6th International Research Conference

Theme: “Leveraging Entrepreneurial Research and Education for Sustainable Development”

Esteemed Collaborators

United Nations Educational, Scientific and Cultural Organization

Kenya National Commission for UNESCO (KNATCOM)

KALRO

Kenya National Research Fund

KIPA

Kenya Education Management Institute

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Inspiring Environmental Conservation for Better Life
Proceedings of the 6th International Research Conference held on the Main Campus from 6th – 8th November, 2019

Theme:

“Leveraging Entrepreneurial Research and Education for Sustainable Development”

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Knowledge is Wealth/Akili ni Mali (Sapientia divitia est)

CHUKA UNIVERSITY FUNDAMENTAL STATEMENTS

**Motto:** Knowledge is Wealth/Akili ni Mali (Sapientia divitia est)

**Slogan:** Inspiring Environmental Sustainability for Better Life

**Philosophy:** Quality education, training, research, extension, environmental sustainability, and entrepreneurship lead to social cohesion, human integrity, and economic development

**Vision:** A Premier University for the provision of quality education, training and research for sustainable national and global development

**Mission:** To provide access, generate, preserve and share knowledge for quality, effective and ethical leadership in higher education, training, research and outreach through nurturing an intellectual culture that integrates theory with practice, innovation and entrepreneurship.

**CORE VALUES**

(1) Customer Value and Focus
(2) Diversity and Social Fairness
(3) Environmental Consciousness
(4) Fidelity to the Law
(5) Innovation
(6) Integrity
(7) Passion for Excellence
(8) Peaceful Co-Existence
(9) Professionalism and Confidentiality
(10) Prudent Utilisation of Resources
(11) Teamwork
(12) Timeliness and Devotion to Duty
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PREFACE

Chuka University is the 9th Chartered Public University in Kenya. It organised the 6th Cycle of these Annual International Research Conferences, whose theme was: “Leveraging Entrepreneurial Research and Education for Sustainable Development”. The Conference theme was in line with contemporary times that require turning research and education milestones into enterprises for solving recalcitrant societal problems for healthy, secure and wealthy livelihoods. It contributed to the realization of the Kenya Vision 2030, UN Sustainable Development Goals and Global Economic Agenda blueprints such as Education for Sustainable Development, and Global Citizen Education. Together with the subthemes, it aspired to link scholars, researchers, industrialists and policy-makers to establish firm partnerships for exponential development.

The Organizers set six subthemes for the Conference. These were: Enterprising Agriculture and Environmental Management; Enterprising Hospitality and Business Management; Enterprising Education and Training Competencies; Enterprising Arts, Humanities and Social Sciences; Enterprising Natural Sciences, Engineering and Technology; and Enterprising Health Sciences and Affirmative Actions.

The objectives included: Dissemination and sharing of current knowledge, innovations and technologies for social upgrading; Bring academia and industry players together to uptake contemporary knowledge for policy setting; Facilitation of industrialists and academia to identify and showcase research milestones for economic transformation; Provision of a forum for stakeholders to interrogate entrepreneurship potential of generated research milestones.

We subsequently received abstracts from over 250 delegates from Kenya and beyond, comprising academicians, policy makers, researchers, industry players, NGOs, CBOs, among others, from both public and private sectors. Almost all Universities in Kenya were represented in this Conference either through direct entry or collaboration. Similarly, many allied institutions were represented. We had a host of exhibitors participating through showcasing of their products, or presenting posters of their latest discoveries and works. For the first time, a huge number of administrative and technical staff members have entered abstracts. It seems the saying that “publish or perish” has finally caught up with them. We therefore urge them to keep it up.

We were truly grateful to all delegates who responded positively and immensely to our invitation. They listened in plenary sessions of their choice. Networking and exhibition sessions proceeded continuously during health breaks. The organizers invited several key lead speakers from pertinent industry sectors to curtain-raise the various breaker sections. The Conference ended with an excursion to a model incubation research centre and national heritage keeper of Kenya.

We packaged full manuscripts submitted into these proceedings and shall upgrade selected highest quality ones for review and publication in the Chuka University Journal for Environmental Sustainability Enhancement Research (JESAR).

We hope you shall find these proceedings informative and that you shall enjoy perusing them. Kindly leave us feedback that can help us improve on future proceedings.

Professor Dorcas K. Isutsa, Ph.D.
Deputy Vice-Chancellor (Academic, Research & Student Affairs)
KEY NOTE ADDRESS BY THE SECRETARY GENERAL/CEO FOR KENYA NATIONAL COMMISSION FOR UNESCO (KNATCOM), DR. EVANGELINE NJOKA, MBS, DURING THE 6TH INTERNATIONAL CONFERENCE OF CHUKA UNIVERSITY, 6TH NOVEMBER 2019

ROLES OF UNIVERSITIES IN IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS

The Vice-Chancellor of Chuka University Prof. Erastus Njoka, Deputy Vice Chancellors, Chuka University, University Staff, Conference participants, Students, Ladies and Gentlemen, Good morning.

I am delighted to join you today during the opening of the 6th International Conference whose theme is “Leveraging Entrepreneurial Research and Education for Sustainable Development”. Allow me to take this earliest opportunity to wish you a very fruitful conference with concrete deliverables towards promoting quality education in Kenya.

Ladies and Gentlemen,

As you are aware, UNESCO was established in 1945 after the Second World War with the aim of contributing to peace and security in the world, based on the premise that “since wars begin in the minds of men and women, it is in the minds of men and women that the defenses of peace must be constructed”. These words no doubt, make it clear that, following the war, mankind was forced to reflect on the nature of war and peace. UNESCO is the only UN body with a mandate of Education from ECDE through Universities. Kenya became a member of UNESCO in 1964 and KNATCOM was established in the same year and was placed under the Ministry of Education. In January, 2013 KNATCOM became a State Corporation through the enactment of the Kenya National Commission for UNESCO Act 2013.

The Commission derives its mandate from the UNESCO Constitution, Charter of the National Commissions for UNESCO and the Kenya National Commission for UNESCO Act 2013. As a State Corporation with international visibility, KNATCOM is the principal link between the national priorities of Kenya and the multilateral agenda of UNESCO. KNATCOM has five main programmes, in line with UNESCO’s areas of competence, these are; Education, Natural Science, Social and Human Science, Culture and Communication & Information. These programmes are supported by specific programme and expert committees drawn from relevant ministries, government agencies, academia and private sector.

Ladies and Gentlemen,

In 2015, the United Nations adopted the Global 2030 Sustainable Development Agenda and proposed 17 Goals with 169 targets covering a broad range of sustainable development issues. These included ending poverty and hunger, improving health and education, making cities more sustainable, combating climate change, and protecting oceans and forests. Education is emphasized not only in goal 4 but also as one of the key factors for the achievement of all the other SDGs. Later in the same year, UNESCO issued the Education 2030 Framework for Action, which is a roadmap for the implementation of SDG4 – Education 2030. Institutions, should and will make a major contribution to the effective implementation of the Sustainable Development Agenda.

Ladies and Gentlemen,

Development is the process of gradually becoming bigger, better, stronger, or more advanced and is very critical to the growth of any individual, society or nation. It is however, important for any individual, community, society or nation to be able to sustain its level of development. Sustenance, is regarded as the ability to make a thing continue to happen for a long time.

Universities play the leading role in the development sector all over the world. Within the last 80 years the world’s population has increased threefold and will grow by approximately 3.7 billion people in the next 30 years with an estimate that ninety percent of the additional people will live in poor countries. There are risks of reversal of the gains made in the area of development over the last decade or so. As a matter of fact some of the countries are already falling behind target dates for meeting the MDGs. The United Nations and several international agencies and non-governmental organization (NGOs) have raised alarms and issued warnings over the state and conditions of the globe today. However, the fundamental and overriding success factor in the implementation of sustainability development is requisite human capital. According to Al-Roubaie (2013), “the concept of sustainable development is concerned with the management of national resources, including indigenous knowledge systems to balance present and future consumption. For example, non-renewable resources are finite and require adequate management
systems capable of exploiting them in a productive way to prolong their use beyond the present generation. In other words, sustainable development involves processes that link present generations with the future.

In this regard, sustainable development should become a regular part of the programmes and curricula of our educational system at all levels. Education is an instrument for training human resources to optimize productivity by encouraging technical progress and by promoting cultural conditions conducive to social and economic change.

Ladies and Gentlemen,
While Universities are expected to play very specific roles in promoting sustainable development through their traditional functions of teaching, research and knowledge dissemination, there is a growing consensus that our current paradigms are inadequate for addressing the long term needs of a sustainable future. As such, it is then necessary for Universities to fill the gaps by updating strategies and procedures to accommodate the resilience required to progressively adapt to changing physical, historical and social conditions in order to play an active role in shaping a more sustainable future. They have a responsibility of taking care of the society and getting rid of the all the hurdles in the way of sustainable socioeconomic development. As the only UN agency with a mandate in higher education, UNESCO helps develop evidence-based policies in response to new trends and works to make education more inclusive and innovative.

Ladies and Gentlemen,
Leadership has a critical role to play in sustaining the transition to sustainable development, by directing institutions’ strategic planning, organizing main capital programmes and leading the institutions’ interactions with external stakeholders. Leadership also has a figurative role in manipulating the vision of staff and students about sustainable development. Universities have a great role to play in the realization of Sustainable Development Goals. This role is recognized by many people in the Universities and reflected by several international agreements between institutions to pursue growth related issues. Universities are supposed to support communities on addressing emerging challenges through continuous development based on new knowledge generated. It also helps get the abreast of the universities can institute hands on oriented training and practices which can be utilized for societal transformation.

The third central reason to make Universities a suitable option for taking the leadership in sustainable development is that each University is a combination of a number of different centers and organizations in which any of these centers or organizations can add a significant amount of knowledge and practices to the sectors of the society. One of the major functions of the Universities is taking care of the society and getting rid of the all the hurdles in the way of sustainable socioeconomic development. They are the role models and the public is largely looking forward to these enlightened segments of society to overcome the issues. It is therefore notable that sustainable development has to be an essential component of the policy for the future development of the education sector.

Therefore, Universities are expected to provide leadership, partnership and the much needed networking for the realization of SDGs. The seventeen (17) Sustainable Development Goals (SDGs) were formulated by the United Nations in September, 2015 to ensure sustainable development of the world in social, economic, environmental and political perspectives. The Goals are contained in paragraph 54 of the United Nations Resolution A/RES/70/1 of 25th September, 2015. They include to:

(1) End poverty in all its forms everywhere  
(2) End hunger, achieve food security and adequate nutrition for all, and promote sustainable agriculture  
(3) Attain healthy life for all at all ages  
(4) Provide equitable and inclusive quality education and life-long learning opportunities for all  
(5) Attain gender equality, empower women and girls everywhere  
(6) Secure water and sanitation for all for a sustainable world  
(7) Ensure access to affordable, sustainable, and reliable modern energy services for all  
(8) Promote strong, inclusive and sustainable economic growth and decent work for all  
(9) Promote sustainable industrialization  
(10) Reduce inequality within and among countries  
(11) Build inclusive, safe and sustainable cities and human settlements  
(12) Promote sustainable consumption and production patterns  
(13) Promote actions at all levels to address climate change
(14) Attain conservation and sustainable use of marine resources, oceans and seas
(15) Protect and restore terrestrial ecosystems and halt all biodiversity loss
(16) Achieve peaceful and inclusive societies, rule of law, effective and capable institutions
(17) Strengthen and enhance the means of implementation and global partnership for sustainable development

The Goals are universal in that they embody a shared vision for all nations to progress in a safe, just and sustainable space. The Goals articulate the vision that no country should be left behind and that each country has a responsibility to contribute to the global development agenda.

Ladies and Gentlemen, SDG 4 on Quality Education emphasizes target 4.7 on Education for Sustainable Development as a tool for addressing interlinked objectives such as:

1. **Society**: to increase understanding of social institutions and their role in change and development, to promote social justice, gender equality, human rights, democratic and participatory systems, and health care (including HIV/AIDS).
2. **Environment**: to increase awareness of the resources and fragility of the physical environment, the effects of human activity on the environment, climate change, environmental protection (including water education), and biodiversity.
3. **Economy**: to create sensitivity to the potential and the limits of economic growth, its impact on society and the environment, responsible and sustainable consumption, and rural development.

In addition to reflection in the classroom, schools often conduct community-oriented projects. This does not only serve to improve immediate local needs, but to equip students with the necessary skills to transform oneself and society. ESD is a broad teaching and learning process that encourages an interdisciplinary and holistic approach and promotes critical and creative thinking in the educational process.

**Ladies and Gentlemen, the following are some of the challenges of Sustainable Development in Kenya.**

1. **Societal Challenges**
   - Poor governance, corruption, bigotry towards cultural diversity, ethnic animosity, gender inequality, HIV/AIDS scourge, incidence of malaria, TB & other communicable and non-communicable diseases, Injustice, human rights abuse, all forms of violence and increased insecurity, scolded lifestyles & behaviours, drug and substance abuse, erosion of cultural values & morals etc
2. **Environmental Challenges**
   - Loss of biodiversity and forest cover, poor farming methods, land degradation, climate changes and variability, droughts, acute water shortages, poor waste management systems, pollution, natural disasters etc
3. **Economic Challenges**
   - Unemployment, poverty, corruption, poor living standards, inadequate investment infrastructure, rural /urban migration, corporate irresponsibility, inefficient & wasteful production systems, lack of accountability, unsustainable utilisation of natural resources, poor economic performance, poor policies, poor governments.

**Ladies and Gentlemen, the following are the Values to be promoted for the realisation of SDGs.**

1. **Respect the earth and life in all its diversity**
   - Recognize that all beings are interdependent and every form of life has value regardless of its worth to human beings and affirm faith in the inherent dignity of all human beings and in the intellectual, artistic, ethical, and spiritual potential of humanity.
2. **Care for the community of life with understanding, compassion, and love**
   - Accept that with the right to own, manage, and use natural resources comes the duty to prevent environmental harm and to protect the rights of people and affirm that with increased freedom, knowledge, and power comes increased responsibility to promote the common good.
3. **Build democratic societies that are just, participatory, sustainable, and peaceful**
   - Ensure that communities at all levels guarantee human rights and fundamental freedoms and provide everyone an opportunity to realize his or her full potential and promote social and economic justice, enabling all to achieve a secure and meaningful livelihood that is ecologically responsible.
4. **Secure Earth's bounty and beauty for present and future generations**
   - Recognize that the freedom of action of each generation is qualified by the needs of future generations and transmit to future generations' values, traditions, and institutions that support the long-term flourishing of Earth's human and ecological communities. [www.earthcharter.org](http://www.earthcharter.org)

Ladies and Gentlemen,
To fast-track the realisation of the SDGs UNESCO put in place the Global Action Programme (GAP) which focuses on enhancing Education for Sustainable Development. The main priority areas include: advancing policy, transforming learning and training environments, building capacities of educators and trainers, empowering and mobilizing youth and accelerating sustainable solutions at the local level. In addition the Ministry of Education has developed a Policy on Education for Sustainable Development (ESD) and guidelines for mainstreaming ESD from Basic Education and Universities and a focal point officer.

The State Department of Planning has a whole section dedicated to SDGs implementation by various sectors of the country. Each Sector has a Goal or more to implement. Universities can cut across all the seventeen Goals due to the diversity of Programmes and faculty in them. Every University need to cut out a niche in the implementation of the SDGs. Currently there are coordinated efforts by the department of planning from the Ministry of Education to develop monitoring and evaluation modalities to be able to track the progress of implementation for the SDGs.

It is also imperative to note that the Ministry of Education in collaboration with KNATCOM developed the Guidelines for mainstreaming Education for Sustainable Development (ESD) and Global Citizenships Education.

Ladies and Gentlemen, in this regard, I urge Universities to take the lead in implementing SDGs. This can be done through integration into the academic and non-academic programmes including Research. I wish you the very best as you continue undertaking this noble assignment of implementing SDGs.

Thank you very much and God bless you.

Dr. Evangeline Njoka, Secretary General/CEO,
Kenya National Commission for UNESCO (KNATCOM)
### CONTENTS

**TITLE PAGE** ...............................................................................................................................i
**CHUKA UNIVERSITY FUNDAMENTAL STATEMENTS** .................................................................ii
**DISCLAIMER, ORGANISERS AND CITATION** ...........................................................................iii
**PREFACE** ...................................................................................................................................iv
**KEYNOTE ADDRESS BY THE CHIEF GUEST** ..............................................................................V

**CONTENTS**...................................................................................................................................ix

**ENTERPRISING AGRICULTURE AND ENVIRONMENTAL MANAGEMENT** ....................................1

| Use of botanicals for ripening and post-harvest shelf life enhancement in banana (*Musa acuminate Var. Dwarf Cavendish*) | 1 |

Effectiveness of meru conservation area management plan in addressing wildlife ecosystems management and human socio-economic needs .................................................................9
Kiria, E., Magana, A., Njue, C.

A review on application of blockchain technology to transform agricultural productivity .................................................................14
Gathungu, G. K., Olooo-Abucheli, G.O.

Financial factors affecting adoption of vermiculture technology in production of indigenous vegetables in Maragwa Sub-County, Kenya .................................................................18
Wairimu, V.N., Gitue, E. W. and Kihoro, D. M.

Integrated effect of rhizobium inoculation and phosphorous application on tissue content, symbiotic and phosphorous use efficiency in soybean production..................................................26
Mulumbula, S., Gathungu, G.K., Ndakhu, H. O., Ogolla, F. O.

Growth performance of meat goat breeds under different plane of nutrition ..................................................35
Maragara, E.N., Musalia, L.M., Njoka, E.N.

Incidence and severity of turicicum leaf blight caused by *Exserohilum turicicum* (Pass.) Leonard and Suggs) on sorghum populations in different regions of Tharaka Nithi County, Kenya ........................................40
Ogolla, F.O., Muraya, M.M., Onyango, B.O.

On-farm evaluation of new green gram varieties for adaptation and adoption in the arid and semi-arid of eastern Kenya for improved food security ..................................................47
Muriithi, C., Nyokabi, M., Karimi, R., Kanga, L.

Indigenous knowledge on pumpkin production in Chuka Igambangombe Subcounty, Tharaka-Nithi County, Kenya 53
Mwaura, M.M., Isutsa, D.K., Munyiri, S.W.

Effect of rate and time of P application, and plant density on growth and development of groundnuts ..........................58
Ngari, A.W., Muraya, M.M., Gathungu, G.K.

Interactive effects of nitrogen rate, mulch and gibberellic acid on physiology of multipurpose pumpkin (*Cucurbita moschata* Duchesne) .................................................................69
Mwaura, M.M., Isutsa, D.K., and Munyiri, S.W.

Effects of agricultural land use practices on soil organic carbon stocks, total nitrogen and available phosphorous in smallholder farms in Embu County, Kenya ........................................75
Nyangundi, N., Gathungu, G., Muraya, M.M.

Influenced of the section of sweet potato vine on yield and yield components in Coastal Kenya ..................................84
Muli, M.B., Chiro, C.T.

Effect of farm inputs on irish potato (*Solanum tuberosum* L.) production in Molo SubCounty, Nakuru, Kenya ......88
Kamau, P. K., Gathungu, G.K., Mwirigi, R.N.

Socio-cultural factors influencing gender disparities in wildlife management and conservation in Maasai Mara Ecosystem, Narok County, Kenya ............................................................95
Mugambi, M.K., Kirui, B.K.

Gender differentials in wildlife management and conservation: a case of selected conservancies in Maasai Mara Ecosystem, Narok County, Kenya ............................................................103
Mugambi, M.K., Kirui, B.K.

Adoption of new grain storage technologies in Embu County, Kenya ............................................................111
Njagi, N.N., Sande, A., Wambugu, S.K.

Review on impact of agricultural cooperatives societies on small-scale potato farmers income ..................................118
Kimondo, N.N.
ENTERPRISING HOSPITALITY AND BUSINESS MANAGEMENT ........................................... 12222
Psychological contract and job stability: the place of welfare initiatives on job embeddedness of university catering employees in Nairobi City, Kenya.............................................................. 12222
Kamau, W.B., Marangu, V., and Mugambi, R.
Sustainable procurement and operational performance in dairy firms in Kenya: Case of new KCC Kiganjo, Nyeri 138
Njeri, N.R., and Mudimba, A.
Internal financing and shareholder wealth maximization of firms listed at the Nairobi Securities Exchange........ 144
Akenga, G.M., G.M., Galo, N.M., Mukaria, H.K.
effect of working capital management on financial performance of deposit taking SACCOS in Kenya .......... 153
Sitienei, C.K.
Effect of corporate tax planning on financial performance of firms listed at Nairobi Securities Exchange, Kenya., 164
Thuita, J.M.
Informal financing and the use of formal financial services among small holder farmers in Kenya.................. 175
Wabwire, J.M.
The role of knowledge resources in leveraging competitive advantage for sustainable development............ 182
Sendeyo, J.N., Kaimenyi C.K.
Use of people-technology hybrid for innovation and creativity in Kenyan hotels .................................. 188
Akoko, G., Muriuki, L.M.
Determinants to child sex exploitation by tourists (CSET) in Kenya: A case study of Mombasa North Coast .... 198
Kambaga, D., Mongare, O., Muriuki, L.M., Mwachondo Dzoro, M.M.
Effectiveness of monetary policy intervention on exchange rate volatility in Kenya................................. 209
Ndagara, M.M., Mugendi L.K., Galo, N.M.

ENTERPRISING EDUCATION AND TRAINING COMPETENCIES ................................... 226
Assessment of the human resource capacity building interventions needed to support the big four agenda on food security and nutrition in Kenya................................................................. 226
Maina, R.N., Ogada, E.O.
Digital entrepreneurship and the enterprising culture by Kenyan Universities ......................................... 236
Muthomi J., Alago, D.
Teaching creative thinking skills among students in public secondary schools for sustainable development: The Case of Nyeri County, Kenya................................................................. 241
Githui, P., Njoka, J.
Effect of discovery teaching approach on scientific creativity amongst students of chemistry in public secondary schools in Imenti North Sub-County, Kenya......................................................... 248
Ikiao, E.K.K.
Social factors affecting utilization of guidance and counselling services among students in national schools in Meru and Tharaka-Nithi Counties, Kenya ......................................................... 256
Manyara, R.N.
Need assessment for psychological counselling interventions in secondary schools. case study of marimba girls secondary school in Mombasa County, Kenya......................................................... 262
Thuo, D.N.
The relationship between academic counselling on mathematics anxiety and performance in mathematics among girls in public county secondary schools in Embu East And West, Kenya ........................................... 269
Kinyua, C.N., Jagero, N., Nyaga, V.
The role of fieldwork in geography performance: a case study of education students of the University of Nairobi. 275
Wakajummah, J.
Effectiveness of integrating science process-skills in teaching mathematics on students’ problem-solving abilities and achievement by gender in secondary schools in Tharaka-Nithi County, Kenya......................................................... 280
Kirimi, D.O.
Propensity of teachers to the use of tablet computers for classroom instruction in lower primary public schools in Meru South Sub-County, Kenya................................................................. 289
Ngigi, M.W., Silas, E.N.
Effect of computer assisted teaching strategy on students’ academic achievement in biology in public secondary schools in Baringo County, Kenya ................................................................. 296
Cherutuyot, L. G.
Environmental dynamisms and entrepreneurship education........................................................................... 305
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karanja, T.W.</td>
<td>313</td>
</tr>
<tr>
<td>Home based challenges faced in management of pupils discipline in public primary schools of Imenti South, Meru County, Kenya</td>
<td></td>
</tr>
<tr>
<td>Gikunda, D. K., Muthaa, G. Mwenda, E.</td>
<td>324</td>
</tr>
<tr>
<td>Role of career guidance and counseling on career awareness level of secondary school students in Meru South District-Kenya</td>
<td></td>
</tr>
<tr>
<td>Mugambi, B.N.</td>
<td>329</td>
</tr>
<tr>
<td>Effectiveness of primary preventive counselling in addressing problem behaviours of students in secondary school of Igembe South Sub-County, Meru County, Kenya</td>
<td></td>
</tr>
<tr>
<td>M'Eng'ang'a, H. K., Kamoyo, J.M.</td>
<td>336</td>
</tr>
<tr>
<td>Groupthink and its impact on academic counseling among secondary school students</td>
<td></td>
</tr>
<tr>
<td>Riungu, E.N., Nyaga, V.K.</td>
<td>342</td>
</tr>
<tr>
<td>Tutors' lesson preparation in the implementation of integrated literature at public primary teacher training colleges in Kenya</td>
<td></td>
</tr>
<tr>
<td>Kirima, S.N.</td>
<td>349</td>
</tr>
<tr>
<td>Effects of parental income and support on students’ participation in free day secondary education at public day secondary schools in Imenti North Sub-County, Kenya</td>
<td></td>
</tr>
<tr>
<td>Kirima, S.N.</td>
<td>355</td>
</tr>
<tr>
<td>Home-based factors influencing school completion rate of boys in public day secondary school in Mbeere South Sub-County, Embu County, Kenya</td>
<td></td>
</tr>
<tr>
<td>Ndegwa, D., Murithi, G.G.</td>
<td>362</td>
</tr>
<tr>
<td>Influence of school feeding program on access to education in public day secondary schools in Embu West Sub-County Kenya</td>
<td></td>
</tr>
<tr>
<td>Mwangi, W.J., Jagero, N., Kanga, B.</td>
<td></td>
</tr>
<tr>
<td>ENTERPRISING ARTS, HUMANITIES AND SOCIAL SCIENCES</td>
<td>370</td>
</tr>
<tr>
<td>Transformed masculinity in: Margaret Ogola’s the river and the source and i swear by Apollo</td>
<td></td>
</tr>
<tr>
<td>Teaching english for use and examination in primary schools in Ruaka Town, Kenya</td>
<td></td>
</tr>
<tr>
<td>Oswago, J. A.</td>
<td>380</td>
</tr>
<tr>
<td>Connotative meanings of business names in Chogoria Town</td>
<td></td>
</tr>
<tr>
<td>Kinegen, L.K., Mbaka, N., Atieno, C.</td>
<td>387</td>
</tr>
<tr>
<td>Understanding audience channel loyalty in vernacular television</td>
<td></td>
</tr>
<tr>
<td>Nkanatha, J. K., Kimani, R. N., Waita, Z. N., Mburugu, B. M.</td>
<td>394</td>
</tr>
<tr>
<td>Media participation and cultural norms around Mugambo Jwetu FM</td>
<td></td>
</tr>
<tr>
<td>Kimani, R.</td>
<td>406</td>
</tr>
<tr>
<td>Critical review of knowledge economy and labour productivity: A literature review</td>
<td></td>
</tr>
<tr>
<td>Mwangi, S.I.</td>
<td>415</td>
</tr>
<tr>
<td>Effect of transport infrastructure investment on economic growth in Kenya</td>
<td></td>
</tr>
<tr>
<td>Njiru, E. W.</td>
<td>425</td>
</tr>
<tr>
<td>Career Advancement as a Coping Mechanism of Widowers and Widows in Meru County, Kenya</td>
<td></td>
</tr>
<tr>
<td>Mburugu, B.M., Kamoyo, J.M.</td>
<td>430</td>
</tr>
<tr>
<td>The didactic role of oral literature as a tool of communication during alternative rites of passage ceremonies among the Igembe People of Meru County</td>
<td></td>
</tr>
<tr>
<td>Imirongo, S.N., Muriungi, C., Waita, Z.N.</td>
<td>442</td>
</tr>
<tr>
<td>Mwonoulumwengu Wa Kisiasa Katika Methali Za Wamuthambi</td>
<td></td>
</tr>
<tr>
<td>Miriti, A.K., Kobia, J.M., Matundura, E.B.</td>
<td>452</td>
</tr>
<tr>
<td>Social and economic activities of the people of siakago of mbeere before introduction of khat</td>
<td></td>
</tr>
<tr>
<td>Kithinji, M.A.W., Kithinji, C.M., Nkoge, D.</td>
<td>462</td>
</tr>
<tr>
<td>Efficacy of the PCEA’s peace building strategies in enhancing inter-ethnic harmony in Kenya</td>
<td></td>
</tr>
<tr>
<td>Mwamba, J.G., Kagema, D.N., Kanga, B.M.</td>
<td>473</td>
</tr>
<tr>
<td>Emerging trends and persistence of inter-ethnic conflicts in Kenya</td>
<td></td>
</tr>
<tr>
<td>Mwamba, J.G., Kagema, D.N., Kanga, B.M.</td>
<td>482</td>
</tr>
<tr>
<td>Marginalization as a determinant and security in Mandera Triangle, Kenya</td>
<td></td>
</tr>
<tr>
<td>Tiialal, M.N., Wambui, T., Bururia, D.</td>
<td>491</td>
</tr>
<tr>
<td>Political dilemma in the Kenyan Highlands 1908-1960</td>
<td></td>
</tr>
</tbody>
</table>
Mutwiri, M.
The syntax of anaphors in ki-imenti; a bantu language spoken in Kenya..................................................501
Kanuru, E., Peter Muriungi, P., Kinyua, A.H.
Position of wh-words in Kipsigis wh-questions .........................................................................................508
Chepnetich, A. Gatakaa, H. and Muriungi, P.K.
Types of non-equivalences in the kikamba bible translation .......................................................................521
Mwiyoka, E.N., Ireri, H.K., Mutiga, J.
Information literacy (IL) skills of secondary school students: A literature review..........................................534
Ireri, J.M.
Spatio-temporal integration of periodic markets in Tharaka-Nithi County .......................................................541
Nkoroi, M.C.
Have seasonal climate forecasts satisfied smallholder farmers: A case of Masinga Sub-County in Machakos ......551
Masesi, G.K.
Gender and urban agriculture: A case study of Kakamega Town in Kakamega County, Kenya .................561
Otieno, O.G., Kiboro, C., Sande, A.
Assessment on risk factors that influence gambling among youth in public universities in Kenya ................567
Otieno, M., Sande, A., Kiboro, C.
Levels of marital satisfaction in Meru County, Kenya ..................................................................................573
Maigallo, A.K., Mbargu, B.M., Magana, A.
Linguistic strategies for persuasion in the discourse of Kenyan commercial banks television advertisements......580
Mbui, M.K., Ireri, H.K.
Consumers’ usage of commercial websites advertising in Kenya .................................................................590
Nabea, H.N.
Effect of family transitions on gender roles and family cohesivenessamong chuka community in Meru South District in Tharaka-Nithi County, Kenya .........................................................602
Kaugi, F.G.
A Review of literature on higher education as a tool for innovation .................................................................610
Thiong’o, C.W.
Relevance of immanuel kant’s philosophy of transcendentalism on implementation of curriculum in secondary schools in Meru-South Sub County, Kenya.................................................................................619
Mbaka, J.K., Muthaa, G., Ogola, F.
Impact of target setting on teaching and learning in secondary schools in Maara, Tharaka-Nithi County, Kenya 627
Kanau, L.N.

ENTERPRISING NATURAL SCIENCES, ENGINEERING AND TECHNOLOGY .............................................637
Spectral picture of almost similar operators .....................................................................................................637
Gitonga, E.M., Musundi, S.W., Nzimi, B.M.
Emerging disruptive innovations impelling the energy sector in East Africa ................................................647
Kirera, F.K., Atilla, J.
An e-voting system based on blockchain technology: A case study of Kenyan elections ...............................656
Kimani, J.N., Kahonge, A.M.

ENTERPRISING HEALTH SCIENCES AND AFFIRMATIVE ACTIONS ..................................................664
Foot care practices among type 2 diabetics mellitus patients attending diabetes clinics in Embu County, Kenya ...664
Mbisi, A.M., Gitonga, L.K., Kiruki, S.
Modelling the effects of mindfulness based stress on breast cancer survival rate among women in Meru and Nyeri counties, Kenya, using cox proportional hazard model ........................................................................670
Mwendwa, N.M., Muraya, M.M., Gitonga, L.K.
Female genital mutilation effects on physical health of the girl child among Ameru Community of Kenya........679
Kinyua, S.M.
USE OF BOTANICALS FOR RIPENING AND POST-HARVEST SHELF LIFE ENHANCEMENT IN BANANA (Musa acuminate var. Dwarf Cavendish)

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ABSTRACT

Banana is one of the most important commercial crops in the world. In Kenya most of what is produced is consumed locally. The ripe fruits are delicate and have very short shelf life of approximately 3-4 days which limit their marketability. Ripening is a complex process and is associated with undesirable changes like quality deterioration hence shelf life reduction. Farmers in the endeavour to sustain their livelihood apply various mechanism to induce faster ripening. Some have adopted use of calcium carbide that is carcinogenic and unsafe for human consumption. Rosemary and Aloe vera are among the locally available herbs that have been found to have anti-inflammatory and ethylene emission properties. A laboratory study was designed to test the efficacy of these botanicals on banana ripening and shelf life. The experiment was set up in a complete randomised block design (CRD) and replicated 4 times. Parameters of data collection involved; determination of total soluble solutes, percentage weight loss, sensory taste, skin colour and shelf-life. Data was subjected to analysis of variance (ANOVA) using SAS statistical package. Mean separation was performed using LSD at 95% probability level. 67% of the respondents indicate that fruits treated using rosemary had an excellent taste as opposed to 7% under Aloe vera and 26% for natural ripening. Banana shelf life of 9 and 8 days were recorded under Aloe Vera and Rosemary treatments respectively compared to 5 days under the control. The results of this study indicate that there is potential for use of botanicals in fruit ripening and preservation as well as palatability enhancement.

Keywords: Banana post-harvest, Rosemary, Aloe Vera, Shelf-life, botanicals

INTRODUCTION

Banana fruit is variable in size, color and firmness but is usually elongated and curved, with soft flesh rich in starch covered with a rind which may be green, yellow or brown when ripe. It is produced by several kinds of large herbaceous flowering plants in the genus Musa. Banana is one of the major fruits grown by farmers for subsistence use across the wet tropics and subtropics including America, Africa, South Asia and the pacific. 87% of banana produced worldwide is for local consumption (Christopher et al., 2009). Commercially, banana is harvested at the mature green stage and then ripened before marketing. Once ripe, the banana fruits are very delicate and have a short life of 3-4 days which limit their marketability (Ahmed and Palta, 2015).

Being climacteric in nature, banana produces moderate levels of ethylene that triggers ripening and senescence. Ripening of banana is characterized by rapid softening which influences its shelf life considerably. Fruit ripening is a complex and genetically programmed process that results in marked changes in color, flavor, aroma, texture and nutritional value of fresh banana (Giovannoni, 2004). These changes are results of coordinated activation of multiple genetic and biochemical pathways influenced by internal and external cues regulated by many critical factors (Martel et al., 2011). However, banana continue to be alive even after harvest thus it is subject to continuous changes until it completely deteriorates due to effect of ethylene. A number of changes take place inside the fruit that influences its appearance, flavor, texture and that causes it to age consequently to rot and decay. While some changes are desirable, for example, changes associated with ripening like sweetness, many others bring about quality deterioration and postharvest loss.

Most post-harvest treatment methods and technologies like refrigeration, modified atmosphere packaging (MAP) and treatment with ethylene inhibitors has been developed overtime for lengthening the shelf life and maintaining the post-harvest qualities of fruits (Pandy et al., 2017). But the accessibility and adoption of these technologies is unaffordable in most under developed countries. Botanical extracts can be used as cost effective simple methods to slow down physiological activities to a certain extent. Aloe Vera (Aloe barbadensis Miller) is a perennial plant that belong to the Liliaceae family with turgid green leaves joined at the stem in a rosette pattern. Aloe Vera produces yellow latex (exudates) and clear gel (mucilage) which proceed from the large leaf parenchymatic cells (Ni et al., 2004) and have high antimicrobial properties. The Aloe Vera gel has been proven one of the best edibles and biologically safe preservative coating for different types of food because of its film forming properties, antimicrobial
actions, and biodegradable and biochemical properties. It is composed of polysaccharides and acts as a natural barrier to moisture and oxygen which are the main agents of deterioration in fruits and vegetables (Misir et al., 2017). This natural product is a safe and environmentally friendly alternative to synthetic preservatives such as sulphur dioxide (Serrano et al., 2006).

Rosemary (Rosmarinus officinalis) belongs to the Lamiaceae family. Rosemary has vast medicinal usage including antibacterial (Karamanoli et al., 2000) and antioxidant properties (Ozam, 2003). Commercially, rosemary is added to products such as frozen desserts, candy alcoholic and non-alcoholic beverages, pudding and various other goods. The antibacterial and antioxidant activities of rosemary is used to extend the keeping quality of fats and meat, while an antioxidant prepared from rosemary improved the stability of soy and potato chips. Rosemary extract is increasingly employed not only to provide flavor but also as natural alternative to synthetic antioxidants for the stabilization of oxygen sensitive foods. The antioxidative function is probably caused by several components in the rosemary extract, which belong mainly to the classes of phenolic acid, flavonoid diterpenoids and triterprenes (EFSA, 2008). Principle antioxidative components of the extract are the phenolic diterpen, carnosol and carsonic acid (EFSA, 2008). In addition to the active anti-oxidant principle and the reference volatiles, the Rosemary extract also contain residual organic material such as proteins, lipids, resins and waxes, carbohydrates and inorganic constituents. (FAO, 2016). Further studies have shown that rosemary and its extract pass hepaloprotecive-ability to prevent damage to the liver (Sotelo-Felix et al., 2005), antithrombotic-used therapeutically for prevention or treatment of dangerous blood clots (Yamamoto et al., 2005), diuretic-reduces fluid levels in vessels thus the body is able to evade high blood pressure (Haloid et al., 2000), antiidiuretic-control fluid balance in an animal’s body, (Bakirel et al., 2008), anti-inflammatory-a substance that reduces certain signs of inflammation (Altinier et al., 2007), antioxidant (a substance that inhibits oxidation especially one used to counteract the deterioration of food products) and anticancer effects-used in prevention or treatment of cancer (Yesil-Celiktas et al., 2010).

Banana is an important crop in East and Central Africa. It is a key staple food in some parts of the region and an important source of income (Soko Directory, 2018). The high perishable nature of banana fruits, inadequate storage facilities, and mechanical injuries due to improper handling, packaging, transportation and microbial infection are the major causes of postharvest losses of banana fruits (Devkota et al., 2014; Zenebe et al. 2015). In Kenya, annual post-harvest losses in fresh horticultural crops like banana are estimated at more than 50% by IITA (2010) and at 18-45% by Kitinoja and Cantwell (2010) due to poor storage and handling (Mashau et al., 2012). Aloe Vera is a well-known plant for its medicinal properties. It is a tropical and sub-tropical plant. Recently researchers’ in Spain have developed a gel-based on Aloe Vera that prolongs the conservation of fresh bananas (Tripathi and Dubey, 2004). The gel is tasteless, colorless and odorless. This natural product is safe and environmentally friendly alternative to synthetic preservatives. According to researchers, this gel operates through a combination of mechanics forming a protective layer against the oxygen and air inhibiting the action of micro-organisms on bananas (Serrano et al., 2006). Aloe Vera gel is composed of a wide range of constituents which are mainly responsible for the antimicrobial activities against various micro-organisms. This gel inhibits the growth of both gram positive and negative bacteria (Habeeb et al., 2007). Emodine has been reported to be effective against several gram-positive bacteria (Cock 2008). Anthraquinones presented antimicrobial activity against Staphylococcus aureus strains and against Escherichia coli through inhibition of solute transport in membranes (Lone et al., 2009). There are some reports on the antifungal activities of Aloe Vera gel against several fungi including Colletotrichum spp (Nidiry et al., 2011).

Aloe Vera coating is a successful bio-preservative and is a useful alternative to synthetic preservatives. To effectively extend the shelf life of fruits and vegetables, Aloe Vera gel-based coating is a relatively convenient and safe measure and is more concerned in food industry in relevant years (Sharmin et al., 2015). Coating concentrations, temperature and packaging has an effect on weight loss, fruit gloss, color and pH. The weight loss of coated grapes decreases with increasing concentration of the coating (Jared et al., 2016). Edible coating is traditionally used to improve food appearance and conservation. Firmness is a critical attribute in the consumer acceptability of fresh fruits and vegetables. Fruit softening considerably occur as a result of dehydration of middle lamella cell wall. Ripening of coated fruits is usually delayed by application of Aloe Vera. Apart from the well-known positive effects on human health (Eshun and He, 2004), Aloe products have the potential to be exploited in food formulations due to their antimicrobial and antioxidant properties, however, processing steps necessary to obtain such produces can compromise the natural qualities (Di scala et al., 2003; Maftoonazad and Ramaswamy, 2005) and consequently decrease the effectiveness.

MATERIALS AND METHODS
The experiment was conducted in the research and teaching laboratory at Chuka University. The area experience an average annual temperature of 19.5 °C and average precipitation is 1599 mm. Freshly harvested bananas of approximate uniform size, shape and color of commercial variety *Musa acuminata* var dwarf Cavendish were harvested from the University farm. Individual fingers were separated from bunches and used for the experiment. The banana fingers were cleaned using distilled water and dried using serviettes just before experimental set up.

**Treatment Description**

Fresh, healthy and mature plants of Aloe Vera and Rosemary were collected from the University demonstration farm. The collected plants were washed first with clean tap water and rinsed using distilled water. They were shade dried at room temperature for 2 hours before use. A fleshy Aloe leaf was cut in canoe-shape and the gel was allowed to ooze out. The gel was then scooped using a spoon into a beaker. 350 ml of the gel was topped to 1 litre using distilled water. 350 grams of Rosemary was ground into small particles using a blender. The ground sample was put in muslin bags and immersed in 1000 ml of distilled water for 12 hours to obtain the extract.

The fruits were washed in distilled water and dried with a cheese cloth. The fruits were dipped in the respective botanical extract treatments and the control was left untreated. The treated bananas were left to undergo normal ripening under ambient room conditions. Banana fingers from each treatment were randomly sampled at a 3-day interval to evaluate color change, weight change, pH and total soluble solids. The initial color of the treated banana was obtained by comparing to the banana color chart (Von Loesecke, 1949) where: 1- green; 2- green with yellow tracks; 3- more green than yellow; 4- more yellow than green; 5- yellow with green tips; 6- all yellow and 7- yellow flecked with black spots. The initial weight was determined using an electronic digital balance from a randomly selected banana and the readings were recorded.

**Experimental model and layout design**

The experiment was laid down in a complete randomized design (CRD) with 3 treatments and 4 replications.

**Experimental model:**  
\[ Y_{ij} = \mu + \alpha_i + \varepsilon_{ij} \]  
where:  
\( Y_{ij} \) = measurement of the experimental unit,  
\( \mu \) = overall mean effect,  
\( \alpha_i \) = true effect of the botanical treatment,  
\( \varepsilon_{ij} \) = error term of the jth unit receiving botanical treatment.

**Parameters of data collection**

**Determination of TSS:** TSS was determined from finely crashed fresh (5 g) sample, homogenized with 5 mL distilled water. The pooled fraction was blended for 3 min and TSS was measured using a calibrated hand-held digital refractometer (model mrc ref-85 refractometer). Three values were taken and averaged.

**Palatability:** Evaluation was done by a panel of 30 people based on the taste of the ripe fruit. Values of taste were given in the scale of 1-5 (5= excellent, 4= very good, 3= good 2= fair and 1= poor), at the end of the experiment.

**Shelf life (days):** Shelf life of banana fruit as influenced by different post-harvest treatments was calculated by counting the days between fruit ripening and decay.

**Skin color change:** Colour change was scored using a standard banana-ripening chart with colour plates ranging from 1-7 as described by Von Loesecke (1949), where: 1-green; 2- green with yellow tracks; 3- more green than yellow; 4- more yellow than green; 5-yellow with green tips; 6-all yellow and 7-yellow flecked with black spots.

![Figure 1: Von Loesecke (1949) banana colour chart](image_url)
The collected data on various parameters was statistically analysed using SAS statistical package. The data was subjected to analysis of variance (ANOVA) and Mean separation performed using LSD at 95% probability level.

RESULTS AND DISCUSSION

Fruit total soluble solids (TSS) measures the amount of carbohydrates, organic acids, proteins, fats and mineral salts. TSS refer to the measure of the brix value which is a cheaper and faster subjective indicator of the fruit quality. Banana TSS ranges between 15-25% depending on variety and growth conditions. The total TSS was significantly affected by the botanical treatments. Sugar formation increase as a result of starch hydrolysis. In this study the increase in TSS was 4 to 18.5 during twenty-seven days of ripening (Figure 2). The magnitude of increase of total soluble solids in banana was dependent on treatments. Ripening is accompanied by occurrence of several biochemical processes that trigger break down of starch into simply sugars leading to increase in TSS (Afshar et al.,2010). The control experiment had the highest TSS compared to Rosemary and Aloe. Rosemary and Aloe have been described to have anti oxidative properties therefore reduces oxidation process that could have led to increase in TSS. Oxidation as a process is key in initiating processes that take place in the ripening banana tissues hence any physiological or biochemical process that interfere with oxidation will result to less TSS (Elitzur et al., 2016). The activities of the botanical extracts might have caused reactions that interfered with increase in TSS.

![Interaction Plot for TSS](image)

**Figure 2: Effect of the treatments on brix percentage**

Palatability

The best taste score 5 excellent and score 4 very good were recorded from bananas treated with Rosemary (Figure 3). After tasting the bananas exposed to Rosemary treatment 20 people acknowledged that the banana taste was very good, 5 people scored good, 2 people said it was excellent and 3 people scored fair taste. 16 people stated that bananas treated with Aloe Vera were good, 9 people stated fair taste, 2 people said the taste was very good while the remaining 3 people concluded that the taste was poor. For the control experiment, 3 people scored good, 13 people said the taste was fair and the rest 14 people gave a score of poor. Pooled data indicated that bananas treated with Rosemary had the best taste as scored by 56.25% of the respondents, followed by Aloe at 37.5% and 6.25% for the bananas that were not exposed to any treatment.

Bananas treated with Aloe vera though not very good the taste was better than the control experiment. The taste of ripening banana is influenced by tannins that are found in the peel. Ripening process was gradual for bananas treated with Rosemary which contributed to best flavour and taste. It took 17 days as opposed to 13 days under the control experiment which led to development of better taste. Rosemary has been reported to produce some ethylene in addition to other antibacterial and anti-oxidative compounds (Karamanoli et al., 2000). Ethylene causes the fruits to become soft, sweet and develop better texture as they ripen.
Figure 3: Pie charts representing the palatability scores for banana treated with Rosemary and Aloe from different respondents

Banana Shelf Life
Fruit ripening took longer time under the Rosemary and Aloe treatments compared to the control (Figure 4). However, banana shelf life was longer under Rosemary and Aloe treated bananas by 8 and 9 days respectively. The least shelf life period was recorded under the control experiment. Aloe vera forms gel like substance when the banana fruits are dipped in the gel the form a coating around the fruit. This causes rise in the concentration of carbon dioxide around the fruits causing it to develop bad flavor, slow ripening or total failure to ripen. This property of Aloe justifies the observation made in this study i.e. the ripening process took longer days compared to the control experiment. Rosemary and Aloe treated bananas had enhanced shelf life compared to the control experiment. The Polysaccharides contained in Aloe Vera acts as a natural barrier to moisture and oxygen which are the main agents of deterioration and antioxidant (Misir et al., 2017) in Rosemary inhibits oxidation which counteract the deterioration of banana fruit (Yesil-Celiktas et al., 2010). This increased the shelf life of banana. The two botanical extracts have antimicrobial activities that caused inhibition to the action of micro-organisms leading to longer shelf life (Serrano et al., 2006; Habeeb et al., 2007).

Figure 4: Ripening days and Shelf Life of bananas treated with Rosemary and Aloe
**Colour change analysis**

Progressive changes were observed in the colour change of the banana fruits from the different treatments.

<table>
<thead>
<tr>
<th>Treatment Days</th>
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<th>T2</th>
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<td>1</td>
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<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
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<tr>
<td>2</td>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
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<tr>
<td>3</td>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
<td><img src="image9.png" alt="Image" /></td>
</tr>
<tr>
<td>4</td>
<td><img src="image10.png" alt="Image" /></td>
<td><img src="image11.png" alt="Image" /></td>
<td><img src="image12.png" alt="Image" /></td>
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<tr>
<td>5</td>
<td><img src="image13.png" alt="Image" /></td>
<td><img src="image14.png" alt="Image" /></td>
<td><img src="image15.png" alt="Image" /></td>
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<tr>
<td>6</td>
<td><img src="image16.png" alt="Image" /></td>
<td><img src="image17.png" alt="Image" /></td>
<td><img src="image18.png" alt="Image" /></td>
</tr>
<tr>
<td>7</td>
<td><img src="image19.png" alt="Image" /></td>
<td><img src="image20.png" alt="Image" /></td>
<td><img src="image21.png" alt="Image" /></td>
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</table>

According to the observation above,
At the beginning of the experiment, all the bananas were totally green, after 9 days the colour development under the control experiment was more green than yellow while banana treated with rosemary and aloe Vera were still green. The change was gradual in all the treatments until all the bananas turned yellow, but as shown above colour change in the control treatment was fast followed by rosemary and lastly aloe Vera. It was therefore, apparent that as much as the plant extracts enhanced shelf life they had low potential in fastening ripening and colour change. Full colour development took 15 days under the control experiment while for the fruits treated with Aloe and Rosemary it took 21 days. It was therefore concluded that the application of the treatments was effective to the experiment because banana that were not exposed to any treatment shown a black color meaning that they underwent rotting as compared to the others.

CONCLUSIONS
It was observed that TSS of pulp increased gradually during ripening across all treatments. Colour development was faster under the control experiment compared to the bananas treated with the plant extract. The extracts of Rosemary and Aloe enhanced banana shelf life for 4 and 5 days respectively above the control treatment. The palatability characteristics evaluated in this study can be important postharvest quality criteria for the consumption of banana.

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EFFECTIVENESS OF MERU CONSERVATION AREA MANAGEMENT PLAN IN ADDRESSING WILDLIFE ECOSYSTEMS MANAGEMENT AND HUMAN SOCIO-ECONOMIC NEEDS

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ABSTRACT
The existence of a functional management plan in any protected area is an indicator of good governance in a park or reserve where the management engages all stakeholders including the local communities not only to conserve wildlife but more so improve the socioeconomic well being of the communities. However, this poses a challenge because many of the protected areas in Kenya operate without consideration of their management plans or they are inexistence all together. A study conducted at Meru Conservation Area to evaluate effectiveness of protected areas using feedback from the local communities, other stakeholders, guided observations and documented literature to explore whether protected areas have positive effects which define their establishment and existence. The main indicators that were tested in this study as outlined in the MCA management plan were; involvement of the community in park planning and management, access to socioeconomic benefits by the community, as well as the rate of human wildlife conflicts. However, the findings revealed that the current management plans prepared based on the Protected Areas Planning Framework (PAPF) lacked effectiveness since it failed to address issues such as human wildlife conflicts, encroachment and socio-economic gains of the communities.

Keywords: Effectiveness, Protected areas, Management, Planning, Communities

INTRODUCTION
Reconciling biodiversity conservation goals with social and economic issues is a strategy for conservation success in this millenium. Protected areas are important conservation responses that help to halt the loss of biodiversity (The Heinz Center, 2007) Their conservation success is often predicted on the local support which is influenced by perceptions of the inputs that are experienced by the local communities as well as opinions of management and governance (Nathan & Philip, 2014). The protected areas worldwide cover more than 12.7% of the terrestrial surface of the earth (IUCN, 1994). Therefore, there is a high expectation for these areas to deliver on many different objectives ranging from biodiversity, climate change mitigation, local livelihood as well as cultural and aesthetic values (Lopoukhine et al, 2012). It is within each of these values that relevant success of a protected area can be evaluated based on quality and performance. Further, these roles are supported by the definite and mandate of protected areas(PAs) as defined by IUCN (1994) that their effectiveness is realized when all stakeholders including the local communities forms part of the management team and are able to realize the benefits of conservation. However, it is worthwhile to note that many PAs have followed the conventional and exclusionary approach of 1872 Yellowstone model (Pretty and smith, 2004; Adrade and Rhodes, 2012). And as a result, many PAs have failed to integrate other important factors such as social, cultural and political issues in biodiversity conservation, an approach that has triggered adverse social impacts on local communities, disrupting their traditional ways of living and control of natural resources (Dudley et al 2003; Daniels et al 2012, Jenifer, 2014). This has in return continued to undermine wildlife protection policies through conflicts between the protected area authorities and the communities (Okello and Wishtemi, 2006; Ogada, 2011; FAO, 2015). Some communities still withhold their association from the PAs due to the initial approach by the management to deny them access to natural resources that supported their livelihood as well as little consultations and inadequate compensation during acquisition of these lands sets aside as PAs (Jim and xn 2002; Antony, 2007). In other studies, (Macsia 2003; Pretty et al. 2004, Gelich et al. 2005, Kiria et al. 2014) alludes that local communities are more likely to comply and commit themselves to long term conservation strategies when their knowledge and opinions are incorporated in the PA decision making process. For example, elsewhere, a study conducted by Lare (2001) revealed that in Bwindi impenetrable forest Uganda, several anonymous fires were set up after the national park was established burning up 5% of the forest. Further, Watts and Falsen (2009) observed that in Tsitsikamma national park, South Africa, local communities practiced illegal activities as a form of retaliation to command–and-control conservation policies.

In Kenya, like any other parts of the world, most of the protected areas were established with the main aim being protection of the wildlife. Much attention was invested towards managing the wildlife and their habitats with minimal inclusion of the local community opinions and needs in the park management plans. The outcome of this approach has been endless human wildlife conflicts, encroachment into the protected areas by the communities,
resentments and mistrust between the local communities and the wildlife managers. With failure of the previous models such as Yellowstone (Machlis and Tichnell, 1985, Runte, 1997, Stevens, 1997,) and People-Park (Stevens, 1997, Oates, 1999; Schwartzman et al, 2000) in integrating communities in PAs planning and management, Protected Areas Planning Framework (PAPF) was introduced by Kenya wildlife service (KWS) in 2007 to link wildlife ecosystems needs and those of the local communities. Following this model, KWS initiated the development of various management plans to replace the existing ones. Tsavo Conservation Area and Meru Conservation Area were among the first to adopt this new framework (KWS 2007).

The study therefore, sought to establish the effectiveness of the existing management plans in Meru Conservation Area (MCA) in promoting wildlife conservation as well as addressing the needs of the local communities. This is amidst the competing demand of other alternative land uses such as agriculture, livestock grazing, and settlement. The PAPF model was meant to enhance efficiency of planning initiatives and the understanding of buy-in of both wildlife managers, local communities and stakeholders. The MCA management plan was intended to provide a practical tool to support and guide the coordinated and integrated management of the four constituent PAs (Meru National Park, Kora National Park, Bisanandi National Reserve, Mwingi National Reserve) as a single ecological and administrative unit (KWS 2007).

METHODOLOGY
The study Area
The study was conducted at Meru Conservation Areas in Meru National Park and Mwingi National Reserve and the adjacent land. The study was conducted inform of a descriptive survey where the study area was purposively divided into four clusters based on the community land use patterns. Simple random sampling was applied to select the respondents from each cluster. A total of 120 local community members and an addition of 10 key informant formed the respondents. The approach was about evaluating effectiveness of protected areas using feedback from the local communities, other stakeholders, guided observations and documented literature to explore whether protected areas have positive effects which define their establishment and existence. The main indicators that were tested in this study as outlined in the MCA management plan were; involvement of the community in park planning and management, access to socio-economic benefits by the community, as well as the rate of human wildlife conflicts.

RESULTS
Human-wildlife Conflicts
The study found out that the communities living around the PAs frequently experience cases of HWC. Of these, 95.8% confirmed that there are wild animals which are found outside the PA boundaries of the most commonly motioned being baboons, elephants, buffaloes.
Table 3: showing common forms of conflicts in the study area

<table>
<thead>
<tr>
<th>Conflict type</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop destruction</td>
<td>84</td>
<td>70.0</td>
</tr>
<tr>
<td>Human death and injuries</td>
<td>4</td>
<td>3.3</td>
</tr>
<tr>
<td>Loss of livestock</td>
<td>27</td>
<td>22.5</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>4.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>120</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

According to the study findings, increase in HWC was attributed to poor management by KWS (69.2%), increased human population around the PAs (17.5%), sub-division of land (10.8%) and dislike of people for wildlife.

Table 6: causes for increased human wildlife conflicts

<table>
<thead>
<tr>
<th>Cause</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor management by KWS</td>
<td>83</td>
<td>69.2</td>
</tr>
<tr>
<td>Increased human population</td>
<td>21</td>
<td>17.5</td>
</tr>
<tr>
<td>Sub-division of land</td>
<td>13</td>
<td>10.8</td>
</tr>
<tr>
<td>People don’t like wildlife</td>
<td>3</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>120</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Involvement of the community in park planning and management

The responses in this section were acquired using a scoring method where a likert scale was used to weigh the attitude of the respondents on a 5-point scale. The key areas that were subjected into test included; awareness of the local community of an existing management plan and their involvement in planning process, occurrence of conflicts and the realization of benefits. The responses were ranked from number 1-5, Where 1 represented, strongly disagree, 2- Disagree, 3- Neutral/No opinion, 4- Agree and 5- Strongly agree. The conclusion was based on the scores for each of the responses.

Table 7: Ranking of protected area effectiveness by respondents attitudes

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Uncertain</th>
<th>Agree</th>
<th>Strongly agree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local community participate in management and planning process</td>
<td>31</td>
<td>70</td>
<td>11</td>
<td>6</td>
<td>2</td>
<td>120</td>
</tr>
<tr>
<td>Cases of human-wildlife have reduced</td>
<td>28.5%</td>
<td>58.5%</td>
<td>9.2%</td>
<td>5.0%</td>
<td>1.7%</td>
<td>100%</td>
</tr>
<tr>
<td>MCA plan has addressed social-economic values</td>
<td>49.2%</td>
<td>42.5%</td>
<td>2.5%</td>
<td>5.8%</td>
<td>0%</td>
<td>120</td>
</tr>
<tr>
<td>MCA plan has addressed cultural values</td>
<td>59</td>
<td>51</td>
<td>3</td>
<td>7</td>
<td>0</td>
<td>120</td>
</tr>
<tr>
<td>Cases of human-wildlife have reduced</td>
<td>15.8%</td>
<td>45.0%</td>
<td>7.5%</td>
<td>25.2%</td>
<td>2.5%</td>
<td>100%</td>
</tr>
<tr>
<td>MCA plan has addressed cultural values</td>
<td>76</td>
<td>24</td>
<td>6</td>
<td>11</td>
<td>3</td>
<td>120</td>
</tr>
<tr>
<td>MCA plan has addressed cultural values</td>
<td>63.3%</td>
<td>20.0%</td>
<td>5.0%</td>
<td>9.2%</td>
<td>2.5%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The local communities disagreed that they were aware of the plan, while only 6.7% reported that they were not aware of an existing management plan for the conservation area. They were not involved during the preparation of the management plan which should have been a participatory process for them to contribute their ideas and make them co-managers of the resources. Further, in addition to involvement in management plan preparation, majority of the respondents (61.7%) disagreed with the fact that they were actively involved in day to day decision making in the protected area.

DISCUSSION

Protected Areas are effective management tools that have a broad array of positive and negative socio-economic, cultural, ecological and political impacts on local communities. Their design and day to day management should be in such that they are able to meet these expectations. Further, PAs protects habitats, ecosystems structure, functioning and integrity and species diversity, richness, size and diversity.

It is expected that PAs should not only protect biodiversity but more so to be centers for alternative livelihood, social, cultural and educational benefits (Hockings et al, 2006). However, the picture painted on the ground is that...
they have revealed to be centers of conflicts due to poor dispute resolution mechanism by the PA management, poor community and stakeholder participation, and limited access to resources and benefit sharing.

The study findings explain the probable reason as to why there exist situations of low or no support by local communities in conservation programs. This is because they continuously experience the cost of conservation through property destruction by animals, low access to resources that can build their livelihood and fears of harassment and arrest. It is therefore noted that poverty prevails in these areas since the communities are not engaging in viable land use investments that tolerate the impacts of wildlife.

The study reveals that effectiveness still lacks in MNP and MNR despite the use of the PAPF model (KWS, 2007) to prepare the MCA management plan since many PAs still follow the same exclusionary top-down approach of management. From the study findings, there is dissatisfaction by the communities who feels they were not consulted in plan preparation as well as its implementation on day to day basis. The KWS has also failed to consider their social, economic and cultural needs as shown by persistence poverty amongst the communities which was revealed by the poor housing and living conditions observed during the field study. The PAPF model developed by KWS provides the framework under which the current MCA management plan operates. As the study reveals, the plan was predestined to enhance effectiveness in PA management through reduced HWC, improved biodiversity conservation, increased tourism activity to boost local economy and increased wildlife security. However, the study findings reveals that the expectations of the management plan have not been realized since human-wildlife conflicts still exists, communities are still encroaching into the park and also practicing land use activities that affect wildlife ecosystems through pollution and reduced river flows downstream.

**CONCLUSION**

Study findings established some gaps in the management plan used in MCA especially in addressing wildlife ecosystems as well meeting the socio-economic needs of the local communities living around the protected area and who shoulder the burden of conservation. Effectiveness of the management plans should be examined through protecting the rights of communities and their access to resources on which they depend. Therefore, to ensure that the management plans produced are both realistic and appropriate, and to build wider acceptance of these communities and other stakeholders, their preparation should incorporate a high level of participation in prioritization for resource allocation, planning and management.

**Conflict of Interest**

The author hereby declares there is no conflict of interest in regard to publication of this research

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A REVIEW ON APPLICATION OF BLOCKCHAIN TECHNOLOGY TO TRANSFORM AGRICULTURAL PRODUCTIVITY

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ABSTRACT
Agriculture Sector contributes 6.4 percent of total world's economic production with a total production valued at $5,084,800 million. There is need for new knowledge and technologies that improve the efficiency of food production to ensure food security for the increasing population to enable attainment of Sustainable Development Goals (SDGs) and the Big Four Agenda. When food products leave the farm for the market, they become a part of the supply chain which involves many intermediaries. Currently, due to food safety issues consumers would like to know where the food has been produced before utilization. Blockchain agriculture makes the process of growing and supplying food simpler by providing all involved parties with a single source of truth. During crop and food production, with the help of smart farming important information like the temperature of the soil, water level, fertilizer details and more that enhances the quality of the farming process as well as produced crops can be collected and sent it to the blockchain. Monitoring and predicting weather conditions throughout the year can be crucial for better crop survival. Using blockchain, farmers can trace weather conditions quickly request and receive insurance claim through smart contracts. Further, with blockchain, the agricultural finance process becomes more transparent and fair, yet enables shared control accessibility. Blockchain technology has ability to improve automation, digitization, and food tracking, there’s no doubt that the technology is a must for modern agriculture. A blockchain based agriculture solution holds a lot of promise for the agribusiness industry with its ability to bring transparency in the system. It can provide a single, unalterable source of truth about the condition of a farm, inventory, and contracts and therefore reduce inefficiencies while saving time and energy in agriculture value chain.

Keywords: Technologies, Smart farming, Blockchain, Tracking, Efficiencies, Agribusiness

INTRODUCTION
Blockchain is an online system that allows record-keeping of transactions in real time. In this system when stakeholders complete a transaction, the time, date, nature and cost of the exchange is recorded and the information is then permanently and indelibly recorded, and can be made accessible to every other stakeholder in the system. Blockchain is therefore a documentation system that records the transaction at each point in the supply chain to ensure both confidentiality and traceability for each trading partner involved. Blockchain is emerging as a new tool for both agricultural producers, supply chain managers, food suppliers, and retailers may use to coordinate supply networks, facilitate financing, and provide customers with product information (Ehmke and Ehmke, 2019). This technology increases informational transparency and accuracy which builds trust between parties, reduces costs and boosts efficiency. This technology therefore can be used in modernizing agricultural commerce.

The agricultural sector’s supply chain is complex as especially export products change hands multiple times before reaching their final destination. It has been difficult for farmers to know where, for what price and how much of their products are ultimately sold in export markets. This lack of information leaves farmers vulnerable, and at the mercy of traders who can dictate community prices and quantities to be absorbed in a specific market. Blockchain technology can help rectify this imbalance by recording transactions in real time and providing up-to-date supply and demand information to farmers who participate in such a system. Having access to such information could allow farmers to properly set their own prices and optimize the quantities of products they put out on the market. Moreover, by keeping an ongoing record of participants’ transaction histories, blockchain can make it much easier for parties all over the world to due diligence each other and confidently conclude transactions without the need for middlemen and agents.

Blockchain technology can also assist in providing lower cost and faster payment options to agri-commerce participants. In the current system, farmers often take weeks or months to get paid for the supplied goods, and traditional payment options such as wire transfers are costly. Blockchain technology can be used to address this inefficiency by using blockchain-based apps that provide cheap, secure and instant farmer-buyer fund transfer. Such blockchain based apps can trigger payments automatically as soon as the farmers produce delivery has been confirmed by the buyer. The technology enhances market knowledge and strategic sourcing for better access and better prices which are key success factors towards increasing agribusiness.
Through blockchain therefore farmers may be able to access mobile-based expert advisory services, ground support for logistics, and clarity into financial transactions, supply chain monitoring and more. The smallholder farmers therefore will be empowered with information regarding farm inputs, produce marketing, market rates, through elimination of middlemen or intermediaries and enabling the farmers with better decision-making powers. Farmers will also be provided with a marketplace that puts them directly in touch with potential retailers and produce organizations. Blockchain technology therefore is a major step to provide traceability of agriculture produce making it visible to potential buyers who offer high price. This will in return help farmers to increase profitability and improve their livelihoods. If farmers continue to be digitally excluded it will be hard for them to take the right decisions at the right time in regard to increasing agricultural productivity.

Blockchain Technology and Agriculture

The rapidly increasing level of digitalization and demand for data and product integrity, in agricultural export crops is in a unique position to explore the use of blockchain technology. This technology can help stakeholders along the valuechain to improve transparency and efficiency in business transactions, compliance processes and tracking and tracing of agricultural export products. Further investors in the product value chain can use blockchain technology to have inclusive business models that will easily be understood by the producers to increase on the production efficiency. In Kenya and many other parts of the world the application of blockchain technology is still in its infancy but it is expected that more initiatives will be taken by public and private organizations to improve on production efficiency. This technology can assist in efficient resource utilization and expose the communities to many opportunities for businesses that will improve the society as a whole.

Ge et al. (2017) reported that blockchain technology provides immutable permanent transactions and distributed data access which has the potential to facilitate data exchange and reduce the opportunities for fraud or adulteration. Therefore, this technology where adopted can assist in improving tracking and tracing, trust in data sharing, and insurance along the agricultural product chain especially where dealing with export commodities like fruits, flowers, vegetables or beverages among others. For example, from a horticultural farm in Kenya, vegetables like cucurbits travel a long way before reaching the tables of European consumers. There is a lot of information that the end consumers including traders and retailers would like to know about these cucurbits on whether they are safe to eat, or produced in a sustainable way, the type of soil used in their growth, fertilizers or pesticides applied, labourer conditions, the produce safety and sustainability and if there are any claims. All this information can be entered into a blockchain by producers to allow consumers get to know products that are provided in the market. A blockchain-based agricultural supply chain therefore will result in production of agricultural products that are safe and traceable while reducing waste of resources and creating economic benefits for all of the stakeholders in the supply chain.

The present-day supply chains are faced with many issues that have to do with the reliability of information, consumer trust, supply chain transparency, product quality, logistic issues, environmental impact, personal consumer data, fraud, food safety, etc. (Trienekens et al., 2012; Ge and Brewster, 2016). Consumers of agricultural products are increasingly concerned about the safety and sustainability of the food products and especially in export markets they require more information on produce handling along the supply chains. Block chain technology will allow reduce the distance between consumers and producers and make it possible for consumers to address their concerns and questions directly to the producers.

Blockchain will create blocks along the supply chain that will allow peer to peer interaction, consensus building, starting of smart contracts, and increased trading. Blockchain technology therefore provides a means to ensure permanence of records and the sharing of data between stakeholders along the agricultural product supply chain. The stakeholders involved in the supply chain may include; Producers/growers and growers’ organizations; Traders (exporters and importers); Logistics companies; Product standard organizations (e.g., certification scheme owners); Data/Information standard organizations; Certification organizations; Supervisory authorities; Financial service providers (e.g., banks and investors); and ICT services and solution providers (Ge et al., 2017).

In agriculture therefore blockchain can be applied in traceability of perishable food products from farm to store, tracking commodities where a blockchain combined with DNA testing might reduce issues in food fraud such as diversion, theft, tax evasion, misuse, and adulteration, and in grain trading (Amen and Ehmke, 2018). There are two forms of traceability; internal within a company and the external (Chain), that is between companies/stakeholders. Internal traceability is the backbone of traceability as everything depends on each company in the chain having good
systems and good practices when it comes to recording all the relevant internal information (Olsen et al., 2019). Chain traceability depends on the data recorded in the internal traceability system being transmitted, and then read and understood in the next link in the chain. Therefore, within the agricultural sector and its related products, blockchain technology can be used to promote food safety, prevent food fraud and verify the origins and authenticity of agricultural products and agricultural inputs. In the agricultural value chain blockchain therefore can be used to identify the poor processes as well as bad actors (Tian, 2017) to ensure that ideal conditions are maintained from the farms up to the market. This ability to trace the origin of food products is valuable in case of food safety outbreak. The early identification of the source of contamination will enable food companies to act quickly to prevent illness and thus save lives. Timely response will help limit food wastage and save resources.

Through blockchain, the farmer will receive a fair payment for their produce and the retailer will equally pay a fair price for the agricultural products supplied. The retailer gets to save money because the technology eliminates agents or middlemen. Blockchain technology therefore ultimately allows the farmers, and producers to justify the premiums they set for certain agricultural products (Ge et al., 2017). Blockchain also promotes better pricing and payment options by providing faster payment options to farmers at reduced costs. Further, blockchain technology can be used to verify the authenticity of agricultural inputs where farmers are not sure if the inputs they buy are authentic and even the retailers may not be aware of the authenticity of the products sold to them by suppliers. Chinaka (2016) reported that blockchain technology can enable farmers and retailers to know the authenticity and the origin of the inputs they buy through use of smart phones to scan the blockchain barcode on each product.

**Types of Blockchains**

The blockchain system can be categorized into three types: (1) public blockchain, (2) private blockchain, and (3) consortium or federated blockchain (hybrid blockchains) (Olsen et al., 2019). Public blockchain protocols open source and anyone can download it and start running a public node on his or her local device, validate transactions within the network, and participate in the consensus process (the process of creating new blocks that are then added to the blockchain) without permission. Anyone can also send transactions to the blockchain network, and if valid, can see them stored permanently in the blockchain. In addition, anyone can read the transactions listed on the blockchain. Examples of public blockchains are Bitcoin (bitcoin.org), Ethereum (ethereum.org), Monero (monero.org), Dash (dash.org), Litecoin (litecoin.org), and Dogecoin (dogecoin.com).

The Consortium or federated blockchains are typically managed by a group of people, entities, or trusted authorities. Therefore, joining the blockchain network is restricted and are faster (higher scalability) and provide more transaction privacy. Such blockchain types are typically used in the banking sector. The consensus process is controlled; for example, a consortium of 15 financial institutions, each of which operates a node and of which 10 must sign every block in order for the block to be valid. The right to read the blockchain may be public or restricted to the participants. Examples of consortium blockchain are R3 (Banks), EWF (Energy), and B3i (Insurance). Successful implementations of consortium blockchains can reduce transaction costs, reduce data redundancies, replace legacy systems, simplify document handling, and create full compliance mechanisms.

A private blockchain is a centralized network since it is fully controlled by one organization and write permission to the blockchain is commonly kept centralized to one organization. Reading the blockchain may be (partly) public or restricted to a selected few; for example, by being invited to join the network or having granted access. A private blockchain is almost always a permissioned blockchain. Private blockchains are thus highly restricted. Private blockchains have their uses inscability, state compliance of data privacy rules, and other regulatory issues. Examples of private blockchains are MONAX and Multichain.

**CONCLUSION**

Blockchain technological platform introduces a new digital institution that lowers uncertainty between buyers and sellers and brings greater efficiency, transparency and traceability to the exchange of valuable and information, which is basic to the growth of the agricultural sector. Removal of intermediaries though a simplified, peer to-peer transaction network and using smartcontracts, increases efficiency in agricultural supplychains, agricultural finance management and the agriculture sector as a whole. Through enhanced transparency and high quality transaction details, blockchain technology delivers improvement in the agricultural sector. Blockchain technology has got the high potential for success within the agricultural sector especially in enhancing food safety through traceability and tracking. Other applications include agricultural product and input verification of authenticity of agricultural inputs, pricing and processing payments. Blockchain application is still relatively new especially to the agricultural sector.
and there still enormous challenges. One of these challenges has got to do with regulation across the globe as there is still not established system to regulate blockchain transactions. To realize the full potential of blockchain technology the technical, institutional, infrastructure and capacity development challenges need to be addressed to ensure the technology achieves the benefits it could deliver. It is necessary to keep improving digital infrastructure and skills to the stakeholders, particularly in the rural areas.

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ABSTRACT
Low crop production due to deteriorating soil fertility in smallholder farmers’ fields of sub-Saharan African have led to a quest for sustainable practices of production. Vermicompost manure can be used to mitigate soil fertility decline, water stress and soil organic matter as an alternative for increasing agricultural productivity. Kenya has been importing 22,000 tonnes of synthetic fertilizers which have had adverse effects to the environment. However, despite the efforts by some non-governmental organization to encourage the adoption of vermiculture, the technology is yet to be adequately adopted. The study therefore aimed to assess the financial factors affecting adoption of vermiculture in production of indigenous vegetables. The specific objectives of the study were to assess the influence of credit access from financial institutions, cost of labour and cost of credit in adoption of vermiculture. The study used snowballing sampling design to identify the farmers practicing vermiculture. The research also used logit model to establish the relationship between credit access, cost of labour and cost of credit and adoption of vermiculture technology in production of indigenous vegetables in Maragwa sub-County. The findings indicate that most of the financial institution (70%) do not offer credits to the farmers wishing to start vermiculture due to lack of collaterals. The research also established that there was high cost of labour (68%) and also lack of skilled labour to rear the worms. High cost of credit (60%) to start up the venture was also established as a financial factor affecting adoption of vermiculture. The research findings were intended to provide information that would sensitize the County government of Muranga on the need to support smallholder farmers on the adoption of vermiculture for the sustainable application of conservation agricultural practices.

Keywords: Vermiculture, Conservation Agriculture, Smallholder farmers, Adoption, Credit, Financial Factors

INTRODUCTION
Kenya is one of the countries in Africa that is yet to reach a self-sufficient level in terms of food production. Climate change, natural resources overexploitation and depletion and desertification poses a challenge for the future food production in Kenya and the entire world. Despite the country having many sources of water, fertile soils, agricultural technologies and hardworking farmers the production of agricultural commodities such as indigenous veggies have not reached the optimal level. The gradual decline in soil organic matter levels has adversely affected the soil quality as a result of uncontrolled use of synthetic fertilizers and poor farming methods (Siampiringue et al., 2019). Vermiculture technologies used in production of vermicompost manure to amend soil organic and help rehabilitate arable lands have not been fully adopted by farmers. According to Koont et al., 2011, the global advancement in commercial agriculture can be said to be the catalyst for soil destructions due to heavy reliance on excessive use of agrochemicals that has attributed to 50% of total GHG emissions.

Vermiculture has been adopted in production of worms to promote production of worm biomass for sale as feed for animals and to new vermicomposting operations in North and South Africa. Vermicompost manure is a high nutritive earthly smelling that is microbiologically active used in soil organic amendments (Jiří et al., 2017). The technology involves the decomposing of the diverse organic wastes by waste earthworm’s eater into a nutritive organic fertilizer. Vermicomposting is a biological process that involves feeding the earth worms with wastes, they ingest and the microorganisms in their gut digest the waste to produce vermicast as a waste which is rich in nutrients. The widely used species for vermicomposting is Eudrilus euginae and Eisenia fetida which are epigeic (Patil et al., 2018) and are naturally found on soil surfaces in most soil rich organic matter.

It is crucial to recognize that in developing countries the indigenous vegetables forms a major diet of the food that is consumed. The high consumption in the developing countries is as a result of the poverty level in the countries. Many household depends on vegetables on daily basis for their meals because they are readily available. Consumption of indigenous vegetables is high in rural areas where they grow whereas only 34% of people in urban and peri-urban consume these vegetables (El Shikerti, 2016). Most indigenous vegetables have medicinal and nutritive values, fast growing and less infested by pests when grown in a fertile soils making them a preferred income earning choice by many farmers. Poor farming practices and uncontrolled fertilization using synthetic fertilizers in many parts of Muranga has resulted to decline in soil fertility leading to low production of vegetables.
Nearly 60% people in the world population rely on agriculture for food and their income (FAO, 2013). Financial constraints have faced small-scale farmers producing indigenous vegetables in the country. For the farmers to adopt vermiculture technology they require capital to sustain and enhance high productions. High costs of credits, labour and worms to start up vermitechnology is a major hindrance to farmers in Kenya. Small scale farmers face problems in quest to access credit from financial institutions (Asogwa, 2014), to facilitate and adopt vermicomposting techniques. Despite agriculture being a key economic contributor employing about 55% of the population in the developing countries, only 1% of banks’ lending is directed toward agriculture (World Bank, 2014). Many poor farmers in rural areas farming indigenous vegetables depend on informal sources of capital from shylocks, loans from friends and accumulating savings and credit groups. Failure by the financial institutions to issue credit to rural farmers is hinged on factors such as illiteracy level, remoteness of the farmers, want to borrow little amounts and lack of collaterals (Anyiro, 2015).

Sustainable agriculture can be one of the sources of revenue to fund “The Big Four Agenda.” Increased adoption of vermin-culture in production of indigenous vegetable remains a game changer in production of chemical free produce. The technology contributes to the reduction of inorganic fertilizer and income to the farmers supplying the worms. Regardless of the importance of the vermiculture technology in production of indigenous vegetable, there has been continued decline in use of the technology. Lack of awareness of the vermiculture technology cannot fully explain the reasons for low adoption of vermicomposting manure in production of indigenous vegetables (Subhani & D, 2015). Hence there is need to study the financial factors affecting adoption of vermiculture.

Despite measures undertaken by some of the NGOs to improve the use of vermicompost manure, the use of the technology remains low among the small-scale indigenous vegetables with low adoption of vermin-culture. Compared to the use of the inorganic fertilizer, vermicompost manure use is minimal (Faisal, 2015). Further, statistics showed that the use of vermiculture technology has fallen from approximately 30,000 farmers in 2009 to about 10,000 farmers in 2017. The land under vermiculture technology in Maragwa Sub-County is below 100 farmers despite the benefits associated with the venture. The use of inorganic fertilizers in Maragwa is highly adopted due to the ease of acquiring the already manufactured input. To worsen the matter some of the farmers who were previously using the technology have abandoned the use of vermicompost manure resulting in reduced indigenous vegetables production.

The ever-changing population calls for advancement in technology and soil management practices to improve soil fertility to meet the food production threshold. It is therefore prudent to ensure that the challenges and problems that the farmers producing the vegetables are confronted and addressed in order to deal with hunger and poverty. The study was therefore aimed at studying the financial factors affecting adoption of the vermiculture technology in production of indigenous vegetables among small scale farmers in Maragwa Sub-County.

**Statement of the Problem**

Sustainable agriculture can be one of the sources of revenue to fund “The Big Four Agenda.” Increased adoption of vermin-culture in production of indigenous vegetable remains a game changer in production of chemical free produce. The technology contributes to the reduction of inorganic fertilizer and income to the farmers supplying the worms. Regardless of the importance of the vermiculture technology in production of indigenous vegetable, there has been continued decline in use of the technology. Lack of awareness of the vermiculture technology cannot fully explain the reasons for low adoption of vermicomposting manure in production of indigenous vegetables. Hence there is need to study the financial factors affecting adoption of vermiculture.

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Study Objectives
The general objective of this study is to examine the financial factors affecting adoption of vermi-culture in production of indigenous vegetables in Maragwa sub-county.

Specific Objectives
To assess the influence of the credit assess to the adoption of vermiculture in production of indigenous vegetables.
To assess the influence of cost of labour in adoption of vermiculture in production of indigenous vegetables
To establish the effects of cost of credit in adoption of vermiculture in production of indigenous vegetables

Conceptual Framework
A conceptual framework adopted help show the relationship between the financial factors that affect adoption of vermiculture in Kenya with specific references to farmers in Mbugwa ward in Maragwa Sub- County in Muranga.

Independent variables
- Access to credit
  - Credit access from financial institution
  - Cost of credit

Cost of labour
- Cost of construction of vermicompost pits
- Cost of heaping

Cost of vermiculture adoption

Intervening variables
- Government Policies, Weather

Dependent variables
- Vermiculture adoption

Figure 1.0. The Conceptual Framework

Research Methodology
This study employed a descriptive survey research design. The population of the study comprised of 96 small scale indigenous vegetable farmers practicing vermiculture with an average acreage of 0.24 ha in Maragwa sub-county. This study used one set of self-administered questionnaires for small scale coffee farmers as the main tool for collecting the data. The study employed descriptive and inferential statistical methods in data analysis. The logit model was utilized to further give inferences to the data obtained using the Statistical Package for Social Sciences (SPSS). Data was tabulated to ease interpretation of the findings and to generate conclusions.

Sampling Procedure and Data Collection
The study was carried out in the rural areas where farmers practiced conventional farming and irrigation due to water availability. It employed descriptive research design to identify farmers who have adopted and those that are intending to adopt vermitenechnology as a business venture and vermicomposting for farming purposes. Kothari (2004) stated that the major purpose of the descriptive research is description of the state of affairs as it exists. The design approach basically catered for collection of quantitative data. The study employed snowballing sampling procedure because only few farmers who are scattered in Maragua have adopted vermitenechnology in the region. A list of farmers was compiled with their respective types of indigenous vegetables they planted in their farms. This gave a sample size of 98. Primary data was collected through administering structured questionnaires to the selected farmers as well as personal interviews. However, many farmers confused vermicomposting with composting, this resulted to data inconsistency and therefore some copies of questionnaires had to be rejected. Education level also posed a greater challenge to some of the farmers whereby some were unable to fill the questionnaires. The analysis was therefore conducted based on the information provided by 96 farmers. The data was collected during the months of March to April 2019 which is a wet season when the farmer’s plant to make use of the rain.
Data Analysis
The data collected was first checked to ensure all questions were answered for completeness and consistency before processing. Quantitative data was analyzed by use of descriptive statistics using Statistical Package for Social Sciences (SPSS) version 23. Descriptive statistics such as percentages, means and frequencies were used. The logit model was used to examine the factors influencing the adoption of vermiculture by the small-scale farmers producing indigenous vegetables. Adoption of vermiculture yields binary dependent variables with options for adoption and that of non-adoption. To ease data analysis, a value of 1.00 was assigned to the farmers practicing vermiculture in production of vermicomposts for vegetable farming and a value of 0.00 to non-adopters. The logit model specifications provided the model in observing the probability of the farmers adopting vermiculture technology. The Logistic regression model was employed in the study for analysis of the financial factors affecting adoption of vermiculture by farmers carrying out indigenous vegetable farming.

The 1-5 point likert scale was used to get the percentage agreement. The logit model was specified explicitly as follows:

\[ p(y = 1|x) = G(\beta_0 + \beta_1x_1 + \cdots + \beta_kx_k) = G(\beta_0 + x\beta) \]

Where:
\[ y = \begin{cases} 
1, & \text{if there is adoption of vermiculture in indigenous vegs production} \\
0, & \text{if the no adoption of vermiculture in production of indigenous vegs} 
\end{cases} \]

The logistic regression model took the following form:

\[ Y_i = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \epsilon \]

Where, \( Y_i \) = Adoption of vermiculture in indigenous vegetable farming, \( \beta_0 \) = intercepts \( \beta_1x_1 \) = credit access, \( \beta_2x_2 \) = cost of labour, \( \beta_3x_3 \) = cost of earthworms and \( \epsilon \) = error term.

RESEARCH FINDINGS AND DISCUSSIONS
Indigenous Vegetable Production

The respondents were asked to indicate the factors that affect adoption of vermiculture in the production of indigenous vegetables in the sub-county. 70% of the farmers showed that limited access to credit from financial institutions hinders them from practicing vermicomposting in large scale since they are unable to meet the expenses associated with vermicomposting. High cost of credits has also locked many farmers from practicing vermiculture. This is because of the high interest rates placed by the banks and SACCOs to small scale farmers borrowing little amounts, creditors perceiving vermiculture as not being a profitable business venture and also the risk associated with agriculture. The high cost of purchasing the earthworms from the limited suppliers also poses a constraint to the farmers willing to buy the worms in large quantities that can support large scale production of vermicompost manure to enable them practice large scale production of indigenous vegetables in the area. The results have been summarized in the table below.

<table>
<thead>
<tr>
<th>Number of kilograms</th>
<th>2016/2017</th>
<th>Percentage</th>
<th>2017/2018</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-49.9</td>
<td>46</td>
<td>48</td>
<td>32</td>
<td>33</td>
</tr>
<tr>
<td>50-99.9</td>
<td>34</td>
<td>35</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>100-149.9</td>
<td>12</td>
<td>13</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>150 and above</td>
<td>4</td>
<td>4</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>TOTALS</td>
<td>96</td>
<td>100</td>
<td>96</td>
<td>100</td>
</tr>
</tbody>
</table>

Factors that affect adoption of vermiculture by farmers practicing indigenous vegetables farming in

Maragwa sub-county

The respondents were asked to indicate the factors that affect adoption of vermiculture in the production of indigenous vegetables in the sub-county. 70% of the farmers showed that limited access to credit from financial institutions hinders them from practicing vermicomposting in large scale since they are unable to meet the expenses associated with vermicomposting. High cost of credits has also locked many farmers from practicing vermiculture. This is because of the high interest rates placed by the banks and SACCOs to small scale farmers borrowing little amounts, creditors perceiving vermiculture as not being a profitable business venture and also the risk associated with agriculture. The high cost of purchasing the earthworms from the limited suppliers also poses a constraint to the farmers willing to buy the worms in large quantities that can support large scale production of vermicompost manure to enable them practice large scale production of indigenous vegetables in the area. The results have been summarized in the table below.
Table 2: Factors affecting adoption of vermiculture

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean agreement on 1-5 point Likert scale</th>
<th>Percentage agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited access to credit</td>
<td>2.80</td>
<td>70</td>
</tr>
<tr>
<td>High cost of credit</td>
<td>2.40</td>
<td>60</td>
</tr>
<tr>
<td>High cost of worms</td>
<td>2.00</td>
<td>50</td>
</tr>
<tr>
<td>High cost of labour</td>
<td>2.72</td>
<td>68</td>
</tr>
<tr>
<td>High requirement for collaterals</td>
<td>1.80</td>
<td>45</td>
</tr>
<tr>
<td>Totals</td>
<td><strong>2.344</strong></td>
<td><strong>59</strong></td>
</tr>
</tbody>
</table>

Measures to address the limited adoption of vermiculture

The farmers indicated that for vermiculture to be adopted fully various measures has to be addressed. 89% of the indigenous vegetables farmers stated that low collateral requirements with low costs (47%). 68% stated that lowering cost of earthworms by the suppliers will promote adoption of vermiculture in producing chemical free vegetables. The rest of the results are as shown below.

Table 3: Measures to address limited adoption of vermiculture

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean on 1-5 point likert scale</th>
<th>Percentage agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessibility to credits</td>
<td>2.00</td>
<td>50</td>
</tr>
<tr>
<td>Low cost of credits</td>
<td>1.87</td>
<td>47</td>
</tr>
<tr>
<td>Low collateral requirements</td>
<td>3.56</td>
<td>89</td>
</tr>
<tr>
<td>Lower cost of earthworms</td>
<td>2.72</td>
<td>68</td>
</tr>
<tr>
<td>Periodic training of farmers on vermitechnology</td>
<td>2.41</td>
<td>60</td>
</tr>
<tr>
<td>Encouraging sustainable agriculture</td>
<td>3.42</td>
<td>86</td>
</tr>
<tr>
<td>Marketing of indigenous vegetables produced with organic farming</td>
<td>2.60</td>
<td>65</td>
</tr>
<tr>
<td>Delivering extension services by the ministry of agriculture to vermiculture practicing farmers</td>
<td>2.00</td>
<td>50</td>
</tr>
<tr>
<td>Totals</td>
<td><strong>2.57</strong></td>
<td><strong>64</strong></td>
</tr>
</tbody>
</table>

The study established that for vermiculture to be adopted fully and integrated with other forms of farming methods, farmers need to be given credits with low requirements of collaterals or security by the financial institutions. Offering credits to vermiculture farmers producing indigenous vegetables at lower costs of interests will help meet the periodic farm expenses.

Financial Factors

The study sought to find out the financial factors hindering the farmers from practicing vermiculture in production of indigenous vegetables. This factors include accessibility to credits, cost of credits, cost of labour, cost of earthworms, source of funding’s and collateral requirements.

Sources of Capital

The respondents were asked to indicate their sources of capital they used to finance their farming operations. 78% of the respondents indicated that they use their personal savings to finance the farming expenses. However, some of the farmers showed that despite using their personal savings, the expenses tend to be higher and therefore they borrow credits from their families, friends and to the lesser extent from the financial institutions. The following result gives the summaries of the research.

Table 4: Sources of Capital

<table>
<thead>
<tr>
<th>Sources of capital</th>
<th>Frequencies</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit from banks and SACCOs</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Personal savings</td>
<td>75</td>
<td>78</td>
</tr>
<tr>
<td>Credit from friends</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Local money lenders</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Local groups( merry-go-rounds)</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Totals</td>
<td><strong>96</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Accessibility to Credits
The study sought to find out the availability of credits to the small scale indigenous vegetables farmers from the financial institutions in Maragwa sub-county. The results are summarized below.

Table 5: Accessibility to Credit from Financial Institutions

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>89</td>
<td>93</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Totals</td>
<td>96</td>
<td>100</td>
</tr>
</tbody>
</table>

The results of the study showed that 93% of the respondents agreed that accessibility to credits availability from the financial institution is a major constraint to financing the vermiculture in their farms.

Costs of Credits
The study sought to find the factors impeding access to loans from the credit institutions. The following table gives the summary

Table 6: Factors Hindering Access to Credits

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean Agreement on 1-5 Point Likert Scale</th>
<th>Percentage Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>High transaction costs</td>
<td>3.40</td>
<td>85</td>
</tr>
<tr>
<td>Lack of collaterals</td>
<td>2.80</td>
<td>70</td>
</tr>
<tr>
<td>High interest rates</td>
<td>3.67</td>
<td>92</td>
</tr>
<tr>
<td>Lack of financial records of sales</td>
<td>3.54</td>
<td>89</td>
</tr>
<tr>
<td>Accessibility of the financial institution</td>
<td>2.40</td>
<td>60</td>
</tr>
<tr>
<td>Totals</td>
<td><strong>3.16</strong></td>
<td><strong>99</strong></td>
</tr>
</tbody>
</table>

The study shows that financial institutions fail to lend credits to small-scale farmers practicing indigenous vegetable production through vermiculture methods due to lack of collaterals to act as security. The respondents also indicated that high interest rates are charged by the bank which discourages them from borrowing loans.

Cost of Labour
The respondents were asked to give their sources of labour in carrying out vermicompost in their farms. Various activities carried out include preparing vermicompost beds, separating (biodegradable from non-biodegradable wastes and fats, citrus, meat and dairy products) wastes and watering of vermicomposting beds. 60% of the indigenous vegetable farmers indicated that they utilize family labour and 0% indicated no communal labour in the area. The following table gives the frequencies and percentages of the responses.

Table 7: Sources of labour for vermicomposting

<table>
<thead>
<tr>
<th>Source of labour</th>
<th>Frequencies</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family labour</td>
<td>58</td>
<td>60%</td>
</tr>
<tr>
<td>Hired labour</td>
<td>23</td>
<td>24%</td>
</tr>
<tr>
<td>Personal labour</td>
<td>15</td>
<td>16%</td>
</tr>
<tr>
<td>Communal labour</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Totals</td>
<td>96</td>
<td>100%</td>
</tr>
</tbody>
</table>

The study showed that vermiculture is labour intensive and requires periodic supervision to maintain the conditions for the worms to work effectively. Majority of the farmers utilize family labour which is not always enough because of the family sizes and age. Most of the farmers require hired labour which is not available due to lack of finance to pay the workers.

Cost of Worms
The respondents were asked to indicate whether the costs of the earthworms were high. The results have been summarized on the table 8 below.
Table 8: Cost of Worms

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequencies</th>
<th>Percentage agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>51</td>
<td>53</td>
</tr>
<tr>
<td>No</td>
<td>45</td>
<td>47</td>
</tr>
<tr>
<td>Totals</td>
<td><strong>96</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The study revealed that 53% of the farmers practicing vermiculture in production of indigenous vegetables indicated that the prices of the earthworms are high. The farmers willing to practice vermiculture in large scale cannot afford to buy the worms in large quantities. 47% of the respondents indicated the prices are not high because the returns are higher compared to the buying prices. This is because the worms reproduce at high rates doubling the biomass.

Table 9: One-way ANOVA results

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of squares</th>
<th>Df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>10.20</td>
<td>4</td>
<td>2.30</td>
<td>9.20</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>30.80</td>
<td>46</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>50.00</td>
<td>50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results indicate that the regression relationship was highly significant in predicting how the financial factors affected adoption of vermiculture. The model was significant at 5% probability level since the $F$-calculated was greater than $F$-tabulated (2.5252).

Table 10: Regression Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized coefficients</th>
<th>Std.Error</th>
<th>Std. coefficients</th>
<th>T</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Constants</td>
<td>1.055</td>
<td>0.216</td>
<td>4.84</td>
<td>0.00025</td>
</tr>
<tr>
<td></td>
<td>Access to credit</td>
<td>0.687</td>
<td>0.150</td>
<td>0.620</td>
<td>4.59</td>
</tr>
<tr>
<td></td>
<td>Cost of labour</td>
<td>-0.750</td>
<td>0.090</td>
<td>0.136</td>
<td>8.37</td>
</tr>
<tr>
<td></td>
<td>Cost of worms</td>
<td>-0.765</td>
<td>0.092</td>
<td>0.137</td>
<td>8.20</td>
</tr>
</tbody>
</table>

Fitting the model: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$ to: $Y = 1.055 + 0.687X_1 - 0.750X_2 - 0.765X_3$ where $Y$ is the vermiculture adoption, $X_1$ access to credit, $X_2$ cost of labour, $X_3$ cost of worms.

The regression equation above established that holding all factors constant (access to credit, cost of labour and cost of worms) vermiculture adoption by scale farmers is 1.055. A unit increase in access to credit led to an increase of vermiculture adoption by 0.687 among indigenous vegetables small scale farmers. Also, a unit increase in cost of labour to a 0.765 decreases the adoption of vermiming by the farmers. The result also indicates that a unit increase in the cost of earthworms by the suppliers led to a 0.750 decrease in adoption of vermiming in growing indigenous vegetables.

CONCLUSION

The research established that access to credit from financial institution, high cost of labour and high cost of earthworms influenced the adoption of vermiminion by the small-scale farmers practicing indigenous vegetable farming in Maragwa sub-county. Many small-scale farmers do not keep their farms and financial records which the lending institutions requires to grant them loans which most of the farmers look upon to finance the vermiringing operations. The farmers that were able to access loans faced difficulties with banks, requiring them to provide collaterals and the high interests rates charged on the loans. The study also found that to operate the vermiringing beds, it require intensive labour which forced the farmers to hire workers. The high cost of worms posed a challenge to the farmers who wanted to adopt vermimination fully in growing of indigenous vegetables because the vermicasts were not enough to fertilize their farms.

RECOMMENDATIONS

For vermimination to be adopted effectively, the following recommendations from the research findings in view of the financial factors affecting the farmers from adopting the vermiculture in production of indigenous vegetables in Maragwa may be utilized.
The limited access to credits by the small-scale farmers can be solved by the farmers forming groups which will facilitate them in borrowing lump sums from the lending institutions, training farmers in record keeping for both farm and financial transactions to act as collaterals and the county government to implement a loan programme where the small-scale farmers can obtain loans conveniently to meet their farm expenses.

The ministry of Agriculture in Muranga County should also promote the adoption of vermitechnology by sensitizing the farmers the importance of remedying the soils through farm trainings and soil testings’ by the extension officers. This will attract many farmers in practicing vermicomposting for production of free chemical vegetables as well as maintaining the soil fertilities in Maragwa sub-county.

The county government of Muranga can also help find market for the vermicasts fertilizers and the earth worms for the farmers; this will motivate many farmers to adopt the vermitechnology both as a business venture and for farm fertilizations. The cost of earthworms can also be subsidized by the county government to enable many farmers to purchase the earthworms at affordable prices.

REFERENCES
Jiří, V., Josef, Š., & Jiří, B. (2017). Manure leachate production and change in manure weight during the storage depending on the amount of bedding. Research In Agricultural Engineering, 63(No. 2), 62-70. doi: 10.17221/7/2016-rae

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INTEGRATED EFFECT OF RHIZOBIUM INOCULATION AND PHOSPHORUS APPLICATION ON TISSUE CONTENT, SYMBIOTIC AND PHOSPHORUS USE EFFICIENCY IN SOYBEAN PRODUCTION

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ABSTRACT
A field experiment was conducted at Chuka University farm to determine the effect of integration of rhizobium inoculation (R) and phosphorus (P) on tissue nutrient content, symbiotic and phosphorus use efficiency (PUE) in soybean production in Meru South Sub County. Two cultivations (Trial I and II) were done between March-August, 2018. The objective was to determine the integration effect of R and P on tissue nutrient content, symbiotic efficiency (SEF) and PUE in soybean production. Treatments included; three rates of R (0, 100 and 200 g ha⁻¹), three rates of P (0, 20 and 30 kg ha⁻¹), either applied alone or in integration and soybean genotypes (SB19 and SB24). Both Trials were laid out in a randomized complete block design in split-split plot arrangement with each treatment replicated thrice. Soybean genotypes were assigned main plot, R subplots and P in sub-subplots. Data collected was subjected to analysis of variance using the Scientific Analysis System SAS and significantly different means separated using Tukeys test at (p≤0.05). The results showed significant difference in tissue nitrogen, tissue phosphorus content, symbiotic efficiency and phosphorus use efficiency for SB19 and SB24 genotypes in both Trials at (p≤0.05). The highest nitrogen tissue content of between 1.73% and 9.10% was observed when integration of R and P were applied at the rate of 200 g and 30 kg for SB19 and SB24 genotypes in both Trials. While R and P at the rate of 200 g and 30 kg per ha showed the highest phosphorus content of between 849.6 ppm and 955.0 ppm in both Trials. The highest symbiotic efficiency recorded was 207% and 261%, and 201% and 227% in Trials I and II, respectively. The PUE was highest when R and P was applied at the rate of 200 g and 30 kg per ha for SB19 and SB24 soybean in both Trials. Integration of R and P at the rate of 200 g and 30 kg ha⁻¹ and adoption of either SB19 or SB24 showed a potential in enhancing soybean cultivation.

Keywords: Genotypes, phosphorus use efficiency, symbiotic, tissue content

INTRODUCTION
Soybean (Glycine max) is a crop that is cultivated as a source of livestock feed, human food and soil fertility improvement (Adjei-Nsiah et al., 2019). It is the world's largest source of protein feed, the second largest source of vegetable oil and the fourth leading crop produced globally (Tani et al., 2016; Murithiab et al., 2016). Biological nitrogen fixation is crucial and efficient process in improving soil fertility (diCenzo et al., 2019). Application of phosphorus in soybean cultivation enhanced biological nitrogen fixation BNF in soybean-rhizobium interaction (Zhou et al., 2016) increasing nitrogen content in plant tissues (Bashir et al., 2011). Integration of rhizobium and phosphorus was reported to have improved uptake of N and P in soybean (Shish et al., 2018). Elsewhere, intercrop of Soybean/maize resulted to a higher nitrogen content in maize grain, indicating enhanced nitrogen uptake (Vanlaauwe et al., 2014). Phosphorus content in grain and straw was influenced by R and P application (Masresha, 2017). Plant nitrogen concentration in response to increased soil phosphorus supply was observed, with phosphorus content in grain and straw being highest in integration of R and P (Nasir et al., 2017). Phosphorus and nitrogen play specific roles in symbiotic N₂-fixation efficiency through their effects on nodulation and N₂-fixation process (Mathenge et al., 2018). High yields with subsequent profits, are related to symbiotic efficiency (SEF) of soybean with N-fixing bacteria (Barbosa, et al., 2017). Nitrogen fixation is very sensitive to P deficiency due to reduced nodule mass and decreased ureide production (Shish et al., 2018). Symbiotic N-fixation has a high P demand for energy provision (Tairo and Ndakidemi, 2014; Makoi et al., 2013).

Nitrogen fixation varied among rhizobia isolates with SEF ranging between 27 and 112% when beans were inoculated with R (Kawaka et al., 2014). Isolates from beans had higher SEF compared to the commercial inoculants (Kawaka et al., 2018). Koskey et al. (2017) used plant shoot dry weight to estimate SEF which ranged between 86.7 - 123.72% in common beans. In seed potato tuber production, phosphorus use efficiency PUE increased from 0 kg/kg observed with 0 kg P per ha and 0 kg N per ha to a range of 75.9 kg/kg to 186.6 kg/kg when integration of P and N was used (Gathungu et al., 2014).
MATERIALS AND METHODS
The experiment was conducted at Chuka University farm, Meru South Sub-County in two cultivations (Trial I and II) in 2018. Chuka University lies at an altitude of 1399m asl, at latitude of 0°20'0"S and longitude of 37°39'0"E (Figure 1). Temperature range of 20.97 °C - 27.25 °C, rainfall of 1178 mm, and nitisol type of soils (Moni et al., 2016). Major crops in the area are; Phaseolus vulgaris, Vigna unguiculate, Cajanus cajan, Glycine max, Sorghum spp, Musa spp, Mangifera indica, Coffea arabica and Camellia sinensis (Abuli, 2016).

Figure 1: Location of Chuka in Tharaka Nithi County in Kenya
Source: (Google) [Modified]

Experimental Design
The experiment was laid out in a randomized complete block design in a split-split plot arrangement with each treatment replicated thrice. Treatments included; three rates of P (0, 20 and 30 Kg ha⁻¹), and three rates of R (0, 100 and 200 g ha⁻¹) either applied alone or integrated and two soybean genotypes (SB19 and SB24). The triple superphosphate (0:46:0) was used as the source of phosphorus. The SB19 and SB24 genotypes were assigned the main plot, P rates the sub-plot and R rates to sub-subplots. The size of experimental plot was 1.5 x 1.3 m with 1 m path between main plots and 0.5 m between subplots and sub-subplots.

Soil Sampling and Analysis
The soil was sampled across and diagonally in each site at a depth of 25 cm using a soil auger. A kilogram of a homogeneous composite soil sample from each site was packed independently into sterile bags for analysis. Soil analysis was done at Kenya Agricultural Research and Livestock Organization (KALRO) – Embu.

Planting Materials, Planting and Crop Management
Certified soybean seeds and inoculant were obtained from KALRO-Kakamega and MEA Limited-Nakuru respectively. The inoculation was done in Plant Science Laboratory of Chuka University according to Ahiabor et al. (2014). Soybean seeds were moistened with 4% Gum Arabica solution in a basin and the inoculant was added at the rates of 10 g per Kg and 20 g per Kg of soybean seeds. The mixture was stirred until even coating was attained. The seeds were then spread on flat plywood under a shade and allowed to air dry for 30 minutes. Inoculated seeds were sown early in the morning to avoid its exposure to direct sun rays that could affect the efficacy of the inoculant. A basal application of phosphorus at the rate of 0, 20, and 30 Kg P per ha which was equivalent to 0, 3.6, and 5.4 g per plot was done during planting to the assigned plots. Two seeds were sown at inter and intra row spacing of 0.5 m and 0.1 m respectively in a plot measuring 1.2 x 1.5 m. Seedlings were thinned to one per hill one week after emergence giving a plant population of 200,000 plants per ha or 39 plants per plot. All cultural practices recommended for soybean cultivation were done equally to all the plots.
Data Collection
Integration Effect of Different Rates of Rhizobium and Phosphorus on Shoot and Grain Nitrogen and Phosphorus
Twenty grams of shoot and grain from experimental plants were randomly taken from every plot, placed in khaki papers and dried in the oven at 60 °C for 72 hours. Dry shoot and grain samples were ground into powder using a blender. The powder was then sieved using a laboratory test sieve and packed in khaki paper bags ready for laboratory analysis. The plant shoots and grain powder were analyzed for nitrogen (% N) and P (ppm) content using Kjeldahl according to Bremner (1996).

Integration Effect of Different Rates of Rhizobium and Phosphorus on Rhizobium Use Efficiency
The plant shoot dry weight (SDW) was used to estimate the symbiotic nitrogen-fixing efficiency (SEF) of the commercial R. Symbiotic efficiency in this study was determined according to (Koskey et al., 2017), using the formula below:

\[ SEF = 100 \times \left[ \frac{(SDW \ of \ inoculated \ (Kg))}{SDW \ of \ non \ inoculated \ (Kg)} \right] \]

Integration Effect of Different Rates of Rhizobium and Phosphorus on Phosphorus Use Efficiency
The phosphorus use efficiency (PUE) was computed according to Belete et al. (2018); Gathungu et al. (2014) and Syers et al. (2008) using the formula below:

\[ PUE = \left[ \frac{(Seed \ yield \ (kg) \ of \ plots \ with \ Fert. – yield \ (kg)\ control)}{Quantity \ of \ phosphorus \ (P) \ applied \ in \ kg \ per \ plot} \right] \]

Data Analysis
The data collected was subjected to analysis of variance using the statistical Scientific analysis system for windows V8 1999-2001 by SAS Institute Inc., Cary, NC, USA (SAS, 2001) and significantly different means separated using Tukeys test at \( p \leq 0.05 \) (SAS Institute Inc. 2001).

RESULTS
Integration Effect of Different Rates of Rhizobium and Phosphorus on Shoot and Grain Nitrogen Content
There were no significant difference in shoot and grain N content between genotype SB19 and SB24 within and between Trial I and II (\( p \leq 0.05 \)). However, there were significant respond of the integration of R and P in shoot and grain N content within genotypes SB19 and SB24 at (\( p \leq 0.05 \)) in both Trials. Rhizobia application at the highest rate of 200 g per ha, increased the shoot N content from the control to 1.4% and 1.03%, and 1.46% and 1.09% for SB19 and SB24 genotypes in Trials I and II, respectively (Table 1). Application of P at the highest rate of 30 Kg per ha, shoot N content increased from the control treatment to 0.94% and 0.83%, and 0.96% and 0.86% for SB19 and SB24 genotypes in both Trial I and II, respectively (Table 1). While, highest integration of R and P at the rate of 200 g and 30 Kg per ha, increased shoot N content to 2.98% and 1.73%, and 3.09% and 1.73% for SB19 and SB24 genotypes in both Trial I and II, respectively (Table 1).

Integration of R and P significantly increased grain N content for SB19 and SB24 genotypes in both Trial I and II whether applied alone or integrated. Rhizobia at the highest rate of 200 g per ha, increased grain N content to 5.97% and 5.11%, and 6.02% and 5.07% for SB19 and SB24 genotypes in both Trial I and II, respectively. Compared to control, highest integration of R and P at the rate of 200 g and 30 Kg per ha, increased grain N content by 3.81% and 2.11%, and 3.53% and 1.93% for SB19 and SB24 genotypes in both Trial, respectively (Table 1).

Integration Effect of Different Rates of Rhizobium and Phosphorus on Shoot and Grain Phosphorus Content
There was no significant difference in shoot and grain P content between genotype SB19 and SB24 within and between the two Trials (\( p \leq 0.05 \)). However, there were significant effect of the integration of R and P in shoot and grain P content within genotypes SB19 and SB24 at (\( p \leq 0.05 \)) in Trials I and II. Rhizobia application increased shoot P content in SB19 and SB24 genotypes in both Trial I and II. Application of R at the rate of 100 g per ha, significantly increased the Shoot P content from 253.1 ppm and 248.2 ppm, and 256.9 ppm and 251.8 ppm observed with the control treatment to 334.3 ppm and 328.4 ppm, and 337.4 ppm and 332.1 ppm for SB19 and SB24 genotypes in both Trial I and II, respectively (Table 1).
Application of P at the highest rate of 30 Kg per ha increased the Shoot P content from control treatment to 326.1 and 320.6 ppm, and 333.6 and 327.8 ppm for SB19 and SB24 genotypes in Trial I and II, respectively (Table 2).

Table 2: Effect of Rhizobia and Phosphorus on Soybean Shoot and Grain N Content.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Trt</th>
<th>Shoot N (%)</th>
<th>Grain N (%)</th>
<th>Trial 2</th>
<th>Shoot N (%)</th>
<th>Grain N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB19</td>
<td>T1</td>
<td>0.81b</td>
<td>5.12b</td>
<td>0.7a</td>
<td>4.4c</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>0.88g</td>
<td>5.54g</td>
<td>0.8d</td>
<td>4.5f</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>0.94f</td>
<td>5.69e</td>
<td>0.83e</td>
<td>4.73c</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>0.98f</td>
<td>5.8e</td>
<td>0.92c</td>
<td>4.83g</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>1.53d</td>
<td>6.8d</td>
<td>1.06d</td>
<td>5.20f</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T6</td>
<td>2.2b</td>
<td>7.69b</td>
<td>1.6b</td>
<td>5.41b</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T7</td>
<td>1.4c</td>
<td>5.97c</td>
<td>1.03d</td>
<td>5.11d</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T8</td>
<td>2.15c</td>
<td>6.82c</td>
<td>1.44c</td>
<td>5.31h</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T9</td>
<td>2.98a</td>
<td>8.93a</td>
<td>1.73a</td>
<td>6.51*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MSD</td>
<td>0.11</td>
<td>0.19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C.V.</td>
<td>6.75</td>
<td>2.78</td>
</tr>
</tbody>
</table>

*Means with the same letter along the column for the same variety are not significantly different at p≤0.05; MSD=Mean Significant Difference; Treatments: T1= Control (0 g R and 0 Kg P per ha); T2 and T3=20 Kg and 30 Kg P per ha respectively; T4 and T7=100 g R and 200 g R per ha respectively; T5=100 g R and 20 Kg P per ha, T6=100 g R and 30 Kg P per ha; T8= 200 g R and 20 Kg P per ha and T9= 200 g R and 30 Kg P per ha; R=Rhizobia; P=Phosphorus.

*Means with the same letter along the column for the same variety are not significantly different at (p≤0.05); MSD=Mean Significant Difference; Treatments: T1= Control (0 g R and 0 Kg P per ha); T2 and T3=20 Kg and 30 Kg P per ha respectively; T4 and T7=100 g R and 200 g R per ha respectively; T5=100 g R and 20 Kg P per ha, T6=100 g R and 30 Kg P per ha; T8= 200 g R and 20 Kg P per ha and T9= 200 g R and 30 Kg P per ha; R=Rhizobia; P=Phosphorus.
While, integration of R and P at the highest rate of 200 g and 30 Kg per ha, increased shoot P content to 849.6 ppm and 906 ppm, and 849.6 ppm and 913.8 ppm for SB19 and SB24 genotypes in both Trial I and II, respectively (Table 2). Rhizobia application increased grain P content in SB19 and SB24 genotypes in both Trial I and II. Rhizobia application at the rate of 100 g per ha, significantly increased the grain P content from the control treatment to 509.9 ppm and 519.6 ppm, and 514.1 ppm and 524.5 ppm for SB19 and SB24 genotypes in both Trial I and II, respectively. Compared to control, application of R at the rate of 200 g per ha significantly increased the grain P content from the control treatment to 430.1 ppm and 529.6 ppm and 434.2 and 534.6 ppm for SB19 and SB24 genotypes in both Trial I and II, respectively (Table 2). Application of P at the highest rate of 30 Kg per ha, increased grain P content from the control treatment to 340.6 ppm and 350.8 ppm, and 346.4 ppm and 356.4 ppm for SB19 and SB24 genotypes in both Trials, respectively (Table 2). Further, integration of R and P at the highest rate of 200 g and 30 Kg per ha, significantly increased grain P content to 852.4 ppm and 950 ppm, and 853.3 ppm and 955 ppm for SB19 and SB24 genotypes in both Trials, respectively (Table 2).

Integration Effect of Different Rates of Rhizobium and Phosphorus on Symbiotic Efficiency

There was no significant difference in symbiotic efficiency between genotype SB19 and SB24 within and between Trials I and II (p≤0.05). However, there was significant influence of the integration of R and P in symbiotic efficiency (SEF) within genotypes SB19 and SB24 at (p≤0.05) in Trials I and II. For instance, application of R at the rate of 100 g, increased SEF from 101% and 107%, and 101% and 100% observed with the control treatment to 129% and 165%, and 114% and 116% for SB19 and SB24 genotypes in Trial I and II, respectively. When P was applied at the highest rate of 30 Kg per ha, SEF increased from the control treatment to 135% and 157%, and 126% and 131% for SB19 and SB24 genotypes in Trial I and II, respectively (Table 3). Compared to control integration of R and P at the highest rate of 200 g and 30 Kg per ha, increased SEF by 106% and 154%, and 101 and 127% for SB19 and SB24 genotypes in Trial I and II, respectively (Table 2).

Table 3: Effect of Rhizobia and Phosphorus on Symbiotic Efficiency (%), Phosphorus (Kg/Kg) and Rhizobium (Kg/Kg)

<table>
<thead>
<tr>
<th>Variety</th>
<th>Trt</th>
<th>SEF (%)</th>
<th>PUE (Kg/Kg)</th>
<th>SEF (%)</th>
<th>PUE (Kg/Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trial I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SB19</td>
<td>T1</td>
<td>101d</td>
<td>0d</td>
<td>107d</td>
<td>0d</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>108d</td>
<td>4.65c</td>
<td>119d</td>
<td>4.8c</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>135cd</td>
<td>3.9c</td>
<td>157cd</td>
<td>3.9c</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>129cd</td>
<td>0d</td>
<td>165cd</td>
<td>0d</td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>153bc</td>
<td>8.15a</td>
<td>182bc</td>
<td>8.15b</td>
</tr>
<tr>
<td></td>
<td>T6</td>
<td>176ab</td>
<td>6.49b</td>
<td>149bc</td>
<td>3.78c</td>
</tr>
<tr>
<td></td>
<td>T7</td>
<td>130cd</td>
<td>0d</td>
<td>152cd</td>
<td>0d</td>
</tr>
<tr>
<td></td>
<td>T8</td>
<td>167ab</td>
<td>8.6a</td>
<td>200ab</td>
<td>8.96a</td>
</tr>
<tr>
<td></td>
<td>T9</td>
<td>207a</td>
<td>6.9a</td>
<td>261a</td>
<td>8.75a</td>
</tr>
<tr>
<td>SB24</td>
<td>T1</td>
<td>101d</td>
<td>0d</td>
<td>100d</td>
<td>0</td>
</tr>
<tr>
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<td>T2</td>
<td>103d</td>
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<td></td>
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<td>3.6c</td>
</tr>
<tr>
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<td>T4</td>
<td>114cd</td>
<td>0d</td>
<td>116cd</td>
<td>0d</td>
</tr>
<tr>
<td></td>
<td>T5</td>
<td>145bc</td>
<td>7.8a</td>
<td>155bc</td>
<td>3.8c</td>
</tr>
<tr>
<td></td>
<td>T6</td>
<td>187ab</td>
<td>6.6bc</td>
<td>209bc</td>
<td>4.2b</td>
</tr>
<tr>
<td></td>
<td>T7</td>
<td>119cd</td>
<td>0d</td>
<td>122cd</td>
<td>0d</td>
</tr>
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<td></td>
<td>T9</td>
<td>201a</td>
<td>9.4a</td>
<td>227a</td>
<td>9.5a</td>
</tr>
</tbody>
</table>

MSD 31 1.3 46 1.4
CV (%) 25 58 31 59

*Means with the same letter along the column for the same variety are not significantly different at (p≤0.05); MSD=Mean Significant Difference; Treatments: T1 =Control (0 g R and 0 Kg P per ha); T2 and T3=20 Kg and 30 Kg P per ha respectively; T4 and T7=100 g R and 200 g R per ha respectively; T5=100 g R and 20 Kg P per ha, T6=100 g R and 30 Kg P per ha; T8 =200 g R and 20 Kg P per ha and T9 =200 g R and 30 Kg P per ha; PUE=Phosphorus Use Efficiency; SEF=Symbiosis efficiency
Integration Effect of Different Rates of R and P on Phosphorus Use Efficiency

There were no significant difference in phosphorus use efficiency (PUE) between genotype SB19 and SB24 within and between Trials I and II (p≤0.05). However, there were significant respond of the integration of R and P in PUE within genotypes SB19 and SB24 at (p≤0.05) in Trials I and II. When P was applied at the rate of 20 Kg per ha, the soybean grain yield obtained increased to 4.65 Kg/Kg and 4.8 Kg/Kg, and 4.2 Kg/Kg and 4.28 Kg/Kg for SB19 and SB24 soybean genotypes in Trial I and II, respectively (Table 3). Furthermore, when P was applied at the rate of 30 Kg per ha the soybean grain yields increased from the control treatment to 3.93 Kg/Kg and 3.9 Kg/Kg, and 3.58 Kg/Kg and 3.6 Kg/Kg for SB19 and SB24 genotypes in Trial I and II, respectively. Integration of R and P at the highest rate of 200 g and 30 Kg per ha increased grain yield from the control treatment to 6.9 Kg/Kg and 8.75 Kg/Kg, and 9.37 Kg/Kg and 9.48 Kg/Kg for SB19 and SB24 genotypes in Trial I and II, respectively (Table 3).

DISCUSSION

There was significant increase of shoot and grain N uptake in the present research. These probably, could be associated with R and P. Which enhanced N fixation, root length and root mass. Resulting to absorption of mineral nutrients from the soil, particularly available N. Similarly, significant increase in root nodules due to integration of R and P, probably, increased N fixation. This led to increase in N uptake which is in agreement with Bargaz et al. (2018) who observed that, P plays a vital role in physiological and developmental process in plants. Similarly, significant increase in root nodulation due to integration of R and P increased N fixation that led to increase in N uptake by shoot and grain of soybean.

Higher P content in shoot and grain was attributed to the root length of soybean. A long root system might have created a greater root-soil contact which increased P uptake hence high P content in shoot and grain. These findings are in agreement with Mathenge (2019) who observed that a larger root system enhanced by P provided greater root-soil contact hence higher uptake. Furthermore, high shoot and grain P content can be attributed to the presence of R applied which enhanced the solubilization of the P in the soil increasing available P for the uptake. This is in agreement with Adjei-Nsiah et al. (2019) who observed that rhizobium has the ability to solubilize P increasing P concentration in the soil. This concurs with Abbasi et al. (2010) who reported that ssoybean grain/straw P uptake was increased with increased integration of P and R.

High SEF observed in control treatment in both Trials, probably, suggest that native R were active and effective, which consequently increased SDW. Further, the good performance of control, could be associated with native strain adaptation to the ecological conditions of the study area. These results are in agreement with the findings by Kawaka et al. (2014) who reported SEF ranging between 67 and 170% when common beans were inoculated with native rhizobia. High performance of commercial R probably, could be associated with the commercial strains being more adapted to the study area compared to the native strains, leading to higher performance in SEF. This is contrary to Mungai and Karubiu, (2011) who observed native rhizobia isolated from common beans having higher SEF compared to commercial inoculants. Integration of R and P had the highest SEF, probably, this was associated with enhanced energy provision by P which improved the performance. This concurs with the findings by Bargaz et al. (2018) who reported BNF having a high P energy demand.

Low PUE where P was applied alone in the present study, probably, may be associated with P fixation in the soil (beyond scope of this study) making P less available to the plants. This concurs with findings by Fageria and Barbosa (2007) and Singh et al. (2005) who observed higher P fixation decreasing PUE in lentil and rice enterprises, respectively. Overall, the present study observed low soybean grain produced for every Kg of P applied for soybean genotype SB19 and SB24 in trial I and II, respectively. This economic production was below findings by Abbasi et al. (2010) who reported higher soybean grain yield produced with each Kg of phosphorus applied.

CONCLUSIONS AND RECOMMENDATIONS

This study demonstrated that integration of R and P at the rate of 200 g and 30 kg per ha was the optimum rate of application compared to other treatment levels in soybean performance. It was observed that symbiotic and phosphorus use efficiency was influenced by the R and P for SB19 and SB24 soybean genotypes. The two genotypes, SB19 and SB24 performed equally well. Farmers can adopt integration of R and P at the rate of 200 g and 30 kg per ha and either of the genotypes for sustainable soybean cultivation. Use of other sources of P such as phosphorus solubilizing bacteria to enhance symbiotic and phosphorus use efficiency can be studied in the area.
ACKNOWLEDGEMENT
The authors acknowledge Chuka University for the provision of the Trial sites and laboratory space where research was done. Thanks to the entire Plant Science Department for their moral support throughout the research period.

REFERENCES


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ABSTRACT
The objective of this work was to investigate the effect of increasing dietary crude protein (CP) on feed intake, growth, feed efficiency and nutrient apparent digestibility on three breeds of goats, namely Toggenburg, Alpine and Small East African. Thirty six male goats approximately 5 months old with live weight of 14.5±0.5 were assigned three different diets under a factorial experimental design. They fed the basal fed from the inception of the feeding trial to the end. Dairy feed intake by every experimental goat and fortnight growth were three treatments namely NGO, NG200 and NG400. The dietary experimental concentrate contained 76% maize grain and 24% sunflower cake which contained a crude protein of 10.27%. Each goat was housed in individual metabolic cages. Daily feed intake and body weight gain were determined and also feed efficiency was determined. The initial weight for three breeds was Toggenburg, Alpine and Small East African respectively. Their final live weight was Toggenburg, Alpine and Small East African respectively. The result show that increasing CP levels in the diet resulted in linear increase of feed intake and body weight gain which was not significant (P>0.05). Feed efficiency improved with increased CP Level. The effects of treatment on apparent digestibility were not significant (P>0.05). Therefore the results of this study show that increasing CP Level improved performance in the three breeds. Supplemental diet was offered on the basis of dry matter feed intake weights, were collected until the end of the feeding trial. Feed intake for all the levels of supplementation was almost equal with an average of 0.6kgDM per day. However the feed intake after 6 months of the feeding trial was higher with about 0.2kgDM per day. The determination of the feed intake and growth intake was carried out in two phases of six months from June 2017 to June 2018. Feed conversion Efficiency among the treatment groups significant with the non-supplemented goats showing lowest performance in growth rate and efficiency.

Keywords: Supplemental diet, Male goats, Napier grass, feed intake and efficiency.

INTRODUCTION
Ruminants are the backbone of Kenya livestock industry and particularly goats act as a major source of livelihood for small, landless farmers in rural areas (Pandey et al., 2013). Growth performance of small ruminant such as goat’s primary depends on the availability of good quality feeds and the feeding regime employed by the farmers. Low growth rate is acknowledged to be the major limiting factor in goat production and the plane of nutrition can markedly improve weight gain though the degree of response varies with breed (Helal et al., 2014). Under high and balanced plane of nutrition, the growth rate of goats increases (Mohammad, et al., 2013.). Dietary nutrients, especially energy and protein are the major nutritional factors affecting meat production in goats (Tshabalala et al., 2003). Goats, like other ruminants have different growth and development patterns, and data on live goat measurements of different breed types, ages, and gender classes are necessary to establish classification groupings of live goats (Luciana et al., 2011). Goats require a balanced diet as a tool for increased production of meat and other products for the growing population in Kenya. Goats can play a vital role in meeting up the demand of protein for human consumption through proper feeding and improving traditional system of feeding by using economic balanced diet. Sufficient protein supply can improve growth, feed conversion efficiency and performance in goats. Optimum protein levels for achieving high growth and performance efficiency are variable. Prieto et al. (2000) reported that optimum protein levels for fatting of kids were about 14%. Negesse et al., (2001) showed that the kids fed with 8% dietary CP level had lower average daily gain (ADG) and dry matter intake (DMI) than the kids fed with 10.5, 12.8, 15.5 dietary CP levels. Hwangbo et al., (2009) reported that the kids fed with 18% CP in diet had significantly higher ADG when compared with the kids fed with 14, 16 and 20% CP in diet. Therefore, the objective of this study was to investigate the effects of three plane of supplementation on feed intake, growth performance and feed conversion efficiency of three genotypes namely Toggenburg, Alpine and Small East Africa goats.

MATERIALS AND METHODS
Study Site
The experiments was carried out at the Goat Unit at Chuka University farm, in Tharaka Nithi County, Kenya. The site is situated between Longitudes 37 18’37”and 37 28’33”East & Latitude 00 07’23” and 00 26’19”South. The altitude of study site area ranges from 5200 meters above sea level at the peak of Mt. Kenya to 600 meters in the marginal areas. The study site area as a bi-modal rainfall pattern with rains falling during the months of March to
May and October to December. The highest amount of rainfall ranges from 2200mm to 500mm. The short rains of October to December are more reliable than long rains of April to June. Temperatures ranges between 14°C and 17°C in the area around Mt Kenya while those of the lowlands ranges between 22°C and 27°C. The experiments were conducted between May 2017 and June 2018.

**Experimental Feeds and Experimental Layout**

Napier grass (*Pennisetum purpureum*) is the most popular fodder plant for small scale farmers in Kenya due to its high yields and ease of harvesting. It is a native of Tropical Africa (Kariuki *et al*., 2001). It is a perennial and robust forage growing to a height of 2 – 6 m with up to 20 nodes. The leaves range from 30 – 120cm in height, 1-5cm in width and are glabrous or hairy. Cultivars differ in thickness of stems, size of leaves; hairiness of stems and leaf sheaths, general vigor, the size of hefts, the number of tillers and height of plant. There are over thirty varieties of napier that have been tested in Kenya, but only a few varieties, namely; Bana grass (Gold Coast), French Cameroon, Kakamega 1, Clone 13 and Pakistan hybrid, have received wide acceptance (Kariuki *et al*., 2001).

Napier Grass that was used in the feeding trail basis from the site of harvest. The three main areas where napier grass was harvested and collected were Njaina, Chogoria and Rubate. The collected napier grass was analyzed for chemical composition at Nutrition Laboratory of University of Nairobi, Kabete Campus. The napier grass was harvested and carried on daily. Prior to feeding, the experimental feed was harvested a day before and then chopped the following day using a chaffcutter (Kariuki *et al*., 2001).

**Sampling and Chemical Analysis of Feeds**

Chemical analysis of the ingredients to formulate the experimental concentrate was done at the University of Nairobi Nutrition Laboratory. The formulated ration was analysed at the Department of Animal Production, University of Nairobi. Determination of dry matter (DM), ash, crude protein (CP), ether extract (EE), crude fiber (CF) were done according to AOAC (2000). The neutral detergent fibre (NDF), acid detergent fiber (ADF) analysis was done as per Goering and Van Soest (1991) procedures.

**Table 1. The chemical composition of the Napier grass, sunflower cake and ground maize used in the feeding the experimental goats**

<table>
<thead>
<tr>
<th>Sample Description</th>
<th>DM%</th>
<th>ASH%</th>
<th>FAT%</th>
<th>FIBRE%</th>
<th>CP%</th>
<th>NFE</th>
<th>NDF %</th>
<th>ADF%</th>
<th>ADL%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Napier grass</td>
<td>22.3</td>
<td>17.14</td>
<td>2.44</td>
<td>35.35</td>
<td>7.99</td>
<td>35.9</td>
<td>72.75</td>
<td>37.48</td>
<td>3.15</td>
</tr>
<tr>
<td>Sunflower cake</td>
<td>92.29</td>
<td>3.18</td>
<td>28.38</td>
<td>26.71</td>
<td>19.62</td>
<td>22.11</td>
<td>47.05</td>
<td>33.41</td>
<td>18.86</td>
</tr>
<tr>
<td>Ground White maize grain</td>
<td>90.45</td>
<td>1.77</td>
<td>6.59</td>
<td>6.04</td>
<td>9.04</td>
<td>76.56</td>
<td>16.34</td>
<td>3.01</td>
<td>0.56</td>
</tr>
<tr>
<td>Experimental diet(concentrate)</td>
<td>88.27</td>
<td>4.31</td>
<td>5.51</td>
<td>10.41</td>
<td>10.27</td>
<td>69.5</td>
<td>40.77</td>
<td>8.22</td>
<td>3.26</td>
</tr>
</tbody>
</table>

**Feed Formulation and Feeding Plan**

After the chemical analysis of the two ingredients namely ground Maize flour and Sunflower cake, the former was used as the principal component (70%) of the experimental diet, while the later constituted 30% of the diets (Rashid *et al*., 2016). The principals ingredients was the main source of (energy sources) and sunflower cake as the main protein source. The chemical composition of the ingredients used to formulate the experimental diet (concentrate) is shown on Table 1 (Mohsen *et al*., 2011). The amount of concentrate offered to the low and high plane cluster of the experimental animals was determined as the feeding trial proceeded. However the changes of the amount offered to the two level of supplementation was done after every 3 months. The low plane group begun with 50g per goat and this amount was increased gradually up to the level of 200 grammes per day per goat while the high plane group begun at 100grammes and the amount was increased gradually up to the level of 400 grammes (Rashid *et al*., 2016)

**Experimental Layout and Feeding of the Experimental Animals**

After the arrival of all the goats, the goats were weighed and randomly assorted into three groups (of 12 individuals each) to correspond to the three experimental units. Each group was further subdivided into 3 replicates of 4 individual animals. The animals were then kept on a preliminary period of 14 days for the purpose of acclimatization. Forages were chopped to about 5 to 10 cm long using a chaffcutter and offered immediately the goats consumed the concentrates. The daily allowance of feed (as fed) per head was on average 2kgs divided equally into morning and evening meals. This amount was decided after it was established that small ruminant could
consume about 3% of its body weight. Animals were also provided with clean drinking water *ad libitum* and a mineral block contained in the feed trough.

**DATA COLLECTION**

**Voluntary Feed Intake (VFI) Measurement**
Groups voluntary feed intake was estimated by arithmetic difference between amount offered and the amount refused after each meal. The daily intake was thus a subtraction of the amount each goat was given in the morning and left over collected the following day in the morning. All the concentrates were apparently completely consumed as no traces of left overs could be observed.

**Growth Performance Measurement**
The experimental animals were weighed after the end of 14 days preliminary period. The animal’s weight taken was recorded as the initial body weight. Thereafter measurement of weight was done fortnightly early in the morning before the ration of the day was offered. Similarly, the final body weight was taken after the end 365 days of feeding experiment when the animals were being slaughtered.

Body weight changes of animals were computed as:

\[
\text{Average daily gain (ADG)} = \frac{\text{(Final weight (kg)} - \text{Initial weight})}{\text{Number of days}}.
\]

**Goat Performance**

Growth performance of small ruminant primary depends on the availability of good quality feeds and the feeding regime employed by the farmer. Low growth rate is acknowledged to be the major limiting factor in goat production and the plane of nutrition can markedly improve weight gain though the degree of response varies with breed (Kassahun, 2000). A major constraint to the performance of the goats is the inadequacy of feeds, particularly during the dry season when the quality and quantity of natural pasture declines resulting to low intakes and reduced animal productivity. The dry matter intake and digestibility is increased by the addition of energy sources such as maize in the diet(Sandra *et al.*, 2009) and supplementation with rich protein sources improves the digestibility of poor quality feeds(Komwihangilo *et al.*, 2000). Goats are selective feeders and their feed intake can be reduced under confinement and therefore careful attention should be observed when determining adlibitum intake (Goetsch *et al.* 2010). Dietary nutrients, especially energy and protein are major nutritional factors affecting meat production in goats (Tshabalala *et al.*, 2003).

It has been observed that the dry matter intake of free choice goats increased by 12% compared to those under control experiment. As for all ruminants a minimum level of effective dietary fibre is required to maintain a neutral PH in the rumen to facilitate digestion. Hirut *et al.*, 2011 stated that the lower basal diet dry matter intake in high level of supplementation could be attributed to the high intake of the supplemental dry matter as a proportion of total dry matter intake, thus preventing maximum intake. The higher feed intake recorded by the animals supplemented with a concentrate mixture(Maize and sunflower) is in agreement with the findings of Hyelda *et al.*, 2007 and ondiek *et al.*, 2013 who observed significant increase in feed intake in his trial with goats fed cereal crop residues supplemented with sunflower deed cake. Supplementing basal feeds with a maize and sunflower feed mixture positively influenced the growth performance of the goats.

There was no significant differences (P<0.05) between treatment’s. The control group was the least in feed conversion ratio when compared to other treatments because it was not supplemented with the concentrate mixtures. The average daily gain for Toggenburg and Alpine breed was 49.56 g/day and 49.11 g/day respectively (Ayo, 2002). However, SEA goats under similar dietary regime grew at 35.5 g/day (Safari *et al.*, 2009). Amine *et al.*, 2019 reported an average daily weight gain of 43.33g/day. The total weight gain at the end of the feeding trial though not statistically different at (P>0.05) for Toggenburg, Alpine and Small East Africa goats was 16.75kgs, 16.6kgs and 12.0kgs respectively (Talat., 2006).

**Statistical Analysis.**
The data on feed intake and body weight changes were analysed using analysis of Variance in factorial experimental design. Mean values were tested for differences (p<0.05) between treatments with least significance differences using SPSS (version 22.0, SPSS INC., Chicago IL, USA. The data generated was subjected to one way analysis of variance (ANOVA) using SPSS Version 22. Means were separated using least significance difference (LSD).
Table 2. Feed intake and growth of goats offered concentrates at different levels

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TOG 0g</th>
<th>200g</th>
<th>400g</th>
<th>ALP 0g</th>
<th>200g</th>
<th>400g</th>
<th>SEA 0g</th>
<th>200g</th>
<th>400g</th>
<th>B</th>
<th>L</th>
<th>BXL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feed intake (kg)</td>
<td>0.67±0.06</td>
<td>0.57±0.02</td>
<td>0.57±0.02</td>
<td>0.62±0.07</td>
<td>0.57±0.06</td>
<td>0.58±0.02</td>
<td>0.64±0.04</td>
<td>0.48±0.02</td>
<td>0.56±0.02</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Forage (kg)</td>
<td>0.68±0.02</td>
<td>0.67±0.02</td>
<td>0.57±0.02</td>
<td>0.67±0.02</td>
<td>0.67±0.02</td>
<td>0.67±0.02</td>
<td>0.67±0.02</td>
<td>0.65±0.02</td>
<td>0.66±0.02</td>
<td>S</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Total growth (kg)</td>
<td>4.47±0.81</td>
<td>10.43±1.6</td>
<td>16.75±1.9</td>
<td>4.07±1.27</td>
<td>10.7±0.71</td>
<td>16.6±1.9</td>
<td>2.65±0.55</td>
<td>8.2±0.78</td>
<td>12.0±0.91</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Initial weight (kg)</td>
<td>14.78±0.62</td>
<td>14.25±0.95</td>
<td>13.88±1</td>
<td>14.08±0.47</td>
<td>14.1±0.73</td>
<td>14.02±1</td>
<td>13.35±0.31</td>
<td>14.25±0.36</td>
<td>14.75±0.14</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Final weight (kg)</td>
<td>19.25±1.36</td>
<td>24.68±0.84</td>
<td>30.63±0.92</td>
<td>19.25±1.36</td>
<td>24.8±1.38</td>
<td>30.63±1.76</td>
<td>16.0±0.65</td>
<td>22.48±0.57</td>
<td>26.75±0.92</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Average dairy gain (kg)</td>
<td>0.01±2.39</td>
<td>0.03±4.73</td>
<td>0.04±5.68</td>
<td>0.01±3.76</td>
<td>0.03±2.09</td>
<td>0.04±5.69</td>
<td>0.01±1.9</td>
<td>0.02±2.31</td>
<td>0.03±2.7</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>FCE</td>
<td>0.02</td>
<td>0.054</td>
<td>0.08</td>
<td>0.02</td>
<td>0.05</td>
<td>0.08</td>
<td>0.01</td>
<td>33.47</td>
<td>0.06</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean values in the same row with different superscript differ significantly (P<0.05).
S(Evidence of significance). NS(No evidence of significance).

Table 3. Feed intake and growth of goats in the first and last 6 months of feeding concentrate at different levels

<table>
<thead>
<tr>
<th>Parameters</th>
<th>0-6 Months(E)</th>
<th>6-12 Months(L)</th>
<th>Significance</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TOG ALP SEA</td>
<td>TOG ALP SEA</td>
<td>B</td>
<td>L</td>
</tr>
<tr>
<td>Feed intake (kg)</td>
<td>0.428±0.014</td>
<td>0.430±0.015</td>
<td>0.429±0.008</td>
<td>0.723±0.01</td>
</tr>
<tr>
<td>Forage (kg)</td>
<td>0.48±0.01</td>
<td>0.507±0.012</td>
<td>0.512±0.009</td>
<td>0.806±0.012</td>
</tr>
<tr>
<td>Total growth (kg)</td>
<td>5.26±1</td>
<td>5.03±0.88</td>
<td>4.15±0.77</td>
<td>4.017±0.8</td>
</tr>
<tr>
<td>Initial weight (kg)</td>
<td>14.3±0.47</td>
<td>14.07±0.4</td>
<td>14.16±0.21</td>
<td>20.833±0.84</td>
</tr>
<tr>
<td>Final weight (kg)</td>
<td>19.81±0.72</td>
<td>19.28±0.99</td>
<td>17.75±0.68</td>
<td>24.85±1.51</td>
</tr>
<tr>
<td>Average dairy gain (g)</td>
<td>31.15±5.8</td>
<td>29.73±5.2</td>
<td>24.7±4.8</td>
<td>25.75±5.1</td>
</tr>
<tr>
<td>FCE</td>
<td>0.073</td>
<td>0.069</td>
<td>0.058</td>
<td>0.036</td>
</tr>
</tbody>
</table>
RESULTS AND DISCUSSION

The feed intake at all levels of supplementation was not significant among all the breeds. However, the feed intake at zero level of supplementation (control diet) was the highest but it was statically not significant when compared with the breeds of goats. The feed intake at low level of supplementation for Toggenburg, Alpine and Small East Africa was 0.672kg/Dm, 0.629kg/Dm and 0.64kg/Dm respectively (Table 2). The value after analysis of variance was lower than the value of 0.05 significance value (P<0.05). The feed offered to the three breeds was also significant especially when the feed offered to Toggenburg was compared to the other two breeds. (Mohsen et al., 2011).

The goats that were supplemented at the level of 400 grammes per day turned to have a better average daily gain compared to those supplemented at the zero and 200 grammers per day. The average daily gain for the goats supplemented at 400 grammes for Toggenburg, Alpine and Small East Africa was 0.086kgs, 0.084kgs and 0.0629kgs respectively. The goats at zero level supplementation had the lowest average daily gain. The goats at 400 grammes level of supplementation have the highest feed conversion efficiency, followed by those at 200 grammes and those at zero supplementation had the lowest feed conversion efficiency (Table 2). Highest amount of protein supplementation sometimes has the lowest value of dry matter intake. The possible reason behind this may be due to the low ruminal degradation rate of high volume feeds that slows the rate of passage and digestion leading to greater rumen fill and thereby decreasing dry matter (Baumont et al., 2000). Average dairy gain for 0-6 months for all the breeds of the goat was better than the Average dairy gain for the second cycle of 6-12 months. The feed Conversion efficiency of feeds for all the three breeds dropped after the first cycle of 6 months of the feeding trial (Table 3).

CONCLUSION

The high plane of supplementation provided the best diet especially for dietary energy and crude protein nutritional factors. Crude protein and dietary energy are the main determinants for growth and meat production in goats (Devendra, 1988). Intake in forages was lower and the digestibility of potentially digestible DM in the forages was higher in goats compared with goats presumably because of slowed rate of passage of the high fibre material in goats. Dry matter intake varies according to protein sources and it is largely dependent on basal composition of diet (Lindela et al., 1995). The use of concentrate diet to supplement the basal diet improved the total feed intake and weight gain for both the goats fed at the low level of supplementation compared to the control group. This concentrate can improve performance of goats with low quality basal feed (Abakura et al., 2017).

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INCIDENCE AND SEVERITY OF TURCICUM LEAF BLIGHT CAUSED BY EXSEROHILUM TURCICUM (PASS.) LEONARD AND SUUGS) ON SORGHUM POPULATIONS IN DIFFERENT REGIONS OF THARAKA NITHI COUNTY, KENYA

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ABSTRACT
Sorghum [Sorghum bicolor (L.) Moench] is a drought tolerant food crop preferred by subsistence farmers in dry areas which experience low annual rainfall. However, Turcicum Leaf Blight (TLB) caused by Exserohilum turcicum has threatened sorghum production in the world. New sorghum varieties have been introduced into the Kenyan production systems, including the drier parts of Tharaka Nithi County to boost yield and thus meet the increased demands for food and as a raw material by brewing industries. Nonetheless, challenges due to infection by TLB have negatively impacted on sorghum production resulting from damaged photosynthetic leaves. This study was conducted to determine the incidence and severity of TLB on sorghum populations in different regions of Tharaka Nithi County. Sorghum farms in eleven villages for the study were selected by multistage random sampling. The study was conducted between the month of January and June 2018. Data analysis was done by SAS software version 9.4 and significantly different means separated using LSD test at 5% probability level. There was statistically significant difference in the severity and incidence of E. Turcicum leaf blight on sorghum population from different regions in Tharaka Nithi County (P<0.05). Disease TLB occurred in all the villages surveyed though at different frequencies. The disease incidence was higher at Kithaga, and Nkairini recording 74.45% and 55.93%, and lowest at Gatuntu and Gituntu both recorded the disease incidences 12.22%. Thus, farmers should be educated on sorghum TLB management for increased sorghum production and higher income to farmers.

Keywords: Incidence, Severity, TLB, Sorghum, Tharaka-Nithi, Kenya

INTRODUCTION
Sorghum is the fifth most important cereal crop after wheat, maize, rice and barley (Traore, 2016) and a dietary staple food for millions of people worldwide (Fetene et al., 2011; Mutisya et al., 2016). Sorghum provides energy, protein, vitamins and minerals (Motlaodi, 2016). It is a food security crop in most areas experiencing low annual rainfall (Chepng’etich et al., 2014) and takes about three to four months to mature. In Africa, sorghum ranks second after maize among cereals (Taylor, 2012). In East and Central Africa sorghum is grown in about 10 million hectares (ha) with Northern Sudan accounting for 21.4% of Africa’s sorghum production, Ethiopia 7.3%, Tanzania 3.5%, Uganda 2%, Rwanda 0.8% and Kenya 0.6% (Mitaru et al., 2012) making Kenya an insignificant producer of sorghum in the region although the national demand for sorghum food product has increased tremendously (FAO, 2014). In Kenya sorghum production is in the semi-arid low lands (Machakos, Kitui, Makueni, Mwingi, Embu, Tharaka Nithi, and Kajiado counties), moist-mid altitude (Busia, Siaya, Kakamega, Kisumu, Homabay, Kisii and Migori counties), cold semi-arid Highlands (Nakuru, Baringo, Laikipia and Taista Taveta Counties), Humid Coast (Kilifi, Lamu, Kwale, and Mombasa Counties (Kange et al., 2014; Biovision, 2017).

Low sorghum production in Kenya has partly contributed to food insecurity brought about by constraints like drought, pest and diseases which are determined by complex changes in crops and agricultural practice brought about by climate change (Timu et al., 2014). Fungal diseases implicated in low sorghum production include, downy mildew (Peronosclerospora sorghii), Turcicum Leaf Blight (Exserohilum turcicum), Anthracnose (Colletotrichum sublineolum Henn.) and sorghum smuts- (Sporisorium sorghi Ehrenberg (Link), loose smut (Sphacelotheca cruenta (Kuhn), Langdon and Fullerton) and long smuts (Tolyposporium entrenbargii (Kuhn) Pattouillard) (Teklay and Muruts, 2015). Yield reductions due to TLB can be significant depending on disease severity, timing, and plant susceptibility (Weems, 2016). However little attention has been given to study the significance of these fungal diseases in their role in low sorghum production.

Infection by TLB is particularly important due to its wide distribution and high grain losses associated with it in maize and sorghum farms (Rajeshwar et al., 2014). There still exists a knowledge gap on the incidence and severity of TLB infestation in Tharaka Nithi County. Severe TLB Incidences in sorghum has been reported in neighbouring
countries like Uganda (Beshir et al., 2012; Beshir et al., 2015) Ethiopia (Teklay and Muruts, 2015) and Sudan (Beshir et al., 2015) but there is scanty information on the epidemiology of TLB in Kenya. In their work, (CGoK, 2018) investigated the sorghum anthracnose (Colletotrichum sublineolum) and leaf blight (Exserohilum turcicum) in Busia county in Kenya, between 1994 and 1996 and reported that sorghum TLB was responsible for up to 1.5 % of yield loses. However, the knowledge on the occurrences of sorghum TLB in other regions in Kenya such as Tharaka Nithi County and its effect on production before this study was scanty.

MATERIALS AND METHODS
Tharaka Nithi County borders the County of Embu to the South and South West, Meru to the North and North East, Kirinyiga and Nyeri to the West and Kitui to the East and South East. The county lies between latitude 000 07' and 000 26' South and between longitudes 37° 19' and 37° 46' East. The highest altitude of the county is 5,200m while the lowest is 600 m Eastwards in Tharaka. The average annual rainfall of 717 mm. The highlands (upper zone) comprise of Maara and Chuka which receive adequate rainfall for agriculture. The semi-arid (lower zone) covers Tharaka receiving less rainfall. The high-altitude areas have reliable rainfall. The lower regions receive low, unreliable and poorly distributed rainfall. Temperatures in the highland areas range between 14 °C to 30 °C while those of the lowland area range between 22 °C to 36 °C. Tharaka constituency experiences temperatures of up to 40 °C at certain periods. The county has a bi-modal rainfall pattern with the long rains falling during the months of April to June and the short rains in October to December (CGoK, 2018). Ferrasols soils which are highly weathered and leached is predominant in Tharaka Nithi County (Jaetzold et al., 2006)[19]. The soil in the experiment site are considered infertile as they are deficient in nitrogen (N) phosphorus (P) and zinc (Zn). Major crops in the area are; Phaseolus vulgaris, Zea mays, Vigna unguiculate, Manihot esculenta, Cajanus cajan, Sorghum spp., Eleusine coracana among others (CGoK, 2018).

Figure 2 Map of Tharaka Nithi County
Survey Method for the Incidence and Severity of TLB on Sorghum Populations
The farms in this study were selected by multistage random sampling method. From each constituency two wards were selected followed by selection of two villages. Sorghum farms in the selected village were listed from which two farms were picked randomly based on the history of growing sorghum for the study. The eleven villages were; Gatuntu, Gituntu, Kamwati, Kanwa, Kanyiritha, Kithaga, Kithinge, Mikuu, Miranji, Nkairini and Tunyai. At farm level stratified random sampling method was used to assess sorghum plants for TLB incidence. Ten sampling locations within sorghum farm were marked using etrex 30x Garmin GPS. Distance between sampling stations was four meters away. Three plants around the marked area at the distance of one meter in front, left and on the right were evaluated for TLB diseases occurrence based on spindle cigar shaped necrotic lesions, the typical characteristic of TLB. Evaluation was followed by rating using scale 1-6 according to Manu et al (Table 1) [Manu et al., 2018] and Sermons and Balint-Kurti (2018).

Supplementary Table 1: Disease Score Criteria

<table>
<thead>
<tr>
<th>Rating value</th>
<th>% LA infected</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>Free from disease</td>
</tr>
<tr>
<td>2</td>
<td>1≤ 5</td>
<td>a few restricted lesions on the lower leaves</td>
</tr>
<tr>
<td>3</td>
<td>6≤10</td>
<td>several small and large lesions on many leaves</td>
</tr>
<tr>
<td>4</td>
<td>11≤25</td>
<td>Slight symptoms Moderate; many large lesions not coalesced</td>
</tr>
<tr>
<td>5</td>
<td>26≤40</td>
<td>Moderate symptoms; many enlarged and coalesced lesions</td>
</tr>
<tr>
<td>6</td>
<td>&gt; 50</td>
<td>Very severe symptoms; coalesced lesions, leaf wilting, tearing and blotching</td>
</tr>
</tbody>
</table>

Disease Score Criteria Manu et al (Manu, 2018)

Disease Incidence Formula
Disease incidence defined as the extent of infection in the field, and calculated using the formula:

\[ \text{Disease incidence (\%)} = \frac{\text{Number of infected plants}}{\text{Number of plants in the field}} \times 100 \]  


Percent disease index Formula
Severity results from number and size of the lesions. Disease severity was calculated using the following formula

\[ \text{PDI} = \frac{\text{Sum of numerical grading}}{\text{2leaves examined}} \times \text{maximum disease grading} \times 100 \]  

RESULTS
Incidence of Sorghum Turcicum Leaf Blight in Different Area of Tharaka Nithi County
There was a significant difference in incidences of TLB in the area of study (p<0.05). The highest infection rate by TLB was recorded at Kithaga location with an incidence value of 74.94% while the least infection rate was at Gatuntu with mean of 13.9500. Five villages; Kithaga, Nkairini, Kamwati, Kithinge and Kanwa recorded means above the overall mean of 34.58% while the 6 remaining villages recorded incidences below 34.58% (Table 2).

Table 2: Incidences of TLB at Different Locations in Tharaka Nithi County

<table>
<thead>
<tr>
<th>Location</th>
<th>Incidence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kithaga</td>
<td>74.9367 a</td>
</tr>
<tr>
<td>Nkairini</td>
<td>54.0833 b</td>
</tr>
<tr>
<td>Kamwati</td>
<td>44.0767 b c</td>
</tr>
<tr>
<td>Kithinge</td>
<td>42.9633 b c</td>
</tr>
<tr>
<td>Kanwa</td>
<td>42.5800 b c</td>
</tr>
<tr>
<td>Mikuu</td>
<td>33.3400 c d</td>
</tr>
<tr>
<td>Miranji</td>
<td>24.4467 c d e</td>
</tr>
<tr>
<td>Kanyiritha</td>
<td>20.0000 d e</td>
</tr>
<tr>
<td>Tunyai</td>
<td>17.1767 d e</td>
</tr>
<tr>
<td>Gatuntu</td>
<td>13.9500 d e</td>
</tr>
<tr>
<td>Gituntu</td>
<td>12.8067 e</td>
</tr>
<tr>
<td>Mean</td>
<td>34.5782</td>
</tr>
<tr>
<td>LSD (p≤0.05)</td>
<td>19.918</td>
</tr>
<tr>
<td>CV (%)</td>
<td>34.0178</td>
</tr>
</tbody>
</table>

aMeans followed by the same letters are not significantly different at 5% probability level.
Severity of TLB Infection on Sorghum in Different Area of Tharaka Nithi County

There was a significant difference in severity of TLB in the area studied (p<0.051). The highest severity rate by TLB was recorded at Kanwa (21.06), while Kanyiritha recorded the lowest severity rate with mean of 4.36 (Table 3). Three villages including Kanwa, Mikuu and Kithinge recorded percentage severity above the overall mean of 11.03% while the rest recorded severity lower than 11.03%.

Table 3: TLB Severity of TLB at Different villages in Tharaka Nithi County

<table>
<thead>
<tr>
<th>Location</th>
<th>Severity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kanwa</td>
<td>21.0600 a</td>
</tr>
<tr>
<td>Mikuu</td>
<td>20.5700 a</td>
</tr>
<tr>
<td>Kithinge</td>
<td>18.3133 b</td>
</tr>
<tr>
<td>Miranji</td>
<td>10.7233 c</td>
</tr>
<tr>
<td>Gatuntu</td>
<td>10.1800 c</td>
</tr>
<tr>
<td>Nkairini</td>
<td>9.3800 c</td>
</tr>
<tr>
<td>Gituntu</td>
<td>9.3700 c</td>
</tr>
<tr>
<td>Tunyai</td>
<td>6.9133 d</td>
</tr>
<tr>
<td>Kithaga</td>
<td>5.7500 d,e</td>
</tr>
<tr>
<td>Kamwati</td>
<td>4.7100 e</td>
</tr>
<tr>
<td>Kanyiritha</td>
<td>4.3567 e</td>
</tr>
</tbody>
</table>

| Mean       | 11.0297      |
| LSD (p≤0.05)| 2.1281      |
| CV (%)     | 11.3943      |

Means followed by the same letters are not significantly different at 5% probability level.

DISCUSSION

The TLB disease incidence and severity within 11 villages of Tharaka Nithi County showed high rates of infection. The infection rate varied from one village to the other with Kithaga being the most affected while Gituntu recording the lowest infection rate (Table 2). This variation in the rate of infection may partly be attributed to the presence of different fungal pathogen strains and cultivars found in different regions. Ogolla et al., (2018) reported existence of culturally and morphologically different E. turcicum isolates in Tharaka Nithi County which can attribute to varied incidences of sorghum TLB in most farms. Localities such as Gituntu and Gatuntu mostly grow Mugana sorghum variety and recorded the lowest incidence of TLB infection, while areas such as Kithaga and Nkairini that grow Muruge and Kaguru experienced the highest disease incidence. Varietal preference clearly influenced disease incidence. The findings agree with those of Izge et al., (2009) that sorghum varieties react differently to fungal infections, with some varieties being more susceptible. Susceptible varieties may be lacking genes associated with genomic regions or QTL (quantitative trait loci) which may resist TLB pathogen (Hooda et al., 2017). Increased TLB incidence has been attributed to factors such as breaking down of qualitative resistance, which is not stable and introduction of temperate susceptible germplasm into tropical environments (Vivek et al., 2010). The varieties mostly susceptible to most pathogens may possess vertical mode of pathogen resistance while those susceptible to fewer pathogen may be due to horizontal mode of pathogen resistance (Keane, 2012). Results of TLB disease incidence revealed that farmers prefer Kaguru variety which is the most susceptible to TLB infestation, similar to findings by Beshir et al., (2015). However, the susceptible varieties such as Kaguru are preferred by farmers because they are high yielding and have better market price compared to other varieties.

Agronomic practices such as crop spacing are known to affect the spread of plant fungal diseases in several ways (Burdon and Chilbers, 1982; Flory and Clay, 2013). Effects of narrow spacing of crops include changes in the number of targets hosts available to intercept inoculum as well as the spatial relationship between the hosts and spore dispersal gradients. Higher plant density in the farm can affect the splash dispersal of fungal conidia (Legard et al., 2000). Narrow plant spacing causes more fruits to escape timely harvesting and contribute to increased levels of inoculum (Burdon and Chilbers, 1982; Maloy, 1993). Observation of sorghum farms in Tharaka Nithi County revealed narrow spacing which was the probable reason for the multiplication and spread of the pathogen. Narrow spacing modifies microclimate which may be suitable for pathogen development (Legard et al., 2000). Additionally, most small-scale sorghum farmers in Tharaka Nithi County grow sorghum yearly in the same field, which may cause infection of the crop from pathogen inoculum or spores sustained by crop debris. Similar findings by Manu et al., (2018) showed that mono-cropped agricultural fields show more TLB disease index compared to mixed-cropped
fields. Indeed, mono-cropped plants harbour fungal pathogens hence increasing the rates of spread (Li et al., 2012; Xiong, 2015). The higher spread of pathogen in a monocrop farms is also due to Pathogen inoculum accumulation (Flory and Clay, 2013). In the study area, most of the sorghum farmers rarely use inorganic fertilizers. Yet, fertilizers application is claimed to be important for management of many diseases, since lack of fertilizer makes plants weak and hence more susceptible (Khatun et al., 2011). Adequate fertilizer application was observed to reduce the incidence of Alternaria leaf blight (Khatun et al., 2011; Regmi and Shrestha, 2018). It is plausible to argue that cultivation of sorghum without application of fertilizer in Tharaka Nithi County could be a contributing factor for increased incidence and severity of the sorghum TLB disease.

Results from this study revealed that TLB incidence and severity is a major constraint to sorghum production in Tharaka Nithi County. Thus, an integrated management system which involves the use of diseases control methods such as biological control, use of resistant cultivars and application of fungicides are necessary. Further efforts are also required on maintenance of high standards of hygiene in conducting cultural practices and legislation that restricts use of unregulated seed systems are required to mitigate further disease spread. Previous studies have shown success in use of biological control agents (BCAs) to control TLB in maize. The BCAs previously used include Bacillus spp. (Sartori et al., 2017), epiphytic bacteria (Sartori et al., 2015; Sartori et al., 2017) and antifungal compounds-producing bacteria that inhibit leaf blight disease (Ye et al., 2012). Resistant cultivars and chemical control with mixtures of fungicides have shown success in controlling TLB (Carmona and Sautua, 2015).

CONCLUSION AND RECOMMENDATIONS
The results obtained indicated that TLB incidence and severity varied from one village to the other in Tharaka Nithi county and the incidences are influenced heavily by the agronomic practices.

The study recommends that the county government should educate sorghum farmers on best farm practices to contain and manage TLB spread in the region.

ACKNOWLEDGEMENT
The research was partially funded by Chuka University internal research grant 2017/2018 cycle. I acknowledge the assistance of Mr. Sam Chabari who played key role in farm identification. Lastly, I acknowledge all the staff at the department of Biological Sciences, Chuka University for their consistent support.

REFERENCES


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ON-FARM EVALUATION OF NEW GREEN GRAM VARIETIES FOR ADAPTATION AND ADOPTION IN THE ARID AND SEMI-ARID OF EASTERN KENYA FOR IMPROVED FOOD SECURITY

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ABSTRACT
Green grams (Vigna radiata (L) Wilczek) is an important staple crop and a source of livelihood to most small scale farmers in the semi-arid eastern Kenya. The current production of green grams cannot meet its demand in the local and export markets. The available green gram varieties are low yielding, have a small grain and are late maturing. Farmer’s participatory field experiments were conducted in Meru and Tharaka-Nithi Counties to evaluate the adaptability and acceptability of three new green gram varieties. The trials were laid in a Randomized Complete Block Design with four plots replicated thrice. The objectives were to evaluate the green gram varieties for yield under farmer’s management, assess the farmers’ preferences and test their adaptability in the region. The treatments comprised of green gram varieties; Karembo, Ndengu tosha, Ndengu Biashara and N26 (control). The varieties were planted in plots of 5m x 5m at a spacing of 60 cm x 20 cm and DAP was used as a source of nutrients. The parameters evaluated were grain yield, number of pods per plant and number of seeds per pod. The findings demonstrated that Tharaka nithi county, Karembo variety was highest in yields with 1.171 t ha-1, followed by Biashara with 1.016 t ha-1. The N26 produced 0.671 t ha-1. In Meru County, Biashara gave the highest yields with 1.99T/ha, followed by Karembo and Tosa with 1.47T/ha and 1.02 T/ha respectively. The local check (N26) had a grain yield of 0.43T/ha. There was a significant difference (p<0.05) among the four green gram varieties for grain yield in Meru county. There was a similar trend for both the number of seeds per pod and number of pods per plant where Ndengu Tosa produced the most seeds per pod and pods per plant in both Tharaka nithi and Meru counties with a mean of 15.4 and 18.4 seeds per pod and 25 and 27.6 pods per plant respectively. This was followed by Biashara that produced a mean of 11 seeds per pod and 22.2 pods per plant in Tharaka-nithi and 13.4 seeds per pod 26.6 pods per plant in Meru County. The local variety N26 produced the least number of pods per plant in both sites having a mean of 5.6 seeds per pod and 10.4 pods per plant in Tharaka-nithi and 4.4 seeds per pod, 16.4 pods per plant in Meru County. During the evaluation, the farmers set their criteria for evaluating the performance of the varieties. Farmers mostly preferred varieties which were pest and disease resistant, marketable high grain yielding and non-shattering. Ndengu Biashara ranked highest because it’s early maturity and high yields, followed by Karembo and Tosa. The results revealed that adoption of these varieties will increase yields and in turn increase income for the farmers. Seed bulking will be an important intervention in dissemination of the new seeds.

Keywords: Green gram varieties, evaluation, farmer’s perception, adoption

INTRODUCTION
Green gram commonly known as mung bean (V. radiata (L) Wilezek) is an important crop in the warm dry parts of Eastern Kenya. It is successful in Machakos, Makueni, Kitui and Tharaka-Nithi owing to its early maturity (USAID, 2013a). Green gram can be grown at 0-1600m above sea level. It is relatively drought tolerant with rainfall requirement of 650 mm per annum (CBS 2003).It is well adapted to a range of soil types including sandy loamy and clayey soils at pH 5.5 -7.5. It is a good has a high dietary value having 24% protein, 6mg/100g iron, 30g/100 energy and 1.8g/100g fibre. (USDA, 2018). Green grams can be grown as a sole crop or can be intercropped with a cereal crop. In the intercrop, 1-2 rows of green grams are planted between 2 cereal rows (Swaminathan et al., 2012).The green grams have a strong root system which is capable of fixing nitrogen from the atmosphere into the soil (Jat et., al 2012). Green grams adds about 30-40 kg N/ha after harvesting thereby improving soil fertility. This implies that subsequent crops (mainly cereal crops), will require less N application (Mbeyagala et. al 2017).

It is grown for subsistence and commercial purposes. There is emerging demand for green grams in the export market that is driving its production (ITC, 2017). The green gram yield gap is up to 80% where the actual yield is 0.46MT/ha against the potential of 3MT/ha (Kilimo Trust, 2017). There is an increased demand for green grams in Kenya as a result of the growing population and increasing prices of other legumes. There is also an increased awareness of the nutritional benefits of green grams leading to increased consumption. Green grams in Kenya are mainly bought by individuals who account for 50% followed by institutions such as the hotel industries. This demand does not equal its production due to low, unreliable and scattered production.
The major constraints to green gram production include pests, diseases and use of inappropriate agronomic practices. Green gram is affected by a number of diseases among them, anthracnose, bacterial bean blight, bean rot, powdery mildew, rust and yellow mosaic virus. The most serious diseases are leaf spot and powdery mildew which reduces yield by up to 30% (Dakshayani and Mummigatti, 2004). Field pests of economic importance include bean fly, thrips, aphids, pod sucking bugs, apion beetle and bruchids (MoAgric RD Kenya, 2002) Control of pests and diseases is usually by use of industrial chemicals (Machocho et al., 2012). This practice is expensive and can lead to health related hazards and can lead to detrimental environmental effects. The resource poor farmers who are the main producers and consumers of green grams are unable to effectively control the pests and diseases effectively resulting to relatively low yields. Therefore, there is need to develop and promote appropriate technologies for green gram production. These include the introduction of varieties that are resistant to these pests and diseases.

The available green gram varieties in Kenyan market include N26 and KS 20 and ordinary (local green gram). The local varieties are characterized by low yield (less than 500kg/ha) and have long maturity periods (3-4 Months). The seeds are small and pods are prone to shattering before harvest leading to post harvest losses. They are characterized by stoniness and are hard to cook reducing their consumption demand (Karanja, 2016). The production of these varieties is 1300-1500kg per ha. N26 has a maturity period of 75-90 days whereas KS20 matures in 80-90 days. The new green gram varieties are Ndengu tosha Kat 00301, Biashara Kat 00308 and Karembo Kat 00309. They mature in 65-75 days and yield up to 1800-2100kg per ha. Farmers lack information about the new varieties because they have not been evaluated in the area. Farmers in the area are demanding for better yielding and pest resistant varieties to increase their production and improve their livelihoods. With productivity of the green grams being below the potential yield of 3MT/ha, there is need to grow and promote high yielding varieties coupled with good agricultural practices to optimize yield. The objectives of this study was to evaluate the adaptability of the new varieties in the area and identify the farmers’ preferences for the new green gram varieties.

MATERIAL AND METHODS
The experiment was carried out in Tharaka Nithi and Meru counties of Eastern Kenya. Tharaka Nithi County lies between latitude 00°03'47" N 00027'28" and longitude S 37°18'24" and E 28°19'12". It is located in the semi-arid region of Kenya. The county covers a total area of 2,638.8 km² with a population of 35,330. It lies in the Eastern slopes of Mt Kenya as the most prominent physical feature in the region. Tharaka sub county lies in the lower midland 4and 5 (LM4 and %) agro ecological zones. The altitude if the area ranges from 510 to 750m above sea level. (Jaetzold et al., 2006). The area experiences a bimodal rainfall pattern with mean annual rainfall range of 200-800mm per annum and temperature range of 11-25.9°C. The soils are mainly ferralsols which are highly weathered soils. Meru County is located on the North eastern side of the slopes of Mt. Kenya. The agro ecological zones range from the highland which are moist and have fertile soils with high agricultural potential to the lowland semi-arid areas. The altitude of the county range between 300-5199m (Dolan, 2012). The annual rainfall ranges between 380 in the lowlands to 2500 in the highlands. The area experience a bimodal rainfall pattern where the long rains are experienced between March to May and the short rains between October and December and has mean temperature of about 18°C. Meru County covers an area of 6936 km². The population is approximately 1,365,301 people.

Figure 1: Map showing location of the study areas of Meru and Tharaka-Nithi Counties
Research design
The study trial was laid out in a Randomized Complete Block Design (RCBD) with plots measuring 5x5m. The treatments included four green gram varieties (Kat 00301 (Biashara) Kat 00308 (Karembo), Kat 00309 (Ndengu tosha) and N26 (control) replicated three times. The row spacing was 0.60m and 0.20m between plants giving a plant density of 83,333 plants per hectare. The planting and management of the trial was participatory done by farmers groups and the KALRO Embu researchers and area agricultural extension officers. Planting was done at the onset of the rains. Di ammonium phosphate fertilizer (DAP) was applied at planting at a rate of 100 kg ha⁻¹. Weeds were controlled through hand weeding.

Variety selection and evaluation criteria
Three new green gram varieties together with the existing N26 were evaluated for their adapation in the areas and their performance in terms of yield. A participatory green gram variety evaluation was conducted to evaluate the new green gram varieties which involved farmers group, researchers and extension staff. This was carried out at flowering and physiological maturity stages and at crop harvest. The farmers developed a criteria for selecting the varieties by first mentioning the important attributes in selecting green grams varieties. These were ranked using the pairwise ranking criteria in order of their importance. Four highly desired attributes were used to rank the green gram varieties. The attributes included drought tolerance, early maturity and high yielding. The farmers used the agreed attributes to score and rank each variety.

Data Collection
The biophysical data was collected on plant and per plot basis. Ten plants were sampled at random from which data on number of seeds per pod and number of pods per plant was taken. Grain weight and biomass was collected from the entire plot. The biophysical data was subjected to analysis of variance (ANOVA) using SAS version 8.0. The least significant differences (LSD) at 5% will be used to compare the difference among means.

RESULTS AND DISCUSSIONS
Evaluation of plant physiological traits

<table>
<thead>
<tr>
<th>Varieties of Green Grams</th>
<th>Tharaka-Nithi</th>
<th>Meru County</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grain Weight (T/Ha)</td>
<td></td>
</tr>
<tr>
<td>Karembo</td>
<td>1.171A</td>
<td>1.47B</td>
</tr>
<tr>
<td>Ndengu Biashara</td>
<td>1.056B</td>
<td>1.99A</td>
</tr>
<tr>
<td>Ndengu Toshга</td>
<td>1.016B</td>
<td>1.02C</td>
</tr>
<tr>
<td>N26</td>
<td>0.671C</td>
<td>0.43D</td>
</tr>
<tr>
<td>Mean</td>
<td>0.979</td>
<td>1.22</td>
</tr>
<tr>
<td>CV</td>
<td>26.990</td>
<td>18.03</td>
</tr>
<tr>
<td>P-Value</td>
<td>0.0842</td>
<td>0.0007</td>
</tr>
<tr>
<td>LSD</td>
<td>0.5277</td>
<td>0.4412</td>
</tr>
</tbody>
</table>

Karembo produced the highest yield under on-farm trial in Tharaka Nithi County with an average grain weight of 1.171 T/Ha followed by Biashara with 1.056 T/Ha and the lowest variety was N26 which produced only 0.671 T/Ha. The results showed that there was no significant difference (p>0.05) between the four green grams varieties. In Meru County, Biashara gave the highest yields with 1.99T/Ha, followed by Karembo and Toshga with 1.47T/ha and 1.02 T/ha respectively. The local check (N26) had a grain yield of 0.43T/ha. There was a significant difference (p<0.05) among the four green gram varieties for grain yield in Meru County.
Ndengu Tosha produced the most seeds per pod in both Tharaka Nithi and Meru counties with a mean of 15.4 and 18.4 seeds per pod respectively. This was followed by Biashara that produced a mean of 11 seeds per pod in Tharaka-Nithi and 13.4 seeds per pod in Meru County. The local variety N26 produced the least number of pods per plant in both sites having a mean of 5.6 seeds per pod in Tharaka-nithi and 4.4 seeds per pod in Meru County. The variation of the varieties in the two Counties may have been brought by the type of soil and elevation although the two area are arid.

The number of pods per plant followed a similar trend as that of number of seeds per pod. Ndengu Tosha produced the highest number of pods per plant in both Tharaka nithi and Meru counties with a mean of 25 and 27.6 pods per plant respectively. This was followed by Biashara that produced a mean of 22.2 pods in a plant in Tharaka-nithi and 26.6 pods per plant in Meru County. The local variety N26 produced the least number of pods per plant in both sites having a mean of 10.4 pods per plant in Tharaka-nithi and 16.4 pods per plant in Meru County.
Farmers' variety evaluation and selection

Farmers identified the following attributes as the most important when choosing green gram varieties: Early maturity, marketability, grain size, taste, non-stoniness, drought resistance, colour pest resistance, disease resistance. A pairwise ranking was conducted to rank the attributes in order of importance.

Table 2: Pairwise ranking of the desired attributes for green gram varieties in Tharaka Nithi County

<table>
<thead>
<tr>
<th></th>
<th>EM</th>
<th>MKT</th>
<th>GS</th>
<th>TA</th>
<th>NS</th>
<th>DR</th>
<th>CO</th>
<th>RD</th>
<th>RP</th>
<th>POINTS</th>
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</thead>
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<tr>
<td>EM</td>
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<tr>
<td>MKT</td>
<td>MKT</td>
<td>MKT</td>
<td>MKT</td>
<td>DR</td>
<td>CO</td>
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<td>RP</td>
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<td>6</td>
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<tr>
<td>GS</td>
<td>GS</td>
<td>GS</td>
<td>DR</td>
<td>CO</td>
<td>RD</td>
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<tr>
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<td>TA</td>
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<td>CO</td>
<td>RD</td>
<td>RP</td>
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<td>7</td>
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<td>2</td>
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<tr>
<td>NS</td>
<td>NS</td>
<td>DR</td>
<td>CO</td>
<td>RD</td>
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<tr>
<td>DR</td>
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<td>DR</td>
<td>DR</td>
<td>RP</td>
<td>0</td>
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<td>CO</td>
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<td>2</td>
<td>5</td>
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<td>2</td>
</tr>
</tbody>
</table>

The most important attributes when selecting the green gram varieties included: early maturity, pest resistance, and drought resistance in Tharaka Nithi. In Meru county the following attributes were considered by the farmers as important criteria of varieties selection; shiny grain, marketability, high yielding, early maturity, resistance to pest and diseases, Non stoniness and taste.

Table 3: Pairwise ranking of the desired attributes for green grams varieties in Meru County

<table>
<thead>
<tr>
<th></th>
<th>SH</th>
<th>MKT</th>
<th>YD</th>
<th>EM</th>
<th>RPD</th>
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<th>POINTS</th>
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<tbody>
<tr>
<td>SH</td>
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<td>7</td>
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<tr>
<td>MKT</td>
<td>MKT</td>
<td>YD</td>
<td>EM</td>
<td>EM</td>
<td>RPD</td>
<td>WC</td>
<td>TA</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>YD</td>
<td>YD</td>
<td>EM</td>
<td>EM</td>
<td>EM</td>
<td>RPD</td>
<td>WC</td>
<td>TA</td>
<td>5</td>
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<td>EM</td>
<td>EM</td>
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<td>RPD</td>
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<td>TA</td>
<td>1</td>
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</tr>
</tbody>
</table>

The farmers' most important traits were: high yielding, early maturity and resistance to pest and diseases (RPD)

The farmers were therefore asked to rank the five varieties and base their judgment on the three attributes identified. They came up with the following ranked.

Table 4: Green gram ranking in Tharaka-Nithi and Meru Counties

<table>
<thead>
<tr>
<th>Variety</th>
<th>Tharaka-Nithi</th>
<th>Meru</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N26</td>
<td>Karembob</td>
</tr>
<tr>
<td>2</td>
<td>Karembo</td>
<td>Ndengu tosha</td>
</tr>
<tr>
<td>3</td>
<td>Biashara</td>
<td>Biashara</td>
</tr>
<tr>
<td>4</td>
<td>Ndengu tosha</td>
<td>N26</td>
</tr>
</tbody>
</table>

The evaluation of varieties was done by a group of farmers. They used different criteria and attributes to evaluate the green gram varieties. The farmers jointly identified a number of attributes that describe a good green gram variety and are important in the selection process. The identified attributes included; early maturity, high yielding, Pests resistance, resistance to diseases, drought tolerance, large grain size, and non-stoniness. After a thorough discussion, the important attributes were identified through a pairwise ranking process. The attributes were based on the problems affecting green gram farming in the region. Farmers’ brainstormed and came up with the attributes which were further ranked to bring out the most important to the least important using a pairwise ranking method. The first four prioritized attributes were used to generate and rank the most desired varieties. The varieties were labelled using numbers to avoid biasness. The farmers’ ranking in Tharaka Nithi County gave N26 as the most preferred variety, followed by Karembo, Biashara and Ndengu Tosha. Karembo was the most preferred variety in Meru County followed by Ndengu tosha, Biashara and N26.
DISCUSSION
It was observed that in Meru County, there was a significant difference in yield among the green gram varieties. The local check (N26) recorded the lowest yields in both TharakaNithi and Meru counties. This clearly shows that the three new varieties are superior to the existing N26 variety, locally known as nylon. The farmers’ evaluation on the varieties ranked N26 and Karembo as the best varieties in Tharaka Nithi County and Karembo and Ndengu tosha in Meru County. This differed with what the researchers found where Karembo and Biashara were the best varieties in Tharaka nithi and Meru counties respectively. The reasons given by the farmers included resistance to drought, high yielding and resistance/tolerance to pests and diseases.

CONCLUSION
The new green gram varieties have a potential of improving food security and raising the household incomes of the resource poor farmers in the ASALs. Farmers in this study used different attributes to evaluate the varieties. The farmers’ preferences are important in adoption and dissemination of the varieties. The information on the farmers preferred attributes gathered in this study can be incorporated by breeders in their programs to come up with improved varieties. Both the researcher and farmers evaluation revealed that the varieties are superior to the already existing varieties and the farmers are readily accepting them. The seeds of the three varieties are large meaning that they will be readily attractive for the local and export market. This would increase the net returns for the farmers and enhance food security and improve livelihoods of small scale farmers. There is need therefore to disseminate the improved varieties to farmers through on farm demonstrations and extension.

ACKNOWLEDGEMENT
The writers would wish to acknowledgement the Upper Tana Natural Resource Management (UTaNRMP) project under IFAD that financed this study.

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INDIGENOUS KNOWLEDGE ON PUMPKIN PRODUCTION IN CHUKA IGAMBANGOMBE SUBCOUNTY, THARAKA-NITHI COUNTY, KENYA

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ABSTRACT
A survey was conducted in Igambangombe SubCounty, Tharaka-Nithi County, Kenya to document farmers’ indigenous knowledge of pumpkins and to identify the variety cultivated, as well as motivation and challenges of pumpkin production. Magumoni, Karingani and Mugwe Wards were purposively selected since there were more pumpkin growing farmers making a population of 100 farmers from the list obtained from Agricultural Extension Offices. A 30% proportion of the farmers was used to make a sample of 30 respondents. Data collection used open-ended questionnaires where farmers were interviewed in their farms. Data values were analysed using the Statistical Package for Social Sciences software. Findings indicated that 64.7% of the farmers have been practicing pumpkin farming for more than 15 years and 88.2% have been planting the local variety. Pumpkin is mainly fertilized with cattle and sheep manure and most respondents (88.2%) do not apply nitrogen fertilizer, while 76.5% of the farmers have not been applying mulch. Findings further showed that the farmers have been producing pumpkins as a source of income (64.7%), leaves for vegetables (58.8%), fruits as a source of food (52.9%) and for nutritional purposes (41.2%). Farmers indicated that the main challenge in pumpkin production was insect pests and diseases (64.7%). This study collated local indigenous knowledge on pumpkins and opportunities thereof for improving management that could lead to higher yields for the farmers.

Keywords: Cucurbita moschata, Emerging fruit-vegetables, Food security, Mineral-nutrition

INTRODUCTION
Pumpkin is a fruit-vegetable belonging to the Cucurbitaceae family together with gourds, melons and squashes. The varieties of pumpkins grown widely in Kenya belong to C. moschata and C. maxima. Pumpkin is a native of Central America but is now domesticated in other tropical and subtropical countries (Fedha, 2008). Globally, China is the major producer followed by India. In Africa, Egypt and South Africa are the leading producers. In Kenya, pumpkin production increased from 599 ha in 2015 to 681 ha in 2016, with a volume increase from 3580 metric tonnes to 4017 metric tonnes respectively (Horticulture Validated Report, 2015-16). In Kenya, pumpkin is regarded as a traditional vegetable that is grown in the high potential areas and the arid and semi-arid lands (Karanja et al., 2014). FAO (2005) reported that pumpkin has immense economic potential for use both as a food and as an industrial crop. Pumpkin is famous for its edible seeds, fruit and greens (Matsui et al., 1998).

According to Grubben and Chigumira-Ngwerume (2004), pumpkin production can take place in almost any part of East Africa and storage after harvesting can last over eight months provided the fruit stalk is retained, making it a food security crop (Horticultural Crops Development Authority, 2012). Pumpkin production and consumption has risen due to several reasons including medicinal properties through the antioxidant beta-carotene that helps improve immune function and reduce cancer and heart disease risks (Ghanbari et al., 2007). Additionally, they contain many vitamins and nutrients such as calcium, iron, magnesium, potassium, zinc, selenium, niacin, foliate, and vitamins A, C, and E (Ondigi et al., 2008). Very little pumpkin is however produced, commercialized and consumed in Africa. Meager value addition is done to pumpkins found in African markets. No export statistics exist in the Kenyan Horticultural Crops Development Authority on-line databases. Processed products of the fruit are virtually nil in African countries. There are no documented pumpkin value chain (PVC) preference and consumption trends that exist in Kenya (Ondigi et al., 2008).

Pumpkin has been considered as beneficial to health because it contains various biologically active components such as polysaccharides, para-aminobenzoic acid, fixed oils, sterols, proteins and peptides (Caili et al., 2006). The fruits are a good source of carotenoids and g-aminobutyric acid (Murkovic et al., 2002). Pumpkin seeds (Cucurbita spp.) are valued for their high protein content and useful amounts of the essential fatty acids like linoleic acid. Pumpkin seeds contain remarkably high proportions of essential amino acids. Pumpkin seeds also contain relatively large amount of various essential micro-elements such as K, Cr and Na. Pumpkin seeds are a good source of Mg, Zn, Cu, Mo and Se (Glew et al., 2006). Further, the seeds are considered as a nutritious food with high oil (50% w/w) and protein (35%) contents that vary depending on cultivar (Fruhwirth & Hermetter, 2007). From pumpkin leaves and germinated seeds, several phytochemicals such as polysaccharides, phenolic glycosides, NEFA and proteins have
been isolated (Koike et al., 2005). Various hypoglycemic polysaccharides have been characterized from fruit pulps of pumpkin plant. D-chiro-Inositol in pumpkin has been identified as an insulin secretor and sensitizer (Jun et al., 2006). Various antibiotic components including anti-fungal have been characterized from various parts of pumpkin plants (Glew et al., 2006).

This study was necessitated by the fact that in spite of the vast potential of pumpkin production and utilization in ensuring food security in Chuka Igamba-ngombe Sub County, an insignificant proportion of households in the region cultivate it as a source of food and livelihood. To ensure a sustainable increase in the production and use of pumpkins in the region, it would be necessary to investigate indigenous knowledge on pumpkins production in Chuka Igamba-ngombe Sub County, Tharaka Nithi County. This information would be useful as a basis for improving pumpkin production leading to increased yields thus higher income for the farmers.

Specifically, the study had the following objectives:

i. To establish the length of time farmers have been producing pumpkins in Chuka Igamba-ngombe Sub County, Tharaka Nithi County.

ii. To find the variety farmers have been planting in Chuka Igamba-ngombe Sub County, Tharaka Nithi County.

iii. To determine whether farmers apply N fertilizers or mulch in pumpkins production in Chuka Igamba-ngombe Sub County, Tharaka Nithi County.

iv. To establish the motivating factors and the main challenges of pumpkins production in Chuka Igamba-ngombe Sub County, Tharaka Nithi County.

METHODOLOGY

Study Sites
The study took place in Chuka Igamba-ngombe Sub County, Tharaka Nithi County where three wards (Magumoni, Karingani and Mugwe wards) were purposively selected since there were more pumpkin growing farmers from the list obtained from agricultural extension offices making a population of 100 farmers. 30% of the farmers were randomly selected as respondents forming a sample size of 30 respondents.

Population and Sample
The study sites were purposively sampled based on the number of farmers producing pumpkins in all the wards in Chuka Igamba-ngombe Sub County. The researcher obtained a list of all the pumpkins growing farmers from the agricultural extension officers in the wards. Magumoni, Karingani and Mugwe wards had a population of 103 farmers producing pumpkins. For each ward, 30% of the farmers cultivating pumpkins was randomly selected to take part in the study as the respondents forming a sample size of 30 as shown in Table 1.

<table>
<thead>
<tr>
<th>Wards</th>
<th>Population</th>
<th>Percentage</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magumoni</td>
<td>45</td>
<td>30%</td>
<td>13</td>
</tr>
<tr>
<td>Karingani</td>
<td>33</td>
<td>30%</td>
<td>10</td>
</tr>
<tr>
<td>Mugwe</td>
<td>25</td>
<td>30%</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>103</strong></td>
<td><strong>30%</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

Data Collection and Analysis
Questionnaires were used to collect the data. Saunders et al. (2007) denoted that questionnaires gives respondents’ opportunity to offer structured and well thought out responses and enables fast collection of alike data across a comparatively distributed population. The researcher interviewed the farmers in their farms. Data analysis entailed the use of descriptive statistics using Statistical Package for Social Sciences (SPSS) software. Data was presented using frequencies and percentages and was presented in form of tables.

Ethical Consideration
Before data collection was embarked on, an introductory letter was obtained from the university introducing the purpose of the study. A permit to carry out the study was also acquired from the National Council for Science, Technology and Innovation (NACOSTI). All matters linked to the respondents were considered confidential.

RESULTS AND DISCUSSION
**Length of time in pumpkins production**
Table 2 shows the length of time farmers have been producing pumpkins in Chuka Igamba-ngombe Sub County, Tharaka Nithi County. Results showed that 64.7% of the farmers have been producing pumpkins for more than 15 years, 17.6% for less than 5 years, and 11.8% for 5-10 years while 5.9% for 11-15 years.

<table>
<thead>
<tr>
<th>Length of time in pumpkins production</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 years</td>
<td>5</td>
<td>17.6</td>
</tr>
<tr>
<td>5-10 years</td>
<td>4</td>
<td>11.8</td>
</tr>
<tr>
<td>11-15 years</td>
<td>2</td>
<td>5.9</td>
</tr>
<tr>
<td>More than 15 years</td>
<td>19</td>
<td>64.7</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Variety you have been planting**
The study sought to find out the variety farmers have been planting in Chuka Igamba-ngombe Sub County, Tharaka Nithi County. Results shown in Table 3 indicated that 88.2% of the farmers have been planting the local variety while only 11.8% have been using hybrid variety (Chinese giant).

<table>
<thead>
<tr>
<th>Variety of pumpkins</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td>26</td>
<td>88.2</td>
</tr>
<tr>
<td>Chinese giant</td>
<td>4</td>
<td>11.8</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Use of N fertilizers or mulch**
The study determined whether farmers were applying N fertilizers or mulch in pumpkins production in Chuka Igamba-ngombe SubCounty, Tharaka Nithi County (Table 4). From the results, 88.2% and 76.5% of the farmers do not apply N fertilizers and doesn’t use mulch respectively. Cattle and sheep manure is what is used as a source of nitrogen for pumpkins while leaves and maize stalks are used by the few farmers as the mulch.

<table>
<thead>
<tr>
<th>N fertilizers and mulch use</th>
<th>N fertilizers</th>
<th>Mulch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Percentage</td>
<td>Frequency</td>
</tr>
<tr>
<td>Yes</td>
<td>4</td>
<td>11.8</td>
</tr>
<tr>
<td>No</td>
<td>26</td>
<td>88.2</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Motivating factors for pumpkins production**
In establishing the motivating factors of pumpkins production in Chuka Igamba-ngombe Sub County, Tharaka Nithi County, results in Table 5 showed that source of income, leaves as a source of vegetables and fruit as a source of food were the key motivating factors in production with 64.7%, 58.8% and 52.9% respectively. Consumption for nutritional purposes was also a motivating factor with 41.2%. Production as a cover crop had 17.6% while pumpkins being drought tolerant had 11.8%.

**Table 5: Motivating factors**

<table>
<thead>
<tr>
<th>Motivating factors</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source of income</td>
<td>19</td>
<td>64.7</td>
</tr>
<tr>
<td>Leaves for vegetables</td>
<td>18</td>
<td>58.8</td>
</tr>
<tr>
<td>Fruit as a source of food</td>
<td>16</td>
<td>52.9</td>
</tr>
<tr>
<td>Nutritional purposes</td>
<td>12</td>
<td>41.2</td>
</tr>
<tr>
<td>As a cover crop</td>
<td>5</td>
<td>17.6</td>
</tr>
<tr>
<td>Drought tolerance</td>
<td>4</td>
<td>11.8</td>
</tr>
</tbody>
</table>

**Main challenges of pumpkins production**
The main challenges of pumpkins production in Chuka Igamba-ngombe Sub County, Tharaka Nithi County were also established (Table 6). Pests and diseases were identified as the main challenge of pumpkins production with 64.7% of farmers. 35.3% of farmers also indicated that pumpkins require a lot of water in its production and therefore cited it as a challenge. Other challenges identified were plant morphology (big sized) thus occupying large land size (17.6%), fruit abortions (17.6%), lack of information on production (11.8%) and lack of market (11.8%).

Table 6: Main challenges of pumpkins production

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pests and diseases</td>
<td>19</td>
<td>64.7</td>
</tr>
<tr>
<td>Plant morphology (big sized)</td>
<td>5</td>
<td>17.6</td>
</tr>
<tr>
<td>Lack of information on production</td>
<td>4</td>
<td>11.8</td>
</tr>
<tr>
<td>Fruit abortions</td>
<td>5</td>
<td>17.6</td>
</tr>
<tr>
<td>Requires a lot of water</td>
<td>11</td>
<td>35.3</td>
</tr>
<tr>
<td>Lack of market</td>
<td>4</td>
<td>11.8</td>
</tr>
</tbody>
</table>

DISCUSSION

Production of indigenous crops like pumpkins is done on small scale and dispersed areas with usually low produce. This is attributable to lack of agronomic information, limited research, lack of high yielding cultivars and undeveloped seed systems (Eyzaguirre et al., 2006). Production of pumpkin has been limited but the crop has the potential to better food security, nutritional status and livelihoods of households (Ondigi et al., 2008) both in the rural and urban areas. Among the factors affecting pumpkins production leading to low production and consumption as denoted by Matenge et al. (2012) are socio-economic changes and preference for modern foods.

According to a study in Western Kenya by Abukutsa-Onyango (2007), production of indigenous vegetables is restricted by drought, pests and diseases, poor seed quality and lack of agronomic and utilization packages. Further, poor weather conditions, low soil fertility and lack of seed systems were found to restrict the production and consumption of traditional leafy vegetables in South Africa (Vorster et al., 2008). Production of indigenous vegetables in Western Kenya is constrained by poor marketing channels and infrastructure (Abukutsa-Onyango, 2007). Inadequate road network, storage facilities and physical trading space, unsuitable policies, lack of credit, lack of product differentiation and value addition constrained the marketing of indigenous vegetables in Nairobi and its environs (Irungu, 2007).

Accordingly, poorly developed marketing and markets are a common characteristic of traditional foods in Sub-Saharan Africa (Eyzaguirre et al., 2006) and it affects production. Research has also shown that nearness to the market influences the amount of output sold and increases participation by households due to cost advantage (Berhanu and Moti, 2010). Decrease in the distance to the market lowers transaction costs and households closer to markets generate larger sale volumes (Komarek, 2010). A study by Otieno et al. (2009) showed that long distance to the nearest market reduces vegetable volumes marketed in rural areas.

CONCLUSION AND RECOMMENDATIONS

The study concluded that pumpkins have a great potential in Chuka Igamba-ngombe Sub County since most farmers have been producing them for many years using the local variety. However, there is need for the extension officers to train farmers on the need to use of N fertilizers and advise them on the best pest and disease control measures which shall promote pumpkin production leading to increased yields thus higher income for the farmers.

ACKNOWLEDGEMENT

The authors are greatly indebted to the pumpkins farmers in Magumoni, Karingani and Mugwe wards for their availability and responses that necessitated this study. Further, the agricultural extension officers in Chuka Igamba-ngombe Sub County are acknowledged for providing the names of farmers growing pumpkins and also accompanying the researcher for data collection.

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Horticulture Validated Report (2015-16), HCDA, Nairobi-Kenya


EFFECT OF RATE AND TIME OF P APPLICATION, AND PLANT DENSITY ON GROWTH AND DEVELOPMENT OF GROUNDNUTS

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ABSTRACT
Groundnut yields are relatively very low in Kenya as compared to other countries which can be attributed to poor agronomic practices and low soil fertility, with phosphorous (P) deficient being most frequent limitation for growth and development of groundnut. Appropriate application of phosphorus and plant density have been found to improve crop production. However, studies on appropriate rate and time of P application, and plant density in groundnut production in Kenya are missing. The objective of this study was to determine the effect of time and rate of phosphorous application, and planting densities on growth of groundnuts. The study was conducted in two locations, one site at Chuka University Farm, Meru south Sub County, and the other site at Kenya Agricultural and Livestock Organisation, Embu, Kenya. The study used a 3 x 3 x 3 factorial experimental design laid out in a Randomized Complete Block Design with three replications. There were three factors with three levels, P application rates (0, 30, and 60kg/ha), time of application (14 days before sowing, at sowing, and 14 days after sowing) and planting densities 148, 149 (45 by 15 cm) plants per ha, 213, 331 (37.5 by 12.5cm) plants per ha and 333, 334 (30 by 10 cm) plants per ha. Data on crop emergence, days to 50% flowering, plant height, days to physiological maturity, number of kernels per pod and number of empty pods was collected. Data collected was subjected to ANOVA using Statistical Analysis Software. Least Significance Difference was used to separate significant means at 5% probability level. The results showed that time and rate of phosphorous application, and planting densities had a significant effect (p-value < 0.05) on growth of groundnuts. It was thus recommended on increased phosphorus application to enhance growth of groundnuts in the area of study.

Key words: Groundnuts, Growth, Phosphorus, Plant density, Analysis of variance, Least significant difference

INTRODUCTION
Groundnut (Arachis hypogaea) is the thirteenth most important food crop in the world; fourth most important source of edible oil and the third most important source of vegetable protein (Taru et al., 2008). In tropical and sub-tropical countries, groundnut is one of the most valuable legumes (Melese & Dechassy, 2017). In Kenya, the crop is not only an important source of protein but also a major source of small holder cash income. In Western Kenya, groundnuts serve as food and cash crop.

Groundnut is a rich source of edible oil, protein, and its seeds contain vitamin B and C (Ajanaku et al., 2012). The nuts are eaten raw, roasted, steamed, crushed and added to soups and stews. It may be used for preparing a nutritive and tasty milk. Groundnuts are also used to make peanut oil, peanut flour and, animal feeds. The industrial use of groundnut in making paints, varnish, lubricating oil, and insecticides (FAO, 2015). The by-products from groundnut include fuel, detergents, bleach, ink, shaving cream, face cream, rubber cosmetics, wall board, abrasive, cellulose, shampoo and medicine (Ihejirika et al., 2006).

In Kenya, the average yields of groundnut is 575 kg/ha, while in Nigeria and most part of West Africa is 930 kg/ha, South Africa 2000 kg/ha, Asia 1798 kg/ha, with a world average of 1447 kg/ha (FAOSTAT, 2015). This shows that the yield of groundnuts in Kenya is relatively low. The low average yields cause’s serious shortfalls in groundnut supply to the market. Despite those low yields, there are large prospects of groundnuts production in Kenya. This is because those farmers are now embracing groundnut farming and ditching unprofitable traditional crops like maize and beans (Ndisio, 2015). However, these prospects have not been realized due to several limiting factors. The main constraints limiting groundnuts production include poor agronomic practices, low soil fertility, unreliable rainfall, and lack of high yielding disease tolerant varieties, poor prices and lack of institutional support (Ayeni & Ogboru, 2016; Bucheyeki et al., 2008; Muhati et al., 2011; Ndisio, 2015). Other constraints include shrinking farm size coupled with a rapid population growth rate, suggesting that agricultural interventions are needed to improve farm productivity (Kipkoech et al., 2007; Thuo et al., 2013).

Groundnut has the potential to fix atmospheric nitrogen at the rate of 21 to 206 kg/ha annually in soils through root nodule bacterium belonging to the genus Rhizobium, thus improves soil fertility (Giller, 2001; Yakubu et al., 2010). However, it needs other macro and micronutrients in the soil. Nutrient deficiency, especially phosphorus (P) and
calcium (Ca) have been reported as major abiotic factors limiting groundnut production especially in Africa where production is characterized by low fertilizer inputs (Bationo et al., 2006; Varra Prasad et al., 2009; Kamara et al., 2011a; Cong, 2017). Phosphorus is essential for many processes in plants such as nitrogen fixation, photosynthesis, respiration, energy storage and cell division, extensive root development thus ensuring high yields.

Studies have shown a linear increase in pod yields of groundnut with increase in P rates from 0 to 40 kg P/ha (Kamara et al., 2011a). An increase in soybean has also been associated with application of P fertilizer (Kamara et al., 2011b). The application of P fertilizer has been associated with enhanced root development which in turn improves the supply of other nutrients and water to plants, resulting in an increased photosynthetic area and consequently more dry matter accumulation (Maity et al., 2003; Warren, 2011). Therefore, an important component of cropping systems is nutrient management. The productivity of groundnuts will depend on careful selection of varieties, correct fertilizer application and other management practices (Lourduraj, 1999; Afridi et al., 2002). Soil productivity is hampered by the differences in major nutrients. Groundnuts require large amounts of phosphorus, potassium, magnesium, calcium and sulphur for seed development and oil quantity (Corvans, 2009). Application of P has been found to increase pod yield and profitability in groundnuts (Ajeigbe et al., 2016). It is therefore important to investigate how the phosphorus application affects groundnut production in Kenya.

Plant density has various effects on crop production. For example, it affects light interception and yield, with varying plant density modifying the distribution pattern of the light within the canopy, thus affect overall light interception and light use efficiency (Zhang et al., 2014). Optimising plant density for nitrogen fixing crops would be critical since plant densities have been found to affect the mechanisms of source-sink and photosynthesis-nitrogen fixation (De Luca & Hungria, 2014). In case of suboptimal higher plant densities, photosynthesis per plant will be lower and so is the nitrogen fixation input per plant (De Luca & Hungria, 2014). At optimum plant density, it would be expected that the photosynthetic rate per plant is optimum, consequently optimum C supply to the nodules, resulting in optimum nodulation and in nitrogen fixation rates. It is therefore important to determine the effect of plant density on both the growth and development of groundnuts in Kenya. It is also important to investigate how the plant density affects the groundnuts yield in Kenya.

In summary, plant density and nutrient availability are two important factors that affect crop productivity. Plant density manipulates micro environment of the plant and thus affects growth, development and yield formation of crops. Many studies have shown that plants have high phenotypic plasticity in response to varying density (Tourino et al., 2002; Njoka et al., 2004; Procopio et al., 2013; De Luca and Hungria, 2014). This trait, phenotypic plasticity, allows plants to alter their morphology and regulate growth and yield components to adapt to a given planting density. Hence, the need to find the optimal plant density for a given crop, under given cultivation conditions. Furthermore, optimum planting densities must be adopted to maximise the utilisation of available soil nutrients. Nutrient utilisation efficiency involves selection of appropriate nutrient sources and application of correct amounts at the right time using efficient methods. As it has been shown, appropriate application of phosphorus and plant density has been found to improve crop production.. However, studies on appropriate rate and time of P application, and plant density in groundnut production in Kenya are missing. This has made Kenyan farmers to rely on recommendation from studies from other countries. It is therefore important to investigate how the rate and time of P application and plant density would improve groundnut production in Kenya.

**METHODOLOGY**

The study was conducted in two locations (April to August 2018). One site was situated at Chuka University farm and the other site was at Kenya Agricultural and Livestock Research Organisation (KALRO) Embu farm. The study used a 3 x 3 x 3 factorial experimental design laid out in a Randomized Complete Block Design (RCBD) and replicated three times. There were three factors with three levels, P application rates (0, 30, and 60kg/ha of SSP 0:18:0), timing of application (14 days before sowing, at sowing, and 14 days after sowing) and plant density [148, 149 (45 by 15 cm) plants per ha, 213, 331 (37.5 by 12.5 cm) plants per ha and 333, 334 (30 by 10 cm) plants per ha]. The treatments were randomly applied to the experimental units. Each plot size measured 1m by 2m with plant spacing of 45 cm by 15 cm (29 plants), 37.5 cm by 12.5 cm (42 plants) and 30 cm by 10 cm (66 plants), respectively. Plant data was on growth parameters such as germination percentage, plant height, days to 50% flowering, and days to physiological maturity. Germinated plants per plot were counted at emergence which was done seven days after sowing and the germination percentage calculated by dividing the number of emerging seedlings per plot by the number of seeds planted and multiplying by 100. Emergence time was determined by counting days from planting to seedling emergence. Stem elongation was determined after every two weeks. Height
was measured from the six randomly selected plants from the middle rows of each treatment plot using a meter rule. This height was measured from the ground level to the tip of the new emerging leaf of each plant. Days to 50% of the plant population flowering was recorded at flowering stage for each treatment plot. 50% flowering was determined by counting the number of plants with flowers. A treatment plot was considered to have attained 50% flowering when half of the plants within the plot had flowers. Days to physiological maturity was recorded when at least 70% pods of the selected plants started blackening. The maturity was normally achieved when the vines begun to turn yellow and the plant started shedding off leaves. Data was analysed using Statistical Analysis Software (SAS). Significant means were separated using Least Significance Difference at 5% probability level. Data collected was subjected to analysis of variance. Mean separation was also done using the Least Significant Differences.

RESULTS AND DISCUSSION
Effect of Rate and Time of P Application, and Plant Density on Growth and Development of Groundnuts
The effect of treatment on germination of groundnut seeds was investigated by use of a $3 \times 3 \times 3$ factorial models. The models were significant ($p$ –value < 0.05) at 5% significant level (Table 1). The fitted models R-squared values were 0.440466 and 0.420341 for the two sites of study (Table 2). The average germination percentages for the two sites of study were 53.93671 and 51.24359 (Table 2).

**Table 1: Model for effect of treatments on germination**

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuka</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>28</td>
<td>2774.354830</td>
<td>99.084101</td>
<td>1.41</td>
<td>0.01448</td>
</tr>
<tr>
<td>Error</td>
<td>50</td>
<td>3524.328714</td>
<td>70.486574</td>
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<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>78</td>
<td>6298.683454</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embu</td>
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<tr>
<td>Model</td>
<td>27</td>
<td>2364.995769</td>
<td>87.592436</td>
<td>1.34</td>
<td>0.01808</td>
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<td>3261.376026</td>
<td>65.227521</td>
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<tr>
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<td>77</td>
<td>5626.371795</td>
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</tr>
</tbody>
</table>

**Table 2: Diagnostics for the model on effect of treatments on germination**

<table>
<thead>
<tr>
<th></th>
<th>R-Square</th>
<th>Coeff Var</th>
<th>Root MSE</th>
<th>Germ Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuka</td>
<td>0.440466</td>
<td>15.56570</td>
<td>8.395628</td>
<td>53.93671</td>
</tr>
<tr>
<td>Embu</td>
<td>0.420341</td>
<td>15.76071</td>
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The effect of treatment on the germination of groundnut seeds was further analyzed using the Analysis of Variance. The results showed that the both blocks and treatments were significant ($p$ –value < 0.05) (Table 3). Mean separation using least squared differences showed that almost all the treatments were not significantly different (Table 4).

**Table 3: Analysis of Variance for effect of treatments on germination**

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<tr>
<th>Source of variation</th>
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<th>MS</th>
<th>F</th>
<th>P-value</th>
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The results of this study showed that there was a significant effect of rate and time of P application, and plant density on the germination of groundnuts. The findings are similar to the results to results that showed that germination was increased by the application of the calcium fertilizer (Kamara et al., 2017). Nyuma (2016) on contrary found out that germination of groundnuts was not affected by phosphorus application. The phosphorus effect on germination is accounted by that during germination, phosphorus is converted into a form in which it can be translocated and becomes part of new protein formed during germination (Drammeh, 2016).

The investigation on the effect of the rate and time of P application, and plant density on plant height showed that the $3 \times 3 \times 3$ factorial model used was significant at all the data collection points (DAS) (Table 5). This meant that this model was sufficient in explaining the effect of application of different treatment combinations on plant height. There was an observed increasing trend in average plant height with increase in the number of days after sowing. This meant that the plants increased in size with increase in the number of days after sowing with application of the
different treatment combinations. The amount of variability in plant height that was accounted for by rate and time of P application, and plant density was explained using the R-squared values.

Table 4: Mean separation for treatment effect on germination

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At 23 DAS, the R-squared value showed that 57.954% of the application of different treatment combinations. At 30 DAS, the R squared value increased to 63.8003%. This showed that 68.8003% of plant height was accounted for by the application of the different treatment combinations. The trend of R squared values continued to increase up to the 79th day. This trend showed that as the plant continued to grow the phosphorous uptake by the groundnuts continued to increase. This was an indication that phosphorous is useful for the growth and development of groundnuts. At 86 DAS, the adjusted R squared value was 73.1855% (Table 6). This was a decrease from what had been obtained at 79 DAS. This trend continued to decrease up to the last date collection point (93 DAS). This means that as the groundnuts neared maturity, the phosphorous uptake decreased because it was less useful to the growth and development of the plant.

Results from Analysis of Variance showed that the treatments had a significant effect (p-value < 0.05) on the plant height of groundnuts (Table 7). Mean separation for the treatments was done using the least significant differences analysis. The results showed that the treatment with the highest amount phosphorus (60kgs/Ha) yielded the largest average plant height. The best average plant height was yielded by applying phosphorus 14 days before sowing with 148149 plants/hectare being the best plant density. Results from the analysis of variance showed that rate and time of P application, and plant density had a significant effect on the plant height of groundnuts. Phosphorus is a stimulus to root development. Roots branch out and root hairs form profusely in the vicinity of a source of phosphorus. Owing to its effect on roots, phosphorus is a major factor in determining the early growth of a plant and its vigor throughout the season.
### Table 5: Model for effect of treatments on plant height

<table>
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<tr>
<th>Source of variation</th>
<th>Df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P-value</th>
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### Table 6: Diagnostics for the models on effect of treatments on plant height

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<th>Average Height</th>
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<td>Coeff Var</td>
<td>0.606559</td>
<td>13.07547</td>
<td>0.634132</td>
<td>4.849786</td>
</tr>
<tr>
<td>Average Height</td>
<td>0.615637</td>
<td>11.01068</td>
<td>0.639361</td>
<td>5.808547</td>
</tr>
<tr>
<td>Embu</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 Source of variation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>0.671187</td>
<td>9.585115</td>
<td>0.626248</td>
<td>6.533547</td>
</tr>
<tr>
<td>R-Square</td>
<td>0.672566</td>
<td>9.183701</td>
<td>0.653318</td>
<td>7.133839</td>
</tr>
<tr>
<td>Root MSE</td>
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<td>7.246705</td>
</tr>
<tr>
<td>Coeff Var</td>
<td>0.089270</td>
<td>45.30533</td>
<td>3.395577</td>
<td>7.494872</td>
</tr>
<tr>
<td>Average Height</td>
<td>0.5073</td>
<td>17.4249</td>
<td>5.322894</td>
<td>10.1824</td>
</tr>
</tbody>
</table>
The finding of this study was in agreement with the results by Tarawali and Qnee (2014) who reported increased crop performance in groundnuts due to the application of phosphorus as single super phosphate. Melese (2011) however found out that the application of phosphorus alone did not have a significant effect on the plant height but an interaction between manure and phosphorus affected the plant height significantly. Drammeh (2016), Nyuma (2016) and Kamara et al., (2017) also made similar findings.

Table 7: Analysis of Variance for effect of treatments on plant height

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuka</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block</td>
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<td>0.474433</td>
<td>0.237206</td>
<td>1.81</td>
<td>0.1647</td>
</tr>
<tr>
<td>Treatment</td>
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<td>77.38218</td>
<td>2.976276</td>
<td>22.72</td>
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</tr>
<tr>
<td>Block</td>
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<td>12.6464</td>
<td>6.322080</td>
<td>11.25</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Treatment</td>
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<td>1.503589</td>
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<td>&lt;.0001</td>
</tr>
<tr>
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<td>2.822765</td>
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<td>&lt;.0001</td>
</tr>
<tr>
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<td>26.172615</td>
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<td>&lt;.0001</td>
</tr>
<tr>
<td>Block</td>
<td>2</td>
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<td>35.2110</td>
<td>23.61</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Treatment</td>
<td>26</td>
<td>1104.84</td>
<td>42.4938</td>
<td>28.50</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Block</td>
<td>2</td>
<td>102.57</td>
<td>51.2834</td>
<td>28.56</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Treatment</td>
<td>26</td>
<td>1525.19</td>
<td>58.6611</td>
<td>26.77</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Block</td>
<td>2</td>
<td>70.4220</td>
<td>35.2110</td>
<td>23.61</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Treatment</td>
<td>26</td>
<td>1104.84</td>
<td>42.4938</td>
<td>28.50</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Block</td>
<td>2</td>
<td>102.57</td>
<td>51.2834</td>
<td>28.56</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Treatment</td>
<td>26</td>
<td>1525.19</td>
<td>58.6611</td>
<td>26.77</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Block</td>
<td>2</td>
<td>70.4220</td>
<td>35.2110</td>
<td>23.61</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Treatment</td>
<td>26</td>
<td>1104.84</td>
<td>42.4938</td>
<td>28.50</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Block</td>
<td>2</td>
<td>102.57</td>
<td>51.2834</td>
<td>28.56</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Treatment</td>
<td>26</td>
<td>1525.19</td>
<td>58.6611</td>
<td>26.77</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

The 3×3×3 factorial model that was used for analyzing the effect treatments on days to 50% flowering showed significance (p-value < 0.05) at 5% level of significance (Table 8). The percentages of amount variation in days to 50% flowering that was accounted for by the application of the different treatment combinations were 82.3928% and 52.0377% for the Chuka and Embu sites respectively (Table 9). The average numbers of days to 50% flowering were 35.59494 days for Chuka site and 38.33333 and Embu site (Table 9).

The analysis of variance for the treatment effects on days to 50% flowering showed that the treatments had a significant effect (p-value < 0.05) at 5% level of significance (Table 10). The least significant differences analysis
showed that the difference analysis showed that the treatment combinations that produced the best estimate of days to 50% flowering contained phosphorus at 60kg/ha applied 14 days before sowing (Table 11). The plant density that accompanied the phosphorus and the time of application to produce the best estimates of days to 50% flowering was 1481490 plants per hectare (Table 11).

**Table 8: Model for effect of treatments on days to 50 % flowering**

<table>
<thead>
<tr>
<th>Source</th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Pr &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuka Model</td>
<td>28</td>
<td>1546.543315</td>
<td>55.233690</td>
<td>8.36</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Error</td>
<td>50</td>
<td>330.494659</td>
<td>6.609893</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>78</td>
<td>1877.037975</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embu Model</td>
<td>27</td>
<td>939.454744</td>
<td>34.794620</td>
<td>2.01</td>
<td>0.0162</td>
</tr>
<tr>
<td>Error</td>
<td>50</td>
<td>865.878590</td>
<td>17.317572</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>77</td>
<td>1805.333333</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 9: Diagnostics for the model on effect of treatments on days to 50% flowering**

<table>
<thead>
<tr>
<th>R-Square</th>
<th>Coeff Var</th>
<th>Root MSE</th>
<th>DT50F Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuka</td>
<td>0.823928</td>
<td>7.222857</td>
<td>2.570971</td>
</tr>
<tr>
<td>Embu</td>
<td>0.520377</td>
<td>10.85593</td>
<td>4.161439</td>
</tr>
</tbody>
</table>

**Table 10: Analysis of Variance for effect of treatments on days to 50 % flowering**

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>DF</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuka Block</td>
<td>2</td>
<td>10.686788</td>
<td>5.343394</td>
<td>0.83</td>
<td>0.4428</td>
</tr>
<tr>
<td>Treatment</td>
<td>26</td>
<td>1589.2330</td>
<td>61.12434</td>
<td>9.47</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Embu Block</td>
<td>2</td>
<td>17.538079</td>
<td>8.769038</td>
<td>0.51</td>
<td>0.6057</td>
</tr>
<tr>
<td>Treatment</td>
<td>25</td>
<td>924.275264</td>
<td>36.971013</td>
<td>2.13</td>
<td>0.0113</td>
</tr>
</tbody>
</table>

**Table 11: Mean separation for treatment effect on days to 50 % flowering**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Chuka Estimate</th>
<th>Treatment</th>
<th>Embu Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3D1S1</td>
<td>43.3333 a</td>
<td>F3D2S3</td>
<td>45.3333 a</td>
</tr>
<tr>
<td>F3D2S3</td>
<td>42.6667 a</td>
<td>F3D3S1</td>
<td>44.6667 ab</td>
</tr>
<tr>
<td>F3D3S1</td>
<td>42.0000 a</td>
<td>F3D5S2</td>
<td>44.0000 abc</td>
</tr>
<tr>
<td>F3D2S1</td>
<td>42.0000 a</td>
<td>F3D1S1</td>
<td>42.6667 abcd</td>
</tr>
<tr>
<td>F3D1S3</td>
<td>42.0000 a</td>
<td>F3D5S3</td>
<td>42.5000 abcde</td>
</tr>
<tr>
<td>F3D2S2</td>
<td>41.3333 a</td>
<td>F3D1S2</td>
<td>41.5000 abcd</td>
</tr>
<tr>
<td>F3D1S2</td>
<td>41.2500 a</td>
<td>F3D1S2</td>
<td>41.5000 abcd</td>
</tr>
<tr>
<td>F3D2S2</td>
<td>40.0000 ab</td>
<td>F3D3S3</td>
<td>40.0000 abcd</td>
</tr>
<tr>
<td>F3D3S3</td>
<td>40.0000 ab</td>
<td>F1D3S3</td>
<td>39.0000 abcd</td>
</tr>
<tr>
<td>F1D3S3</td>
<td>36.0000 bc</td>
<td>F2D2S1</td>
<td>38.3333 bcde</td>
</tr>
<tr>
<td>F1D2S3</td>
<td>35.6667 c</td>
<td>F1D3S2</td>
<td>38.0000 bcde</td>
</tr>
<tr>
<td>F1D2S2</td>
<td>35.0000 cd</td>
<td>F1D2S1</td>
<td>37.6667 cde</td>
</tr>
<tr>
<td>F1D1S2</td>
<td>34.0000 cde</td>
<td>F1D2S2</td>
<td>37.6667 cdefg</td>
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<tr>
<td>F1D1S1</td>
<td>34.0000 cde</td>
<td>F1D1S2</td>
<td>37.3333 cdefg</td>
</tr>
<tr>
<td>F1D1S3</td>
<td>34.0000 cde</td>
<td>F1D1S2</td>
<td>37.3333 cdefg</td>
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<tr>
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<td>F1D2S1</td>
<td>37.0000 defg</td>
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<td>F2D2S1</td>
<td>34.0000 cde</td>
<td>F2D2S2</td>
<td>36.5000 defg</td>
</tr>
<tr>
<td>F1D2S1</td>
<td>33.6667 cde</td>
<td>F1D1S3</td>
<td>36.3333 defg</td>
</tr>
<tr>
<td>F1D3S1</td>
<td>33.6667 cde</td>
<td>F1D3S1</td>
<td>36.3333 defg</td>
</tr>
<tr>
<td>F2D2S2</td>
<td>32.5000 cde</td>
<td>F2D2S3</td>
<td>36.3333 defg</td>
</tr>
<tr>
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<td>F2D2S3</td>
<td>35.7500 cef</td>
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<tr>
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<td>F2D3S2</td>
<td>34.3333 fg</td>
</tr>
<tr>
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<td>33.6667 fg</td>
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<tr>
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<td>30.3333 e</td>
<td>F2D1S2</td>
<td>33.3333 fg</td>
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<td>33.0000 g</td>
</tr>
<tr>
<td>F2D1S1</td>
<td>30.0000 e</td>
<td>LSD</td>
<td>6.89</td>
</tr>
<tr>
<td>LSD</td>
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<td>CV</td>
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</tr>
<tr>
<td>CV</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

*Proceedings of the 6th International Research Conference*
The effect of the rate and time of P application, and plant density on days to 50% flowering was also investigated using the $3 \times 3 \times 3$ factorial model which was significant and therefore adequate for the investigation. The R-squared values of the model showed that the rate and time of P application, and plant density accounted for over 80% variation in the number of days to 50% flowering. This was a preliminary result to show that the treatments had a significant effect on the number of days to 50% flowering.

The analysis of variance results indicated that the rate and time of P application, and plant density had a significant effect on the number of days to 50% flowering. The least significant differences analysis showed that the difference analysis showed that the treatment combinations that produced the best estimate of days to 50% flowering contained phosphorus at 60kg/ha applied 14 days before sowing to a plant density of 1481490 plants per hectare. Phosphorus is a vital component of ATP, the "energy unit" of plants. ATP forms during photosynthesis, has phosphorus in its structure, and processes from the beginning of seedling growth through to the formation of grain and maturity. Thus, phosphorus is essential for the general health and vigour of all plants. These results are similar to findings from a study where phosphorus application was observed to reduce the number of days to 50% flowering when compared to the plants which were used as the control group (Drammeh, 2016). These results were also similar to the ones obtained by the Ellah et al., (2018).

The $3 \times 3 \times 3$ factorial models were also used to investigate the effect of the treatments on the days to physiological maturity. The models were also significant (p-value < 0.05) at 5% level of significance (Table 12). The amount of variation in the number of days to physiological maturity that was accounted for by the application of the different treatment was 95.1339 % and 99.8491 % for the Chuka site and the Embu site respectively (Table 13). The average number of days to physiological maturity was at 131.2152 days and 138.8718 days for Chuka site and Embu site.

| Table 112: Model for effect of treatments on days to physiological maturity |
|---|---|---|---|---|---|
| Source | DF | Sum of Squares | Mean Square | F Value | Pr > F |
| Chuka  |  |  |  |  |  |
| Model  | 28 | 551.1506636 | 19.6839523 | 34.91 | <.0001 |
| Error  | 50 | 28.1911085 | 0.5638222 |  |  |
| Corrected Total | 78 | 579.3417722 |  |  |  |
| Embu   |  |  |  |  |  |
| Model  | 27 | 424.0771795 | 15.7065622 | 1225.60 | <.0001 |
| Error  | 50 | 0.6407692 | 0.0128154 |  |  |
| Corrected Total | 77 | 424.7179487 |  |  |  |

The results from the analysis of variance on the effect of treatments on the days to physiological maturity showed that the effect of the treatments was significant (p – value < 0.05) at 5% level of significance (Table 14). The least squared differences analysis showed that the best estimates of the days to physiological maturity were obtained after applying 60kg/ha of phosphorus to a plant density of 333,334 plants/ha (Table 15).

| Table 123: Diagnostics for the model on effect of treatments on days to physiological maturity |
|---|---|---|---|---|
| Chuka  |  |  |  |  |
| R-Square | 0.951339 |  |  |
| Coeff Var | 0.572252 |  |  |
| Root MSE | 0.750881 |  |  |
| DTPM Mean | 131.2152 |  |  |
| Embu  |  |  |  |  |
| R-Square | 0.998491 |  |  |
| Coeff Var | 0.081518 |  |  |
| Root MSE | 0.113205 |  |  |
| DTPM Mean | 138.8718 |  |  |

The effect of the rate and time of P application, and plant density on growth and development was also done by investigating the effect of treatments of the number of days to physiological maturity. The $3 \times 3 \times 3$ factorial model used was significant and therefore adequate for the analysis. The R-squared statistics indicated that 95.13390% of the days to physiological maturity of the groundnuts was accounted for the rate and time of P application, and plant density. This preliminarily showed that the rate and time of P application, and plant density had a significant effect on the number of days to physiological maturity.
Table 15: Mean separation for treatment effect on days to physiological maturity

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Chuka Estimate</th>
<th>Treatment</th>
<th>Embu Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3D3S1</td>
<td>137.00 a</td>
<td>F3D3S2</td>
<td>142.00 a</td>
</tr>
<tr>
<td>F3D2S2</td>
<td>135.00 b</td>
<td>F3D3S3</td>
<td>142.00 a</td>
</tr>
<tr>
<td>F3D3S2</td>
<td>134.00 bc</td>
<td>F1D3S1</td>
<td>142.00 a</td>
</tr>
<tr>
<td>F3D2S3</td>
<td>134.00 bc</td>
<td>F1D3S2</td>
<td>142.00 a</td>
</tr>
<tr>
<td>F2D3S2</td>
<td>134.00 bc</td>
<td>F3D3S1</td>
<td>142.00 a</td>
</tr>
<tr>
<td>F3D2S1</td>
<td>134.00 bc</td>
<td>F1D3S3</td>
<td>141.00 b</td>
</tr>
<tr>
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<td>140.00 c</td>
</tr>
<tr>
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<td>F1D2S3</td>
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<td>F1D2S3</td>
<td>140.00 c</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
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<td>140.00 c</td>
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<td>132.00 d</td>
<td>F3D2S2</td>
<td>140.00 c</td>
</tr>
<tr>
<td>F2D2S1</td>
<td>131.00 de</td>
<td>F2D3S1</td>
<td>140.00 c</td>
</tr>
<tr>
<td>F2D2S1</td>
<td>131.00 de</td>
<td>F2D2S3</td>
<td>138.00 d</td>
</tr>
<tr>
<td>F2D2S2</td>
<td>130.00 ef</td>
<td>F3D1S3</td>
<td>138.00 d</td>
</tr>
<tr>
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<td>129.33 f</td>
<td>F3D1S2</td>
<td>138.00 d</td>
</tr>
<tr>
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<td>129.00 fg</td>
<td>F2D1S3</td>
<td>137.33 e</td>
</tr>
<tr>
<td>F1D2S2</td>
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<td>137.00 f</td>
</tr>
<tr>
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<td>F2D1S2</td>
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</tr>
<tr>
<td>F1D3S2</td>
<td>129.00 fg</td>
<td>F2D2S2</td>
<td>137.00 f</td>
</tr>
<tr>
<td>F1D1S1</td>
<td>128.00 g</td>
<td>F2D2S1</td>
<td>136.00 g</td>
</tr>
<tr>
<td>F1D3S1</td>
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<td>F1D1S3</td>
<td>136.00 g</td>
</tr>
<tr>
<td>F1D2S3</td>
<td>128.00 g</td>
<td>F2D1S1</td>
<td>136.00 g</td>
</tr>
<tr>
<td>F1D3S2</td>
<td>128.00 g</td>
<td>F1D1S1</td>
<td>135.00 h</td>
</tr>
<tr>
<td>F1D1S2</td>
<td>128.00 g</td>
<td>F1D1S2</td>
<td>134.00 i</td>
</tr>
<tr>
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<tr>
<td>LSD</td>
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<td>CV</td>
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</tr>
<tr>
<td>CV</td>
<td>2.00856</td>
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</tr>
</tbody>
</table>

The results indicated that the rate and time of P application, and plant density had a significant effect on the number of days to physiological maturity of groundnuts. The least squared differences analysis showed that the largest estimates of the days to physiological maturity were obtained after applying 60kg/ha of phosphorus at time for a plant density of 333,334 plants/ha which showed that the application of a lot amount of phosphorus at the sowing time prolonged the growth period but still supported a higher plant density. The least estimate of the days to physiological maturity was obtained after the application of 0kg/ha of phosphorus, 14 days before sowing on a plant density of 148,149 plants per hectare which was an indication that plant groundnuts with no phosphorus application showed faster maturity but for a smaller plant density and lower yields. This is an indication that with no phosphorus application in the soil, a fewer density of groundnuts could be supported and consequently resulting to lower yields.

Increasing the plant density would mean more competition for nutrients and thus the high amounts of phosphorus would be required to be manually applied. A high plant density would also mean competition for other resources such as sunlight, which could mean a little delay in maturity. Phosphorus plays a very vital role in the growth and maturity of groundnuts. Some of the roles associated with phosphorus are: stimulated root development, increased stalk and stem strength, improved flower formation and seed production, more uniform and earlier crop maturity. The findings of this study showed similarity with other studies in literature. For instance, phosphorus application was found to have a significant effect on the days to 50% maturity (Melese, 2011). Increased rate of phosphorus application resulted to a decrease in the number of maturity days (Melese, 2011). Drammeh (2016) also reported a decrease in the number of days to maturity with application of phosphorus at sowing as compared to the application after sowing. Waghmode (2012) also found similar results.
CONCLUSION
In conclusion the rate and time of P application had a significant effect on germination of groundnuts in the two sites and the finding was supported by the studies available in literature. The other growth components were significantly affected by the rate and time of P application and plant density. The rates and time of P application that yielded the best estimates of the growth components were the 30 kg per hectare of phosphorus applied 14 days before sowing. The plant density that yielded the best estimates of the growth estimates was 333,334 plants per hectares. These are the optimal combinations that would lead to the best and fast growth.

REFERENCES
Drammeh, K. M. (2016). Rate and time of phosphorus application on growth, n-fixation, seed yield of groundnut (*Arachis hypogaea L.*) and residue fertility on maize production (Doctoral dissertation)


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ABSTRACT
Pumpkin acts as a dependable source of food providing families producing it with various diets that ensure stability in household food security and nutrition. There is increasing demand for indigenous pumpkins, which can only be fulfilled by using best practices that enhance pre-harvest and post-harvest productivity and quality. An experiment was conducted between January and July 2019 at Chuka University farm to determine the interactive effects of nitrogen rate, mulch and gibberellic acid on physiology of multipurpose pumpkin (Cucurbita moschata Duchesne). The experiment was arranged in split-plots in randomized complete block design, with three replications. The main plots were assigned to nitrogen (0, 50, 100 and 150 kg N/ha), split plots to mulch (no mulch, black-painted and unpainted rice straws), while sub-plots were gibberellic acid (GA) (0 mg/L, 40 mg/L and 80 mg/L). Nitrogen was applied as calcium ammonium nitrate in two equal dosages for each rate at three weeks post-emergence and at the beginning of flowering. The black-painted and unpainted rice straws were placed on plots after land preparation. The GA solution was sprayed to plants with a knapsack sprayer, starting with 40 mg/L followed by 80 mg/L, once during the fourth week after emergence. Data collection was done fortnightly from the fourth week after emergence. Data values were subjected to analysis of variance using the SAS software version 9.3 and means separated using the least significant difference test at α = 0.05. Preliminary results showed that nitrogen, mulch, and GA and their interactions did not significantly (P>0.05) affect chlorophyll content. Mulch had a significant (P<0.05) effect on stomatal conductance, photosynthetic and transpiration rates. Unpainted rice straw had significantly higher stomatal conductance than black-painted rice straw. No mulch had lower stomatal conductance and transpiration rates than black-painted and unpainted rice straw. Gibberellic acid resulted in reduction of stomatal conductance and net photosynthetic rate. The study concluded that mulch was the factor that significantly affected physiological traits of pumpkins and hence is recommended for use to optimize performance.

Keywords: Chlorophyll content, Photosynthesis, Stomatal conductance, Transpiration rate

INTRODUCTION
Pumpkin is a fruit-vegetable belonging to the Cucurbitaceae family together with gourds, melons and squashes. The varieties of pumpkins grown widely in Kenya belong to C. moschata and C. maxima. Pumpkin is a native of Central America but is now domesticated in other tropical and subtropical countries (Fedha, 2008). Globally, China is the major producer followed by India. In Africa, Egypt and South Africa are the leading producers. In Kenya, pumpkin production increased from 599 ha in 2015 to 681 ha in 2016, with a volume increase from 3580 metric tonnes to 4017 metric tonnes respectively (Horticulture Validated Report, 2015-16). In Kenya, pumpkin is regarded as a traditional vegetable that is grown in the high potential areas and the arid and semi-arid lands (Karanja et al., 2014). FAO (2005) reported that pumpkin has immense economic potential for use both as a food and as an industrial crop. Pumpkin is famous for its edible seeds, fruit and greens (Matsui et al., 1998). Nitrogen is a key element required for successful plant growth. Although inorganic nitrogen compounds (NH₄⁺, NO₂⁻ and NO₃⁻) account for less than 5% of the total nitrogen in the soil, Liu et al. (2014) indicated that they form the critical elements that most plants absorb. Nitrogen is the most important element for proper growth and development of plants which substantially increases and enhances yield and quality as it plays a critical role in biochemical and physiological plant functions (Ullah et al., 2010). Nitrogen enhances total leaf biomass which is a determinant of pumpkin vegetable yield (Nasim et al., 2012). Mulch prevents fertilizer leaching since it slows down runoff, conserves soil moisture, increases soil temperature, suppresses weeds and prevents pathogen splash onto produce, thereby enhancing pumpkin yield and quality (Cerniauskienė et al., 2015). Gibberellic acid helps in transport of water and nutrients through the xylem and influences biochemical and physiological parameters like photosynthesis, respiration, protein synthesis, cell extension, and wall thickness and stability (Abbas et al. 2011) which are important in productivity and quality enhancement. It strengthens parthenocarpic flowers and fruits to prevent premature abortion, which is common in pumpkins particularly when pollination is inadequate (Mwaura et al., 2014; Isutsa and Mwaura, 2017).
Pumpkin acts as a dependable source of food providing families producing it with various diets that ensure stability in household food security. The increased demand can only be fulfilled by using practices that enhance increased productivity. Nonetheless, the interactive effects of nitrogen, mulch and gibberellic acid have been given little attention by researchers despite existence of enormous potential. While several studies have been done both locally and globally on the physiological factors affecting Cucurbita species both in greenhouse and open field conditions, none has examined interactive effects of nitrogen, mulch and gibberellic acid on physiological factors of multipurpose pumpkin. The scanty data on the effect of interactive N, mulch and gibberellic acid on the physiological traits of multi-purpose pumpkins elucidates the research gap that this study seeks to fill. Specifically, the study’s objectives were

i. To determine the effect of effect of nitrogen, mulching and gibberellic acid on SPAD (chlorophyll), photosynthetic rate, stomatal conductance and transpiration rate of multipurpose pumpkins

ii. To determine the effect of mulch type on stomatal conductance, photosynthetic rate and transpiration rate of multipurpose pumpkins

**METHODOLOGY**

The experiment was conducted at Chuka University Ndagani research farm. The farm lies at 0° 19’ S, 37° 38’ E and 1535 m above sea level. The average annual temperature is 19.5 °C (from 12.2 °C and 23.2 °C). The area experiences two rainy seasons with the long rainy season occurring in March through June and the short rainy season from October to December. The average annual rainfall is 1200 mm annually (http://en.climate-data.org). The soils are humic Nitisols, deep, strongly weathered, well drained tropical soils with a clayey subsurface horizon made of angular, blocky structural elements that easily crumble into polyhedralcips with shiny faces. The soil has a high cation exchange capacity (Koskey et al, 2017). A three factor split-split block experiment embedded in a randomized complete block design (RCBD) with three replications was used. Individual plots in a block measured 2m x 2m separated from each other by 1 m. Nitrogen occupied the main plot; mulch the split plots and gibberellic acid the subplots. The four nitrogen rates were 0, 50, 100 and 150 kg/ha. Mulch factor included no mulch, black-painted rice straw and unpainted rice straw. Gibberellic acid rates were 0, 40 and 80 ppm.

The field was prepared to appropriate tillth required for pumpkin seedlings establishment. Mulching was laid as per the treatments just before sowing. Two seeds were sowed in the plots directly where one was uprooted two weeks after emergence. Nitrogen was applied at two split equal dosages for each rate, at three weeks post-emergence and at the beginning of flowering. Gibberellic acid was sprayed once during the fourth week after emergence. All plots were kept weed free through rogueing and weeding of plots. Pest and disease control was done on and when appropriate using the different recommended pesticides. Data collection was done fortnightly from the fourth week after emergence and recorded as Time 1, Time 2 and Time 3. SPAD (Chlorophyll), photosynthetic rate, stomatal conductance and transpiration rate were the parameters measured. Data values were subjected to analysis of variance using the SAS software version 9.3 and means separated using the least significant difference (LSD) test at α = 0.05.

**RESULTS AND DISCUSSION**

**Effect of nitrogen, mulching and gibberellic acid on SPAD (chlorophyll)**

Analysis of the effect of nitrogen, mulching and GA₃ on SPAD (chlorophyll) of multipurpose pumpkin was conducted and the results shown in Table 1. Results showed that the effect of nitrogen level, mulching type, and gibberellic acid and their interactions were not significant on the SPAD value during Time 1, 2, and 3 (Table 1) which suggested that the pumpkin variety used in this study had low nitrogen requirements for optimum physiological function.

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th>Time 2</th>
<th>Time 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-level (a)</td>
<td>0.61</td>
<td>0.45</td>
<td>0.54</td>
</tr>
<tr>
<td>Mulching (b)</td>
<td>1.19</td>
<td>0.20</td>
<td>0.51</td>
</tr>
<tr>
<td>Gibberellic acid (c)</td>
<td>0.02</td>
<td>0.01</td>
<td>0.19</td>
</tr>
<tr>
<td>a x b</td>
<td>2.31</td>
<td>2.94</td>
<td>0.18</td>
</tr>
<tr>
<td>a x c</td>
<td>0.83</td>
<td>0.36</td>
<td>1.12</td>
</tr>
<tr>
<td>b x c</td>
<td>0.26</td>
<td>1.51</td>
<td>0.29</td>
</tr>
<tr>
<td>a x b x c</td>
<td>0.59</td>
<td>1.41</td>
<td>1.09</td>
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</table>

<table>
<thead>
<tr>
<th></th>
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<th>P value</th>
<th>F value</th>
<th>P value</th>
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<tbody>
<tr>
<td>N-level (a)</td>
<td>0.61</td>
<td>0.6262</td>
<td>0.45</td>
<td>0.7259</td>
<td>0.54</td>
<td>0.6661</td>
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<td>Mulching (b)</td>
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<td>0.8234</td>
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<td>Gibberellic acid (c)</td>
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<td>0.19</td>
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<td>a x b</td>
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<td>2.94</td>
<td>0.0394</td>
<td>0.18</td>
<td>0.9786</td>
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<tr>
<td>a x c</td>
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<td>0.5501</td>
<td>0.36</td>
<td>0.8978</td>
<td>1.12</td>
<td>0.3638</td>
</tr>
<tr>
<td>b x c</td>
<td>0.26</td>
<td>0.9051</td>
<td>1.51</td>
<td>0.2136</td>
<td>0.29</td>
<td>0.8834</td>
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<td>a x b x c</td>
<td>0.59</td>
<td>0.8384</td>
<td>1.41</td>
<td>0.1968</td>
<td>1.09</td>
<td>0.3932</td>
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</table>
Effect of nitrogen, mulching and gibberellic acid on photosynthetic rate

Analysis of variance done on the effect of nitrogen, mulching and gibberellic acid on photosynthetic rate of multipurpose pumpkin (Table 2) indicated that their interactions were not significant on the photosynthetic rate during Time 1. Results showed that the effect of gibberellic acid and mulching was significant during Time 2 and Time 3 respectively.

Table 2: Analysis of variance on the effect of nitrogen, mulching and gibberellic acid on photosynthetic rate (µmol m\(^{-2}\)s\(^{-1}\))

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th></th>
<th>Time 2</th>
<th></th>
<th>Time 3</th>
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<tbody>
<tr>
<td></td>
<td>F value</td>
<td>P value</td>
<td>F value</td>
<td>P value</td>
<td>F value</td>
</tr>
<tr>
<td>N-level (a)</td>
<td>0.09</td>
<td>0.9626</td>
<td>0.70</td>
<td>0.5778</td>
<td>0.31</td>
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<tr>
<td>Mulching (b)</td>
<td>0.09</td>
<td>0.9136</td>
<td>0.20</td>
<td>0.8216</td>
<td>0.70</td>
</tr>
<tr>
<td>Gibberellic acid (c)</td>
<td>0.70</td>
<td>0.5026</td>
<td>5.00</td>
<td>0.010</td>
<td>1.54</td>
</tr>
<tr>
<td>a x b</td>
<td>0.51</td>
<td>0.7894</td>
<td>0.91</td>
<td>0.5154</td>
<td>0.91</td>
</tr>
<tr>
<td>a x c</td>
<td>0.78</td>
<td>0.5880</td>
<td>0.75</td>
<td>0.6162</td>
<td>0.86</td>
</tr>
<tr>
<td>b x c</td>
<td>1.61</td>
<td>0.1863</td>
<td>0.69</td>
<td>0.6049</td>
<td>0.58</td>
</tr>
<tr>
<td>a x b x c</td>
<td>0.90</td>
<td>0.5532</td>
<td>0.69</td>
<td>0.7555</td>
<td>1.01</td>
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</table>

Effect of nitrogen, mulching and gibberellic acid on stomatal conductance

Results in Table 3 are an analysis of variance on the effect of nitrogen, mulching and gibberellic acid on stomatal conductance. Results showed that during Time 1, mulch was significant (0.03) while gibberellic acid effect was significant (0.016) during Time 2. Their interactions on stomatal conductance were not significant during Time 3.

Table 3: Analysis of variance on the effect of nitrogen, mulching and gibberellic acid on stomatal conductance (mol m\(^{-2}\)s\(^{-1}\))

<table>
<thead>
<tr>
<th></th>
<th>Time 1</th>
<th></th>
<th>Time 2</th>
<th></th>
<th>Time 3</th>
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<tr>
<td></td>
<td>F value</td>
<td>P value</td>
<td>F value</td>
<td>P value</td>
<td>F value</td>
</tr>
<tr>
<td>N-level (a)</td>
<td>0.48</td>
<td>0.7077</td>
<td>1.37</td>
<td>0.3190</td>
<td>1.30</td>
</tr>
<tr>
<td>Mulching (b)</td>
<td>4.38</td>
<td>0.0305</td>
<td>0.01</td>
<td>0.9907</td>
<td>1.55</td>
</tr>
<tr>
<td>Gibberellic acid (c)</td>
<td>1.28</td>
<td>0.2881</td>
<td>4.52</td>
<td>0.0160</td>
<td>1.27</td>
</tr>
<tr>
<td>a x b</td>
<td>1.82</td>
<td>0.1588</td>
<td>0.79</td>
<td>0.5931</td>
<td>1.02</td>
</tr>
<tr>
<td>a x c</td>
<td>0.54</td>
<td>0.7753</td>
<td>1.11</td>
<td>0.3714</td>
<td>1.02</td>
</tr>
<tr>
<td>b x c</td>
<td>0.67</td>
<td>0.6144</td>
<td>1.02</td>
<td>0.052</td>
<td>1.17</td>
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<tr>
<td>a x b x c</td>
<td>0.41</td>
<td>0.9508</td>
<td>0.64</td>
<td>0.7951</td>
<td>1.20</td>
</tr>
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Effect of nitrogen, mulching and gibberellic acid on transpiration rate

Analysis of variance on the effect of nitrogen, mulching and gibberellic acid on transpiration rate was done and the results are shown in Table 4. Transpiration rate data was not collected during this time (Time 1). Results indicated that gibberellic acid and mulching effect was significant during Time 2 and Time 3 respectively.

Table 4: Analysis of variance on the effect of nitrogen, mulching and gibberellic acid on transpiration rate (µmol m\(^{-2}\)s\(^{-1}\))

<table>
<thead>
<tr>
<th></th>
<th>Time 2</th>
<th></th>
<th>Time 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F value</td>
<td>P value</td>
<td>F value</td>
</tr>
<tr>
<td>N-level (a)</td>
<td>0.83</td>
<td>0.5153</td>
<td>0.74</td>
</tr>
<tr>
<td>Mulching (b)</td>
<td>0.05</td>
<td>0.955</td>
<td>9.90</td>
</tr>
<tr>
<td>Gibberellic acid (c)</td>
<td>6.89</td>
<td>0.0024</td>
<td>1.20</td>
</tr>
<tr>
<td>a x b</td>
<td>0.23</td>
<td>0.9587</td>
<td>0.68</td>
</tr>
<tr>
<td>a x c</td>
<td>0.95</td>
<td>0.4704</td>
<td>0.52</td>
</tr>
<tr>
<td>b x c</td>
<td>1.38</td>
<td>0.2554</td>
<td>0.08</td>
</tr>
<tr>
<td>a x b x c</td>
<td>1.35</td>
<td>0.2235</td>
<td>0.38</td>
</tr>
</tbody>
</table>
Effect of mulch type on stomatal conductance, photosynthetic rate and transpiration rate during Time 1, 2 and 3

Figure 1: Effect of mulch type on stomatal conductance, photosynthetic rate and transpiration rate during Time 1, 2 and 3

Results in Figure 1 above showed that brown mulch tended to have a significantly higher stomatal conductance than the black mulch in early growth stages i.e. Time 1 (Fig. 1A). However, in later growth stages i.e. Time 3, there were no significant differences in stomatal conductance between the two mulch treatments (Fig. 2A). In contrast, plots with no mulch application tended to have a lower stomatal conductance than those with black and brown mulch treatments (Fig. 2A). Application of mulch reduces soil water loss through evaporation and thus enhances water use efficiency which contributes to enhanced transpiration. In this study, both the brown and black mulch treatments had greater transpiration rates than that of no mulch plots (Fig. 2C). Increased transpiration rate is often associated with enhanced gaseous exchange and hence greater photosynthetic rate when mulching was applied (Fig. 2B). It was found that increasing gibberellic acid resulted in a reduction of the stomatal conductance and net photosynthetic rate in the pumpkin variety used in the current study (Fig. 3A & B). This result suggests that gibberellic acid affected the chlorophyll content or played a role in the regulation of stomatal opening in the leaves and hence the need to evaluate the optimum amount for maximum photosynthetic rates.
DISCUSSION

The findings by Hamidi et al. (2015) on the effect of nitrogen on the morphological and physiological characteristics of pumpkin showed significant effect on chlorophyll b at the late stages of flowering period which contradicts with the findings of this study. Further, nitrogen fertilization increased the amount of chlorophylls and photosynthetic content of the leaves of medicinal pumpkins (Aroiee & Omidbaigi, 2004). A study by Yue et al. (2018) showed that GA significantly increased the net photosynthetic rate (Pn) of 1st and 6th leaves of *Camellia oleifera*. GA3 treatment also showed significant effect on chlorophyll b and stomatal conductance of Syzygium samarangense (Khandaker et al., 2017). Hatfield et al. (2001) reported a 34-50% reduction in transpiration rates, crop residues (grasses, lantana leaves, cotton and maize stubbles) as mulches reduces moisture losses. Muhammad et al. (2009) agreed that mulching improves the ecological environment of the soil, increases soil water contents, reduces infiltration rate, increases the total intake of water due to formation of loose soil surface and reduces sealing of soil particle pores. The control of leaf stomatal conductance is a crucial mechanism for plants, since it is essential for both CO2 acquisition and desiccation prevention (Dodd, 2003). Mulching and GA significantly affected stomatal conductance of multipurpose pumpkins in this study.

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study suggest that mulching was the most important factor that affected physiological traits of the pumpkin used in this study as it was found to have significant interactive effect on the physiological traits of multipurpose pumpkins. The study recommends that the application of gibberellic acid should be carefully considered if optimum yields of multipurpose pumpkins are to be achieved.

Acknowledgement

The authors are greatly indebted to the management of Chuka University for funding the research and provision of the land where the experiment was laid. Secondly to KALRO Mwea for providing the equipment required and personnel to operate it.

REFERENCES


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EFFECTS OF AGRICULTURAL LAND USE PRACTICES ON SOIL ORGANIC CARBON STOCKS, TOTAL NITROGEN AND AVAILABLE PHOSPHOROUS IN SMALLHOLDER FARMS IN EMBU COUNTY, KENYA

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Corresponding E-mail: osonafny@gmail.com

ABSTRACT
The study determined soil organic carbon stocks (SOCs), total nitrogen (TN) and available phosphorous (AP) changes in agricultural land use practices with a focus on maize and coffee along Kapingazi river catchment in Embu County. Demarcation was done into four agro-ecological zones (AEZ) following the river downstream; Lower Highland Zone 1 LH1; Upper Midland Zone 1, UM1; Upper Midland Zone 2, UM2; Upper Midland Zone 3, UM3. Soil samples were obtained from two depths of 0-25 cm and 25-50 cm across slope positions. Data obtained was subjected to ANOVA and significantly different means separated using Tukey test. The soil organic carbon stocks were high in LH1 at 58.38 kg/m$^2$ whereas UM3 had least amount at 29.48 kg/m$^2$. The total nitrogen was higher in LH1 at 0.27% while least at UM3 with 0.07%. The UM1 had higher mean amount of available phosphorous at 0.84% and least at LH1. The coffee based agricultural system had more available phosphorous in LH1 at 23.75 ppm whereas maize had more of available phosphorous in UM1, UM2 and UM3. The soil organic carbon stocks and total nitrogen reduced across the agro-ecological zones. The toe slope sampling point had higher soil organic carbon stocks and least in the summit sampling point in both depths. The concentration of total nitrogen in coffee was high in all slope positions whereas available phosphorous was higher in maize. Therefore, it is concluded that topography and agricultural land use management practices influence soil nutrients.

Keywords: Agroforestry, Agro-Ecological Zones, Agricultural Land Use Practices, Soil Organic Carbon, Soil Organic Carbon Stocks.

INTRODUCTION
Background to the Study
In the presence of land degradation, climate change and biodiversity loss, soils have become one of the most vulnerable resources in the world (Food Agriculture Organisation [FAO], 2017). Soil plays a crucial role in combating climate change and ecological restoration through controlling the global carbon cycle. Agricultural land use changes have become an increasing focus of research because of its significance in affecting soil fertility and related properties, such as soil bulk density, soil organic carbon, total nitrogen (TN), available phosphorus (P), and ultimately the value of ecosystem services (Feng et al., 2010). The type of land use system is an important factor that controls soil organic matter levels since it affects the amount and quality of litter input, the litter decomposition rates and the processes of organic matter stabilization in soils (International Union for Conservation of Nature and Natural Resources [IUCN], 2018).

The continent of Africa is one of the current hotspots of land use and land cover changes and degradation, this has an effect on soil organic carbon stocks, available phosphorous (AP) and total nitrogen (TN) dynamics including changes along the vertical soil profile (Don et al., 2011). Smallholder farmers represent 80% of all farms in the continent (Livingston et al., 2011). Productivity of crops per unit of land is low in Africa. Over the last several decades, crop harvest and erosion has led to depleted nitrogen in the soils and declining grain yields (Hickman et al., 2011). Inappropriate agricultural land use practices alters soil-plant nitrogen and phosphorous uptake resulting to erosion of nitrogen and phosphorous based compounds to waterways causing eutrophication (Galloway et al., 2008). A marginal reduction in soil organic carbon content in the order of one per cent can have a significant negative impact on soil natural capital and ecosystems services (Brady et al., 2015).

Agriculture is the mainstay of the Kenyan economy directly contributing 23.9% of the country’s Gross Domestic Product (GDP) growth in 2012 (Kenya National Bureau of Statistics [KNBS], 2014) and another 25% indirectly. The sector accounts for 65% of Kenya’s total exports and provides more than 70% of informal employment in the rural areas (Kenya National Bureau of Statistics [KNBS], 2014). In addition, the sector provides food security and livelihood for over 80% of the Kenyan population. Therefore, the agricultural sector is not only the driver of Kenya’s economy but also the means of livelihood for the majority of Kenyan people (Kenya National Bureau of Statistics [KNBS], 2014). Over the years, population pressure and lack of growth in other economic sectors in
Kenya has increased pressure on land resources, resulting in declining soil fertility, productivity and general environmental degradation (Mati, 2005).

Population pressure in the Eastern highlands of Kenya has increased demand on food production forcing smallholder farmers to practice poor methods of farming such as limited crop rotation and clearing large areas of natural forests (Micheni et al., 2002). The different agricultural land uses in Embu County include cultivation of upper zones with tea. At the lower altitude gradient coffee is grown as a cash crop. This zone is immediately followed by an area where maize, beans, horticultural crops are grown. In all the zones the crops receive different types and quantities of agricultural inputs like fertilizers and manure at different times (Kimenju et al., 2009).

Studies have been done on how soil organic carbon, total nitrogen and available phosphorous are affected by land use change in Africa and Kenya (Abdollahi et al., 2014) but the effects of agricultural land use and spatial variation in soil organic carbon stocks, total nitrogen and available phosphorous in smallholder farms in localised Counties in Kenya has not been well documented. This study examined the effects of agricultural land use and spatial variation on soil organic carbon, total nitrogen and available phosphorous in smallholder farms in Embu County of Kenya. The focus was on coffee and maize based agricultural systems located along different agro ecological zones in the Kapingazi river catchment of the Embu County.

**Statement of the Problem**

A decline in soil organic carbon stocks, total nitrogen and available phosphorous creates an array of negative effects on land productivity such as loss of soil quality, decline in crop productivity and sustainability of the agricultural systems in river catchments. Smallholder farmers’ activities in Kapingazi river catchment that involve modification of the plant cover and soil through agricultural land use changes have produced considerable alterations, like the loss of carbon and soil stocks of soil organic matter. In Embu County, there is inadequate documented work on the spatial distribution of soil organic carbon pools, total nitrogen and available phosphorous that can aid the formulation or development of feasible carbon sequestration programmes. There is lack of focus on farmers at farm level that are practicing coffee and maize agricultural land use that accumulates organic carbon stocks. There is also minimal baseline data on the spatial distribution of soil organic carbon pools, total nitrogen and available phosphorous in the County. Lack of awareness by smallholder farmers on the contribution of different agricultural land uses on soil organic carbon stocks, total nitrogen and available phosphorous and its influence on soil productivity that determines crop performance is also an issue.

**Objectives of the Study**

The objectives of the study were to:
1. Assess the different types of agricultural land use management practices in coffee and maize based agricultural systems along the Kapingazi river catchment.
2. Quantify the spatial distribution of soil organic carbon stocks, total Nitrogen and available Phosphorus contents in coffee and maize based agricultural systems along the Kapingazi river catchment.
3. Investigate the contribution of smallholder farms landscape differences on soil organic carbon stocks, total Nitrogen and available Phosphorus in coffee and maize based agricultural systems along Kapingazi river catchment.

**LITERATURE REVIEW**

**Agricultural Land Use Management Practices**

The increasing demand for food can encourage farmers to reduce the length of fallow periods, cultivate continuously, overgraze fields, or remove much of the above-ground biomass through fuel collection or for building materials. Such practices can result in the reduction of soil organic carbon stocks, water holding capacity, nutrients, as well as enhance soil erosion (Lal, 2004). The adoption of agriculture practices, such as no till, agroforestry and crop-livestock systems, generally leads to an increase in soil carbon stocks at least at more surface depths (Eclisa et al., 2012; Peichl et al., 2006).

**Spatial Distribution of Soil Organic Carbon Stocks, N and P Contents in Agricultural Land Uses**

According to (Saha et al., 2012), the magnitude of variation in soil organic carbon, total nitrogen and available phosphorous content and stock (increase/decrease) depends on the type of land-use, degree of land-use change and post-conversion land management. A better understanding of the spatial variability of soil organic carbon stocks,
total nitrogen and available phosphorous is important for the refining agricultural management practices and for improving sustainable land use (McGrath & Zhang, 2004).

The Contribution of Smallholder Farms Landscape Differences on Soil Organic Carbon Stocks, Nitrogen and Phosphorus in Coffee and Maize Based Agricultural Systems

Topography as one of soil forming factors should be considered in local management of soils. Major changes in soil type can occur over a very small difference in distance due to topography. Tropical agriculture soils on sloping landscape have been regarded as “global hotspots” in terms of soil fertility loss, which is a threat not only to food security but also to climate stability of the region (Dorji et al., 2014). According to Buol et al. (1989), landscape attributes affect organic matter activity, run-off and run-on processes, condition of natural drainage, and exposure of soil to wind and precipitation. Papiernik et al. (2007) stated that topography is one of the key factors of soil formation and its effects on soil carbon have been well documented.

METHODOLOGY

Study Design and Site

The Kapingazi River Catchment has an area of 61.23 km² and is part of the larger Upper Tana River catchment. It drains into river Rupingazi at the lower parts of Embu town. It is located in Embu County, Kenya in the Central Highlands on longitudes 0°00’N and 38°00’E. The catchment illustrates a typical agro-ecological profile of the County. The catchment is 27 km long and is situated at altitudes of between 1230 m to 2100 m above sea level (Mount Kenya East Pilot Project [MKEPP], 2009).

![Figure 3: Map showing the location of Kapingazi River Catchment](Source: Water Resources Management Authority [WRMA], 2009)

Research Design

The quasi factorial experimental design was utilised in this study. The agricultural land use practices focussed on maize and coffee and the agro-ecological zones following the river downstream. The experiment was laid down on randomized complete block design, with blocks nested within landscape position. Each treatment was replicated three times within the same zone from each of the smallholder farms identified for sampling. The survey research design was utilised in the study and involved the use of questionnaires.
Sample Size and Soil Sampling Procedure
A sample size of 380 respondents was arrived at as per Krejcie & Morgan (1970). Stratified random sampling was used where a questionnaire to collect primary data from farmers whose farms had been identified for soil sampling. The study area was demarcated into four agro-ecological zones and in each of the zone three coffee and maize based farms were identified randomly through intensive sampling and participatory approach involving farmers and Agricultural Officers. Soil samples were collected for maize and coffee based agricultural system. A total of seventy two (72) soil samples were collected for each of the two agricultural based systems making a grand total of one hundred and forty four (144) soil samples (Table 1). Three soil samples were collected across the landscape position in the two depths of 0-25 cm and 25-50cm. The soil samples were appropriately labelled, placed in khaki carrier bags and transported to the Kenya Agricultural and Livestock Research Organization (KALRO) laboratory in Embu.

Total nitrogen (TN) was analysed by the micro-Kjeldahl procedure (Institute of Soil Science Chinese Academy of Sciences (ISSCAS], 1978), available phosphorous by the Olsen and Sommers method. The Soil organic carbon (SOC) was analysed using the Walkey and Black method (Nelson & Sommers, 1982). Computation of soil organic carbon was done through the following method.

\[
SOC = BD \times d \times %C \quad \text{Equation (1)}
\]

Where, SOC = Soil Organic Carbon [kg/m²]; BD = Bulk Density [g cm⁻³]; d = Depth of the Soil Sample [cm]; % C = Carbon Concentration [%]

### Table 13: Representation of the Agro-Ecological Zones, Farms and Soil Depths and Sampling Procedure

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Data Analysis
The nominal data obtained from the questionnaire were analysed using cross tabulation in Statistical Packages for Social Science (SPSS) where descriptive statistics (measure of location and dispersion) were obtained. An analysis of variance (ANOVA) was used to analyse data on SOCs, AP and TN obtained from coffee and maize based agricultural land use practices at different two depths. Analysis of variance (ANOVA) was further used to evaluate
any significant differences in distribution of soil organic carbon across the coffee and maize based agricultural land use practices. The significantly different means were separated using the Tukey test at α=0.05.

RESULTS

Assessment of the Different Types of Agricultural Land Use Management Practices in Coffee and Maize Based Agricultural Systems along the Kapingazi River Catchment

Demographic Data of the Respondents
The information derived from the research indicated that 60% of smallholder farmers are in the age bracket of 31–40 years and 28.2% in the age bracket of 41-50 years. The findings established that the age bracket of below 20 years recorded a low level of involvement in farming practices at 1.6%. The age bracket of 51-60 years recorded the second lowest level of participation in agriculture based systems at 3.2%.

Socio-Economic and Livelihood Analysis
The results indicated that most of the smallholder farmers had farms sizes ranging 1-2 ha, this represented 73.4% of the farm holding. A sample population of 22.9% had land holding of 22.9%. The lowest farm holding is less that 1 ha representing 3.7% of the smallholder farmers sampled during the study.

Maize Based Agricultural System
The results indicated that 80% of smallholder farmers do not till their land in order to prepare for planting of maize crops whereas 20% of the smallholder farmers did tilling the land. The findings of the research established that 45% of smallholder farmers practiced monocropping, 38% practiced legume intercropping whereas 15% practiced crop rotation. The results indicated that 79% of maize stalks/stovers were used as feed whereas 18% were integrated the maize stalks / stovers into the farms. The results indicated that 98.7% of smallholder farmers’ used fertilizer when planting their maize crop whereas1.3% of did not. The findings established that majority of smallholder farmers representing 92.4% used DAP fertilizer in planting the maize crop, 5.3% used NPK fertilizer while another 1.3% were mixed CAN and DAP. The least used fertilizer was CAN at 0.8%. The study established that animal manure was the most preferred type of organic manure at 84.5%, coffee shells were used at 8.4% whereas green leaves was preferred at 6.8%.

Coffee Based Agricultural system
A total of 91.8% smallholder farmers undertook mixing of manure and fertilizer in their farms whereas 8.2% of did not mix. The study established that most smallholder farmers incorporated coffee prunings and pulps in their farms at 89% whereas 11% did not incorporate coffee prunings and pulps in their farms. A total of 73% of smallholder farmers used a mix of NPK and CAN fertilizer in the coffee crops. A total of 16% of the farmers used DAP fertilizer while another 8% used NPK. The least used fertilizer was CAN at 3%. The study established that 82% used organic manure in their coffee crops whereas 8% did not. A total of 81.3% of farmers did intercropping of coffee and tree species whereas 2.9% did not.

Quantification of the Spatial Distribution in SOC Stocks, TN and AP Contents in Coffee and Maize Based Agricultural Systems along the Kapingazi River Catchment
The results indicated that coffee agricultural based system had the highest concentration of soil organic carbon stocks as compared to the maize based agricultural system (Fig.1-a). The results show that soil organic carbon stocks are higher in LH1 and tend to reduce towards UM3 in both agricultural based systems. Similar studies have established that areas of high altitude have large quantities of soil organic carbon stocks (Biazin et al., 2018).
The results indicate that coffee agricultural based system had the highest concentration of total Nitrogen compared to the maize based agricultural system. The results show that total Nitrogen is higher LH1 and tends to reduce towards UM3 in both agricultural based systems (Fig. 1-b). The findings have been confirmed by several literatures elsewhere in the world (Brevik et al., 2016). The results derived for available Phosphorous indicate that the trend did not follow the spatial distribution like that of soil organic carbon stocks and total Nitrogen. The agroecological zonation of LH1 showed a highest concentration of available Phosphorous in coffee whereas in agroecological zonation of UM1 showed a highest concentration of available Phosphorous in maize (Fig. 1-c).

**Fig. 4 Mean comparison of soil properties in different agro-ecological zones**

The results indicate that coffee agricultural based system had the highest concentration of total Nitrogen compared to the maize based agricultural system. The results show that total Nitrogen is higher LH1 and tends to reduce towards UM3 in both agricultural based systems (Fig. 1-b). The findings have been confirmed by several literatures elsewhere in the world (Brevik et al., 2016). The results derived for available Phosphorous indicate that the trend did not follow the spatial distribution like that of soil organic carbon stocks and total Nitrogen. The agroecological zonation of LH1 showed a highest concentration of available Phosphorous in coffee whereas in agroecological zonation of UM1 showed a highest concentration of available Phosphorous in maize (Fig. 1-c).

**Determination of the contribution of smallholder farms landscape differences on SOC stocks, TN and AP in coffee and maize based agricultural systems along Kapingazi river catchment**

The results indicate that coffee based agricultural system had the highest concentration of soil organic carbon stocks in all slope positions as compared to the maize based agricultural system. The results show that soil organic carbon stocks in TSSP was higher than the results obtained in SSP1 and SSP2 (Fig. 2-a). Wiaux et al. (2014) findings established that the soil organic carbon stocks of the toe slope position were 2.5 times higher than other slope positions. The landscape position SSP2 had the lowest mean concentration in both depths of soil organic carbon stocks (Fig. 2-a). This could be attributed to erosion in this position. The higher concentration in TSSP could be contributed to deposition that occurs in this slope position.
Fig. 5 Mean comparison of soil properties in different slope positions

The results indicate that coffee based agricultural system had the highest concentration of total Nitrogen in all slope positions as compared to the maize based agricultural system (Fig. 2-b). The results show that total Nitrogen in TSSP was higher in coffee whereas in maize SSP1 showed higher concentration of total Nitrogen. The landscape position SSP2 had the lowest mean concentration in both depths of total Nitrogen (Fig. 2-b). This could be attributed to erosion in this position. The higher concentration in TSSP could be contributed to deposition that occurs in this slope position. Similar studies have supported these findings that total Nitrogen significantly differs with the slope positions (Yimer et al., 2006). The result depicts similar concentrations that were derived in soil organic carbon stocks. The result indicates that maize based agricultural system had the highest concentration of available phosphorous in all slope positions as compared to the coffee based agricultural system (Fig. 2-c). The results shows that available Phosphorous in SSP2 was higher in both coffee and maize based agricultural systems (Fig. 2-c).

**RECOMMENDATIONS**

From the results of this study, the following recommendations are proposed.

1. Agricultural land use and land cover change analysis is a good indicator of the trend of their dynamics. However, to use the result of the analysis for decision making; intensive socio-economic data needs to increase its efficiency and accuracy.

2. The need to develop a public policy for conservation programmes, information on spatial distribution and baselines of the soil organic carbon pools in association with different land uses.
Suggestions for Further Research

Further studies should be done to:
1. Investigate the effects of different agricultural land use regimes and different soil types on soil organic carbon stocks, total Nitrogen and available Phosphorus
2. Investigate the environment factors that affect soil organic carbon stocks, total Nitrogen and available Phosphorous

CONCLUSION
Agricultural land use system influence soil organic carbon stocks, total Nitrogen and available Phosphorous in soils. The analysis indicated that where tillage had occurred soils had lower amounts of organic carbon and total Nitrogen. This implies the need for sustainable cropping system such as crop rotation, addition of organic matter and crop residues to reverse the situation. Intensive tillage unlike no tillage affects the concentration of soil organic carbon stocks, total Nitrogen and available Phosphorous. The use of organic manure and inorganic fertilizers affects the concentrations of the mineral elements. The variation of organic carbon and total nitrogen among the agricultural based systems were minimal on the lower soil layer as compared to the surface soil layer, implying that the surface soil layer was most affected by different management practices. There is need for smallholder farmers to integrate farm stovers and stalks into the agricultural systems. Appropriate farming and management practice which increase inputs and reduces losses of the soil organic carbon should be designed and implemented in the study area.

REFERENCES


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INFLUENCED OF THE SECTION OF SWEET POTATO VINE ON YIELD AND YIELD COMPONENTS IN COASTAL KENYA

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ABSTRACT

There exist a five month gap between sweet potato harvesting and the next planting in coastal lowland Kenya. Planting material multiplication takes place within this period and in most cases the vines are usually over-mature at the time of planting unless the farmer prepares two succeeding nurseries or cuts back the first crop in the nursery for re-growth. A single sweet potato vine can be cut into three or more planting cuttings and a study was conducted to determine the influence of the variety and section of the vine on sweet potato yield and yield components. Four sweet potato varieties were evaluated alongside three stem cutting source sections: base, middle and the tip. The four varieties were K135, Bungoma, SPK004 and Mtwapa 8 (check). The experimental design was a split plot with varieties assigned to main plots and cutting source sections to sub-plots. Variety SPK004 showed the least percent sprouting which was significantly \((P \leq 0.05)\) lower that of Bungoma variety only. Variety Bungoma revealed significantly \((P \leq 0.05)\) lower number of roots per plant than the other varieties including the check. The check exhibited significantly \((P \leq 0.05)\) higher number of marketable roots, percent marketable roots and marketable root yield per hectare than the test varieties. Bungoma variety had significantly \((P \leq 0.05)\) higher vine yield and percent dry matter than the check. The cutting from the tip of the vine showed significantly \((P \leq 0.05)\) higher sprouting percentage than the base and the middle. The tip and the middle sections revealed significantly \((P \leq 0.05)\) higher number of roots per plant than the base. As regards the number of marketable roots, the base revealed significantly \((P \leq 0.05)\) lower number than both tip and the middle. Significantly \((P \leq 0.05)\) marketable root yield differences existed among the three cutting section sources with tip showing higher yield followed by the middle. From the results, it can be inferred that sweet potato yield is influenced by the section of the vine planted and the best time to make cuttings for planting is when the stem vine can provide only two cuttings.

Keywords: Variety, cutting source, K135, Mtwapa 8, Marketable roots, Percent dry matter, vine yield

INTRODUCTION

Sweet potato is the second most important root crop after cassava in the coastal region of Kenya. It is grown mainly by smallholder female farmers for subsistence, and male farmers for cash. The crop plays an important role in household food security (Ndolo et al. 2001). Sweet potato is adapted to many agro-ecological zones (AEZs) and can yield well with few inputs (Kipkorir 2016). Sweet potato yield depends on management systems, environmental conditions and variety. The average root yield in the region is about 8 t ha\(^{-1}\) (MoA 2012). Muli and Agili (2013) reported sweet potato yields ranging from 10.5 to 40.2 t ha\(^{-1}\) due to differences in variety and time of harvesting.

Significant sweet potato yield differences due to variety and environmental conditions have been reported in studies carried out in Kenya and other parts of the world (Ndiritu et al., 2009, Endale et al., 2001, Egbe, 2012). The varietal and environmental responses are attributed to differences in pest and disease attack, soil fertility, management practices, genetic variability and rainfall. Most sweet potato varieties produced in coastal Kenya are local landraces that are adaptable to the local growing conditions but are low yielding and susceptible to sweet potato weevils and feathery mottle virus.

The acreage under sweet potato in the region is low and this has been attributed to inadequate supply and the resulting high cost of planting materials. The low supply and resulting high cost is attributed to difficulties in sweet potato planting materials production. There exist a five month gap between sweet potato harvesting and the next planting. Planting material multiplication takes place within this period and in most cases the vines are usually over-mature at the time of planting unless the farmer prepares two succeeding nursery beds or cuts back the first crop in the nursery for re-growth. A single sweet potato vine can be cut into three or more planting cuttings and a study was conducted with the following objectives:

1. To determine the influence of the variety and section of the vine on sweet potato yield and yield components
2. To determine whether the most suitable section of the vine cutting depends on the variety used

MATERIALS AND METHODS
The study was carried out at the Kenya Agricultural and Livestock Research Organization’s Research Centre at Mtwapa in 2013 to 2015. KALRO Mtwapa is situated in Latitude: S 03°56.184’ and Longitude: E 039°44.183’ and an altitude of 15 m above sea level. The site is in the agro-ecological zone coastal lowland (CL) 3 as described by Jaetzold and Schmidt (2006). The mean annual rainfall for the site is 1200 mm and the mean monthly minimum and maximum temperatures are about 22 and 30°C, respectively. Four sweet potato varieties were evaluated alongside three stem cutting section: base, middle and the tip (Fig. 1).

The four varieties were K135, Bungoma, SPK004 and Mtwapa 8 (check). The experimental design was a split plot with varieties assigned to main plots and cutting sections to sub-plots. The treatments were replicated three times. Ridges were prepared spaced at one metre apart and plots consisted of four ridges, 6 m long. Planting was done on the ridges and for each respective section of stem cutting, three nodes were buried and the rest were exposed. The intra-row spacing was 30 cm. Compound fertilizer NPK 17:17:17 was applied at the rate of 100 kg ha\(^{-1}\). Earthing was done when the ground started to crack as a result of the growing storage roots underneath. This serves as a cultural control against sweet potato weevil. The crop was weeded three times throughout its cycle. Harvesting was done by carefully digging the area around the sweet potato vine and exposing all the storage roots borne by the vine before uprooting the vine. Data were collected on: percent sprouting, number of roots per plant, number of marketable roots per plot, percentage of marketable roots, marketable root yield, vine yield and dry matter (DM).

RESULTS
There was no significant interaction between the variety and the section of the sweet potato vine and therefore the results of the main effects are presented and discussed separately. Table 1 shows the effect of sweet variety on yield and yield components of the sweet potato. Variety SPK004 showed significantly \((P \leq 0.05)\) lower percent sprouting than the rest of the varieties whereas Bungoma revealed significantly \((P \leq 0.05)\) lower number of roots per plant than the other varieties. The check exhibited significantly \((P \leq 0.05)\) higher number of marketable roots than the test varieties, however K135 and SPK004 showed significantly \((P \leq 0.05)\) higher number of marketable roots than Bungoma. The same trend was observed for marketable root yield. Bungoma revealed significantly \((P \leq 0.05)\) higher vine yield per hectare than the rest of the varieties. The variety also exhibited significantly \((P \leq 0.05)\) higher percent dry matter than Mtwapa 8 and the SPK004 but not K135.

Table 1: Effect of Variety on Sweet Potato Yield and Yield Components

<table>
<thead>
<tr>
<th>Variety</th>
<th>% SPT</th>
<th>NRP</th>
<th>NMR</th>
<th>%MR</th>
<th>MRY (t ha(^{-1}))</th>
<th>VY (t ha(^{-1}))</th>
<th>%DM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bungoma</td>
<td>96.0(^a)</td>
<td>2.1(^b)</td>
<td>21.0(^c)</td>
<td>52.6(^b)</td>
<td>5.9(^c)</td>
<td>44.3(^b)</td>
<td>39.0(^b)</td>
</tr>
<tr>
<td>K135</td>
<td>95.0(^{ab})</td>
<td>2.9(^a)</td>
<td>36.6(^b)</td>
<td>53.4(^b)</td>
<td>11.2(^b)</td>
<td>33.0(^b)</td>
<td>38.3(^{ab})</td>
</tr>
<tr>
<td>Mtwapa 8</td>
<td>95.0(^{ab})</td>
<td>2.8(^a)</td>
<td>51.2(^a)</td>
<td>75.3(^a)</td>
<td>17.3(^a)</td>
<td>33.9(^b)</td>
<td>37.4(^b)</td>
</tr>
<tr>
<td>SPK004</td>
<td>88.6(^b)</td>
<td>2.6(^a)</td>
<td>38.6(^b)</td>
<td>58.3(^b)</td>
<td>9.9(^b)</td>
<td>32.3(^b)</td>
<td>37.0(^b)</td>
</tr>
<tr>
<td>LSD</td>
<td>7.39</td>
<td>0.41</td>
<td>6.41</td>
<td>12.99</td>
<td>3.04</td>
<td>11.13</td>
<td>1.01</td>
</tr>
</tbody>
</table>

**KEY:** %SPT - Percent sprouting; NRP - Number of roots per plant; NMR - Number of marketable roots per plot; %MR - Marketable roots; MRY - Marketable root yield (t ha\(^{-1}\)); VY - Vine yield (t ha\(^{-1}\)); %DM - Percent dry matter

Means followed by the same superscript are not significantly different \((P \leq 0.05)\)

Table 2 shows the effect of the section of sweet potato vine cutting on yield and yield components of sweet potato varieties. The cutting from the tip of the vine showed significantly \((P \leq 0.05)\) higher sprouting percentage than the
base and the middle. For the same parameter, the middle section indicated significantly \((P \leq 0.05)\) higher percent sprouting than the basal section. The tip and middle sections revealed significantly \((P \leq 0.05)\) higher number of roots per plant than the base. As regards the number of marketable roots, the base revealed significantly \((P \leq 0.05)\) lower number than both tip and the middle. There were no significantly \((P \leq 0.05)\) differences among cutting sections as regards percent marketable roots. However, significantly \((P \leq 0.05)\) marketable root yield differences existed among the three cutting section sources with tip showing higher yield followed by the middle. The three cutting sections had no significant \((P \leq 0.05)\) influence on vine yield and the percent dry matter.

**Table 2: Effect of Stem Cutting Section on Yield and Yield Components of Selected Sweet Potato Varieties**

<table>
<thead>
<tr>
<th>Section of vine</th>
<th>Parameters</th>
<th>TIP</th>
<th>MIDDLE</th>
<th>BASE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% SPT</td>
<td>97.5a</td>
<td>94.6b</td>
<td>88.5c</td>
</tr>
<tr>
<td></td>
<td>NRP</td>
<td>2.9a</td>
<td>3.0b</td>
<td>2.2c</td>
</tr>
<tr>
<td></td>
<td>NMR</td>
<td>39.8a</td>
<td>41.3a</td>
<td>29.4c</td>
</tr>
<tr>
<td></td>
<td>%MRP</td>
<td>65.8a</td>
<td>53.7a</td>
<td>60.2a</td>
</tr>
<tr>
<td></td>
<td>MRY (t ha(^{-1}))</td>
<td>12.6a</td>
<td>11.5b</td>
<td>9.3c</td>
</tr>
<tr>
<td></td>
<td>VY (t ha(^{-1}))</td>
<td>35.9a</td>
<td>35.7a</td>
<td>36.0a</td>
</tr>
<tr>
<td></td>
<td>%DM</td>
<td>37.5a</td>
<td>37.5a</td>
<td>38.2a</td>
</tr>
</tbody>
</table>

**KEY:** %SPT - Percent sprouting; NRP - Number of roots per plant; NMR - Number of marketable roots per plot; %MRP - Marketable roots; MRY - Marketable root yield (tha\(^{-1}\)); VY - Vine yield (tha\(^{-1}\)); %DM - Percent dry matter

**DISCUSSION**

Percent sprouting depended on variety and differences were attributed to differences in stem thickness of the variety. SPK004 had thin vines leading to larger surface area exposed TO evapotranspiration hence more cuttings drying up. The number of roots per plant is a varietal characteristic and it expected that less adapted variety like Bungoma should have least number of roots per plant (Muli 2016). The same applies to the number of marketable roots per plant and this explains why the check (Mtwapa 8) had the highest number of marketable roots. SPK004 was among the varieties with the highest number of roots per plant, however, most of its storage root were too small to be regarded as marketable and this is the reason why the variety had low percent marketable roots per plant. Bungoma variety is new and less adapted to the region and this is the reason for the lowest yield among the other varieties. The variety was observed to be too vegetative leading to highest vine yield compared to the other varieties. The percent dry matter range of 37.0 to 39.0 is within the range reported by (Munda et al., 2007). Apart from Bungoma, the other varieties had been evaluated by farmers in the region and selected on basis of percent dry matter (Muli 2016).

The apical section registered the highest percent sprouting with basal section showing the least. This was expected because age of the cutting has an influence on sprouting ability and sweet potato vine base is more mature than the tip since it occurred first. The section of stem cutting was also found to have an influence in number of roots per plant with tip and middle section having higher number of roots per plant than the base. This could be due to faster sprouting hence becoming vegetative earlier and commencing the process of yield formation earlier. Marketable root yield was found to decrease with the age of the cutting as exhibited by the section of the vine. The same results were also reported by Wilson (1988) where young cuttings resulted in higher yield than the older cuttings. Moreproof (2015) also reported similar results but in his study, there was no significant difference between the tip and the middle sections as regards both root and vine yield. The percent dry matter was not influenced by the section of the vine and this was expected since the parameter is a function of variety.

**CONCLUSIONS**

- Sweet potato yield is influenced by the variety and the section of the vine used as planting material.
- The most suitable section of the vine used as planting material does not depend on the variety planted

**RECOMMENDATIONS**

From the results, it can be inferred that sweet potato yield is influenced by the section of the vine planted and the best time to make cuttings for planting is when the stem vine can provide only two cuttings.

**ACKNOWLEDGEMENTS**

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ABSTRACT
Kenya is a food deficit country with households exposed to food and nutrition insecurity. Matching the population increase with increase in food production is an uphill task despite the development of modern agricultural technologies. Maximum and sustainable production can be attained through efficient use of the available farm inputs. The aim of this study was to analyze the effect of farm inputs on Irish potato production. The study collected cross sectional data in quantitative form from a sample of 377 Irish potato producers regarding 2018/2019 production season. Selection of the respondents involved the multistage method. A Cobb-Douglas form of the stochastic frontier model was used to determine effect of the farm inputs on smallholder Irish potato production. The Maximum likelihood estimates of the stochastic frontier model indicated that land size allocated to Irish potato production (0.507), potato seeds (0.156), fungicide (0.185) and labour (0.300) were significant inputs in increasing the level of Irish potato output in the study area at 5% level of significance except for fertilizer. Therefore, smallholder Irish potato farmers can raise their production through better allocation of land, labor, potato seeds and fungicide. Land allocated to Irish potato production contributed the most towards the Irish potato production followed by labor, fungicide then Irish potato seed. The partial output elasticity (1.048) implies that increasing returns to scale are likely to be experienced in Irish potato production if the available resources are efficiently allocated and a proportional increase in all factors of production may yield a larger proportional increase in output.

Keywords: Stochastic frontier model, Cobb-Douglas, Technology, Efficiency, Input, Output

INTRODUCTION
Globally Irish potato (Solanum Tuberosum L.) stands as the fourth largest food crop produced following wheat, rice and maize production (Alam, Kobayasi, Matsumura, Ishida, Mohamed & Faridulla, 2012). It is the most significant root and tuber crop, grown in more than 125 countries and consumed daily by more than a billion people (Lutaladio, Ortiz, Haverkort & Caldiz, 2009). The largest Irish potato producers in the world include China, India and Russia (De Haan & Rodriguez, 2016). Globally, Irish potato production has gradually risen from 267 million tonnes in 1990 to 373.83 million tonnes in 2016 (Torero, 2018) and it is expected to rise to more than 400 million tonnes by 2020 (Scott, Rosegrant & Ringler, 2000). From the years 1981-2015, the total area under the Irish potato crop in Asia had increased by 300% and in Africa, it had increased by 237% making valuable contributions towards food security and livelihoods of smallholder farmers (Lutaladio et al., 2009; De Haan & Rodriguez, 2016; Food and Agriculture Organisation [FAO], 2017). However, its yield in Africa (14.2 tonnes per hectare) is low in comparison with other continents such as Asia which has 18.3 tonnes per hectare, Europe which has 21.1 tonnes per hectare and America that has 25.9 tonnes per hectare (De Haan & Rodriguez, 2016).

In Kenya, Irish potato happens to be second after maize as the highest consumed staple crop with an average of 2-3 million tonnes of Irish potato valued at Ksh.40-50 billion being produced annually against an annual average of 40 million bags of maize worth Ksh. 120 billion (Ministry of Agriculture, Livestock and Fisheries[ MOALF], 2016). Most Irish potato farms are located in the highland areas of central, eastern and rift valley parts of Kenya (Kaguongo, Makokha, Barker, Nganga & Guenthner, 2013). Smallholder Irish potato farmers mainly produce potato as a food and a cash crop making it an important source of rural income and food. In Kenya, Irish potato is mainly grown during the short and long rains season. Smallholder farmers intercrop Irish potato with maize and beans while some rotate it with barley, wheat or maize (D’Alessandro, Caballero, Lichte & Simpkin, 2015). However, Kenya’s average Irish potato national production is estimated to be about 10 tonnes per hectare contrary to a national potential production of 40 tonnes per hectare (Kaguongo et al., 2013). Production of Irish potato is constrained by a number of challenges such as shortage of quality seeds, traditional production systems, poor technology transfer, pests and diseases, cash constraints, inadequate access to extension services and low yields (Gebre , Mohammed, Dechassa & Belew, 2017; Karanja, Belew & Makokha, 2014). Muthoni and Nyamongo, (2009) suggested that decline in Irish potato yields is attributed to poor farming practices and low use of farm inputs. According to Agricultural and Food Authority (2016) horticulture crops directorate, Nakuru County, the second largest producer...
of Irish potato in Kenya experienced a reduction in yield per unit hectare from 12.86 tonnes per hectare to 12.76 tonnes per hectare.

Farm inputs are significant determinants of yields of any type of agricultural production. They consist of but are not limited to seed, fungicide, manure, fertilizer, labor and machinery. Irish potato production is influenced by availability of clean seeds, diseases and labor (Lamin, Fatty & Sambou, 2013; Muthoni et al., 2013). Seeds are a crucial element in agricultural production while fertilizers incorporate the necessary soil nutrients at various stages of production. Fungicides are also a necessary farm input, as crops are susceptible to pests and diseases that can lead to huge losses for smallholder farmers. However, there is a knowledge gap on the effect of farm inputs on Irish potato production in Nakuru County.

Land is an important farm input in crop production. Land size is directly correlated to production (Taiy et al., 2017). Thus, farmers with large land sizes are expected to experience increased production. In the analysis of sorghum production technical efficiency of smallholder farmers in Konso district, Southern Ethiopia Gemeyida et al. (2019) found that land is a significant farm input in raising the amount of sorghum produced in the study area. In contrast, Barasa, Odwori, Barasa and Ochieng (2019) examined technical efficiencies of smallholder Irish potato farmers in Trans Nzoa County. The maximum likelihood estimates of the stochastic frontier indicated that the land was not a significant factor of production in Irish potato farming.

Planting more seed increases the crops population and therefore raises production. Ayedun and Adeniyi (2019) examined efficiency of 408 rice peasant farmers in North Central zone of Nigeria focusing on Benue and Nasarawa States. From the Cobb-Douglas frontier model, results demonstrate that the amount of rice seed planted positively and significantly affected rice production. Similarly, Barasa et al. (2019) found that the amount of seed positively and significantly affected Irish potato production of farmers in Trans Nzoa County. A study by Wollie (2018) sought to investigate on barley production technical efficiency of 123 smallholder farmers in Meket region, Amhara national regional state, Ethiopia. The study results implied that barley seed had a negative effect on barley production. Crop production is a labor-intensive activity and thus significance of labor cannot be ignored. A study was carried out by Ayedun and Adeniyi (2019) on rice production efficiency of farmers in North Central zone of Nigeria focusing on Benue and Nasarawa States. From the Cobb-Douglas frontier model results, there is a positive and a significant relationship between rice production and the amount of hired labor. Gemeyida et al. (2019) assessed technical efficiency of 124 sorghum smallholder farmers in Konso district, Southern Ethiopia. From the estimated stochastic production frontier model, labour was observed to be an important factor in increasing the level of sorghum output in the study area.

Fertilizer plays a key role in replenishing used up soil nutrients. Irish potato producing areas especially in the highlands have low soil fertility (Muthoni and Nyamongo, 2009). Abubakar and Sule (2019) did an analysis of technical efficiency of maize production in Rijau local government area of Niger state. The Cobb-Douglas results implied that fertilizer is a significant farm input in maize farming. A consistent observation was made by Gemeyida et al. (2019) who investigated smallholder farmers’ sorghum production technical efficiency in Konso district, Southern Ethiopia. From the estimated stochastic production frontier model Urea and DAP chemical fertilizers were observed to be important factors in increasing the level of sorghum production. Crop diseases are a major contributor to crop low yields and thus the need for fungicides. A survey on technical efficiency of maize production in Rijau local government area of Niger state done by Abubakar and Sule (2019). The Cobb-Douglas results suggested that agro-chemicals were significant in maize production. However, Barasa et al. (2019) in determining technical efficiency of 384 smallholder Irish potato farmers in Trans Nzoa County found that fungicides were not significant in increasing Irish potato production in the study area. From the reviewed literature the farm inputs play an important role in crop production but their effect on Irish potato production in Nakuru County is unclear.

**METHODOLOGY**

**Description of the Study Area**

The study was conducted from April to June 2019 in Molo Sub County in Nakuru County located in the Rift Valley. Molo Sub County is one of the six Sub Counties in Nakuru County. The Sub County has a total area of 478.79 Km² and a population of 140,584 (County Government of Nakuru, 2017). It is located along the Mau forest running on the Mau escarpment. Administratively, the Sub County has four wards: Mariashoni, Elburgon, Turi and Molo. Most of its inhabitants migrated from Central and Nyanza regions due to its soil fertility and vast vegetation. Molo Sub County is situated at 0.25° South latitude, 35.73° East longitude and 2534 meters above sea level, with 27,896
inhabitants. Molo is ranked the second largest Irish potato producer in Kenya with fertile lands. It hosts the Irish potato seed multiplication project aimed at enhancing availability of certified seed for better yields. The area climate is categorized as warm and temperate with the average temperatures at 14.1°C and an average rainfall of 1131 millimetres. Generally, the main economic activities in this area include crop farming, dairy and sheep raising. The main crops are maize, pyrethrum, Irish potato and barley (Jaetzold, Schmidt, Hornetz & Shisanya, 2006).

Sample size, Sampling procedure and Data Collection
The study sample size of smallholder Irish potato farmers was computed as in Yamane (1967):

\[ n = \frac{N}{1+N(e)^2} = \frac{6450}{1+6450(0.05)^2} = 377 \] smallholder Irish potato farmers

where, \( n \) = desired sample size; \( N \) = population size; \( e \) = sampling error.

The study assumed 95% confidence (5% sampling error) to obtain a sample size of 377 smallholder Irish potato farmers in the Molo Sub County. A multi-stage sampling technique was adopted in selecting farmers to be part of the sample. During the 1st stage, four wards in Molo Sub County were purposively selected and from each ward sub-localizations were randomly selected. In the 2nd stage, villages from the selected sub-localizations were identified randomly. Lastly, a list of smallholder Irish potato farmers from the selected villages was generated with the support of the local administrative leaders and the ministry of agriculture extension officers to aid in the random selection of the farmers to be interviewed. The survey questionnaire was used to gather data on farm inputs used in the last planting season.

Data Analysis
A Cobb-Douglas functional form of a stochastic frontier model was adopted to test the first hypothesis that there is no statistical significant relationship between farm inputs on the Irish potato production. The model was proposed by Aigner et al. (1977) and Meeusen and Van den Broeck (1977). It is usually appropriate for fitting agricultural production data because of its mathematical properties, computational ease and straightforward interpretation (Heady & Dillon, 1969). The stochastic frontier approach was applied because it has the ability to determine the effect of the farm inputs on output and at the same distinguish technical inefficiency from statistical noise. Irish potato production is likely to be influenced by random shocks such as harsh weather conditions, diseases, pest infestation, drought and measurement errors may be high and farmers technical efficiency level. Consequently, a model that explains the effect of the inputs, statistical noise and the causes of inefficiency is more suitable. Thus, the stochastic frontier approach was suitable for this study. A basic stochastic frontier can be presented as:

\[ Y_i = f(X_i, \beta) + \epsilon_i \quad i = 1, 2, ..., 377 \text{ farmer} \]

where,

- \( Y_i \) = Irish potato output for the 377 farmer in Kgs
- \( X_i \) = the vector of farm inputs used in Irish potato production
- \( \beta_i \) = is a vector of farm inputs coefficients to be estimated
- \( f(X, \beta) \) = is a suitable Cobb-Douglas production function
- \( \epsilon_i \) = error term made of two separate components \( v_i \) and \( u_i \)

Component \( v_i \) contains the production variations because of random factors outside the control of the producer for example weather, natural disasters and measurement errors. The model assumes that each is independently and identically distributed N (0, \( \delta_v^2 \)). The \( u_i \) component represents technical inefficiency of the 377 farmers and takes only positive values (\( u_i \geq 0 \)). Each \( u_i \) is distributed independently as a skewed normal distribution with zero mean and variance (\( \delta_u^2 \)). A farmer’s production is said to be technical efficient if \( u_i = 1 \) and technical inefficiency exists if, \( u_i > 0 \) irrespective of the value taken by \( u_i \).
RESULTS
Response Rate
This section shows the number of questionnaires that were filled and returned (Table 1).

Table 1. Response Rate of the Respondents

<table>
<thead>
<tr>
<th>Ward</th>
<th>Population</th>
<th>Sample size</th>
<th>Achieved sample</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elburgon</td>
<td>645</td>
<td>37</td>
<td>37</td>
<td>8.34</td>
</tr>
<tr>
<td>Mariashoni</td>
<td>2252</td>
<td>132</td>
<td>120</td>
<td>27.06</td>
</tr>
<tr>
<td>Molo</td>
<td>1319</td>
<td>77</td>
<td>77</td>
<td>17.36</td>
</tr>
<tr>
<td>Turi</td>
<td>2234</td>
<td>131</td>
<td>126</td>
<td>28.41</td>
</tr>
<tr>
<td>Total</td>
<td>6450</td>
<td>377</td>
<td>360</td>
<td>81.17</td>
</tr>
</tbody>
</table>

The information provided in Table 1 indicates that 81.17% (360) of the respondent filled and returned the questionnaires. This is an acceptable response rate and was achieved through the drop and pick method.

Descriptive Statistics of Farm Inputs and Irish Potato Production.
Descriptive results on the five farm inputs namely land, seeds, fertilizer, fungicide and labour used in the analysis of Irish potato production technical efficiency are as at presented in Table 2.

Table 2: Descriptive Results of Farm Inputs and Irish Potato Production

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land (Ha)</td>
<td>360</td>
<td>2.229</td>
<td>1.403</td>
<td>0.25</td>
<td>6</td>
</tr>
<tr>
<td>Seed (Kgs)</td>
<td>360</td>
<td>912.036</td>
<td>84.514</td>
<td>50</td>
<td>4800</td>
</tr>
<tr>
<td>Fertilizer (Kgs)</td>
<td>360</td>
<td>0.938</td>
<td>0.024</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Fungicide (Litres)</td>
<td>360</td>
<td>1.340</td>
<td>1.129</td>
<td>0.08</td>
<td>6.4</td>
</tr>
<tr>
<td>Labor (Man-days)</td>
<td>360</td>
<td>7.344</td>
<td>1.129</td>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td>Irish potato production (Kgs)</td>
<td>360</td>
<td>2699.389</td>
<td>200.443</td>
<td>20</td>
<td>9000</td>
</tr>
</tbody>
</table>

The information presented in Table 1 depicts that the sampled Irish potato farmers’ allocated an average of 2 hectares to Irish potato production. The mean land size under Irish potato confirms that smallholder farmers carry out Irish potato farming. The average amount of seed used is about 912 Kgs. The average amount of fertilizer applied in the production of Irish potato is 0.938 Kgs during the last planting season with a standard deviation of 0.024 Kgs ranging from 0 to 1 Kg. All the sampled respondents were found to apply chemical fertilizer on their Irish potato. On average, the sampled farmers applied 1.34 Litres of fungicide. The surveyed households employed an average of 7 man-days of labour in Irish potato production. Labor comprised of both hired and family labour mainly used in farm operations such as ploughing, planting, weeding, and fungicide application. The average yield was 2,699.389 Kgs with 20 Kgs as the minimum yield and 9,000 Kgs as the maximum yield. The results indicate that there is variability in Irish potato production amongst the farmers.

Effect of Farm Inputs on Irish Potato Production
The Cobb-Douglas stochastic frontier contained five farm inputs namely land, seeds, fertilizer, labour and fungicide. Table 3 presents results of the maximum likelihood estimates of the farm inputs coefficients.

Table 3. Stochastic Frontier Model Parameter Estimates

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>SE</th>
<th>Z</th>
<th>P-value</th>
<th>95% Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.387</td>
<td>0.265</td>
<td>9.00</td>
<td>0.000</td>
<td>1.867 - 2.907</td>
</tr>
<tr>
<td>Logland</td>
<td>0.262**</td>
<td>0.091</td>
<td>2.87</td>
<td>0.004</td>
<td>0.083 - 0.441</td>
</tr>
<tr>
<td>Logseed</td>
<td>0.629**</td>
<td>0.096</td>
<td>6.55</td>
<td>0.000</td>
<td>0.440 - 0.817</td>
</tr>
<tr>
<td>Loglabor</td>
<td>0.089</td>
<td>0.006</td>
<td>1.52</td>
<td>0.129</td>
<td>-0.026 - 0.205</td>
</tr>
<tr>
<td>Logfertilizer</td>
<td>-0.299**</td>
<td>0.066</td>
<td>-4.50</td>
<td>0.000</td>
<td>-0.430 - -0.167</td>
</tr>
<tr>
<td>Logfungicide</td>
<td>0.131**</td>
<td>0.037</td>
<td>3.52</td>
<td>0.000</td>
<td>0.058 - 0.203</td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-17.957</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total observations</td>
<td>360</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prob&gt; chi2</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Represents level of significance at 5%.
The information in Table 3 indicates that out of the five inputs considered namely: land, seed, fertilizer and fungicide had a significant effect on Irish potato production at 5% level of significance (p-value = 0.004<0.05, p-value =0.000<0.05, p-value =0.000<0.05 and p-value =0.000<0.5 for land ,seed, fertilizer and fungicide respectively). The coefficients of the land, seed and fungicide variables were positive except for fertilizer variable. Land was measured in terms of size of land under Irish potato. An advantage of the Cobb-Douglas functional form is the straightforward interpretation of its parametric coefficients as partial elasticity of output with respect to the farm input used (Gemeyida et al., 2019). This feature allows assessment of the possible effects of changes in the quantities of inputs on output. The coefficients of the input variables in the production function are interpreted as elasticity of production and are as presented in Table 4.

Table 4. Elasticity of Inputs Used in Irish Potato Production

<table>
<thead>
<tr>
<th>Variable inputs</th>
<th>Elasticity of production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>0.262</td>
</tr>
<tr>
<td>Seed</td>
<td>0.629</td>
</tr>
<tr>
<td>Fungicide</td>
<td>0.131</td>
</tr>
</tbody>
</table>

As the farmer increased land under potato production, amount of seed and fungicide by a unit, production was expected to increase by a factor 0.262, 0.629 and 0.131 respectively.

DISCUSSION

A unit increase in the land size allocated to Irish potato farming increased production by a factor of 0.262. This implied that Irish potato production would probably increase if the farmers would increase the land sizes under Irish potato crop. Danquah et al. (2019) had consistent results to the significance and positive effect of land on maize production. Irish potato seeds were a necessary input for Irish potato production. The seed variable has a positive coefficient at 0.629. This implied that an increase in the quantity of potato seed used would increase Irish production by a factor of 0.629. Asfaw et al. (2019) reported consistent findings that seed was a significant input in wheat production. Use of more seeds increases the crop population hence increasing production. Thus, a farmer who applies more quality seeds receives higher yields.

The study results showed that fertilizer had a negative effect on Irish potato production in the study area. For a unit increase in fertilizer Irish potato production reduced by a factor of 0.299 in this study. This was contrary to the expectation that it would increase Irish potato output. The results are not in line with Abubakar and Sule (2019) who observed that fertilizer had a significant and a positive effect on maize output. Therefore, for a unit increase in fertilizer amount increases the maize production. This may be because the fertilizer used by the farmers was not compatible with the soil conditions for Irish potato production. The smallholder Irish potato farmers might not be applying the recommended fertilizer (DAP) amounts leading to inadequate soil nutrients replenishment. Smallholder farmers also continuously grow crops on the same parcel of land without having a fallow period (Kaguongo, Gildemacher, Demo, Wagoire, Kinyae, Andrade, Forbes, Fugilie, & Thiele, 2008). The farmers could have been applying fertilizer (DAP) without considering the soil requirements of their farms hence reducing their production. Smallholder farmers should consider testing their soil before application of fertilizer in order to determine the soil needs of their farms to boost production.

In addition, the result revealed that for a unit increase in fungicide application the level of Irish potato output increases by a factor 0.131. This result coincides with the finding of Chepkowny (2014) that fungicide is a significant input in Irish potato production. The sampled smallholder Irish potato farmers applied fungicides to deal with early and late blight. The result implies that increasing fungicide use improves Irish potato production. Therefore, fungicide increase leads to an increase in Irish potato production. However, labour had an insignificant effect on Irish potato production. The stochastic production frontier can be expressed as:

\[ Y = 2.387 + 0.262X_1 + 0.629X_2 - 0.299X_3 + 0.131X_5 + v_i - u_i \]

where, 
\[ Y \] = natural logarithm of Irish potato is the production  
\[ X_1 \] = natural logarithm of land size  
\[ X_2 \] = natural logarithm of seed quantity  
\[ X_3 \] = natural logarithm of fertilizer quantity  
\[ X_5 \] = natural logarithm of fungicide quantity  
\[ v_i \] = variations due to random factors beyond the control of the farmer  
\[ u_i \] = technical inefficiency model

2.387 is expected value of Irish potato production when farm inputs (land, seed, fertilizer, fungicide) value is zero.
The stochastic frontier results depict that amount of Irish potato seed has the highest level of responsiveness to Irish production, followed by land and then fungicide. The individual elasticities furthermore imply that Irish potato farmers do not allocate their resources optimally. However, they have an opportunity to increase their production with better allocation of the significant farm inputs.

CONCLUSIONS
Based on the study findings the following conclusions were drawn:
Irish potato production can be raised through increasing use of land allocated to Irish potato farming.
Irish potato production can be improved through increasing used use of Irish potato seed and fungicide.
Fertilizer negatively affected on Irish potato production in the study area.

RECOMMENDATIONS
Based on the conclusions made by this study the following recommendations were made:
The smallholder Irish potato farmers are encouraged use of more of the farm inputs (land, seeds and fungicide) to boost Irish potato production.
In order for smallholder Irish potato farmers to increase potato production, there is need to test soil to determine the appropriate fertilizer to be used for higher Irish potato production.

REFERENCES


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SOCIO-CULTURAL FACTORS INFLUENCING GENDER DISPARITIES IN WILDLIFE MANAGEMENT AND CONSERVATION IN MAASAI MARA ECOSYSTEM, NAROK, KENYA

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ABSTRACT
Community-based conservation through formation of wildlife conservancies aimed to benefit local people as well as to achieve conservation goals. However, it has been criticized for taking a simplistic view of “community” and failing to empower men and women living in the conservancies equitably. In the context of Kenya’s Maasai Mara conservancies, this study was conducted to assess the socio-cultural factors influencing gender disparities in wildlife management and conservation. The study was carried out in four wildlife conservancies in Maasai Mara. Descriptive survey and sequential explanatory mixed method approach were adopted for the study. A sample size of 167 respondents comprising of wildlife managers, conservancy landowners and conservancy rangers participated in the study. Data collection was done using questionnaires, Focused Group discussion and interviews. Reliability of the instruments was tested using test-retest method and Cronbach’s Alpha co-efficient was used to determine the internal consistency of the instruments. The findings showed that cultural norms, education, landownership and domestic work were the key factors that influenced gender disparities in wildlife management and conservation. These sociocultural factors impacted more negatively on women participation in wildlife management and conservation than did men. The study recommends culturally strategic measures to be developed in collaboration with the community members for sustainable and gender responsive wildlife management and conservation in Mara. Additionally, a culturally accepted group of individuals can be chosen to empower other community members in order to effectively penetrate the cultural seal that hinder gender equity in wildlife management and conservation. Further, the study recommends that government and non-governmental institutions focusing on wildlife conservation should effectively communicate, implement, enforce and institutionalize the policies and legal frameworks focusing on gender equity for the margin of disparity to be narrowed.

Keywords: Gender, Disparities, Wildlife Management and Conservation, Sociocultural factors

INTRODUCTION
Gender equality and women’s empowerment is a prerequisite to effective conservation, climate action and meeting the Sustainable Development Goals (SDGs). International agreements on biodiversity (CBD), sustainable development (Agenda 2030) and most recently climate change (the Paris Agreement) present new opportunities for engaging both men and women and accelerating equitable action. From Nationally Determined Contributions (NDC) processes to biodiversity strategies and climate change gender action plans (ccGAPs). Governments, businesses and civil society are now embracing gender-responsive solutions to address the world’s most pressing development challenges, (IUCN, 2018). This study informed these gender responsive solutions in wildlife management and conservation.

Among the Australians, both women and men are directly involved as hunters, (Martu, Bliege and Bird, 2008) In other cases, women derive part of their livelihood from the sale of cooked or uncooked bush meat. In line with culturally-ascribed notions of masculinity, the consumption of wild meat in Vietnam has become associated with “relaxation and adventure” activities such as indulging in alcohol and paid sex for men with disposable incomes, (Drury 2011). In contrast, wild animal products are marketed to women in the form of fashion products and accessories (such as bear tooth necklaces and tortoise shell combs). McElewe (2012), argues that understanding the cultural and gendered nuances influencing consumption can help create culturally appropriate and effective campaigns against illegal wildlife products.

Agarwal (2001) highlights how the ability of many Indian women to both act on their environmental concerns and put their ecological knowledge into practice is often severely restricted by cultural restrictions on their mobility and participation in the public decision-making forum. Particular attention must be paid to the role of women in patriarchal systems. In Sariska, national park in India, traditional beliefs (such as the one concerning the widows) can lead to the marginalization of women and can constitute obstacles to effective women participation in benefit sharing derived from community-based conservation initiatives, (Agrawal,2015). They can also trigger social inequities amongst community members.
Environmental education is an important tool to improve attitudes related to wildlife. For instance, education through direct experiences, such as visits to protected areas by local residents, can be a valuable learning tool. Particularly in the case of women, such visits can help reduce the participants’ fear of wildlife and increase their support for the conservation of species that they rarely see or may view negatively due to human-wildlife conflicts (HWCs). (Boone & Galvin, 2014). Education and training for women and men regarding the impacts of overharvesting and the loss of threatened and endangered species are also important measures to support sustainable wildlife management.

Relationships between men and women at household level affect hierarchies of access, use and control of resources, resulting in different needs, perceptions and priorities. Gender relations are an aspect of broader social relations and, like all social relations, are constituted through the rules, norms and practices by which resources are allocated, tasks and responsibilities are assigned, value is given and power is mobilized (Gray, 2002). Any interventions made through community-based conservation are likely to create different impacts for men and women and lead to deliver varying costs and benefits for the two groups.

In many societies discriminatory customary and social practices curtail women’s rights to land; women generally receive the most marginal lands. Insecure land tenure reduces rural women’s and men’s incentives to improve natural resources management practices and conservation. Although natural resource management researchers and policymakers are aware of the importance of gender issues, research is most often gender ‘blind’ (Currie and Vernooy, 2010). Researchers mostly employ households or communities as units of analysis and seldom deconstruct changes in gender power relations among those units. Those studies that do attempt to understand the gender differentials of biodiversity generally focus on gender roles and how they have changed over time (Gurung, 1998; Krishna, 1999), rather than on power relations that shape women’s and men’s access to, and control over, resources.

Recognizing relations of power and how they are inseparable from knowledge production is critical to understanding the gender dimensions of biodiversity conservation and management. While women may be marginalized from centers of knowledge production and in accessing, controlling, and using biodiversity and other productive resources, they are not powerless actors. Many bodies of literature, have documented the creative and powerful ways that women negotiate, contest, resist, and create room to maneuver in their struggles over biodiversity resources (Nellemann 2011). It is thus essential to keep the changing patterns of gender relations in wildlife management and conservation under continual examination, to monitor the extent to which progress is being made towards gender emancipation and to interrogate the adequacy of prevailing strategies towards this goal, hence this study.

Keane, Kaelo, Gurd, Said, Rowcliffe and Homewood (2016) argue that women have fewer opportunities to participate in making environmental decisions due to cultural stereotypes that devalue women opinions. As a result, their perceptions and interests are sometimes ignored or excluded when policies are designed. The absence of opportunities is often due to reproductive work, cultural restrictions, and women’s lack of schooling and low self-esteem. Due to socio-cultural restrictions the right to access and control natural resources, such as land and forests, is different for men and women hence the need to unveil and address the socio-cultural factors influencing gender differentials in wildlife management and conservation.

Westernmann (2005) found that women’s participation in natural resource management across 20 countries in Latin America, Africa, and Asia increased collaboration, solidarity and conflict resolution in groups. It also increased groups’ ability for self-sustaining collective action but noted that women participation was less compared with that of men. The causes of this disparity were not established and hence a need to interrogate the socio-cultural factors influencing gender differentials in wildlife management and conservation a gap that this study intended to fill.

**Study Area**

The study was conducted in selected conservancies in Maasai Mara ecosystem, Narok County, Kenya. The Maasai Mara National Reserve ecosystem covers 1,510 km² in south-western Kenya. It is the northern-most section of the Mara-Serengeti ecosystem, which covers 25,000 km² (9,700sq mi) in Tanzania and Kenya. It is bordered by the Serengeti Park to the south, the Siria escarpment to the west, and Maasai pastoral ranches to the north, east and west. The Talek and Mara rivers are the major rivers draining the reserve. Shrubs and trees fringe most drainage lines and cover hill slopes and hilltops. The terrain of the reserve is primarily open grassland with seasonal riverlets. The long rains occur from March-June, followed by the dry season from July-October while the short rains fall during
November-December, and a short dry season finishes off the year. The Altitude of Maasai Mara is: 1500-2180m; Rainfall: 83mm/month; Temperature range: 12-30°C.

Figure 1 Map of Maasai Mara conservancies

Theoretical Framework
This study was grounded upon feminist political ecology theory. Feminist political ecology (FPE) emerged in the 1990s as a subfield of political ecology, building on previous Work by feminist scholars, and feminist theorists. Feminist political-ecology was developed by (Rocheleau, 1995.) The approach has extended “the multiple scale analysis of environment and power in political ecology to gendered relations both within and beyond the house-hold, from individual to national scales”. The theory demonstrates that gender is an important element in influencing access to resources, knowledge, and control over natural resources. This study thus adopted this gender-based political-ecology approach in analyzing biodiversity conservation and management issues. Access to, control over, and ownership of natural resources such as biodiversity resources and land are negotiated within and between households, and therefore gender and household relations are a focal point through which the relations of production are studied. Access to and the control over natural resources are structured by power relations and authority that are embedded in formal (e.g. the state, and global rules and regulations) and informal (e.g. social norms) institutions at local, national and international levels. Access to natural resource can be viewed spatially, across the landscape, or by scale, in relation to hierarchically arranged political economic structures that influence local use.

METHODOLOGY
The research design for this study was descriptive research. Orodho (2009) states that a descriptive research design is suitable where the study seeks to describe and portray characteristics of an event, situation, and a group of people, community or population as it is. Since descriptive research allows for a multifaceted approach to data collection and analysis, sequential explanatory mixed method approach was used to guide the data collection and analysis process of the study. This approach is characterized by collection and analysis of quantitative data followed by a collection and analysis of qualitative data. The fundamental principle of mixed method approach is that the
A combination of qualitative and quantitative approaches provides a better understanding of the problem than either approach can achieve alone (Creswell & Plano Clark, 2007).

**RESULTS AND DISCUSSION**

The study sought to examine the socio-cultural factors influencing gender differentials in wildlife management and conservation. The socio-cultural factors that were enlisted include: Education, Cultural norms, Land ownership, Decision making and domestic work. The respondents were asked to tick appropriately the extent to which they agreed or disagreed with the statements that were listed in a five point Likert scale. The findings are shown in table 1 below and further discussed thereafter.

**Socio-Cultural Factors Influencing Gender Differentials in Wildlife Management and Conservation.**

Indicate the extent to which you agree with the following statements: No Extent(NE) Small Extent(SE)No Opinion (NO) Great Extent(GE) Very Great Extent(VGE)

<table>
<thead>
<tr>
<th>Statement</th>
<th>NE F</th>
<th>NE %</th>
<th>SE F</th>
<th>SE %</th>
<th>NO F</th>
<th>NO %</th>
<th>GE F</th>
<th>GE %</th>
<th>VGE F</th>
<th>VGE %</th>
<th>Mean</th>
<th>S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education skills limit men from wildlife management and conservation.</td>
<td>5</td>
<td>21.7</td>
<td>13</td>
<td>56.5</td>
<td>2</td>
<td>8.8</td>
<td>3</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>2.13</td>
<td>.920</td>
</tr>
<tr>
<td>Culture limits women in wildlife management and conservation.</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>8.7</td>
<td>0</td>
<td>0</td>
<td>10</td>
<td>43.5</td>
<td>11</td>
<td>47.8</td>
<td>4.30</td>
<td>.876</td>
</tr>
<tr>
<td>Culture limits men in wildlife management and conservation.</td>
<td>15</td>
<td>65.2</td>
<td>5</td>
<td>21.7</td>
<td>3</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2.00</td>
<td>1.16</td>
</tr>
<tr>
<td>Educational skills limit women from wildlife management and conservation.</td>
<td>1</td>
<td>4.3</td>
<td>3</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>21.7</td>
<td>14</td>
<td>60.9</td>
<td>4.22</td>
<td>1.24</td>
</tr>
<tr>
<td>Land ownership limits women from wildlife management and conservation.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4.3</td>
<td>2</td>
<td>8.7</td>
<td>20</td>
<td>87</td>
<td>4.83</td>
<td>.491</td>
</tr>
<tr>
<td>Decision making in conservancies is dominated by men.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>30.4</td>
<td>16</td>
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<td>Land ownership policies in the conservancies discriminate against women.</td>
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<td>0</td>
<td>2</td>
<td>8.7</td>
<td>8</td>
<td>34</td>
<td>7</td>
<td>30.4</td>
<td>6</td>
<td>26.1</td>
<td>3.74</td>
<td>.961</td>
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<td>0</td>
<td>4</td>
<td>17.4</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>34.8</td>
<td>11</td>
<td>47.8</td>
<td>3.62</td>
<td>1.27</td>
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<tr>
<td>Decision making in conservancies involves equal participation of men and women.</td>
<td>12</td>
<td>52.2</td>
<td>10</td>
<td>43.5</td>
<td>1</td>
<td>4.3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.52</td>
<td>.593</td>
</tr>
<tr>
<td>Both men and women have equal land ownership rights in the conservancy.</td>
<td>18</td>
<td>78.3</td>
<td>4</td>
<td>17.4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4.3</td>
<td>1.35</td>
<td>.885</td>
</tr>
<tr>
<td>Domestic work limits men participation in wildlife management and conservation.</td>
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<td>73.9</td>
<td>6</td>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>1.74</td>
<td>.449</td>
</tr>
<tr>
<td>Land ownership limit men from wildlife management and conservation</td>
<td>15</td>
<td>65.2</td>
<td>6</td>
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<td>1</td>
<td>4.3</td>
<td>1</td>
<td>4.3</td>
<td>0</td>
<td>0</td>
<td>1.478</td>
<td>.790</td>
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**Education**
The findings from table 1 above shows that education skills limited women to a great extent than men in involvement in wildlife management and conservation. 56% of the respondents affirmed that education limited men to a small extent and 21.7% responded to no extent. On the other hand, 60.9% of the respondents agreed that education limited women to a very great extent and the other 21.7% reported that education skills limited women to a great extent in involving in wildlife management and conservation. These findings are hand in hand with Martin, (2012), O’Brien & Hapgood, (2012); Adamo, (2013) who reported that there was paucity of senior female scientists in science, including ecology and conservation, which is a growing concern globally. The retrogressive cultural practices such as FGM and early marriage were pointed by the participants in the FGD as key impediment to acquisition of education for the girl child in Maasailand. One woman participant argued that:

The problem that is affecting us women living in these conservancies is lack of education. Our girls also do not want to study. We take them to school they get married off. Others drop out because of early pregnancies. Even most of the people who occupy good jobs in the conservancy are people from other communities. Because the tourist camps are operated by white people and they want educated people. (OI Nomali*, 2/6/2019).

Another man participant also added that; In fact, most of the learned women you find in those tourist camps and conservancies working as managers and in top positions are not our own. This is because our girls do not prioritize education. Jobs have been taken by other communities (OI Pareyio*, 2/6/2019).

The above statements show that men and women in Maasai Mara ecosystem are aware that education plays a key role in wildlife management and conservation but the school completion and retention rates for girls are very low. The rangers interview also confirmed on the other hand maintained that education greatly limited the girl child more than the boy child in engaging in wildlife management and conservation.

One ranger argued that: Women at times are even allowed to compete at lower education level than men for wildlife conservation and management than men but they are hard to get. In jobs like this one of ours (ranger job) when rarely will you find women. Sometimes the wazungu (white people) who own these tourist lodges and camps really search for girl who have finished form four so that she is taken for further studies but it is hard to get them. Even the ones that get sponsored in secondary schools end up dropping out or scoring very poor grades. (OI Parakuo*, 2/6/2019).

Cultural Norms

The study also revealed that culture influenced wildlife management and conservation to a great extent as shown in table 1. This is reflected by 47.8% responses that affirmed that culture limits women in wildlife management and conservation to a very great extent and 43.5% who affirmed to a great extent. In comparison, the study revealed that men were not limited by culture like women. 65.2% responded that culture did not limit men in wildlife management and conservation to any extent, 21.7% responded to a small extent. It is therefore evident that societal culture and norms limits gender equity in wildlife management and conservation.

Two women landowners shared how the Maasai culture discriminates against women procession of land. In Maasai community sons get inheritance of land from their parents while girls don’t. Even after the death of a husband the windowed woman has little or no control over land. This affects the women participation even in conservancy meetings as they it was earlier argued in the FGD meetings where most of them sent their sons to represent them.

Noolparakuo*, (OI 2/6/2019) noted that: When one is windowed, you give the responsibility to your elder son or a more responsible son because at times as women we cannot get time to go for conservancy meetings. Those meetings are even dominated by men so it is better for men to go discuss then you agree with what they say.

Another old woman land owner added that: The conservancy meetings are dominated by men since they are the majority of landowners. Our culture does not allow women and men to mix freely during discussions hence we write our sons as our representatives. The other thing is that those meetings can be scheduled during late hours which are not apt for us women. (OI Naserian*, 2/6/2019).

The two statements above clearly explain how cultural norms have negatively influenced participation of women in wildlife management and conservation. If conservancy meetings are scheduled during hours that do not favour
women due to reproductive roles, then women are likely to be left out in major conservancy decisions. Cultural norms also have been noted to influence the discussion forums that men and women do not interact freely in meetings. This means that women opinions in wildlife conservancies do not count. Sustainable wildlife management and conservation hence may not be achieved if one gender is left behind in core conservancy decisions. Women also may not appreciate wildlife management and conservation initiatives as they are not held accountable hence wildlife crimes may set in in the long run hence threatening biodiversity conservation in Mara. Among the interviewed rangers, cultural norms influenced their perception on women as rangers in a different way.

One-man ranger openly declared that: We would wish to have women rangers in our camps so they can be cooking for us and washing our clothes when we go out on patrol. Sometimes we go far and get so tired that we are unable to cook and since all of us are men we end up sleeping hungry. However, women fear being involved in scouts/rangers job so that they are not labelled as tough headed just the way policewomen are perceived. (OI Ledama*, 2/6/2019)

The above statement reveals some form of cultural stereotype towards women hired as rangers. The men rangers do not view women rangers as fellow colleagues at work but cooks and cleaners. In addition, women are portrayed to fear scouts jobs so that they are not stigmatized in the society as hard headed or man-like. This shows a very strong distinction between gender roles among men and women in the Maasai community that security jobs are basically associated with men whereas domestic and home making are affiliated with women. The study agrees with (McElewe,2001) findings who argued that understanding the cultural and gendered nuances influencing participation in wildlife management and conservation helps create culturally appropriate and effective campaigns on gender equity in wildlife conservation.

**Land Ownership Policies**

The study also revealed that land ownership influenced wildlife management and conservation with women adversely affected than men as few women owned land.87% of the respondents for example agreed that women were limited to a very great extent in wildlife management and conservation by land ownership. On the contrarily,65.2% of the respondents reported that land ownership did not limit men in wildlife management and conservation. This is a clear proof that in Maasai community majority of the men own land and majority of the women do not own land. One-woman participant who represented his husband in the FGD in deed confirmed that by arguing that, I do not own a piece of land therefore when it comes to matters of conservancy I am not counted as part of the shareholders. Most of us women here do not have land. Land here belongs to men. Ours is to wait for them to provide for us and the children. You cannot even question conservancy money because you don’t have land else you will be beaten ruthlessly. (OI Naipamei*, 2/6/2019)

The study agrees with Henri, (2007) findings that gender imbalances exist in land access and ownership, and on average fewer than 10% of women farmers in developing countries own land. In Kenya, although statutory laws do not prevent women from owning land, they still face numerous difficulties in trying to own land (NBSAP, 2016). Lack of land ownership could hinder women’s access to many of the benefits derived from the use of natural resources. Even though women have conservation expertise, control over resources lies in the hands of men in male dominated communities. Since land is a critical focal point in wildlife conservancies, this explains why there are glaring gender disparities in wildlife management and conservation. Wildlife conservancies hence need to engender their land ownership policies to enhance gender equity in wildlife management and conservation.

**Decision Making in Conservancies**

The study examined whether decision making in the conservancies involves equal participation of men and women.69.6% of the respondents argued that decision making in the conservancies was dominated by men to a very great extent and additionally,30.4% agreed with the same statement to a great extent. On the other hand,52.2% of the respondents argued that decision making in the conservancies did not involve equal participation of men and women. Only 43.5% of the respondents stated that decision making involved men and women to a small extent. The study hence deduced that women are left out in the decision making in issues of conservancies.

In addition, a woman participant in the FGD who once worked as a land owners committee revealed her experience as noted below, I once was selected as a committee in this conservancy but women committees have no authority even to give a view in the meeting. I think it was not the wish of land owners to have women in the committees but the pressure from Maasai Mara Wildlife Conservancy Association. Our names were there but basically men dominated the decision making. Even today that’s the case. (OI Noolmeshuki*, 2/6/2019).
The above statement portrays that cultural values and norms are so much upheld in the Maasai community that women still do not have authority to make decisions even when they are rightfully entitled to do so. According to Coleman and Mwangi (2013), the characteristics of resource managers, especially their assigned gender roles, influence how natural resources are managed. In regard to the above statements, even if women have secured employment opportunities in the conservancies, the roles assigned to them may be gendered. This according to Coleman and Mwangi (2013), is because men have dominated decision making and managerial positions in the wildlife conservation institutions hence they stereotypically perceive women as incompetent enough to engage in wildlife conservation.

**Domestic Work**

The study sought to establish whether domestic work influenced participation of men and women in wildlife management and conservation. Majority of the respondents 73.9% agreed that domestic work limited men to no extent and the other 26.1% agreed to a small extent. On the contrary, 47.8% of the respondents agreed that domestic work limits women to a very great extent and 34.8% agreed that women are limited to a great extent by domestic work. This shows that women are more restricted by domestic work than men in regard to participating in wildlife, management and conservation.

The land owners also confirmed that women were more restricted by domestic work that men and that hindered them from participating in wildlife management and conservation. This was even confirmed during data collection as explained in section 3.5.3 where majority of the women landowners failed to turn up for the discussion and instead sent their sons to represent them. They stated cattle grazing and other domestic cores as the reasons they could not turn up.

The findings from the rangers also concurred with those of the land owners and wildlife managers. They strongly upheld that women are married so that they take care of the home while men go out to fend for them and the children. One man ranger in Enoonkishu conservancy reported: When we go out all of us, who will take care of the work at home? Here men have the responsibility to provide for the family. It is the woman to tell me what she wants or what is not there and I struggle to provide it.

The study concurs with Kafarowski, (2005) in Canadian Arctic, which reported that percentage of women on wildlife management and conservation boards was low due to higher status given to men as compared to women and the lack of reimbursement for costs of caring for children or elders, for which women are primarily responsible.

**CONCLUSION OF THE FINDINGS**

The study revealed that more men than women were educated in Maasai Mara and this gave them a competitive advantage over women in employment opportunities in wildlife management and conservation. This was revealed among the wildlife managers and more impact was felt among land owners and scouts. The study also found out that retrogressive cultural practices such as FGM and early marriages were still practiced among the Maasai community and they played a key role in school dropout among the girls.

In terms of cultural norms, the study revealed that women were restricted more by domestic work than men and this affected their participation in wildlife management and conservation. Culture also was seen to influence land inheritance and acquisition in Maasai Mara ecosystem and this study therefore found out that land ownership greatly restricted women from wildlife management and conservation. The women rangers for example noted how the society labeled them as hard headed/aggressive for engaging in that type of job. The land owners also revealed how windowed women delegated their conservancy shares to their responsible sons who will be attending meetings on their behalf as well as withdrawing money and sharing it out. This concurs with the theoretical foundation of this study (feminine political ecology theory) which reported that the gender relations of production are culturally specific and characterized by different relations of power between (and among) women and men across different wildlife management and conservation institutions. In Maasai Mara for example gender power relations that have been instilled by cultural norms have strategically favored men at the expense of women. The cultural norms have suppressed the women both physically and psychologically hence leaving her powerless and with little access and control over wildlife resources. Physically the woman is left out during hiring in the conservancies, decision making during conservancy meetings and benefits less from PES income. Psychologically, the women have confined themselves to subordinate position and have lost confidence in themselves thereby allowing their sons to represent
them in conservancy meetings and take over conservancy shares. Domestic work was such as cattle grazing, caring for the children, fetching water and other cleaning activities were also noted to be restricting women involvement in wildlife management and conservation. Even among the land owners those women who failed to turn up for FGD gave excuses of reproductive roles as the major reason that limited them.

RECOMMENDATIONS
Advocating for girl child education. A lot of reforms have been done in the education sector to ensure the girl child accesses and completes school equally with boys. There are alternatives even for readmission of pregnant girls. Additionally, women have a low entry points to the universities compared to men. However much the education system in Kenya is struggling to empower the girl child, retrogressive cultural practices are pulling the education sector behind at all levels.

Gender advocacy training and capacity building can also be initiated in community based conservation. This is because in most communities, cultural restriction towards women involvement in natural resources management is a key challenge. A lot of investment therefore needs to be done in creating awareness and mobilizing both men and women to appreciate partnership in natural resources management and conservation especially wildlife.

Culturally strategic measures need to be developed in collaboration with the community members for sustainable and gender responsive wildlife management and conservation in Mara. This involves holding debriefing sessions with the community stakeholders so as to discuss on more culturally effective communication strategies that can be used to mobilize the community stakeholders at all levels. Additionally, a culturally accepted group of individuals can be chosen to empower other community members in order to effectively penetrate the cultural seal which is at times so hard to break.

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Proceedings of the 6th International Research Conference

Page 102 of 702
GENDER DIFFERENTIALS IN WILDLIFE MANAGEMENT AND CONSERVATION: A CASE OF SELECTED CONSERVANCIES IN MAASAI MARA ECOSYSTEM, NAROK COUNTY, KENYA

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ABSTRACT

This study aimed at assessing the gender differentials in wildlife management and conservation in conservancies within Maasai Mara ecosystem, Narok County, Kenya. Gender equity and women’s empowerment are prerequisites to effective biodiversity conservation, climate action and meeting the Sustainable Development Goals. In view of its ecological, social and economic value, wildlife is an important renewable natural resource. Its significance is felt in areas such as rural development, land-use planning, food supply, tourism, scientific research and cultural heritage. A better understanding of the different roles, knowledge, needs and aspirations of women and men with regard to wildlife management and conservation can help us achieve the twin goals of better conservation outcomes and increased gender equity. The study was carried out in four wildlife conservancies in Maasai Mara. Descriptive survey and sequential explanatory mixed method approach were adopted for the study. A sample size of 167 respondents comprising of wildlife managers, conservancy landowners and conservancy rangers participated in the study. Data collection was done using questionnaires, focused group discussion and interviews. Reliability of the instruments was tested using test-retest method and Cronbach’s Alpha co-efficient was used to determine the internal consistency of the instruments. The findings showed that women were underrepresented as staff, wildlife managers and beneficiaries in payment for ecosystem benefits in conservancies. In addition, cultural norms, education, landownership and domestic work were revealed as the key factors that greatly influenced underrepresentation of women in wildlife management and conservation. The study recommends that the wildlife stakeholders should employ gender advocacy and empowerment programmes to facilitate gender equity and sustainable wildlife ecosystems. Further, the study recommends that government and non-governmental institutions focusing on wildlife conservation should effectively communicate, implement, enforce and institutionalize the policies and legal frameworks focusing on gender equity for the margin of disparity to be narrowed.

INTRODUCTION

Gender equality and women’s empowerment is a prerequisite to effective conservation, climate action and meeting the Sustainable Development Goals (SDGs). International agreements on biodiversity (CBD), sustainable development (Agenda 2030) and most recently climate change (the Paris Agreement) present new opportunities for engaging both men and women and accelerating equitable action. From Nationally Determined Contributions (NDC) processes to biodiversity strategies and climate change gender action plans (ccGAPs). Governments, businesses and civil society are now embracing gender-responsive solutions to address the world’s most pressing development challenges, (IUCN, 2018).

In view of its ecological, social and economic value, wildlife is an important renewable natural resource. Its significance is felt in areas such as rural development, land-use planning, food supply, tourism, scientific research and cultural heritage, (FAO,2017). A better understanding of the different roles, knowledge, needs and aspirations of women and men with regard to natural resources can help us achieve the twin goals of better conservation outcomes and increased gender equity. Since the development of wildlife management and conservation initiatives one wonders to what extent both men and women are involved in the management and conservation of wildlife as a natural resource. Therefore, the need to investigate the gender representations in wildlife management and conservation in Maasai Mara ecosystem, Narok County.

Historically, higher participation rates of men in various wildlife activities, as well as traditional employment patterns, may account for the substantially greater numbers of men working in wildlife and other natural resource professions. However, a study by Torres-Cruz and McElwee (2012), explained how treating illegal wildlife poaching and trade in a gender-blind way and failure to incorporate women in wildlife related crimes at decision making and investigations may prevent understanding the issues fully and finding more effective solutions because wildlife crimes are highly gendered activities. Thus there is a need of assessing the gender disparities in wildlife management and conservation so as to come up with gender responsive wildlife management and conservation policies and strategies for sustainable biodiversity.
There is a long history of community based conservation (CBC) throughout Africa, but in Kenya a new and important group of initiatives known as conservancies has emerged over recent years. Despite their growing importance there have been few attempts to evaluate the outcomes of conservancy establishment, (Keane, Kaelo, Gurd, Said, Rowcliffe and Homewood (2016). Thus a critical need to come up with gender disaggregated data on wildlife management and conservation for sustainable wildlife conservation interventions. It is thus essential to keep the changing patterns of gender relations in wildlife management and conservation under continual examination, to monitor the extent to which progress is being made towards gender emancipation and to interrogate the adequacy of prevailing strategies towards this goal (IUCN,2018), hence the current study.

Statement of the Problem

Establishment of wildlife conservancies creates potential local level partnerships for improving wildlife management and addressing gender inequalities in wildlife management and conservation for sustainable wildlife biodiversity. Despite their growing importance the attempts that have tried to evaluate the outcomes of conservancy establishment, are limited in their ability to unveil the gender disparities in wildlife management and conservation. This therefore makes it difficult for any intervention focusing on gender equity in wildlife management and conservation to know which direction to reinforce. There is therefore a critical need to come up with gender disaggregated data and gender analytical information on wildlife management and conservation for sustainable wildlife conservation interventions hence this study.

Study Area

The study was conducted in selected conservancies in Maasai Mara ecosystem, Narok county, Kenya. The Maasai Mara National Reserve ecosystem covers 1,510 km² in south-western Kenya. It is the northern-most section of the Mara-Serengeti ecosystem, which covers 25,000 km² (9,700 sq mi) in Tanzania and Kenya. It is bordered by the Serengeti Park to the south, the Siria escarpment to the west, and Maasai pastoral ranches to the north, east and west. The Talek and Mara rivers are the major rivers draining the reserve. Shrubs and trees fringe most drainage lines and cover hill slopes and hilltops. The terrain of the reserve is primarily open grassland with seasonal riverlets. The long rains occur from March-June, followed by the dry season from July-October while the short rains fall during November-December, and a short dry season finishes off the year. The Altitude of Maasai Mara is: 1500-2180m; Rainfall: 83mm/month; Temperature range: 12-30°C.
LITERATURE REVIEW

Gender Representation in Wildlife Management and Conservation Institutions

Biodiversity conservation and management practices are social processes in which women and men across various classes, castes, ages, occupations, and power groups are important actors in helping to conserve, manage, and use biodiversity in a sustainable way (Leach, 2007, FAO, 2017). Therefore, diverse elements of gender analysis such as gender roles, responsibilities, and division of labor, gender relations of power, and rights, ownership, access to, and control over, biodiversity are useful in analyzing the gender differentials embedded in biodiversity conservation and management practices. Most studies of men vs. women wildlife-related recreation globally have found higher participation rates among men in institutions of conservation. This contrast is especially striking when activities involve consumptive use, for example, hunting, trapping, or fishing (Hendee and Potter, 1971; Schole, 1973; Bryan, 1979; Boddicker, 1980).

Historically, higher participation rates of men in various wildlife activities, as well as traditional employment patterns, may account for the substantially greater numbers of men working in wildlife and other natural resource professions. However, a study by Torres-Cruz and McElwee (2012), explained how treating illegal wildlife poaching and trade in a gender-blind way and failure to incorporate women in wildlife related crimes at decision making and investigations may prevent understanding the issues fully and finding more effective solutions. This is because wildlife crimes are highly gendered activities. Thus there is a need of assessing the gender disparities in wildlife management and conservation so as to come up with gender responsive wildlife management and conservation policies and strategies for sustainable biodiversity. Westermann (2005) found that women’s participation in natural resource management groups across 20 countries in Latin America, Africa, and Asia increased collaboration, solidarity and conflict resolution in groups. It also increased groups’ ability for self-sustaining collective action but noted that women participation was less compared with that of men.

In India, for instance, women are poorly represented at the decision-making level, and even if they participate in discussions about wildlife management, their power was limited due to the social and cultural settings (Douma, 2002). Chetri (2008) also argued that the importance of gender is not recognized to the same extent in protected area policy. For example, the Department of National Parks and Wildlife (DNPWC) in Nepal India does not keep track of the number of women participating in buffer zone management. As at 2011, there had been only one woman on a buffer zone management committee, who happened to be the chair (personal communication, DNPWC staff member). The Convention on Biological Diversity (CBD) recognizes the role of people, especially women and indigenous peoples, in the conservation and sustainable use of biological resources (UNDP, 2007). It also affirms the need for the meaningful participation of women at all levels of policy-making for biodiversity conservation (UNDP, 2012, FAO, 2010). However, critics point out that merely mentioning women in CBD documents is not enough to strengthen their access to biological diversity (Momsen, 2007). There is hence a need of evaluating the existing strategies on gender responsive wildlife management and conservation.

In Africa, women rangers in Virunga national park in Congo and the Black Mamba Anti-Poaching women rangers of Balule national reserve in South Africa are excellent examples of gender inclusion in wildlife management. Since its inception in 2013 the Black mamba women rangers have reduced snaring and poaching in Balule national reserve to a large extent (UNDP, 2012). This study hence sought to interrogate and document the gender representations in the selected conservancies and wildlife institutions in Maasai Mara ecosystem.

Among the vhavenda people of Zimbabwe, dialogue inclusiveness and complementarily among men and women in management of natural resource were the major pillars that helped to sustain ecological systems at the same time benefiting the human race, (Manuku, 2013). Ogra argues that experience and attitudes relating to the gendered used of space in conservation areas must not be overlooked (Ogra, 2008, 2012). This position is supported by Gnyawali (2011) whose case-study research in the Khata Community in Nepal, India has demonstrated the advantages of working with communities in a gender inclusive way in order to reconcile the needs of both humans and wildlife within a conservation setting. Similarly, support for a gender approach to biodiversity conservation is provided by Rajasekharan Pillai and Suchintha (2006) in their study of women self-help groups in the Periyar Tiger Reserve in the Kerala where groups of women regularly patrol the forests to discourage illegal entry and control biomass extraction. Therefore, there was a need to establish the adequateness of the gender representations in wildlife management and conservation in Kenyan wildlife ecosystems.
The TRY Oyster Women’s Association is an almost exclusively female Producer association with exclusive rights to the cockle and oyster fishery within the Tanbi Wetlands National Park (TWNP) area of The Gambia on Africa’s West Coast. The project has resulted, not only in restoration of the oyster stocks through the establishment and enforcement of an optimal harvest season and size limits for harvested oysters, but also in the reforestation of local mangroves, thereby impacting positively on the conservation of marine forest biodiversity. It provides a valuable example of a gender aware approach to conservation which ensures that measures to regulate the harvesting of a common pool resource are drawn up and agreed upon together with representatives of the communities whose livelihoods depend on it, Antipode (2012). Maasai Mara ecosystem is a (common pool resource) for the Maasai community whose livelihoods depend on it. For this wildlife ecosystem to be sustained, a gender aware approach to wildlife conservation is critical.

A study by Sayuni (2016) on impacts of protected areas(PAs) on gender, Tanzania indicated variations between the two PAs studied. In the Enduimet wildlife management area, men and women have access to natural resources for household use, and derive some direct and indirect benefits from tourism activities, while in the Kilimanjaro National Park, resource access is denied and local tourism benefits are minimal. The PAs impact both men and women, but the most significant impact is felt by women due to inequality in the gendered division of labour and resources at the household level. Further, poor men and women are stricken more severely since they lack livelihood and subsistence alternatives. In addition, women in female-headed households are affected more than their counterparts in male-headed households. The study also found that the PAs’ attempt at benefit sharing as compensation for resource restrictions does not meet the felt needs of men and women. The PAs function in such a way that they have aggravated people’s workloads and risks, instead of addressing community interests, paying attention to relevant livelihood needs, or improving wellbeing. This study therefore suggested strategies for a gender responsive wildlife management and conservation which can be replicated in conservancies in Africa with similar characteristics for sustainable wildlife conservation.

There is a long history of CBC throughout Africa, but in Kenya a new and important group of initiatives known as conservancies has emerged over recent years. Despite their growing importance there have been few attempts to evaluate the outcomes of conservancy establishment, (Keane et.al.2016). Thus a critical need to come up with gender disaggregated data on wildlife management and conservation for sustainable wildlife conservation interventions. It is thus essential to keep the changing patterns of gender relations in wildlife management and conservation under continual examination, to monitor the extent to which progress is being made towards gender emancipation and to interrogate the adequacy of prevailing strategies towards this goal.

Theoretical Framework
This study was based on feminist political ecology theory (FPE) that emerged in the 1990s as a subfield of political ecology, building on previous Work by feminist scholars, and feminist theorists. Feminist political-ecology was developed by (Rocheleau, 1995.) The approach has extended “the multiple scale analysis of environment and power in political ecology to gendered relations both within and beyond the house-hold, from individual to national scales”. The theory demonstrates that gender is an important element in influencing access to resources, knowledge, and control over natural resources. This study thus adopted this gender-based political-ecology approach in analyzing biodiversity conservation and management issues. Access to, control over, and ownership of natural resources such as biodiversity resources and land are negotiated within and between households, and therefore gender and household relations are a focal point through which the relations of production are studied.

METHODOLOGY
The research design for this study was descriptive research. Orodho (2009) states that a descriptive research design is suitable where the study seeks to describe and portray characteristics of an event, situation, and a group of people, community or population as it is. Since descriptive research allows for a multifaceted approach to data collection and analysis, sequential explanatory mixed method approach was used to guide the data collection and analysis process of the study. This approach is characterized by collection and analysis of quantitative data followed by a collection and analysis of qualitative data. The fundamental principle of mixed method approach is that the combination of qualitative and quantitative approaches provides a better understanding of the problem than either approach can achieve alone (Creswell & Plano Clark, 2007).
RESULTS AND DISCUSSION

Gender of the Respondents (Wildlife Managers)
The study established that 57% of the respondents were men while 43% were women. This can be interpreted to mean that there were more men than women working in the wildlife management and conservation institutions as staff and even as wildlife managers. The findings are presented in Figure 1 below.

Gender of the Participants (Conservancy Landowners)
The total number of the conservancy land owners that participated in the FGD were 128. Out of these only 10 representing (7.81%) were women and the rest 118 representing 92.1% were men. This disparity can be attributed to land ownership as majority of the women do not own land in the Maasai community.

Gender of the Informants (Rangers)
The number of rangers who participated in the study were 16 of which 2 were women and 14 were men. This can be represented as 12.5% women and 87.5% men. Although Kenya wildlife service has played a great role in employing women rangers nationally, a lot needs to be done in mainstreaming gender in the recruitment patterns in the Maasai Mara conservancies.

Gender Representations in Selected Wildlife Management and Conservation institutions in Maasai Mara ecosystem

Gender Representations among wildlife managers
Figure 1 above displays the analysis of men and women wildlife managers who were sampled for this study. According to the analysis, 57% of the respondents were men while 43% were women. The study further probed on the gender representations in the respective departments where the sampled respondents’ worked. This was done in order to get a deeper understanding of the other staff working in wildlife management and conservation institutions. The sampled respondents were asked to give the number of the staff who work in their respective departments in terms of the gender composition. They were also asked to give the number of men and women who work in the management/supervisory level in their respective departments. The responses were tabulated below:

Table 1: Gender representations of the staff in the sampled wildlife institutions

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>Max</th>
<th>Sum</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women staff in the department</td>
<td>23</td>
<td>8</td>
<td>63</td>
<td>22.5</td>
</tr>
<tr>
<td>Men staff in the department</td>
<td>23</td>
<td>20</td>
<td>217</td>
<td>77.5</td>
</tr>
<tr>
<td>Women in management level in your department</td>
<td>23</td>
<td>3</td>
<td>28</td>
<td>24.5</td>
</tr>
<tr>
<td>Men in management level in your department</td>
<td>23</td>
<td>8</td>
<td>86</td>
<td>75.4</td>
</tr>
<tr>
<td>Valid N (list wise)</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the table above, the responses revealed that the total number of men staff in the departments of wildlife management and conservation where the sampled respondents worked was 217 which comprises 77.5%. The responses further revealed that the women staff who were working in wildlife conservation institutions where the sampled respondents worked was 63 in number which represents 22.5%.
The study further interrogated on the number of men and women who worked in the management level in the various departments that the sampled respondents worked. The responses as shown in table 1 above shows that men in the management level were 86 in number in the sampled institutions of wildlife conservation which represents 75.4% whereas women in the management level were 28 in number which represents 24.5%. This reveals a wide gap of disparity in staff working in wildlife conservation institutions as well as those holding managerial and decision making levels in these institutions. This study hence concurs with the feminine political ecology theory discussed earlier on which argues that gender is considered to be a critical factor in “shaping resource access, and control, interacting with class, caste, race, culture and ethnicity to shape processes of ecological change. The findings can also be interpreted to mean that the existing strategies to enhance gender responsive wildlife management and conservation are inadequately implemented to reflect in the hiring and promotion processes in wildlife management and conservation institution.

The slow transition towards gender equity in wildlife management and conservation can be explained by Lopez and Scott (2000), who argued that social and organization structures influence the human resource and social processes leading to division of labor and related gender differentials. Social structures comprise the patterns of social interaction thereby influencing the primary and secondary socialization at the family and at workplace respectively. Socialization is the transmission of social norms, values and role expectations to the members of the society within socializing agencies such as the family, the education system, and the workplace. The socialization process leads to gendered division of labor, as women and men learn their gender role expectations. The division of labour is transferred from the family to other institutions leading to gender differentials and inequalities in wildlife management and conservation institutions.

The findings from the informants (rangers) also revealed that women were underrepresented among the scouts and rangers employed by the wildlife conservancies in Maasai Mara. They argued that most of the women could not make it as rangers due to fear of wildlife especially the dangerous ones and that domestic work such as caring for children, grazing cows and cleaning activities restricted women from seeking employment.

One-man ranger for example explained that, the women cannot do the work we men rangers do. This is a risky job especially when the animals become wild and women do not know the tricks of escaping and running. Even the few women rangers we have are left behind to guard the camps, they don’t go to patrol. (OI Martin*, 29/6/2019).

They also added that most men could not allow their wives to seek employment in wildlife conservancies as rangers since they regarded this job as a man’s domain. Further, they concluded that women rangers could not make good wives as they will be very aggressive and this may destabilize their homes.

A woman working as ranger elaborated this by saying, most of the tourist camps and lodges that are in these conservancies are far from our residential homes because the game reserve is so wide. If you happen to get a job, as a woman you will be needed to stay in the staff houses which most of the men will not condone. If you decide to go very early, it is not safe because of wild animals roaming all over. Most married women decide to let men go as they are left behind to take care of children and cattle. She added that the ranger job requires a lady who is not married because she is not under any external authority (OI Nalinkunkera*, 29/6/2019).

Boone and Galvin (2014) argue that environmental education is an important tool to improve attitudes related to wildlife. For instance, education through direct experiences, such as visits to protected areas by local residents, can be a valuable learning tool. Particularly in the case of women, such visits can help reduce the participants’ fear of wildlife and increase their support for the conservation of species that they rarely see or may view negatively due to human wildlife conflict. Further research in Maasai Mara ecosystem needs to be done to evaluate the adequateness of environmental education in fostering gender responsive wildlife management and conservation. The findings from the informants have also revealed some form of cultural stereotypes in wildlife conservation roles in that women who work as rangers are labelled aggressive hence cannot make good women.

This confirms Keane et.al (2016) findings which supported that women have fewer opportunities to participate in making environmental decisions due to cultural stereotypes that devalue women opinions. As a result, their perceptions and interests are sometimes ignored or excluded when policies are designed. The absence of opportunities is often due to reproductive work, cultural restrictions, women’s lack of schooling and low self-esteem. The findings of this study hence confirms that nothing much has changed in Maasai Mara ecosystem in

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terms of penetrating the cultural seal to awaken the Maasai community on the benefits of gender responsive wildlife management and conservation.

Additionally, the participants (landowners) discussed that all the conservancies were managed by land owners committee (LOC) that was elected by the land owners themselves. They however stated that women were underrepresented as land owners in all the conservancies. The reasons given for this was that majority of the women did not own land in Maasai Mara. Further probing also revealed that those women who owned land in Maasai Mara were either windowed or were empowered economically.

CONCLUSION
The study’s objective was to establish the gender representations in wildlife management and conservation institutions. This was analyzed with indicators such as number of men and women in wildlife management and conservation institutions and those in the management and decision making level in wildlife conservation institutions. The study also further probed on those who managed the conservancies at the community level and how the wildlife managers were selected at local/community level. The study found that men were more represented in the wildlife management and conservation institutions as workers and occupy majority of the management positions. The study also revealed that men dominated the rangers jobs in the conservancies as was evident in some conservancies where there were no women rangers at all. Further probing noted that the community labelled rangers job as a man domain and women who ventured into it were considered hard headed/aggressive and not fit for home making. Among the landowners, women were also underrepresented and men comprised the majority. The reasons for this disparity was that very few women owned land in Maasai Mara as compared to their men counterparts.

RECOMMENDATIONS FOR POLICY
While the government gender policy, SDGs, Kenya constitution 2010 and the Kenya wildlife act 2013 have been formulated, ratified and enacted, gender disparities continue to persist in natural resource management. This is because policy and legal frameworks cannot bring out gender equity unless they are properly communicated, implemented, enforced and institutionalized. This study therefore recommends that the governmental and non-governmental organizations to revisit the policies and legal frameworks aforementioned so as to ensure they are effectively put into practice in wildlife management and conservation institutions. This calls for an evaluation Programme to address all the conformities and non-conformities with a purpose of implementing sustainable changes. Availability of gender disaggregated data in all wildlife management and conservation institutions so that it becomes easier to track the non-conformities and rectify. This is because without this data, wildlife management and conservation institutions cannot know where to reinforce and the course of action to be taken. Hiring and recruitment personnel will not know the group that has a deficit and the one that is overrepresented.

Based on the research findings, it is recommended that wildlife management and conservation institutions give a fresh look on addressing the issue of gender equity in wildlife management and conservation. This is because women have been depicted to have fewer opportunities than men in wildlife management and conservation. This overall puts the sustainability of wildlife conservation initiatives at stake as both men and women are actors in both wildlife conservation and wildlife destruction. The study for example revealed some forms of wildlife conservation threats in the conservancies such as charcoal burning, overgrazing and crop cultivation. This depicts a shift in focus by the groups that benefit less or those that do not benefit at all from the conservation initiatives. It is against this that gender considerations in wildlife management need to be given a fresh look vis a vis the current situation.

The study also recommends that the curriculum for environmental sciences, natural resources management and ecology be revised to embrace gender studies and lessons. This will enable the scholars to acknowledge the importance of gender in any conservation initiatives. It will also help them to embrace gender equity in the institutions they will work for in future instead of perpetuating gender stereotypes in conservation institutions.

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ADOPTION OF NEW GRAIN STORAGE TECHNOLOGIES IN EMBU COUNTY, KENYA

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ABSTRACT
This study was carried out to investigate the factors that influence the adoption of new grain storage technologies in selected wards of Mbeere South Sub-County in Embu County. Data was collected from a total of 312 respondents who were randomly selected from 2 wards of Mbeere South Sub-County. Proportionate samples of 145 and 167 respondents were interviewed in the two wards. The variables examined in the study are age, level of education, and farm size. Descriptive statistics and logistic regression model were used to analyze data. The inferential statistical tool used indicated significant a relationship between farm size and adoption of new grain storage technologies. Level of education and age were not significantly related to adoption of new grain storage technologies. This study recommends awareness creation of these technologies to all people regardless of age or education status but should target small-scale holders as they are the majority. It is hoped that the study findings will make a significant contribution to the body of knowledge regarding adoption of new grain storage technologies in Kenya.

Keywords: Adoption, education, farm size, age, and logit regression model.

INTRODUCTION
Food insecurity is a global concern which is aggravated by inefficient methods of food storage. The situation of hunger has been worsening worldwide as a result of that and the countries in Sub Sahara Africa are most affected (United Nations [UN], (2015). Grains are staple food in Kenya which are consumed by human beings and livestock. The major grain crops cultivated in Kenya are maize, rice, sorghum, cowpea and green grams (Kimenju, 2013). The Kenyan government has provided incentives to the farmers which has tremendously increased the grain production. The increase in yield through improved cropping systems and the introduction of high yielding varieties has re-emphasized the need for more resources to prevent post-harvest losses (Kimenju, 2013). Therefore, efficient storage is an important activity which has a potential to enhance marketing efficiency by constant supply of grains throughout the year.

Although new grain storage technologies have been made available the adoption rate has been disappointing (Abiodun, 2012). A farmer’s decision to adopt a technology is greatly influenced by a number of factors. According to Rao and Rao (1996), factors such as age and education have a positive and significant association with adoption. According to Abiodun et al. (2012), other than age the level of education of an adopter is significantly related to the adoption of grain storage technologies. Okolo (2018), on the contrary states no significant relationship exists between a farmer’s age and the adoption of grain storage technology (P>0.05). Owach (2017), observes that the adoption of new grain storage technologies depends on the farm size, age and education of the household head. Similar results were found in studies of the adoption of improved storage structures for maize in Benin (Adebola et al., 2011, & Affognon et al., 2015), and in Malawi (Maongo et al., 2013) where the results suggest a possibility that education improves the rate at which a new technology is adopted by farmers.

Gerhardt (1975), tracked the adoption of hybrid maize in Western Kenya in the early 1970’s and observed that the diffusion process was fast in some areas and slow in others due to some reasons such as lack of education among the farmers. Mbugua (2009), analyzed factors influencing adoption of the recommended maize technology’s package in Makuyu and observed that younger farmers are more likely to respond to new farming methods than older ones who might be rigid to changes. Education is also noted to increase a person’s awareness of his/her environment, ability to acquire and process information about the environment and to detect changes in it. It also enhances a farmer’s ability to identify alternatives and compare benefits and costs associated with each of the alternatives possibly under different states of nature (Schultz, 1981).

Under farm characteristics, farm size is one of the major and significant determinants of the metallic silo technology adoption by households (Maonge, 2013). Farm size was significant at 5% level. Increasing the size of farmland for grain production improved the probability of adopting the small metallic silo technology by 15.4%. Farm size is a stimulus for grain production especially with regards to smallholder farming where use of inputs such as fertilizer is constrained by its prohibitive cost. The findings imply that smallholder farmers with large pieces of farmland have increased chances to produce large quantities of grain; therefore, they have higher probability to adopt the small
metallic silos. This result is consistent with the findings of Bocquêho, Jacquet and Reynaud, (2011), on miscanthus adoption in France, and Barungi, Ng’ong’ola, Edriss, Mugisha, Waithaka, and Tukahirwa, (2013), on adoption of tree planting as soil conservation control technology in Uganda. Thus, embedding small metallic silo programme with land productivity programmes was likely to improve adoption of the grain storage technology.

In a study on the assessment of grain storage technologies for effective marketing in Nigeria (Abiodun et al. 2012), indicate that adoption rates varied across different age categories as follows 3.3% of the adopters were between 20 to 30 years, 24.2% between 31 to 40 years, 35% between 41 to 50 years, 26.7% between 51 to 60 years, and only 10.8% were between 61-70 years. This suggests a possible relationship between adoption of technology and age. The critical age of adoption appears to be between 41 and 50 years. Majority of traders (85.0%) stored between 1 and 20 bags of 100 kg weight which showed that grain storage in the study area was still at subsistence level. The main objective of this study was to investigate the factors that influence adoption of new grain storage technologies in Mbeere South Sub-County in order to come up with a possible strategy that can improve the adoption of new grain storage technologies by farmers.

Statement of the Problem
Food losses in Kenya were found to range between 10 to 50% which is a huge economic loss and could threaten food security among the households. Majority of the households in Mbeere South Sub-County were known to have been using traditional methods for food storage leading to destruction of grains. Despite the availability of new grain storage technologies in Kenya their adoption has remained low. Studies on food losses have scarcely focused on adoption of these technologies in spite of their importance in grain storage. Thus, the researcher investigated the factors that influence their adoption to device methods that can increase their adoption in Mbeere South Sub-County.

METHODOLOGY
The study was carried out in Mbeere South Sub County which is one of the Sub-Counties in Embu County. It is one of the sub counties of Kenya which is Semi-Arid. The residents in the study area are predominantly small scale farmers mainly producing maize, green grams, cowpeas, millet, and sorghum. The respondents were randomly selected from 2 wards of the sub county namely Mavuria and Mbeti South. The wards were purposively targeted and selected because post-harvest grain management program was implemented in these wards by Diocese of Embu Caritas which is an NGO dealing with socio-economic development and were among the wards where the metal silo project was implemented. Simple random sampling technique was used. A total of 312 household heads were interviewed from the selected wards. To be eligible for interview, the household heads must have lived in the area for more than one year. The questions in the interview schedule were made simple and translated to household heads in their various local languages at the point of information and data collection. The interview schedules were directed towards the household heads. A well-structured open ended and close ended set of questions were put in the instrument. Questions were asked on household head’s personal socio-economic characteristics. Other information provided by the household heads was; if education level is related to adoption of new grain storage technologies, if farm size influences adoption of new grain storage technologies and whether age of an adopter is related to adoption of new grain storage technologies by the households in Mbeere South Sub County.

RESULTS AND DISCUSSION
Influence of Education Level on Adoption of new Grain Storage Technology
After analyzing the data regarding education level of respondents, the results indicate that the highest percentage of respondents had attained secondary education (Figure 3).
This percentage is followed by those who had attained primary education. Only a small percentage of the respondents had attained tertiary education. Education was hypothesized to positively affect adoption of new grain storage technology. This was based on the fact that educated farmers stood a better chance to acquire new information and appreciate importance of modern technologies through a better understanding of the technologies.

| Table 14. Influence of education on adoption of new grain Storage Technology |
|--------------------------------------------------|-------------------|------------------|
| Response          | Frequency | Percentage |
| Yes               | 176       | 56.41% |
| No                | 78        | 25%    |
| Undecided         | 58        | 18.58% |

P value=0.650; \( \chi^2 = 0.862 \)

The results of analysis of the data using chi-square test show that P value = 0.650 and \( \chi^2 = 0.862 \) which indicate a no association between education level and technology adoption because P value > 0.05. This could mean that most of the people in the Sub-County had accessed formal education and thus it does not have any influence on their choice of technology adoption. Okoruwa (2009), however, argues that education influenced farmers’ choices of storage technologies in Nigeria. Similarly, in Northern Uganda adoption of new grain storage was found to depend on education level of the household head (Owach, 2017). The education level of a farmer was also found important in the study of adoption of metallic silo technology in Malawi (Maonga, 2013).

Similarly, education was found to be significant in the study of adoption of recommended maize varieties in Muranga County (Mbugua, 2011). This finding is supported by a previous study on adoption of small metallic grain silos in Malawi where it was found that education level of the adopter was a significant determinant for the adoption of the technology (Maonga, 2013). A significant relationship between level of education and adoption of new grain storage technology was noted in previous studies (Abiodun et al., 2012). Similar results were found in the studies of the adoption of improved storage structures for maize in Benin (Adegbola et al., 2011, cited in Affognon et al., 2015), and metallic grain silos in Malawi (Maongo et al., 2013). These studies show that education improves the rate at which new techniques and skills can be absorbed and applied by farmers, and explains the phenomenon of increasing adoption rates as years of education for farmers increase.

Rogers (1971) said early adopters of innovations are those who have attained more education, have higher social status and specialized more in farm operations while laggards on the other hand, are alienated and past oriented. Misiko (1976), has a similar argument by observing that farmers who had received formal education and were at youthful or middle age groups were rigorous in trying new practices and were ready to undertake risks involved in those practices. Better educated farmers are likely to adopt modern farm inputs more efficiently. Education is seen to trigger farmers to try out new innovations. Similarly, a study by Ndiema et al. (2002), in Njoro shows that, a significant relationship existed between adoption of agricultural technologies and farmers’ level of education.
This result also corroborates with the outcome of a previous study on determinants of input use and maize productivity in Kenya by Karanja et al. (1998), who found that education at post-secondary level positively influences the use of fertilizers by farmers. This is because educated farmers are able to evaluate the difference of using or not using fertilizers on productivity. According to reviewed literature education seems to improve the likelihood of adopting improved storage structures. The present findings also indicate that the probability of using improved storage structures is correlated with the level of education of the household head; an increase by one year increased the probability of using improved storage technology by 16% in Apac district, 11% in both study districts, as well as for households growing finger millet and beans (Owach et al., 2017).

According to Welch (1979), the level of education attained by a farmer is noted to influence the probability of adoption of new maize variety technology because more years of schooling tend to make farmers less risk averse therefore enabling them to try out new innovations. Education also increases a person’s awareness of the environment and the ability to acquire and process information. Educated farmers are able to comprehend new information and are more aggressive to utilize new agricultural technologies. However, a study by Ndiema et al. (2002), in Njoro shows that, a significant relationship exists between adoption of agricultural technologies and farmers’ level of education. The study finding was also consistent with Uaiene et al. (2009), who found that completion of at least lower primary school resulted in higher chances of adoption of agricultural technology than lower or zero levels of education in Mozambique.

Evenson (1981), suggests that farmers with better education are likely to be earlier adopters and apply modern inputs more efficiently. Gerhardt (1975) and Rosenzweig (1978), observe that the likelihood of adoption of hybrid seed is positively related to education. Jamison and Lau (1982), argues that education and age have a positive effect on the likelihood of adoption of an agricultural technology. The results from different researchers vary on the influence of education on adoption, therefore the reason why this study was conducted.

**Influence of Farm Size on Adoption of new Grain Storage Technology**

The results after analyzing data on the size owned by households indicate that the highest number of respondents (55.13 %) had a farm size of below 1 acre. The number of respondents who owned 1 acre and above decreased as the farm sizes increased (Figure 4).

![Figure 4: Summary of farm size owned by the respondents](image)

Farm size is the total land that farmers use to produce different types of grains. It impacts on the household’s land use decisions in terms of type and diversity of farming activities, as well as cropping systems and patterns (Maonga, 2005). Farm size is therefore expected to have positive effect on adoption of metallic silos or other types of new grain storage technology. Thus, it was hypothesized that technology adoption rates would increase with farm size.
Table 15. The influence of farm size on adoption of new grain storage technology

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>132</td>
<td>42.31%</td>
</tr>
<tr>
<td>No</td>
<td>62</td>
<td>19.87%</td>
</tr>
<tr>
<td>Undecided</td>
<td>118</td>
<td>37.82%</td>
</tr>
</tbody>
</table>

χ² = 9.554; P value =0.008

The results indicate that P value =0.008 and χ² = 9.554 which show an association between farm size and technology adoption since P< 0.05. Thus, there is a significant association between farm size and technology adoption. The reason for this association possibly is because people with large farms tend to have more grain produce compared to people with small farms. This would then have an influence on the choice of the new grain storage technology to be adopted. According to the World Food Program (2015), it is argued that an increase in agricultural land by one hectare (2.47 acres) improved the likelihood of household adoption of improved storage structures by 7% in Apac and Arua districts in Uganda. That was attributed to better possession of financial resources to hire farm labor and increased millet output.

The findings of Maonga’s study (2013), on the adoption of metal silos in Malawi indicate farm size as an important determinant in the adoption of metal silos by farmers in Malawi. The result corroborates with the finding that increasing the size of farmland for grain production increased the probability of adopting the small metallic silo technology by 15.4% in Malawi (Maonga, 2013).

Influence of age on Adoption of new Grain Storage Technology
The highest percentage of the respondents was below 35 years. However, over 85% of the respondents were within the active age of below 65 years (Figure. 5).

It was hypothesized that technology adoption would increase with age at least to a certain level considering the fact that older farmers have a longer experience than younger ones. Thus, it was hypothesized that there is an association between age of the respondent and the adoption of new grain storage technology. The chi-square value obtained from the analysis is χ² = 8.25; and P value=0.083. Thus, the results indicate that age did not have a significant association with technology adoption. This meant there was no specific age where an individual would have a preference on a specific choice of a new grain storage technology as compared to another. The result corroborates with a previous study which showed that a farmer’s age was not related to adoption of hermetic storage in Nigeria (Okolo, 2018). Another similar result is from a study on adoption of recommended maize variety where age of the...
farmer was found not to influence its adoption in Murang’a (Mbugua, 2011). However, this result contradicts with a previous study which found that age was important in the adoption of metal silos in Malawi (Maonga, 2013). Kimenju and De Groote (2010), argues similarly by stating that older farmers have accumulated enough capital from farming so they can easily buy the new grain storage facilities. This implies that age increases chances of adoption. This result was supported by earlier findings which established that adoption rates of new grain storage technologies varied across different age categories suggesting a possible relationship between adoption of new grain storage technology and age. The critical age of adoption appeared to be between 41 and 50 years (Abiodun, 2012).

The result corroborates with previous studies which establish that age is a significant determinant in the adoption of small metallic silo technology (Maonga, 2013). However, in Northern Uganda, age was found to be important in the adoption of improved storage methods (Owach, 2017). The study finding was found to corroborate with Deng et al. (2005), where age has a positive impact on adoption, suggesting a relationship between age of an adopter and adoption of grain storage where the probability of adoption is higher among older farmers. In a study of adoption of small metallic grain silos in Malawi it was hypothesized that technology adoption would increase with age at least to a certain level considering the fact that older farmers have a longer experience than younger ones of the grain damage associated with poor storage facilities. However, the outcome is that age has a negative influence on adoption of the technology (Maonga, 2013). The same result agreed with reviewed literature, that farmers’ age on technology adoption has a negative effect, in that older farmers are more reluctant to change or expect lower return even after adopting new technology (Bocquého et al., 2011).

CONCLUSION
Results of the study indicated that that households were aware of new grain storage technologies. Households’ adoption of the technologies examined were related to a number of socio-economic factors of which farm size is associated significantly with adoption. The level of education and age of the household heads were not significantly related to the adoption of new grain storage technologies. Since farming is a predominant occupation in the study area, households need to be trained on effective use of the grain storage technologies that were developed by various agents and that different sizes of these technologies were made available to take care of even small-scale farmers. This could ensure that problems that are targeted by research emanate from farmers and as such identified solutions touch the interest of farmers at heart. There exist a significant association between adoption of new grain storage technology and farm size however no significant relationship exists between age, education of the adopter and adoption of new grain storage technology.

RECOMMENDATIONS
Technology agencies dealing with post-harvest management programs should disseminate awareness of these technologies to all people regardless of age or education status. They should target small-scale farmers as they are majority and may not be producing enough to store in large containers. They should Designs of small size storage containers should be put into consideration to fit small scale farmers.

REFERENCES


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ABSTRACT

In Kenya, small-scale potato farmers are associated with low income attributed to low farm gate prices of potato during harvesting time, access to credit facilities, and the use of uncertified seeds. These problems can be mitigated through cooperative societies. Despite the cooperative societies offering the facilities to mitigate some of these problems, the income of the farmers remains low. Therefore, there is a need to access the impact of the cooperative societies towards improving potatoes farmers’ income. The objective of this study was to determine the impact of cooperative societies as a marketing channel, credit facilities and transfer of technologies provider on potato farmers’ income. The research was conducted in Tarakwa ward in Uasin Gishu County. The study used descriptive design. A sample of 100 household farmers was obtained through random sampling. The questionnaire and face to face interview were used to collect the data on the selected household farmers. The data was analyzed using regression analysis as implemented in the Statistical Package and Social Science software. The study revealed that the cooperatives were not providing certified seeds to the farmers, hence low productivity and income level. The farmers were unable to access formal credit facilities due to high interest rates and short repayment period. The cooperatives were also found not to have an effective marketing channel, hence, majority of farmers were selling their produce at farm gate, leading to low returns. Therefore it was recommended that cooperative societies should reduce their interest rates on credit facilities and also increase the loan repayment period so as to make it accessible by the farmers. Also, effective marketing channels should be enhanced in order to facilitate high income for farmers from their output.

INTRODUCTION

Low income on small-scale potatoes farmers have been a major challenge in Kenya. Cooperative societies play major roles in the agriculture sector. However, despite their availability in Uasin Gishu County, small-scale potatoes farmers in Tarakwa ward still get low income level. It therefore arise the need of finding out what made it difficult for the farmers to achieve high income level from their output despite their availability.

To carry out the study, we looked at the following specific objectives.

1. To determine the impact of cooperative societies on credit facilities and certified seeds.
2. To determine the impact of cooperative societies as a marketing channel on farmers’ income

Cooperative society being in a position of providing farmers with credit facilities, farmers still do not go for the loans. Credit facilities are important since through it access, farmers are in a position of purchasing farming inputs where they end up planting without fertilizers. They are also not in good position of using pesticides since they have no fund which finally results to low income and low yield. Farmers from the area were using uncertified seeds. They reuse what they were remained with after selling those potatoes of a certain size.

### TABLE 1. Sources of potato varieties grown by small-scale potatoes farmers in Tarakwa ward, Uasin Gishu County.

<table>
<thead>
<tr>
<th>Varieties</th>
<th>Own</th>
<th>Neighbour</th>
<th>Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>58</td>
<td>38</td>
<td>2</td>
</tr>
<tr>
<td>Shangi</td>
<td>70</td>
<td>27</td>
<td>2</td>
</tr>
<tr>
<td>Nyayo</td>
<td>57</td>
<td>39</td>
<td>1</td>
</tr>
<tr>
<td>Tigoni</td>
<td>40</td>
<td>46</td>
<td>3</td>
</tr>
<tr>
<td>kimande</td>
<td>68</td>
<td>31</td>
<td>0</td>
</tr>
<tr>
<td>Asante</td>
<td>64</td>
<td>33</td>
<td>0</td>
</tr>
<tr>
<td>Komesha</td>
<td>60</td>
<td>30</td>
<td>0</td>
</tr>
</tbody>
</table>

Source Kaguongo et al., 2008
The use of uncertified seeds led to spread of diseases such as bacterial wilt hence low level of production and income. This was echoed by Kaguongo et al., 2008 who stated that most of the farmers supply themselves with potatoes’ seeds. The price of certified seeds was expensive in that farmers resort to reuse what they have harvested (Kinyae et al., 1997, Mureithi 2000). For one or the other reason, farmers go outside their farms for new “seeds” (renewal seeds) from the sources indicated in the table above at the indicated frequencies. Farmers renew seeds due to various reasons for example acquiring a new variety (Ng’ang’a et al., 2003)

Farmers sort out their potatoes after harvest. They sell the big ones and then they use the small sized potatoes as planting seeds. This was supported by (Barton et al., 1997) who stated that farmers use the seed tubers that the middlemen selected against due to their small size. Farmers were not familiar about the certified seeds and they believe that when disease emerged, it was because the variety was used in that soil and they then end up exchanging with the neighbours or buying the seeds from other places other than from that area. Ng’ang’a et al.,2003,stated that when productivity of a certain variety decreases, farmers thought it was because the variety have been used in the soil and then they end up exchanging their seeds with their neighbours or they change their planting plot for their potatoes.

Smallscale potatoes farmers were exploited by middlemen since it was difficult for them to access market by themselves direct. The act of collective action by cooperative society was not there where farmers end up being exploited by the middlemen who purchases their potatoes at a very low farm gate price. This goes hand in hand with Kaguongo et.al, 2008, who stated that most of the farmers do not store their potatoes but sell them directly from their fields hence getting low net returns and total low income.

Seasonality and rain fed production which increases supply than the demand level prone farmers being exploited by traders and brokers. This therefore leads to high fluctuation of farm gate prices leaving farmers with low income. Generally ,June , July and August was the season that potatoes flood with K.sh 500 to K.sh 600 per bag, March, April, May and December was the season when the potatoes were rare to find where a bag goes for K.sh1200 to K.sh 1800 and sometimes it goes for k.sh 2300.

LITERATURE REVIEW

Mostly cooperatives contribute towards increasing farmers production and hence income. Therefore cooperatives are in a position of enabling farmers to access most of factors that are required for their production and marketing. The study looked at how cooperatives would contribute towards increasing farmers’ income through provision of certified seeds, credit facilities and marketing channels.

Certified Seeds

There was inadequate supply of seeds in that farmers solely depend on informal sources such as ether buying from their neighbour or reusing the small sized leftovers seeds. Mostly, self supply of the seeds was the main source of farmers’ potatoes seeds. According to Kaguongo et al, 2008, farmers got their seeds from their neighbours, local market or from themselves .Basically, institutions responsible for the production of potatoes certified seeds gives less incentive for the sector. Cooperative societies supply the few available certified seeds to farmers at high prices depending on the cost that they acquired the seeds with. Since the major institution supplying seeds to farmers is Kenya Agricultural Research institutes (KARI) which was the sole supplier, its capacity for production was limited as it struggle for research and seed production. The seed production efficiency was reduced since there are very few incentives for increasing productivity and efficiency (Kaguongo et al, .2008). As per KARI 2007; it produces between 25 and 55 tones of basic seeds per year. This means that only about 1% of the potatoes farmers were able to access the produced certified seeds (Ayieko and Tschirly, 2006).

This means that if that was the only amount produced, then therefore there was inadequate certified seeds in cooperative societies. This finally raises the price of those certified seeds which make it difficult for the farmers to acquire the certified seeds from the cooperative societies that were in the area. Lung’aho et al., 1997, stated that there was low quantity of certified potato .Due to this, these certified seeds were highly priced which resorts to farmers using seeds from other sources such as buying from neighbours, local market and reusing what they harvest (Kinyae et al., 1997; Mureithi, 2000).Reuse of uncertified seeds by farmers leads to spread of diseases which then therefore reduce their output hence low income. Most of the farmers have a thought that the spread of diseases is as a result of planting potatoes on the same plot severally and therefore they sort the issue by planting their potatoes in a different piece of land to avoid the disease which become difficult to them. Barton et al., 1997 suggested that,
farmers most frequently plant small tuber seeds and sort the big sized ones for sell or to eat. This was because commercially, middlemen looked for the big sized potatoes. It arises as the cause of disease spread.

**Poor Marketing Channels**
Most of the farmers do not store potatoes but they sell them directly from the field. This led to accumulation of potatoes which decreased their prices hence low income. Kaguongo et al., stated that most of the farmers sell their potatoes directly from the farm at glut prices which depressed their net return. Most of the farmers produced their potatoes seasonally where they depend on rain. This leads to accumulation of potatoes in a certain season where traders and brokers took the chance and exploit the farmers by reducing the farm gate prices to the lowest therefore resulting to low income for the farmers. According to Kaguongo et al.,2008, stated that exploitation of the farmers due to seasonality production resulting to fluctuation of farm gate prices and market potato prices sometimes with minimum and maximum prices varying by more than 70% contributed towards low income for the farmers. Generally June, July, August, October and November are the glut season with farm gate prices at K.sh 800 and market prices of K.sh1600. January,February,March and December are the scarce periods with farm gate prices at K.sh1200-1800 and the market wholesale prices of K.sh2000-2500. If the potatoes could be stored then sold after sometime, then farm gate prices could be regulated. Due to extremely low farm gate prices, farmers sell their potatoes at low prices as compared to the wholesale market prices (Kirumba et al., 2004).

Currently, potatoes are marketed through different channels which open chances for farmers’ exploitation. Brokers in the area purchases them at a very low prices and having a wide self gain gap where farmers are left with low net returns. Also brokers require the packages to go too high in that they took a lot of potatoes as it is required by policy. The packaging standards policies are not well formed where the middlemen and brokers took position of exploitation. Collective action has not been enhanced by cooperative societies. This therefore leads to poor marketing channels which become a cause for low income to farmers.

**Credit Facilities**
Cooperative societies are in better position to provide farmers with formal credit facilities. Despite its availability, farmers still have difficulty in acquiring planting materials, fertilizers and pesticides due to high cost and inadequate funds with farmers. This means that farmers are not in position of getting the credit facilities from the available cooperative societies. Credit is an essential facility to every farmer since their farming activities involves a lot of fund. This was also revealed by Vandenberg,2003; Zinych Odening 2009 who stated that access to credit facilities have been found a productivity enhancing and risk-mitigating factors for agricultural businesses. In access of credit facilities by farmers become a barrier to productivity and income generating. Jayne et al., (2010) stated that in access of credit facilities by the farmers make it difficult for the farmers to access fertilizers, planting materials and pesticides. Although cooperative societies in the area have credit facilities, farmers are not in a position to access it. Grace payment period for the credit facilities given by cooperative societies is of just for a give short period of time. Therefore farmers with ability to pay the credit loan within the duration required are the only ones in a position of accessing the credit loan. This means that a lot of farmers are not able to access the credit due to limited time. For accessibility of these credit facilities and amount to be lending to them from cooperative societies, farmers need to have security in order to access it. Many smallscale potatoes farmers took their end season yield as their security for the access of loan which for most of the farmers become difficult. Cooperative society gives the credit facilities at a high interest rate which make it difficult.

**CONCLUSION**
There were limited certified seeds in cooperative society. The institution responsible for production of certified seeds have inadequate incentives for the production. This in turn therefore made the produced seeds to be expensive. Since there is only a few institutions producing certified, only a few number of smallscale potatoes farmers that were in a position of accessing the credit facilities. Therefore, it became difficult for the farmers to purchase the certified seeds where they end up using uncertified ones. Smallscale potatoes farmers are not in a position to access credit facilities from cooperative societies. The grace payment period for the loan given by cooperative societies to the farmers is very short in that it’s not enough for them in settling their loan. Therefore it becomes a limit to farmers in accessing their loans. The interest rates charged by cooperative society on credit loans are not favorable to the farmers. These therefore become a hindrance for the farmers to acquire the credit loans. Also farmers get discouraged on getting the loans from the cooperative society by this high interest rate charges.
RECOMMENDATION

Cooperative societies should provide their loans at a favourable interest rates. Interest rate charges should be reduced in that farmers will not find it’s inaccessible. Also the grace payment period for the loan should be increased so as to give farmers enough time of preparing themselves in repaying the loan.

Government should tries to provide the required incentives for production of certified seeds in the institutions which are responsible. Cooperative societies should as much as possible tries to get certified seeds from the institution in maximum quantities where all smallscale potatoes farmers will be able to access them. Institution responsible for the production of the certified seeds should distribute them in a favourable price which in turn will favour farmers as it will be cheap while purchasing them from cooperative societies in their area.

Cooperative societies should enhance effective marketing channels .It should enhance collective action which will be a means of mitigating farmers’ exploitation by middlemen. This means therefore that farmers will be in a position of achieving their expectation on the level of income.

REFERENCES


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PSYCHOLOGICAL CONTRACT AND JOB STABILITY: THE PLACE OF WELFARE INITIATIVES ON JOB EMBEDDEDNESS OF UNIVERSITY CATERING EMPLOYEES IN NAIROBI CITY, KENYA

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ABSTRACT
The study sought to establish the relationship between the psychological contract and job stability of university catering employees in Nairobi City County, Kenya. The psychological contract was measured by the concepts of; provision, adequacy and employees value. The relationship between psychological contract and job embeddedness was measured between the adequacy and employee attachment used interchangeably to mean job embeddedness. The study was descriptive covering a stratified sample of 189 respondents drawn from 300 employees. Isreal’s sample size calculation formula was used to determine the sample size of the study. Primary data was collected through self-administered questionnaires and interview guide questions from university catering employees in Nairobi City County. Questionnaires were pre-tested in one university not included in the actual study findings. The instruments of this study were validated by the use of content analysis Content analysis was done by cross-checking responses against the study objectives, hypotheses and against the conceptual framework. Test-re test method was used to establish the reliability of the questionnaires. A Cronbach alpha was used to test the consistency of variables. The results of the individual welfare initiatives were between 0.800 to 0.822; meaning the data collection instruments were reliable as they were higher than 0.7 the determining value. A total of 189 questionnaires were administered, out of which 152 were properly filled and retuned. This is a response rate of 80.41%. 61% of the respondents were female while 39% were males. The findings demonstrated that, (54%) of the respondents aged between 35-49 years of age. majority of the respondents (75.7%) was married while minority (0.7%) was of the opinion that, marriage is not applicable. The findings demonstrated that, majority (38.8%) had a diploma as the highest level of education whiles the minority (1.3%) held a primary level certificate. According to the study findings, majority (29.6%) of the respondents had an experience of between 5-9 years while the minority (8.6%) had an experience of >20 years of age. Means were established and interpreted as follows; Means >4.5 implied strongly agreed, 3.5-4.5 implied disagreed; 2.5-3.5 implied neutral, 1.5-2.5 implied agreed, <1 implied strongly agreed. Standard deviations were also obtained and interpreted as follows; >1 implied: significance variance and lack of consensus while <1 implied, lack of significance variance in responses, 1, implied that, the responses were further spread out, >0.5 and <1, implied that, the responses were moderately distributed, while < 0.5 implied that, the responses were concentrated around the mean. Means of the four welfare initiatives of the study had means of between 2.5 - 3.5; an indication that, the respondents remained neutral on whether their employers fulfill their part of contract as a party to a psychological contract. The mean for the provision of a comprehensive pension policy (3.73) were between3.5-4.5. This means that, the respondents disagreed that, a comprehensive pension policy is offered to them. The standard deviation for all the five welfare initiatives were; leave policy (1.527), Sporting Facilities (1.239), regular salary increment (1.366), comprehensive pension policy (1.347), sufficient number of toilets (1.077). This means that they were >1, an indication that, there was a significance variance and lack of consensus on the responses of the study. Another measure on whether the employer fulfilled his psychological contract was through establishment of adequacy of welfare initiatives. The findings indicated that, (96.1%) were of the opinion that, the five welfare initiatives provided to them were inadequate while minority (3.9%) said they were adequate. Another measure of psychological contract was on the part of employees where they were asked whether welfare initiatives provision makes them feel valued. The findings indicated that, majority (44.1%) of the respondents agreed while (40.8%) strongly agreed that; welfare initiatives if adequately provided will makes them feel more valued by their organizations. This is an indication of the employee’s belief that, implementing welfare initiatives in an organization is an indication that, an organization is fulfilling its responsibility as a party to a psychological contract. The two tailed Pearson product moment correlation was conducted and interpreted as follows; a p-value of between 0.010 to 0.041 implied, insignificant relationships, between 0.041 to 0.70 implied, a moderate relationship, > 0.70 implied a significant positive relationship while a negative value implied, an inverse relationship between the variable. The R-value represents the p-value while ∞ represent the level of significance. On the relationship between employees value and job embeddedness, the findings were; (r = 0.000, ∞ = 0.625). Meaning, there is no significant relationship between an employee sense of being valued and job embeddedness of catering employees. On the relationship between welfare initiatives and job embeddedness the results were as follows; leave policy and job embeddedness (r= 0.946, ∞ = -0.006), regular salary increment and job
employees perceive that the company takes care and rewards their employees, focuses on long-term relationships, and demonstrates extra-role behavior. The findings demonstrated a significant positive relationship between the Psychological Contract and Job Embeddedness (r = 0.567, p < .047) and Job Embeddedness, there is a significant moderate positive relationship between pension policy (r = 0.567, p < .047) and Job Embeddedness. There is a significant moderate positive relationship between salary increment (r = 0.515, p < .053) and Job Embeddedness, there is a significant moderate positive relationship between pension policy (r = 0.567, p < .047) and Job Embeddedness. There is a significant moderate positive relationship between pension policy (r = 0.798, p < .021) and Job Embeddedness of university catering employees. On the relationship between Psychological Contract and Job Embeddedness, the results were (r = 0.111, p < .175), meaning, there is a significant positive relationship between Psychological Contract and Job Embeddedness of university catering employees in universities in Nairobi, City County, Kenya.

**Keywords:** Social Exchange, Affective commitment, Contract malleability

**Definition of terms:**
- **Contract malleability:** extent to which employees can tolerate deviations from expectations without reciprocating negatively in return.
- **Breach severity:** is the extent to which employees perceive that the most important promises in their psychological contracts have gone unfulfilled. In other words, severe contract breach occurs when firms fail to fulfill their promises on contract elements that employees value most.
- **Contract replicability:** employees perceptions about the likelihood of getting the same (or better) psychological contract elsewhere.

**INTRODUCTION**

Psychological contract is, “the trust of both parties on the reciprocal agreement in which some contracts must be accomplished, some contributions are needed, and some liability must be attained” (Karagonlar, 2016). According to (Festing, 2014), psychological contract refers to the employee’s perception of the implicit agreement between themselves and the organization that contains a shared responsibility between the two parties. Psychological contract refers to implicit non-written agreement between the employer and the employee. Employees expect welfare initiatives from the employer, while the employer in-turns expect to utilize their potentials and skills for his business growth. According to (Allen, 2013) when employees perceive that the company takes care and rewards their contributions, the employees will feel emotionally attached. When employees consider that the organization is able to facilitate their expectations and focuses on long-term relationships they demonstrate extra role behavior (Kiazad, 2014b); (Pannacio, 2009). The psychological contract is based on the perception of each responsibility, and reciprocal provisions of both parties. (McShane, 2003). The study further demonstrated that, “though the contract is not written, yet it is actually very constructive for both sides”. Employers provide access to welfare initiatives, competitive rewards, training, and compensation. On the other hand, employees dedicate their capabilities on an ongoing basis in the form of extra efforts for organizational advancement. Job embeddedness refers to an increased intention to stay with the current organization and/or a reduced degree to which an employer searches for another job (Murphy, 2014). According to (Mitchell T. B., 2001) job embeddedness refers to the extent to which employees are “connected” to an organization.

Employees are a valuable resource that may contribute in several different ways to organizations activities if the organization gives them an appropriate chance (Abok, 2016). An appropriate chance can only be afforded to employees when their needs are addressed. “The fulfillment of the needs of the employees can be created by creating a pleasant working environment” (Anggreani, 2017). The findings demonstrated that, psychological contract is demonstrated by the fulfillment of employee’s needs, which establishes a harmonious social relation, an impetus for the emotional attachment of employees with the organization. The study further stated that, the organizational consideration in treating employees as a job partner can improve the level of emotional attachment, and, eventually, they are willing to contribute to the progress of the business. “The support given to employees by the employer indicates that the employer cares about the contributions of the employees and their welfare”. (Rhoades, 2001). According to (Ravindra, 2013), “labour welfare measures make industrial employment attractive and it helps to reduce labour turnover and absenteeism. It helps to buy employees loyalty as good welfare measures leads to employees satisfaction and increased loyalty among employees”.

**Welfare initiatives and their Role on Job Embeddedness**

Welfare initiatives refers to all aspects of employees welfare that includes; employee welfare programmes, welfare schemes, welfare facilities, employees welfare measures, welfare benefits provided by the employer to improve the
life of an employee. According to (Manzini., 2014) “employee welfare programmes include all aspects that relate to employees wellness and personal development in the workplace”. A logical evaluation by (Manzini., 2014) found out that, the provision of welfare schemes is to create an efficient, healthy, loyal and satisfied labour force for the organization. According to the International Labour Organization (ILO), welfare can be classified into; intra-mural (provided within the establishments e.g. Uniforms, canteens) and extra-mural welfare activities (provided outside the organizations e.g. recreational facilities, pension, gratuity, maternity) among others. (Ankitta, 2010) Classified welfare into statutory and voluntary welfare services.

Relationship between Welfare Initiatives and Job Embeddedness
Accordind to (Abok, 2016) leaves give the employees a sign of satisfaction as the feel appreciated and valued by their employer. The study demonstrated that, the provision of relocation benefits results to job satisfaction. (Saillesh, 2012) Stated that, employee welfare measures supports healthy industrial relations making a positive working environment. Saillesh et al. (2012) found out that, welfare policies maintain a satisfactory level of employee engagement, job and organizational commitment. According to (Ghosh, 2015), A benefit programme, effective human resource management practices and organizational support are antecedents of job embeddedness. A study by (Hussain, 2012) found out that, organizational support towards employee’s welfare is a strong predictor of employee’s turnover intention According to (Smith, 2015) employees often find find reasons to stay with an employer who cares for their personal and professional welfare.

Relationship between Psychological Contract and Job Embeddedness
According to (Mohan, 2013), welfare facilities and especially recreational services, account for healthy individuals besides increasing their happiness and emotional quotient. This is an indication that, when employees are happy they will have a positive attitude toward work, and that, they will feel more attached to their current jobs. (Zhao, 2007), conducted a meta-analysis to assess the influence of breach on a set of work-related outcomes. The study found out that, psychological contract breach is strongly and positively related to turnover intentions. The meta-analytic correlation matrix of (Zhao et al, 2007) study found out that, there is a positive correlation between psychological contract violation and turnover intention. The seminal work on relative deprivation theory according to (Crosbey, 1982); (Crosbey, 1984) suggests that, “individual satisfaction with their job situation also depends on what employees want and feel entitled to”. According to a report by (Mande, 2012) stated that, psychological contract breach and violation are relatively common, but can significantly affect employee behaviour, altitude, job satisfaction and commitment to the organization.

Statement of the Problem
According to (Arero, 2013) the provision of welfare benefits have gone down due to the magnitude of the expenditure incurred in most organizations. (Abok, 2016) noted that, “most of public sectors in Kenya rarely provide overall competitive packages of employee welfare programmes due to poor HR policies, which results in high rate of staff turnover”. According to (Willis, 2014), “organizations expect much more returns from the employees than what it provides for their welfare.” The study argued that, non-competitive working conditions and poor organizational practices results to employees discontent and hence nonperformance. A study by (Coopers, 2008) demonstrated that, there is a mismatch in in disposable incomes rewards, bonuses and allowances for the employees in public sector. Meaning, there is a discrepancy between what employees expects and what they receive in relational to personal individual needs. According to (Otieno, 2016) “The contemporary employment relationships of 21st century have many controversies such as; less job security, less organizational attachment, less commitment and less loyalty. According to (Morley, 2015), “how the dynamics of the psychological contract influence affective outcomes is also underdeveloped area of research” here,affective outcomes refers to an Affective commitment which is the tendency of an employee to remain in an organization due to his emotional attachment and strong identification with objectives and the mission of an organization. The study further explains that, the prepositions above require a method that fully explores their relationship. According to (Thomas, 2009), “the research evidence suggests that, more employees are losing their bonds to their employers over time”. (Karatepe, 2011) stated that job embeddedeness is a relatively new concept under-researched in hospitality management and marketing literature.

Research Hypotheses
H₀₁: Welfare initiatives play no role on job embeddedness of university catering employees in selected universities within Nairobi City County, Kenya.
H₀₂: There is no relationship between welfare initiatives and job embeddedness of university catering employees in selected universities within Nairobi City County, Kenya.
There is no relationship between psychological contract and job embeddedness of university catering employees in selected universities within Nairobi City County, Kenya.

The Conceptual Framework

The conceptual framework shows the relationship between the independent variables (welfare initiatives) and the dependent variable (Job Embeddedness) of university catering employees in Nairobi City County, Kenya.

Source: Researcher, 2019

LITERATURE REVIEW

Role of Welfare Initiatives on Job Embeddedness

Welfare initiatives refer to all aspects of employees welfare that includes: employee welfare programmes, welfare schemes, welfare facilities, employees welfare measures, welfare benefits provided by the employer to improve the life of an employee. According to (Manzini., 2014) “employee welfare programmes include all aspects that relate to employees wellness and personal development in the workplace”. A logical evaluation by (Manzini., 2014) found out that, the provision of welfare schemes is to create an efficient, healthy, loyal and satisfied labour force for the organization. According to the International Labour Organization (ILO), welfare can be classified into; intra-mural (provided within the establishments e.g. Uniforms, canteens) and extra-mural welfare activities (provided outside the organizations e.g. recreational facilities, pension, gratuity, maternity) among others. (Ankitta, 2010) Classified welfare into statutory and voluntary welfare services. The Pakistan study by (Khan, 2014) studied the relationship of factors such as retirement benefits, job security and financial crisis affecting the employees in private and semi-government organizations revealed that, retirement benefits, job security and financial crisis have a significant impact on employees.

Relationship between Welfare Initiatives and Job Embeddedness

According to (Abok, 2016) leaves give the employees a sign of satisfaction as the feel appreciated and valued by their employer. The study further demonstrated that, the provision of relocation benefits results to job satisfaction. According to (Smith, 2015) employees often find find reasons to stay with an employer who cares for their personal and professional welfare. Therefore, any organization that aims to be an attractive employer need to strive to create a supportive and a caring work environment for its employees. This is an indication that, welfare initiatives relates to employees being connected to their organizations. Eaton, Marx and Bowie, (2007) studied employee’s wellness programmes in the United States of America institutions and its impact on health behaviour and status of faculty and staff. The findings indicated that, health promotions attract and retain skilled staff. Grawitch, et al., (2007) examined the affiliation between safety health practices and turnover intention in universities. The findings indicated that, health and safety practices are positively related to turnover intentions. A study by (Hussain, 2012) found out that, organizational support towards employee’s welfare is a strong predictor of employee’s turnover intention.
Relationship between Psychological Contract and Job Embeddedness

A psychological contract refers to a set of tacit agreements between members of an organization and their managers and is founded on the reciprocal obligations between an employer and an employee (Robinson, 1994). According to (Mohan, 2013), welfare facilities and especially recreational services, account for healthy individuals besides increasing their happiness and emotional quotient. This is an indication that, when employees are happy they will have a positive attitude toward work, and that, they will feel more attached to their current jobs. (Morley, 2015) Stated that, “fulfillment and violation of psychological contract expectations evoke different affective reactions in different employees, depending on the range of variables”. The variables put under lenses by this study are welfare initiatives. (Dennis, 2012) Studied the extent to which welfare issues are resonant in the hospitality and tourism industry. His findings indicated that, welfare policy stem from measures to improve health and safety, paid holidays, reduced working hours and mental well-being of employees. Employers who fulfils their obligations by providing Welfare initiatives to their employees makes the employees to believe in them as demonstrated by (Armirnenjad., 2016) who stated that, “Employees are interested in and believe in an organization that provides well-being, comfort and safety”. According to (Walker, 2013) when organization breaks their obligation to psychological contract, trust is negatively affected; this leads to a decrease of organizational commitment as demonstrated by (Casser, 2011). It also leads to a psychological deviance and a perception of discrimination in employee’s minds.

Psychological Contract Theory

Psychological contract theory posits that, individual’s responds negatively when they perceive that, their employer has failed to fulfill their obligations. (Pascal, 2013). Psychological contract breach is negatively associated with a range of individual attitudes and behaviours. Previous studies have emphasized the effect on psychological contract breach , for example; (Zhao, 2007) studied the role of job satisfaction , organizational commitment , role performance, organizational citizen behaviour, intention to leave and turnover, without exploring the effect of psychological fulfilment brought about by better human resource management practices. The current study therefore, addresses this using welfare initiative as one of the Human resource practices. The psychological contract theory by (Rousseau, 2001) describes a set of individual perceptions on exchange relationships between individuals and their organizations. Psychological contract is a useful frame work for investigating employee’s perception on the employment relationships that is concerned with the unspoken needs and expectations (Arnold, 1996) cited in (Otieno, 2016). These expectations are said to be subjective (Roehling, 1997) and to a large degree based on employees values (Greenhaus, 2000). According to (Guest, 2004) the content and behavioral consequences of the psychological contract are determined by the employee’s variables such as work values and personal values. This is supported by (Chukwunenye and Angabare, 2010) who stated that ‘the established give and take relationship between the employer and the employee, which is critical for the prosperity of a business, can be eroded due to a violation of a psychological contract’. This is demonstrated by (Morley, 2015) fulfillment or a violation of common belief among employees undermines the strength of a normative contract giving raise to different types of emotions.

Psychological contracts can be classified into transactional, relational and balanced contracts. Transactional contract is a kind of a contract which contains terms of exchange given in monetary value such as a bonus. Relational contract is a relationship between the employee and the organization mostly developed on non-monetary and social emotional factors based on trust and organizational commitment. Balanced psychological contract combines the open ended time flame and mutual concern of relational agreement with the performance demand and renegotiation of transactional contracts (Wangithi and Muecke, 2012). The psychological contract is based on employee’s sense of fairness, trust and belief that the employer is honouring the deal between them (Guest, 2004). Moreover, employees exchange their skills, effort and commitment in return for monetary and social emotional rewards provided by the organization (Winter, 2006). (Johnson, 2003)Found out that, there is a close link between fulfilment of the psychological contract and higher organizational commitment .According to (Walker, 2013), when organization breaks their obligation to psychological contract, trust is negatively affected; this leads to a decrease of organizational commitment as demonstrated by (Casser & Briner, 2010). The relationship between Psychological Contract breach and organizational commitment: Exchange imbalance as a moderator of the mediatinf role of violation. It also leads to a psychological deviance and a perception of discrimination in employee’s minds. Psychological contracts are influenced by HR practices such as compensation and benefits (Greller, 1994); (Lester, 2007), Relational psychological contracts include a notion of relationship and a notion of shared obligation in which both parties perceive responsibilities to each other (Byrne, 2000).
Theory of Job Embeddedness

Holtom (2008) described “Embeddedness” as a way to explain how social relations influence economic decision. JE refers to forces that create a feeling in people that they cannot leave an organization (Ng, 2007). They measure the extent to which employees feel stuck and connected to their jobs (Laurina, June, 2011). JE theory examines an individual’s link to other people, fit with the organization and beliefs about what they would have to sacrifice if they leave their jobs (Young, 2012). Links are formal or informal connections between a person, institutions or other people. They include co-workers and non-work friends, groups and the community. Fit refers to the perceived employee’s compatibility with the organization and the surrounding community. Organizational fit occurs when employee’s values, career aspirations, knowledge, skills and ability are compatible with the organizational culture, and, the requirements of his job. It also considers compatibility with the aspects of the community and environment such as climate, weather conditions, religious beliefs and entertainment activities. The better the fit, the stronger the ties an employee has with the organization. Sacrifice is the perceived psychological, social or material cost of leaving ones organization and the community. This includes: leaving familiar friends, interesting projects, desirable benefit and an easy commute.

The closer that one’s person views, values, and goals are to the organisational culture, the better the fit, and the “higher the likelihood that an employee will feel attached to the organization (Mitchell H.).) Job embeddedness is a broad constellation of psychological, social and financial influences on employee’s retention. These influences are present on the job as well as outside the employee’s immediate working environment, and, are likened to strands in a “web” in which a person can become stuck to a job. Past studies carried out in banking and correctional facilities, explored the application of JE construct on factors influencing intention to stay (Crosseley, 2007); (Cunningham, 2005); (Inderriedden, 2006); (Lee, 2001) but failed to explore welfare initiatives and their role on job stability of university catering employees. From the job embeddedness theory, it is clear that, there is a need to create formal and informal connections between universities and their catering employees. This is to ensure employees compatibility with both the university and the surrounding community. As such stronger ties are created, making it hard for them to leave by increasing their costs of leaving their universities. As such welfare initiatives and their roles on job stability needs to be re-assessed.

Summary of the Literature Review and the Research Gap

Previous studies found out that, most of public sectors in Kenya rarely provide overall competitive packages of employee welfare programmes due to poor HR policies, which results in high rate of staff turnover (Abok, 2016). However, the study failed to demonstrate how the welfare initiatives be made competitive to address the turnover rate. The study cited poor Human resource practices as an impediment to the provision of competitive welfare packages without citing the welfare initiatives which may be a solution to the problem (Coopers, 2008) Demonstrated that, there is a mismatch in in disposable incomes rewards, bonuses and allowances for the employees in public sector but failed to demonstrate how the mismatch can be addressed. Meaning, there is a discrepancy between what employees expects and what they receive in relational to personal individual needs which is not yet addressed. According to (Morley, 2015), “how the dynamics of the psychological contract influence affective outcomes is also underdeveloped area of research. This study intends to not only demonstrate how psychological contract influence affective outcomes in terms of being connected to job and being attached to it, but establish the relationship between the two variables of the study. According to (Otieno, 2016) “The contemporary employment relationships of 21st century have many controversies such as; less job security, less organizational attachment, less commitment and less loyalty which have not been addressed through the application of welfare initiatives.

METHODOLOGY

The research study used the descriptive research design to find out the place of welfare initiatives on Job Embeddedness of University Catering Employees in Nairobi City County, Kenya. The design has quantitative and qualitative approach methods which established welfare initiatives and their roles on embeddedness of catering employees working in universities in Nairobi City County, Kenya. The study was carried out in catering departments of 5 out of 46 university campuses in Nairobi City County Kenya (Commission for the University Education, 2016). The target population comprised of 300 university catering employees within the area of the study. The population was heterogeneous, thus stratified sampling was done in selecting the respondents of the study and simple random sampling was used to select university campuses of the study.
Table 1. Summary of Sampling Technique

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</thead>
<tbody>
<tr>
<td>Simple Random Sampling</td>
<td>University Campuses from University Campuses in Nairobi City County</td>
<td>Equal chance of being selected to represent the sample</td>
</tr>
<tr>
<td>Stratified Sampling</td>
<td>Individual respondents of the Study</td>
<td>Equal representation of catering employees working in university catering departments</td>
</tr>
</tbody>
</table>

Sample Size
A total of 189 respondents participated in the study as shown on summary distribution of the respondents according to three subsets of the study.

Table2. Sample Size

<table>
<thead>
<tr>
<th>Participants</th>
<th>Population</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Catering Employees</td>
<td>300</td>
<td>63%</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>189</td>
</tr>
</tbody>
</table>

The sample size of university catering employees was determined using Israel’s (1992) sample size calculation formulae as shown;

\[ n = \frac{N}{1+N(e)^2} \]

Where N = total population size  
\( e \) = precision rate at 5% (0.05)  
\( n \) = sample size

Data Collection Instruments
The study used both primary and secondary data collection methods to collect data. Primary data was collected by means of self-administered questionnaires and an interview guide. Secondary data was collected from journals, annual reports, websites and publications.

Pretesting
All the instruments of data collection were pretested in one university not included in the actual study findings. The pre-test assisted the researcher to ensure clarity of items in the instrument of study. It also aided the researcher to identify the similarity of meanings, and the actual time needed to administer the actual data collection process.

Instruments Validity and Reliability
The instruments of this study were questionnaires and interview guide questions which were validated by the use of content analysis. Content analysis was done by cross-checking responses against the study objectives, hypotheses and against the conceptual framework. The content validity of questionnaires was ensured through consultation with the supervisors. Test-re test method was used to establish the reliability of the questionnaires. A Cronbach alpha was used to test the consistency of variables. A cronbach alpha test results were interpreted according to (Gliem, 2003), who stated that, the closer the cronbach alpha coefficient is to 1.0, the higher the internal consistency of the study variables. The same is supported by (Brotherton B. , 2012) study which stated that, a reliable scale should have an alpha value of at least 0.7, or higher. The results of pretest were analyzed to identify the errors. The results of the individual welfare initiatives were between 0.800 to 0.822, meaning, the data collection instruments were reliable as they were higher than 0.7 as suggested by (Brotherton B. , 2012).

Data analysis technique
Quantitative and qualitative data analysis techniques were used in the study as the data collected were both numerical and narrative.

Analysis of data
For analysis and interpretation of data inferential statistics (two tailed Pearson product moment correlation coefficient) was used to establish the relationship between employee’s commitment and job stability. It also established the relationship between employee’s value and job embeddedness, welfare initiatives and job embeddedness, psychological contract and job embeddedness of university catering employees in Nairobi City.
Table 4. Analysis of Hypotheses

<table>
<thead>
<tr>
<th>Objective</th>
<th>Analysis Method</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>H&lt;sub&gt;0&lt;/sub&gt;: Welfare initiatives have no role on job embeddedness of</td>
<td>Chi-Square</td>
<td>Determine the relationship between the study variables.</td>
</tr>
<tr>
<td>university catering employees in Nairobi City County, Kenya.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H&lt;sub&gt;1&lt;/sub&gt;: Welfare initiatives have a role on job stability of university</td>
<td></td>
<td></td>
</tr>
<tr>
<td>catering employees in Nairobi City County, Kenya</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RESULTS AND DISCUSSIONS

Response Rate
A high response rate was obtained; this reduced the chances of getting biased statistics. As such, the findings were reliable as shown on the Figure 1.

Figure 1. Response Rate

A response rate of 80.42% was obtained; this is adequate for analysis, as it conforms to Mugenda and Mugenda, 1999 (as cited in Keitany, 2014, p. 30) that “a response rate of 70% and over is excellent” for analysis and conclusions. A non-response rate of 19.58% of university catering employee’s questionnaires was due to time constraints especially at the meal times.

Demographic Characteristics of the respondents
The study sought employee’s demographics and the findings were presented as shown

Figure 2. Gender of the respondents

According to the Figure 2, majority (61.2%) of the respondents were females while the minority (39%) were males. This contrasts (Azeem and Quddus, 2014) study conducted in Maulna Azad National University which found out that, majority (71.4%) was males.
According to figure 1.4, majority (22%) of respondents aged between 40-44 years of age while the minority (1%) were of the age category of < 20 years of age. Meanwhile, a similar majority of (22%) aged between 35-39 years of age. This demonstrated that, (44%) of study respondents aged between 35-44 years of age. It is also interesting to note that, (10%) of the respondents were aged between 45-49 years of age. Meaning (54%) of respondents aged between 35-49 years of age.

Marital Status of the Respondents
The majority of the respondents (75.7%) were married while minority 0.7% was of the opinion that, marriage is not applicable. This concur with (Kosgey, Mutai and Lagat, 2018) where 89% of the respondents were married.

<table>
<thead>
<tr>
<th>Level</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary School</td>
<td>2</td>
<td>1.3</td>
</tr>
<tr>
<td>Secondary School</td>
<td>6</td>
<td>3.9</td>
</tr>
<tr>
<td>Certificate</td>
<td>38</td>
<td>25.0</td>
</tr>
<tr>
<td>Diploma</td>
<td>59</td>
<td>38.8</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>34</td>
<td>22.4</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>13</td>
<td>8.6</td>
</tr>
<tr>
<td>Total</td>
<td>152</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 3. Age of the respondents

Figure 4. Marital Status and Education Level of the Respondents

Table 5. Education Level of the Respondents
Meanwhile, majority (38.8%) had a diploma as the highest level of education while the minority (1.3%) held a primary level certificate. Meanwhile, (25%) of the respondents had certificate as the highest level of education while, (22.4%) had an undergraduate degree qualifications as their highest level of education. 8.6% of the respondents had a postgraduate level of education as the highest level of education.

### Employees Experience
The study revealed that, majority (29.6%) had an experience of between 5-9 years while the minority (8.6%) had an experience of >20 years of age. Meanwhile, (26.3%) of the respondents had worked in their universities for a period of between 10-14 years while (23.7%) had worked for a period of between 0-4 years.

### Welfare initiatives provided to university catering employees

#### Means and Standard Deviations
Means were established and interpreted as follows; Means >4.5 implied strongly agreed, 3.5-4.5 implied disagreed; 2.5-3.5 implied neutral, 1.5-2.5 implied agreed, <1 implied strongly agreed. Standard deviations were also obtained and interpreted as follows; >1 implied: significance variance and lack of consensus while <1 implied, lack of significance variance in responses, 1, implied that, the responses were further spread out, >0.5 and <1, implied that, the responses were moderately distributed, while < 0.5 implied that, the responses were concentrated around the mean. The findings of the were presented on Table 1.1 as shown.

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leave policy</td>
<td>3.14</td>
<td>1.527</td>
</tr>
<tr>
<td>Sporting Facilities</td>
<td>3.22</td>
<td>1.239</td>
</tr>
<tr>
<td>Regular salary increment</td>
<td>3.03</td>
<td>1.366</td>
</tr>
<tr>
<td>comprehensive pension policy</td>
<td>3.73</td>
<td>1.347</td>
</tr>
<tr>
<td>Sufficient number of toilets</td>
<td>2.57</td>
<td>1.077</td>
</tr>
</tbody>
</table>

Notes: Valid N (list wise) = 152

The findings presented on Table 4.1 were based on the question posed to the respondents on whether their current organization provides them with the mentioned welfare initiatives. The findings demonstrated that means for; leave policy (2.57), regular salary increment (3.03), sporting facilities (3.22) and leave policy (3.14), were between 2.5-3.5. this is an indication that, majority of the respondents held neutral position in regard to question as to whether, the indicated welfare initiatives are provided to them. This is an indication that, they remained neutral on whether their employers fulfill their part of bargain as a party to a psychological contract. However, the mean for the provision of a comprehensive pension policy (3.73) were between3.5-4.5. This means that, the respondents disagreed with the provision of a comprehensive pension policy to them by their universities. The standard deviation for all the five welfare initiatives were; leave policy (1.527), Sporting Facilities (1.239), regular salary increment (1.366), comprehensive pension policy (1.347),sufficient number of toilets (1.077). This means that, there was a significance variance and lack of consensus on the responses of the study.

#### Adequacy of Welfare Initiatives
Another measure of psychological contract that attempted to find out whether the employer, in this case the universities fulfill their part of bargain as a part to a psychological contract in terms of provision of welfare initiatives was the question whether the respondents thought that, the welfare initiatives in Table 1.1 are adequate. The findings of are presented on table 4.2 as shown
Table 4.2 Adequacy of welfare initiative

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>6</td>
<td>3.9</td>
</tr>
<tr>
<td>No</td>
<td>146</td>
<td>96.1</td>
</tr>
<tr>
<td>N=</td>
<td>152</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The findings in Table 4.2 demonstrated that, majority (96.1%) of the respondents thought that; welfare initiatives provided to them are inadequate. They do not address their real needs and that, is a clear indication that, the employees perceived that, their employers who are a party to a psychological contract do not fully fulfill their part.

Employee’s value

Another measure of psychological contract that attempted to find out whether the employer, in this case the universities fulfill their part of bargain as a part to a psychological contract in terms of provision of welfare initiatives was the question whether the provision of welfare initiatives makes the feel valued by their organizations. The findings are presented on Table 4.3.

Welfare makes me feel valued

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>62</td>
<td>40.8</td>
<td>40.8</td>
<td>40.8</td>
</tr>
<tr>
<td>Agree</td>
<td>67</td>
<td>44.1</td>
<td>44.1</td>
<td>84.9</td>
</tr>
<tr>
<td>Neutral</td>
<td>12</td>
<td>7.9</td>
<td>7.9</td>
<td>92.8</td>
</tr>
<tr>
<td>Disagree</td>
<td>5</td>
<td>3.3</td>
<td>3.3</td>
<td>96.1</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>6</td>
<td>3.9</td>
<td>3.9</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Notes: N= 152

The findings presented on Table 4.3 demonstrated that, majority (44.1%) of the respondents agreed while (40.8%) strongly agreed that; welfare initiatives if adequately provided will makes them feel more valued by their organizations. This is an indication of the employee’s belief that, implementing welfare initiatives in an organization is an indication that, an organization is fulfilling its responsibility as a party to a psychological contract. Meanwhile, 7.9% were neutral while 3.3% disagreed, moreover, 3.9% strongly disagreed that, welfare initiatives makes them feel more valued by their organizations.

Hypothesis Testing

Chi-square test was used to test the hypothesis. Where the results were <0.05, H0 was accepted while the H1 was rejected, where the results were >0.05, H1 was accepted while H0 was rejected.

<table>
<thead>
<tr>
<th></th>
<th>Leave</th>
<th>Sport facilities</th>
<th>Salary increment</th>
<th>Pension</th>
<th>Sufficient toilets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>8.86</td>
<td>14.12</td>
<td>5.04</td>
<td>47.28</td>
<td>68.59</td>
</tr>
<tr>
<td>df</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>P value</td>
<td>.065</td>
<td>.007</td>
<td>.283</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

The hypothesis testing results showed that, welfare initiatives; sporting facilities, (.007), pension policy (.000) and sufficient number of toilets (.000) had p-value of <0.05, as a result, H0 was accepted while the H1 was rejected. Meaning, sporting facilities, pension policy and sufficient number of toilets has no role on job embeddedness of university catering employees in Nairobi City County, Kenya. The hypothesis testing results for welfare initiatives; leave policy (.065) and regular salary increment (.283) had a p-value >0.05, as a result, H1 was accepted while H0 was rejected. Meaning, leave policies and regular salary increment have a significant role on job embeddedness of university catering employees in Nairobi City County, Kenya.

H0: Welfare initiatives have no role on job embeddedness of university catering employees

H1: Welfare initiatives have a role on job stability of university catering employees in Nairobi City County, Kenya

Correlation analysis

Employee’s value and Job Embeddedness

The two tailed Pearson product moment correlation was conducted and interpreted as follows; a p-value of between 0.010 to 0.041 implied, insignificant relationships, between 0.041 and 0.70 implied, a moderate relationship, > 0.70
implied a significant positive relationship while a negative value implied, an inverse relationship between the variable. The R-value represents the p-value while ∞ represent the level of significance.

Table 4.4 Employee value and Job Embeddedness

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Welfare makes me feel valued by the organization</th>
<th>Being valued makes me more attached to the organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welfare makes me feel valued by the organization</td>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.625*</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>152</td>
<td>152</td>
</tr>
<tr>
<td>Being valued makes me more attached to the organization</td>
<td>Pearson Correlation</td>
<td>.625*</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>1</td>
</tr>
<tr>
<td>N</td>
<td>152</td>
<td>152</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).**

According to table 4.4, the Pearson product moment correlation results were as follows; employees value and job embeddedness (r = 0.000, ∞ = 0.625). Meaning that, there is no significant relationship between an employee sense of being valued and job embeddedness of catering employees in selected universities in Nairobi City County.

**Welfare Initiatives and Job Embeddedness**

**Leave Policy and Job Embeddedness**
The study established that, there is a significant strong positive relationship between leave policy (r= 0.946, ∞ = -0.006) and Job Embeddedness of university catering employees.

**Sporting Facilities and Job Embeddedness**
The study established that, there is a significant strong positive relationship between sporting facilities (r= 0.102, ∞ = -0.133) and Job Embeddedness of university catering employees.

Table 4.5 Leave and Job Embeddedness

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Employees attachment</th>
<th>Leave policy</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees attachment</td>
<td>Pearson</td>
<td>1</td>
<td>-.006</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.946</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leave policy</td>
<td>Pearson</td>
<td>-.006</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>946</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>152</td>
<td>152</td>
<td></td>
</tr>
</tbody>
</table>

**Salary Increment and Job Embeddedness**
The study established that, there is a significant a moderate positive relationship between salary increment (r= 0.515, ∞ = -0.053) and Job Embeddedness of university catering employees.
Table 4.7 Salary increment and job embeddedness

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Employees attachment</th>
<th>salary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson</td>
<td>.053</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.515</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>152</td>
</tr>
<tr>
<td>salary increment</td>
<td>Pearson</td>
<td>.053</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.515</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>152</td>
</tr>
</tbody>
</table>

Reject the HO1 Accept the H11. Meaning: There is a moderate significant positive relationship between salary increment and job Embeddedness.

Pension policy and Job Embeddedness

The study established that, there is a significant a moderate positive relationship between pension policy ($r= 0.567$, $\alpha .047$) and Job Embeddedness of university catering employees.

Table 4.8 Pension and job embeddedness

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Employees attachment</th>
<th>Pension policy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson</td>
<td>.047</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.567</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>152</td>
</tr>
<tr>
<td>Pension policy</td>
<td>Pearson</td>
<td>.047</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.567</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>152</td>
</tr>
</tbody>
</table>

Reject the HO1 Accept the H11. Meaning: There is a moderate significant positive relationship between pension policy and Job embeddedness.

Sufficient number of toilets and Job Embeddedness

The study established that, there is a significant a moderate positive relationship between pension policy ($r= 0.798$, $\alpha .021$) and Job Embeddedness of university catering employees.

Table 4.9 Sufficient Toilets and Job Embeddedness

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Employees attachment</th>
<th>Sufficient toilets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson</td>
<td>.021</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.798</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>152</td>
</tr>
<tr>
<td>Sufficient toilets</td>
<td>Pearson</td>
<td>.021</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.798</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>152</td>
</tr>
</tbody>
</table>

Reject the HO1 Accept the H11. Meaning: There is a significant strong positive relationship between sufficient number of toilets and job embeddedness.

Relationship between Psychological Contract and Job embeddedness

Table 4.10 Psychological Contract and Job Embeddedness

<table>
<thead>
<tr>
<th>Decision</th>
<th>Being valued makes me more attached to the organization</th>
<th>Do you think the welfare initiative packages provided are adequate?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson</td>
<td>.111</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.175</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>152</td>
</tr>
<tr>
<td></td>
<td>Pearson</td>
<td>.111</td>
</tr>
<tr>
<td></td>
<td>Correlation</td>
<td>.175</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>152</td>
</tr>
</tbody>
</table>
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Murphy, B. H. (2014). Employees reaction to job insecurity in a declining economy; A longitudinal study of the mediating role of job Embeddedness,. (pp. 1-41). Illinois.


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*****
ABSTRACT
Sustainable procurement means purchasing and investment process that entails environmental, economic and social impacts of the organizations expend leading to sustainable development. Sustainable procurement permit organizations to converge their needs for services, construction works, goods and efficacy in a process that attains value for money on a whole-life cost in terms of result in satisfaction of both organization, the economy and society, in additional to environment conservation. The study focused on sustainable procurement and operational performance in Dairy firms in Kenya and a case of new KCC Kiganjo in Nyeri County. This has been brought about by NEEMA in its initiative to preserve environment plus the Kyoto Protocol in the word. The study examined the sustainable procurement by focusing at its 3 pillars namely: environmental, social and economic. Descriptive research design was adopted, target population was 52 respondents and purposive and census sampling method were embraced. Data collected using semi-structured, self-administering questionnaires anchored in 5 likert scale. Both inferential and descriptive statistics were employed to exhibit the degree of relationship among variables. SPSS version 22 was employed to process the data and presented by operating in frequent tables, percentage and standard deviation. The findings revealed that there are vital benefits accrued from sustainable procurement and conclude that it is the best strategy in global procurement as it complies with both international and local rules and law governing procurement. The study recommended that both multinational and local firms should execute sustainable procurement to intensify their vigorous potentiality through supply chain performance.

Keywords: Value for money, Economic pillar, Social pillar, Environmental pillar, Sustainable development

INTRODUCTION
Background of the Study
Greater disquiet to attain sustainable development and procurement has emerged due to globalization and turbulent world (Brammer & Walker, 2011). Recently academicians and procurement professionals have progressively attentive in how companies and their suppliers influence economy, environment and society (Wendy &Walker 2006). Today, the judicious responsibility of purchasing and supply departments to ensure sustainable development is substantial demonstrated better than before. Procurement techniques on lessening the environmental effects on supply chain activities, improving organizational efficiency, promoting lean practices and risk management strategies in supply chain, leading to competitive advantage and better reputation had facilitated environmental issues to be considered as a competitive perspective. Sustainable procurement means acquisition of goods, services and works, which aid sustainable development, use of available finances to achieve sustainable development by converging present needs without compromising the potentiality of future generations to possess their needs guided by economic, social and environmental pillars(Adjei, 2012)

Sustainable procurement is a procedure used by public sector to reach their needs for services, goods, works and utilities in a way that attains value for money on a whole life cost leading to benefits accrued by organization, the economy, society and reducing harm to the environment (Defra, 2006;CIPS &NIGP,2012). Sustainable Procurement links: Economic factors which entails the cost of services and products over their whole life time, cost for entire society to guarantee actual value for money over the longer term (“Whole life costing, WLC”), and tax benefits. Environmental factors means reducing the environmental effects of services, goods and works, employment of proper disposal methods, enhancement of recycling activities, energy consumption and to minimize the use of resources. Social factors entails acknowledgement of diversity and equality : perceive core labor worth, guarantee equitable working conditions, progressively employment and skills, gender and ethnic equality, social inclusivity of PWD, women and youths in sourcing practices and developing local communities. According to CIPS(2009) sustainable procurement as ‘whole life cost’ by affirming that it should examine the economic, environmental and social impact of design; service delivery non-renewable material use logistics;::; use; operation; maintenance; reuse; recycling options; manufacture and production methods; disposal; and suppliers’ capabilities to address these results throughout the supply chain”. Moreover economic impact concentrated on the following: ethical trading, corporate governance and timely payment. Social impact was concerned with; diversity of both workforce and suppliers and human rights. Environmental impact incorporated the following; carbon footprints.
Biodiversity and climate change. Lastly sustainability assists business on three levels namely: Legal requirements alleviate of risks, conservation of brand and reputation and cost and waste reduction.

Sustainable Procurement is a “process of acquiring goods, works and services from a supplier that provides the optimum combination of whole life costs and benefits to meet the customer’s requirements (Van Weel, 2002). Dairy industry in Kenya was started with the Kipkelion Creamery, which was built in 1908 by a certain Mr. Watts. KCC was incorporated in August 22, 1925 and the first Kenya Co-operative Creamery was opened in Naivasha on April 12, 1926. In 1927 a plan began to start a creamery near Nanyuki, as the original building was a grass banda (shelter) with two old hand churns. On 8 February 1932, the Kenya Co-operative Creamery became the first company to be registered under the Co-operative Societies Ordinance 1931. The Thompson Falls Creamery was opened in 1934 and the Eldoret Creamery in 1935. From 1935 onwards, the Kenya Co-operative Creamery began taking over the liquid milk market in the. Packaging is all about hygiene, convenience and standing out on the shelf. The brand has various small Stock Keeping Units (SKUs) for each brand to give consumers a choice for every wallet. New KCC’s distribution system sees it products available in small shops country wide. Milk products are packaged in Tetra Classic, Tetra Rex, Tetra Brik Aseptic, Tetra Classic Aseptic, Tetra Fino Aseptic, pouch and bottles, offering a wide variety of safe, healthy choice. Consumer choice is vast: From fresh milk products (Gold Crown and KCC fresh milk); long life milk products (UHT and KCC Shake); fermented milk (Mala, flavoured Mala and Yoghurt Delite); powder milk (Safariland); whey drink (Shakalaka); butter (Finest Creamery Butter); Cheese (rindless cheddar, tavern, gouda and processed cheddar); and ghee (New KCC Superfine Ghee).

Operational performance on the other hand is the performance of an organization against its set standards such as waste reduction, productivity, cycle time, environmental responsibility and regulatory compliance (O’Brien, 2009).The firm operations be compelled with efficient and effective. Effectiveness is the stretch to which customers” needs are satisfied, while efficiency is defined as a compute of how economical firms” resources are utilized. In order to precisely increase accessibility and examine operational performance, the accurate measurement structure should be planned, developed and executed. Performance measurement networks are consequently developed to facilitate monitor and support operational control. Operational Control is the procedure that warrant a n organization to convince action with the aim of attaining the overall goals and objectives. Attainment of these goals is a demonstration of outstanding in organizational performance (Hubbard, 2009).

Statement of the Problem
Sustainable Procurement (SP) is experiencing a progressively aggregate of attention as a result of increase in environmental concerns due to pollution and global warming. Sustainable procurement is converging of company needs for services, goods, utilities and materials in an environmentally-friendly manner, accountability and ethical way. Companies committed to sustainable procurement attempt to build economical and effective strategic decisions that satisfy the company, society, customers and the environment (IFPS, 2019). Ministry of environment and forestry national sustainable waste management policy to safeguard our economy, social and environmental aspect. Moreover the increasing need for sustainability in the whole campaigned by different bodies and conferences held like Kyoto protocol world due to conservation and protection of resource for future generation. Lastly, the Kenya’s effort to blue economy to ensure value chain in plastics promoted sustainability and also increased demand from customer concerning sustainability products due to their empowerment. Thus the study sought to bridge the gap by determining the effects of sustainable procurement and operational performance of dairy firms in Kenya.

General Objective
The general objective of the study is to determine the effect of sustainable procurement on operational performance of New KCC Kiganjo, Nyeri.

Specific Objectives
1. To establish the effect of economic pillar on operational performance of New KCC Kiganjo, Nyeri.
2. To examine whether social pillar has an effect on operational performance of New KCC Kiganjo, Nyeri.
3. To assess the effect of environmental pillar on operational performance of New KCC Kiganjo, Nyeri.

LITERATURE REVIEW
Theoretical Review
Sustainability Theory
Ekardt (2016), in his third edition on sustainability theory he outlined form of economy and society that is enduring and is capable to be rated on a global scale. Sustainability theory explains the relationship of any organization, individual or institution which associates itself with a company and is influenced by that company in one area or another, or there is an effect on the company’s activities and goals. Hart (1995) company that persuade to develop and execute an enterprising strategic environmental dedicated are examined to be more conscious of their customers, suppliers, workers any other individual who plays a part in it. Firms involve players other than those that are only conscious with converging minimum environmental regulation essentials they also look at social and economic impact. Sustainability is equitable not insignificant general affirm to take economic, social and environmental policy important independent of any relationship in space and time to afflict a sound balance connecting these aspects.

**Institutional Theory**

Meyer and Rowan (2006) stated that institutional environment robustly affects the development of formal systems in an organization increasingly than market pressures. To enhance efficiency in organizations innovative systems are legitimized. Eventually this innovations arrive a level of legitimization where failure to embrace them is perceived as irrational and negligent”. Here, new and existing organizations will adopt the system form even if it doesn’t improve efficiency. This process that the institutional myths” are prescribes received so that organizations support legitimacy in the institutional environment with, vocabularies of systems such as job titles, procedures and roles.

**Empirical Review**

**Economic Pillar**

Potential economic gain, financial savings, lessen total cost for acquisition, use, conservation and disposal by applying WLC. In some cases flat upfront cost for sustainable products are underneath caused by sustainable production procedures. Costs illuminate from global warming, pollution etc. can also be minimized (externalities). Engineering markets to more innovative explanations: SP can guide markets to move more quickly to cleaner technologies leading to the generation of income, upgrading competitiveness of internationally, suppliers nationally and eventually lowering cost/prices due to economies of scale. Increased access to markets: Promotion of small and medium-sized companies, supplier diversity (Defra, 2006). Public procurement should deliver broader government objectives, such as energizing innovation in supply markets, proper use of public finance to support environmental, economic and social objectives and for supporting domestic markets (McCrudden, 2014). This lay the basis of linking sustainability in the procurement procedures to warrant that the nation objectives are attained.

**Social Pillar**

Potential social benefits, upgrade compliance with labor law social: Compliance with delivery of the basic ILO Conventions which prohibit child labor and forced labor, establish right to freedom of alliance and collective bargaining, and fairness in employment terms and occupation. Upgrading living conditions; promoting voluntary social worth such as Fair Trade, alleviation of poverty. Upgrading social justice: linking of persons with disability or improved ethic and gender equity (Defra, 2006). Sammalisto and Brown (2012) managers to change their perception is vital in implementing management structures which conger with environmental view of sustainability. Social view programs are prepared to the main actors (employees, community and the customer) who implement these actions. These actions often have satisfaction in terms of positive effect to the customer and community support. Organizational leaders are increasingly being expected to ensure that their organizations behave as ‘good corporate citizens, not only at home, but in their dealings internationally (Brammer, 2012). Organizational leaders face difficult decisions, including how to balance their expectations of high returns and the interests of shareholders. In the sustainable concept, procurement professionals must take social responsibility purchasing, along with other corporate considerations, such as ‘value for money’, low cost sourcing, and consumer expectations of low prices.

**Environmental Pillar**

Potential environmental satisfaction contributing to converging environmental challenges: Acknowledge to climate change, soil humiliating, biodiversity mislaying, acquire of fresh water, etc. In corporate to attainment of binding targets: Lessening of greenhouse gas emissions, national environmental objectives energy efficiency. Local environment-Example By facilitating non-toxic cleaning products, designing healthier conditions for school children or by using low-emission buses, upgrade local air quality. Procedure whereby organizations converge their needs for goods, services, works and utilities in a way that attains value for money on a whole life cost in terms of result in to satisfaction to economy, organization and customers whilst reducing damage to the environment(Defra, 2006).
RESEARCH METHODOLOGY
Sample and Sampling Technique
A sample is a subdivision of the total population that can be used to make generalization about the population (Orodho, 2004). The study used census and employed purposive sampling design and responded were only fifty two. Census entails enumeration of the entire subject (Cohen, Manion & Morrison, 2007). Aina and Ajifuruke (2002), purposive sampling is subjective and permit the researcher to concentrate only with subjects having relevant information to the study. The study targeted only procurement, production, sales and marketing and finance.

Data Collection Instrument
Primary data will be collected by use of questionnaires from respondent. According to Oso & Onen, (2011) questionnaires are set of question in written forms used to collect information from respondent. The study used semi-structured, self -administering questionnaires to collect data from respondent.

Data analysis and Presentation
According to Cohen, Manion and Morrison (2007), data analysis is a procedure of submitting order, structure and explanation to the abundance of collected data. The combined data was coded and edited then analyzed using both descriptive and inferential statistics. Descriptive statistics was used that is mean and percentages and inferential statistics on the other side correlation and regression. Statistical Package for Social Sciences (SPSS) was used to process the data. Multiple regression model was used to establish whether a group of variables combined predict a stated dependent variable (Mugenda & Mugenda, 2009).

The study used multiple regression model to analyze regression coefficient.
\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e \]
Where: \( Y \) = Sustainable Procurement; \( \beta_0 \) = Autonomous factors; \( X_1 \) = Economic pillar; \( X_2 \) = Social pillar; \( X_3 \) = Environmental pillar; \( e \) = Error term

RESEARCH FINDINGS
Data that was analyzed was obtained from forty six (46) respondents out of the targeted fifty two (52) staff member working in various departments in KCC. Thus the response rate achieved was 88.5%. This is a response rate of above 80% which is referred to as excellent according to (Mugenda and Mugenda, 2003). Multiple linear regression analysis was done to examine the effect of sustainable procurement and operational performance in Dairy firms. Economic pillar, environmental pillar and social pillar were the sustainable procurement factors considered as independent variables. The regression model summary shows R value of 0.462 which indicates positive association between sustainable procurement and operational performance in Dairy firms. R\(^2\) value of 0.214 means that approximately 21.4% of the resultant changes in operational performance among dairy farm is explained by sustainable procurement.

Regression Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.462*</td>
<td>.214</td>
<td>.157</td>
<td>1.15685</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Environmental pillar, Social pillar, Economic pillar

The multiple linear model significance was evaluated using ANOVA. Regression results indicate that the linear association between sustainable procurement and operational performance has an F value of F=3.803 which is significant with p value p=.017. This implies that the overall model is significant in forecasting the effect of sustainable procurement and operational performance at 5% level of significance.

Analysis of Variance (ANOVA)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>15,270</td>
<td>3</td>
<td>5,090</td>
<td>3.803</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>56,209</td>
<td>42</td>
<td>1,338</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>71,478</td>
<td>45</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Operational performance
b. Predictors: (Constant), Environmental pillar, Social pillar, Economic pillar
Regression Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Constant</td>
<td>.919</td>
<td>.784</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Economic Pillar</td>
<td>.069</td>
<td>.146</td>
<td>.076</td>
</tr>
<tr>
<td></td>
<td>Social pillar</td>
<td>.357</td>
<td>.169</td>
<td>.304</td>
</tr>
<tr>
<td></td>
<td>Environmental pillar</td>
<td>.417</td>
<td>.168</td>
<td>.414</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Operational performance

The regression coefficients results for the model revealed that the beta coefficient of the resulting regression model were $\beta_0 = 0.919$, $\beta_1 = 0.069$, $\beta_2 = 0.357$ and $\beta_3 = 0.417$ respectively. Using the value of the coefficients from the regression coefficient, the accepted regression equation takes the form of: $\text{Operational Performance} = 0.919 + 0.069X_1 + 0.357X_2 + 0.417X_3$ where $X_1$ is economic pillar, $X_2$ social pillar and $X_3$ is environmental pillar. The study shows that all the independent variables have a positive relationship with the dependent variable. The results stipulate that a unit change in economic pillar will show to 0.069 changes in operational performance while with a unit change of Social pillar changes in operational performance by 0.357. The findings stipulate that for every unit change in environmental pillar there is a 0.417 increase in operational performance hence directly proportional.

The findings of the study suggest that social pillar and environmental pillar had a positive and significant influence on operational performance in dairy farms with P value of 0.041 and 0.017 respectively at 5% level of significance. This implies that an increase in the social pillar and environmental pillar has a major impact on the operational performance. Economic Pillar was found to have positive but insignificance effect on operational performance in dairy farms.

CONCLUSION
The researcher concluded that in order to enhance operational performance dairy farms should focus on social pillar, environmental pillar and economic pillar since they all contributed positively to the operational performance in dairy farms. Moreover more emphasis should be given to Social pillar and Environmental pillar which were found to have significant effect.

RECOMMENDATIONS
The study recommends the management of dairy farms to evaluate regularly sustainable procurement to establish whether they comply with social pillar, environmental pillar and economic pillar. There is also need to focus on other factors not considered which contribute to 78.6% of the operational performance in dairy farms.

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INTERNAL FINANCING AND SHAREHOLDER WEALTH MAXIMIZATION OF FIRMS LISTED AT THE NAIROBI SECURITIES EXCHANGE

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ABSTRACT
Internal funds offer firms a unique financing alternative for investments. When a firm retains earnings, it conserves cash flows that can be deployed into available investment opportunities. Similarly, internally generated finances ought to be less costly than externally sourced funds from issuing ordinary shares. When finances are raised internally, firms avoid floatation cost and hence can reduce the overall cost of capital that is used to discount the expected earnings of such firms and consequently earn higher market value. On the contrast, when a firm employs retained earnings in financing, it may reduce the amount available to pay dividends. A reduction in dividends may communicate information to shareholders that the firm’s future growth prospects are dwindling. This brings forth information asymmetry to investors and increase uncertainty that could lead to decline in firm market valuation. In the same vein, managers to purse their own interests using excess of cash resulting from retained earnings and shrink shareholder value. This study set out to explore the effect of internal financing on shareholder wealth maximization of firms listed at the Nairobi Securities Exchange. The study was grounded on pecking order theory, free cash flow theory and information asymmetry hypothesis. The study population consisted of 65 listed firms that yielded 440 firm-year study observations from 2011 to 2018. Panel data analysis was applied to estimate the random effect and fixed regression of internal financing on shareholder wealth maximization. Further, a generalized least square estimator was adopted in attempt to confirm robustness of results. Tests of homoscedasticity and serial correlation as well as the Hausman specification tests were undertaken. The panel data analysis based on random effect model and the generalized least squares estimation findings revealed that internal financing has a negative effect on shareholder wealth. Nevertheless, regardless of the econometric approach employed in the estimation, consistent findings are obtained a sign that the results are robust. The implication of the findings for policy and practice is that internal financing erodes shareholders wealth.

Keywords: Listed Firms, Panel Data Regression, Random Effects, Generalized Least Squares

INTRODUCTION
Since the Modigliani and Miller (1958) seminar paper on financing policies, a substantial number of studies have investigated financing and shareholder wealth maximization. Retained earnings offer firms an alternative to financing for investments. When a firm retains earnings, it conserves cash flows that can be deployed into available investment opportunities, consequently the investment undertaken can maximize shareholders’ value in progressive years. Similarly, internally generated finances ought to be less costly than externally sourced funds from issuing ordinary shares (Pandey, 2010). When finances are raised internally, a firm will avoid floatation cost and hence can reduce the overall cost of capital that is used to discount future earnings of such a firm and consequently generate higher market value (Copeland, Weston & Shastri, 2005). In the same vein, the excess cash resulting from retained earnings can be used by managers to pursue their own interests thus shrinking shareholder value.

A firm’s dividend policy is synonyms with retention and reinvestment policy. Firms are motivated to distribute their earnings in dividends when there exist no feasible investment opportunities. Therefore, a firm’s corporate policy relating to dividend decision could similarly be its retained earnings policy (Farooq, Rehman, Khan & Bilal, 2017). When firms employ retained earnings in financing, it may reduce the amount available to pay dividends to shareholders. However, a reduction in dividends may communicate information to shareholders that future growth prospects are dwindling. This brings forth information asymmetry between firm managers and investors and may lead to decline in firm market valuation. A firm that increases easily their leverage present lower problems on matter of information asymmetry (Myers, 1984).

Internal financing relates to undistributed earnings that are employed as a firm’s alternative source of financing (Copeland et al., 2005). Specifically, the internal financing is a component of shareholder equity which also consists of external share capital, capital reserves and non-controlling interest component. The retained funds are beneficial to a firm when utilized in viable investment opportunities or used to repay debts instead of paying dividends. Likewise, the internal source of funds provides a cheaper financing alternative than raising external equity. When a firm adopts internal financing, it does not dilute ownership of shareholdings. A firm that retains earnings is
perceived to have potential and growth investment opportunities (Pandey, 2010). However, retained earnings are a limited source of financing and uncertainties in the growth prospects of a firm increases the opportunity cost of capital for the retained funds.

Shareholders’ wealth maximization implies boosting the market price of firms’ ordinary shares (Pandey, 2010). Wealth is considered as the present value of expected future cash flows from investment undertaken by a firm. The shareholder wealth maximization is a central objective that firms target to deliver value to its shareholders based on expected cash flows (Copeland, Weston & Shastri, 2005). In an attempt to create value to the shareholders, it is vital to account for the timing and risk of the expected benefits. Colorado (2010) opine that financial decisions result in value to shareholders where funds are invested in opportunities provide a return that compensate for inherent risk and time duration of investment. Wealth maximization goal seeks to maximize shareholders welfare subject to satisfying the welfare of other stake holders. Therefore, managers ought to make investments and financing decisions that preserve long-run shareholder wealth that is measured by the long run market price of ordinary shares relative to that of equally risky investments. In essence it targets to efficiently allocate economic resources and achieve optimum capital formation for benefit of all firm stakeholders and not merely the shareholders.

Corporate finance focus on decisions that maximize shareholders wealth. According to the pecking order theory, internally generated funds are less costly, contrary to risky debt and particularly equity, the most expensive source of financing (Myers & Majluf, 1984). In this case, managers utilize ploughed back profits to undertake corporate investment in an attempt to maximize shareholders’ wealth. However, managers may utilize the free cash flow retained in the firms to pursue their own interests as postulated by the free cash flow theory.

Firm size can provide further evidence to the link between internal financing and shareholder wealth maximization. Larger firms may continuously retain revenue reserves and create excess cash flow in a firm if all feasible projects have been implemented (Alves & Silva, 2017). Similarly, debt can influence the nexus between internal financing and shareholder wealth due to the fact that it can reduce free cash flows available to the managers for investing in unfeasible projects (Jensen, 1986). In this case, any retained earnings would be channeled to viable investments or repayment of regular interest. In order to isolate the effect of firm size and leverage in the link between internal financing and shareholder wealth maximization, the factors are included in the analysis as control variables.

Firms listed at the Nairobi Securities Exchange trade their shares in an organized securities market (Nairobi Securities Exchange, 2018). The firms’ share prices are determined by the forces of demand and supply. Investors at the Securities Exchange make informed decisions on which shares to buy or sell. The future prospects of the listed firm based on the investment that the firms are undertaking also provide useful information on the likely value an investor derives by holding the securities of the firms. Past performance by the firms is keenly monitored and acts as a key guideline when making investment decisions. The firms’ managers continually undertake financing and investment decisions aimed providing return to the providers of capital. The firm management make strategic decisions on whether to utilize debt, issue shares or retain earnings so as to finance viable investment opportunities. The listed firms provide a suitable context to establish the link between internal financing and shareholder wealth.

The motivation for this article emanates from the documented reviews showing extensive discussion of external financing compared to internal funding. Incidentally, the capital market exists to provide firms with an avenue for rising long term financing by issuing ordinary shares and debt instruments. Comparatively, however, Alves and Silva (2017) opine that firms operating in emerging markets retain more earnings than firms from developed countries. Indeed, listed firms in Kenya continually build a reserve of undistributed profits yet there exist a raging debate on whether it adds value to shareholder wealth or not. The conflicting views on the link between internal financing and shareholder wealth maximization could probably be explained by adopting robust econometric regression that account for unobserved firm heterogeneity based on panel data or by including control variables such as firm size and leverage in the estimation models. Further, an empirical test in Kenyan context can provide additional evidence on the link between internal financing and shareholder wealth maximization. Therefore, the objective of this study was to evaluate the nexus between internal financing and shareholder wealth maximization of firms listed at the Nairobi Securities Exchange. The null hypothesis adopted is that the relationship between internal financing and shareholder wealth maximization of firms listed at the Nairobi Securities Exchange is not significant.

The remainder of this paper is structured as follows. Section 2 discusses theoretical and empirical literature underpinning the relationships between internal financing and shareholder wealth maximization. Section 3 details
the data and methodology framework. Section 4 describes analysis, findings and discussion. Section 5 presents the conclusions, recommendation and possible future research extensions.

LITERATURE REVIEW

Internal financing and shareholder wealth maximization are grounded in the pecking order theory, information asymmetry hypothesis and free cash flow theory. The pecking order theory (Myers and Majluf, 1984) argues that there exist a clear financing hierarchy and that firms prefer the use of less costly internal funds in place of external funds that encapsulate debt and equity in an effort to preserve value and firm stability (Gordon, 1963). This theory maintains that profitable firms generate high earnings and are expected to use internal financing first. If internal funds are not sufficient, managers will issue debt next so as to safeguard the existing shareholders against the diluting effect. They (firms) will only issue external equity when it is no longer sensible to issue any more debt and when the market has fully appreciated the firm’s potential in which case the external equity would be overvalued.

Information asymmetry hypothesis postulated by Myers and Majluf’s (1984) suggests that managers generally have more information about the firm’s operation, risk profile and prospects than external investors such as debt and equity holders. The existence of information asymmetry between the firm and providers of capital causes the relative cost of funding to vary between the different sources. Firm managers’ action provides signal to the investors about the prospects of a firm. If firms managers retain more profit, it may be a signal to the shareholder either there exists feasible investment opportunities or that the future prospects of the firm are dwindling (Copeland et al., 2005). In contrast, firms adopting leverage to finance their investments communicate favorable firm forecasts of expected cash flows. Information asymmetry may therefore increase uncertainty among investors and in essence raise the cost of capital that acts as a discounting factor used to discount expected future cash flows and hence obtain shareholders’ wealth. The Information asymmetry hypothesis advocates that firms will prefer sources of finance associated with least information asymmetry (Modigliani & Miller, 1958).

The free cash flow theory of Jensen (1986) provides that management may invest in projects that are not feasible if a firm has idle cash flows. A free cash flow situation arises where excess cash exists after all appraised projects with positive net present values have been fully funded. Subsequently, firm executive may deploy the excess cash in unnecessary management discretionary expenses. The managers can also pursue their own interests by awarding themselves hefty perks. When firms continuously retain funds or obtain debt, it can result in extra funds. If returns from the excess funds are lower than the cost of financing, it can lead to reduction of shareholder wealth.

Several authors present empirical studies on the nexus between internal financing and shareholder wealth maximization. Yemi and Seriki (2018) investigated the influence of retained earnings on market value of 75 non-financial firms listed on the Nigeria stock Market for the period 2003 to 2014. The study adopted an unbalanced panel data analysis and the results of the study revealed that earnings retention has a positive and significant link with entities market value. A contextual research gap arises to evaluate whether the findings could hold for listed firms in Kenya. Thereafter, a study undertaken by Alves and Silva (2017) investigated retained earnings around the world and economic growth for 50 countries. The study considered 40,917 firms and 336,318 observations for period from 1995 to 2014. The study adopted a panel with random and fixed firm effects and a dynamic panel model through generalized method of moment’s estimator. The results indicate that firms located in emerging markets retain more earnings than firms from developed countries. The random and fixed effect and generalized method of moment’s estimator model reveal a positive impact of gross domestic product by abnormal retained earnings. This is a sign that as firm retain more cash flows; the economy grows providing a larger set of investment opportunities.

In similar vein, for listed firms in Pakistan, Urooj, Sindhu, Hashmi and Hussain (2017) examined the effect of retained earnings on future profitability and stock returns. The study targeted 100 firms for the period from 2006 to 2015 based on panel data analysis. The study incorporated Leverage, liquidity and firm size as control variables. The study results reveal a have significant and positive relationship of retained earnings and stock returns for the Karachi stock exchange listed firms. In addition, Farooq, Rehman, Khan and Bilal (2017) test the impact of internal financial policy on share holders’ wealth and firm value of 438 observations for manufacturing sector firms listed on Pakistan Securities Exchange from 2009 to 2014. The study adopted static panel regression by operationalizing retained earnings as net profit after tax minus dividends divided by the number of outstanding shares. The study findings reveal that retained earnings per share have a positive and significant impact on stock price. A generalized least square panel regression adopted for this paper provides further insight on the nature of relationship between the internal financing and shareholders wealth maximization for Kenyan context. Javed and Shah (2015) posit the effect
of retained earnings on stock returns (stock price) for 7 food and personal care firms listed at the Karachi Stock Exchange in Pakistan between 2009 and 2014. The study was based on a linear regression and established a moderate positive and significant relationship between retained earnings and closing price of stock. However, the study was conducted on only 7 firms drawn from a particular sector. Likewise, a study by Haynes and Brown (2009) investigated the link between internal funds and firm growth for small, private firms in the United States that have fewer than 500 employees. The study targeted small growth firms and used data from the Federal Reserve Board’s 1993 and 2003 for 7,352 total firm-year observations. The study employed logistic regression methodology. The findings highlight the significance of programs that effectively shrink the borrowing costs and nurturing the growth of small businesses. The results show a strong positive relationship between the level of internal funds and the likelihood that small firms report positive growth. Nevertheless, the study was based on non-publicly traded firms.

In contrast, Thuranira (2014) investigated the link between retained earnings and stock returns for 57 firms listed at the Nairobi Securities Exchange from 2009 to 2013. The results of the study unveil an inverse statistically significant relationship between retained earnings and stock returns, a sign that internal financing does not enhance shareholders value probably due to the fact that excess cash from retained earnings is misappropriated by the managers. However, the study methodology was a cross sectional regression analysis. Ugwueze, Onyekwelu and Nwachukwu (2019) evaluated the relevance of retained earnings on the performance of 11 listed pharmaceutical firms in Nigeria. A cross section regression methodology was adopted. The analysis results reveal that retention impacts negatively on the performance. Conversely a small sample of 7 firms was used and turnover level was considered as the performance measure.

**METHODOLOGY**

The study population constituted 65 listed firms in Kenya as at 31st December 2018 and data was collected from annual reports for the 2011 to 2018 period. The listed firms share market prices was obtained from Nairobi securities exchange price list circulations. Panel data that encompasses same firm observations obtained over multiple time periods was adopted for the study analysis model. Panel data models were preferred for the analysis as it enables to exploit the double dimensionality of multiple observations for each firm unit and thus reveal more accurate and reliable results. The data pools were considered appropriate as it eliminates disturbance term component that is time invariant and unobserved firm heterogeneity from the regression model error term (Wooldridge, 2013). Complete data set was available from 5 to 8 year for 57 firms and resulted in 440 observations of short and unbalanced panels.

Data analysis was based on panel regression of fixed and random effect. Fixed effect model assumes that units are heterogeneous and therefore the model considers a unique intercept term that vary across firm units but it is time invariant (Gujarati & Porter, 2009). In essence, the unobserved individual unit error term is correlated with explanatory variables and therefore, fixed effect model approach is employed to control for time-invariant unobserved heterogeneity. On the other hand, the Random effect model allow the intercept to vary between units and further it decomposes unobserved firm and time effects from the error terms (Baltagi, 2005). Moreover, the estimation assumes that individual specific error term effects are not correlated with independent variables (Wooldridge, 2013). Further generalized least square estimator was also adopted for analysis to enable achieve robust results. The estimator allow a combination of between groups and between group variations of cross sectional units (Baltagi, 2005). The model in addition, resolves auto correlation and panel heteroskedasticity of the error term.

The measurement of the variables was adopted from previous literature. The dependent variable is shareholders wealth while independent variable is internal financing. Firm size and leverage are adopted as firm level control variables in analysis. Table 1 present the summary of variable definitions in incorporated in the regression models.

<table>
<thead>
<tr>
<th>Table1. Research Variable Measurement</th>
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<tr>
<td>Variable</td>
</tr>
<tr>
<td>Shareholder wealth</td>
</tr>
<tr>
<td>Internal financing</td>
</tr>
<tr>
<td>Firm Debt</td>
</tr>
<tr>
<td>Firm Size</td>
</tr>
</tbody>
</table>
In estimating the relationship between the dependent and the independent variables, the fixed and random effect and
generalized least square estimator are modelled in a panel regression data analysis framework. The regression model
adopted for the analysis is as follows.

\[ SW_{it} = \beta_0 + \beta_1 RE_{it} + \beta_2 FS_{it} + \beta_3 DE_{it} + \epsilon_{it} \]

Where \( SW_{it} = \) Shareholder wealth for \( i^{th} \) firm in \( t^{th} \) year
\( RE_{it} = \) ratio of internal financing based on retained earnings to total equity for \( i^{th} \) firm in \( t^{th} \) year
\( FS_{it} = \) firm size based on natural logarithm of total assets for \( i^{th} \) firm in \( t^{th} \) year
\( DE_{it} = \) ratio of total debt to Shareholders equity for \( i^{th} \) firm in \( t^{th} \) year
\( \epsilon_{it} = \) error term

Larger firm may continuously retain revenue reserves and create excess cash flow in a firm if all feasible projects
have been executed. Likewise, debt can influence the internal financing and shareholder wealth nexus due to the fact
that it can reduce free cash flows available to the managers for investing in unfeasible projects (Jensen, 1986). In
this case, any retained earnings would be channeled to viable investments or repayment of regular interest. In order
to mitigate the effect of firm size and leverage, both were included in the analysis as control variables.

**ANALYSIS, RESULTS AND DISCUSSION**

Descriptive and inferential statistics were applied in carrying out study analysis. To start with, the descriptive
statistics of mean, standard deviation as well as minimum and maximum variable data points were computed. Table
1 shows the descriptive statistics results for the dependent and independent variables of the study for the study
period of 2011 to 2018 summarizing the 440 firm observations.

**Table 2. Descriptive statistics**

<table>
<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB</td>
<td>0.40</td>
<td>543.70</td>
<td>35.98</td>
<td>58.91</td>
</tr>
<tr>
<td>RE</td>
<td>(12.40)</td>
<td>45.80</td>
<td>0.68</td>
<td>2.76</td>
</tr>
<tr>
<td>DE</td>
<td>(168.30)</td>
<td>30.80</td>
<td>1.46</td>
<td>10.51</td>
</tr>
<tr>
<td>FS (Sh. Million)</td>
<td>191.24</td>
<td>714,313</td>
<td>75,122.81</td>
<td>116,755.64</td>
</tr>
</tbody>
</table>

Table 2 reveals that the mean shareholders wealth was 35.98 with a maximum of 543.70 and minimum of 0.40. A
market price to book value ratio greater than one is favourable. Accordingly the mean value of 33.98 indicates that
the companies on an average did create value for the shareholders during the period under study. Conversely, a less-
than-one value as exhibited by the minimum of 0.40 reveals that some firms did not create value for shareholders.
Besides, the standard deviation of 58.51 indicates a substantial variation in shareholder wealth among the listed
firms. Moreover, the internal financing mean of 0.68 point to the fact that the firms on average apply retained
earnings at a significant proportion of the total shareholder equity in financing the investments of the firm. The
minimum value of -12.40 reveals a case of accumulated losses by some listed firms. Further the highest level of
retained earnings accumulated by the firms over the study period was 46 percent of shareholder funds. The standard
deviation of 2.76 signifies a spread among the firms in the application of retained earnings in financing decisions.

With regard to the control variables of firm size and leverage, the variables also were described as follows. The
leverage level represented by debt to equity ratio had a mean of 1.46 which means that on average the firms has
Sh.1.46 in debt for every shilling of equity employed by the firms. The standard deviation of 10.51 was evidence
that the firms’ debt to equity were extremely dispersed. Equity is obtained as the excess of total liabilities from total
assets. The minimum data point of debt to equity ratio of -168.30 means liabilities far outweigh assets thus indicating
that the company has been on aggressive usage of debt or has been piling cumulative losses over time. A low debt-to-equity ratio would imply a case of profitable firm that follow the pecking order theory. The firm size is represented in terms of firms’ asset value. The mean value denotes that on average firm size was Sh.75 billion worth of assets. Further, the firm size range from Sh. 191 million to Sh.714 billion in terms of asset value. The spread in asset value implies a diverse variation in the size for the firms. In an attempt to obtain robust results, the Pearson’s product-moment correlation was adopted to establish the strength of association between the variables of study. The approach adopted a bivariate correlation and the results of the association are displayed in Table 2.
Table 3. Correlation matrix of variables

<table>
<thead>
<tr>
<th></th>
<th>MB</th>
<th>RE</th>
<th>DE</th>
<th>FS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB</td>
<td>Pearson Correlation</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DE</td>
<td>Pearson Correlation</td>
<td>-0.009</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>FS</td>
<td>Pearson Correlation</td>
<td>0.039</td>
<td>-0.901**</td>
<td>1</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed)

As evident in Table 3, the correlation coefficient between internal financing and shareholder wealth is negative though not statistically significant. The inverse correlation denotes that companies with large accumulated retained earnings are generally associated with declining shareholder wealth. The statistically significant positive correlation coefficient between firm size and shareholder wealth supports the view that larger firms retain higher revenue reserves and have the potential to maximize shareholders wealth. Nonetheless, the debt ratio coefficient is directly related to shareholder wealth firm.

The subsequent step of the analysis involved performing the regression estimation. Meanwhile, the panel regression based on random and fixed effect estimator was tested first then followed by the generalized least square estimation. In order to determine the appropriate model between the random and fixed effect estimator, the Hausman specification test that examines whether the firm units (heterogeneous) individual effects were uncorrelated with independent variables in the model was performed. The following hypothesis was tested to draw conclusion.

H₀: The relationship between internal financing and shareholder wealth maximization of firms listed at the Nairobi Securities Exchange is not significant

Table 4 shows the results of Hausman test of null hypothesis that error terms are correlated with one or more regressors and hence random effect model was appropriate. The result [Chi-square (3) = 1.606; p =0.658]) inform the decision to fail to reject the null hypothesis at the conventional level of significance. Moreover, Table 4 presents a comparison of the results of the fixed-effect and random-effect regressions.

The random effect regression results show that without controlling for any other factor (s), the coefficient on internal financing variable is negative and statistically insignificant (β = -0.44024; p = 0.4151). The results of the regression fails to reject the null hypothesis of the no effect of internal financing on shareholders’ wealth. The control variables of leverage and firm size displayed a direct relationship with shareholder wealth. The coefficient on log of firm size (β = 11.269; p = 9.811e-05) is statistically significant while leverage coefficient (β = 0.058; p = 0.881) was not statically significant.

Overall, the point estimate -0.138 on internal financing is statistically insignificant at 5% level. This implies that controlling for leverage and firm size, a unit increase in internal financing would reduce the market to book ratio by about 0.138 units. This result does not support the claim that internal financing has significant effect on shareholders’ wealth consistent with prior study by Thuranira (2014).

The findings, however, are in contrast to results by Alves and Silva (2017), Urooj et al. (2017) and Haynes and Brown (2009) who observed a direct relationship between internal financing and shareholders’ wealth. The random effect estimator model could likely be distorted by the presence of auto correlation and heteroskedasticity.

Therefore, the generalized least square estimation correcting for heteroskedasticity is employed in the next subsection and the results are shown in Table 5. The GLS regression results in Table 5 reveal that without controlling for any factor (s), the coefficient for internal financing is negative and insignificant (β = -0.01888, p = 0.02436 *).
### Table 4. Random and fixed effects panel regression

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Random Effects Model</th>
<th>Fixed Effects Model</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>RE</td>
<td>-0.44024</td>
<td>-0.138</td>
<td>-0.33902</td>
<td>-0.154</td>
</tr>
<tr>
<td></td>
<td>-0.4151 (0.022*)</td>
<td>(0.5328)</td>
<td>(0.915)</td>
<td></td>
</tr>
<tr>
<td>DE</td>
<td>0.058</td>
<td>-</td>
<td>0.153</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-                  (0.881)</td>
<td>-</td>
<td>(0.696)</td>
<td></td>
</tr>
<tr>
<td>Log (FS)</td>
<td>11.269</td>
<td>-</td>
<td>10.38</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(9.811e-05 ***</td>
<td>-</td>
<td>(0.09)</td>
<td></td>
</tr>
<tr>
<td>Intercept (Constant)</td>
<td>-</td>
<td>(0.00074 ***</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.00177</td>
<td>0.034</td>
<td>0.00013</td>
<td>0.01</td>
</tr>
<tr>
<td>Adj. R-Squared</td>
<td>-0.16859</td>
<td>0.028</td>
<td>-0.00215</td>
<td>-0.165</td>
</tr>
<tr>
<td>F-statistic</td>
<td>0.66553</td>
<td>5.177</td>
<td>-0.12912</td>
<td>1.246</td>
</tr>
<tr>
<td></td>
<td>-0.41513</td>
<td>-0.002</td>
<td>(1.0000)</td>
<td>(0.293)</td>
</tr>
<tr>
<td>Observations</td>
<td>440</td>
<td>440</td>
<td>440</td>
<td>440</td>
</tr>
<tr>
<td>Hausman Test, χ², df = 3</td>
<td>1.606</td>
<td>(0.658)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durbin Watson (pdw)</td>
<td>0.803</td>
<td>(&lt; 2.2e-16)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dependent Variable: Shareholders’ Wealth
Asterisk codes *, ** and *** indicate significance levels at 10%, 5%, and 1% respectively

### Table 5: Generalized Least Square regression with auto-correlation and heteroscedasticity correction

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Generalized Least Squares Model</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>RE</td>
<td>-0.01888</td>
<td>-0.1116</td>
</tr>
<tr>
<td></td>
<td>(0.915)</td>
<td>(0.02436 *)</td>
</tr>
<tr>
<td>DE</td>
<td>-</td>
<td>0.02378</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.77392)</td>
</tr>
<tr>
<td>Log (FS)</td>
<td>-</td>
<td>7.54746</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.84e-05 ***)</td>
</tr>
<tr>
<td>Intercept (Constant)</td>
<td>35.42351</td>
<td>-143.92324</td>
</tr>
<tr>
<td></td>
<td>(1.43e-12 ***)</td>
<td>(0.00013 ***)</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.2068</td>
<td>0.2647</td>
</tr>
<tr>
<td>Wald statistic</td>
<td>0.0113</td>
<td>17.3034</td>
</tr>
<tr>
<td>Pr(&gt;Chi-square)</td>
<td>0.9153</td>
<td>6.00E-04</td>
</tr>
<tr>
<td>Observations</td>
<td>440</td>
<td>440</td>
</tr>
</tbody>
</table>

Dependent Variable: Shareholders’ Wealth
Asterisk codes *, ** and *** indicate significance levels at 10%, 5%, and 1% respectively

The control variable firm size is observed to be statistically significant (β = 7.54746, p = 4.84e-05) suggesting a positive link between firm size and shareholders’ wealth maximization. This result is consistent in both the random effect estimation and generalized least squares estimation and similar to that obtained by Alves and Silva (2017). The robust estimation check on GLS model confirms that though a positive link exists (β = 0.02378, p = 0.77392)
the estimated coefficient on leverage is indistinguishable from zero. Overall, the study shows that controlling for size and leverage, there is an inverse relationship between internal financing and shareholders’ wealth maximization ($\beta =-0.11160$, $p = 0.02436 \ast$) which is consistent with the findings based on the random effect model estimation. Indeed, regardless of the econometric approach employed in the estimation, the coefficient on the internal financing variable is insignificant and inversely related to shareholder wealth thereby suggesting that the findings are robust and reliable to make inference. Thus, the negative link internal financing and shareholder wealth maximization is robust across different econometric estimation techniques. This finding is generally in agreement with Ugwuze et al. (2019). The finding however contrasts with the finding by Yemi and Seriki (2018), Farooq et al. (2017) and, Javed and Shah (2015). This empirical evidence thus supports the information asymmetry agency perspective that when firms managers retain more profit, it may be a signal to the shareholder of the existence of viable investment opportunities that creates uncertainty among investors and in essence raise the cost of capital which acts as a discounted factor used to determine the expected future cash flows and hence shareholders wealth.

CONCLUSION

This paper examines the effects of retained earnings on shareholder wealth maximization of firms listed at the Nairobi Securities. Analysis data set was available from 5 to 8 year for 57 firms and resulted in 440 observations of short and unbalanced panels for a study period from 2011 to 2018. The descriptive statistics of mean, standard deviation as well as minimum and maximum variable data points were summarized to reveal the general data trends and suitability for analysis. Moreover, correlation among the data variables were undertaken to establish the strength of association between the variables of study. Panel data analysis was applied to estimate the random effect and fixed regression of internal financing on shareholder wealth maximization. Further, a generalized least square estimator was adopted in attempt to confirm robustness of results.

The findings indicate that profit retained in the business have no potential of boosting future earnings. Consistent with Information asymmetry argument, firms ought to target sources of finance associated with least information asymmetry. In addition, in situations where excess cash exist after all appraised projects with positive net present values have been fully funded, firms can consider distributing the free cash flow to the shareholders. The practitioner firm managers and policy formulators can consider this empirical paper findings that internal financing erodes shareholders wealth. Therefore, firms owners ought to consider monitoring mechanisms including use of debt against firm executives’ utilization of funds in managerial discretionary expenses and viable investment opportunities. This can ensure that the funds are used in generation of cash flows for the firms. Similarly, a strategy to reduce information asymmetry can contain the cost of capital which acts as a discounted factor used to determine present value of the expected future cash flows that influence shareholders wealth.

The article strength lies on methodological application of a panel data and estimation based on random effect model and the generalized least square that is better equipped to handle problems of unobserved individual effects (heterogeneity) and omitted variables problem. The panel data observations that span both time and individuals in a cross-section, provides more information that yields regression results of efficient estimates. However, the article can be advanced by analyzing year on year incremental of retained earnings to equity ratio or determining the optimum retained earning lag so as to offer valuable insights into the nexus between internal financing and shareholders wealth. Further, alternative pure market measures of shareholder wealth such as the share prices can be adopted to expand the study findings. Indeed, this dimension of advancement offers tentative directions for future research in this study area.

REFERENCES


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EFFECT OF WORKING CAPITAL MANAGEMENT ON FINANCIAL PERFORMANCE OF DEPOSIT TAKING SACCOs IN KENYA

Sitienei, C.K.

ABSTRACT
Working capital management is a critical aspect to any organization since it determines the organization’s ability to meet its short term as well as long term goals. Based on WOCCU report (2016), about 50% of SACCOs globally were not fully operational due to inefficiency in working capital management. This study determined the effect of working capital management on financial performance of deposit taking SACCOs in Kenya. The objectives were to determine the effect of: cash management, accounts payable management, accounts receivable management and liquidity mix management on financial performance of deposit taking SACCOs in Kenya. It employed a descriptive research design and a population of 135 deposit taking SACCOs licensed in Kenya by 2013 where purposive sampling was used in selection of the research sample. The selected sample consisted of 56 registered deposit taking SACCOs whose five years’ data from 2013-2017 was employed in determining the effect of working capital management on financial performance. The data was obtained from the audited financial statements of respective SACCOs lodged with SASRA and were available in the regulator’s website. Two multiple linear regression models were employed by the researcher to bring out the effect of working capital management on financial performance with the help of SPSS version 23. The significance of each independent variable was tested using t-test while the overall significance of the model was tested using F-test at P=5%. There was statistically significant positive effect of cash management and liquidity mix management with coefficients of 0.332 and 0.026 and P=0.001 and 0.001 respectively for ROA and coefficients 0.505 and 0.02 and P=0.001 and 0.031 respectively for ROE. Thus deposit taking SACCOs should increase their cash and liquidity mix levels since the two impacted positively on their performance. The findings are important to policy makers such as SASRA and SACCO directors in planning on their working capital levels.

Keywords: SACCO; SASRA; Working Capital Management; Descriptive Research Design

INTRODUCTION
Background of the Study
Management of working capital and the role it plays in advancing financial performance continues to steer debate among various scholars and researchers globally (Dalayeen, 2017). Working capital management is an important aspect of firm’s operations and growth. It is the lifeblood and the controlling nerve centre for any type of business organization because without its proper control, no business can run smoothly (Joshi, 2013). In global context, in any organizational setting that requires lucid financial attention, sound planning and management competency, working capital is a vital element (Alu, 2012). A positive working capital indicates the ability of a firm to pay off its short term obligations as and when they fall due. On the other hand, a negative working capital indicates a firm’s inability to finance its short term debts when due (Singh & Asress, 2010). The main components of working capital are inventories, cash, accounts receivable and accounts payable.

Nyabwanga (2011) describes cash management as the practice of ensuring proper plans and controls regarding cash that gets into and out of the business the business, cash flows within the business, and cash balances held by the business at a point in time. Efficiency in cash management entails the determination of the optimal cash to hold by considering the tradeoff between the opportunity cost of holding too much cash and the trading cost of holding too little (Ross, Westerfield & Jordan, 2016). Cash, just like inventories is a very significant component of working capital. Management of cash requires that firms decide on how much liquid capital ought to be used in the most optimal manner (Brigham & Houston, 2013). Sound planning and monitoring of cash flows over time is required so as to determine the optimal cash to hold. Holding excess cash however, impacts the cost of capital needed in financing maturing obligations. It is therefore imperative that a firm attains an optimum balance between cash at hand and the amount to be invested in marketable securities since cash deficits will most likely result in transaction costs (Brealey & Meyers, 2013).

Nyabenge (2014) describes receivables as the practice of receiving cash from customers in exchange for goods and services. Sound credit management policies must be developed by a firm with respect to credit analysis, debt collection policy and terms of sale. She further explains that as much as efficient collection policy significantly improves a company’s working capital position, an aggressive collection policy may sour the relations between the company and its debtors. The goal of accounts receivable management is to maximize shareholders wealth. Receivables stimulates sales because they allow
customers to assess product quality before paying (Gill, 2011). The parameters used in measuring accounts receivable include collection effectiveness index and accounts receivable collection period.

Accounts payable refers to the suppliers of goods and services to a firm whose payment has not yet been effected by the firm. Accounts payable encompasses trade credit and accrued expenses which together act as a sort term source of finance to the operations of a business on a going concern basis (Hassan, Imran, Amjad and Hussain, 2014). Firms would prefer selling for cash than on credit, but competitive pressure forces most companies to sell their goods and services on credit. Trade credit rely on trust and reputation unlike credit from financial institutions which rely on a formal collateral (Fafchamps, 1999). Firms delay payments to their suppliers in order to assess the quality of their purchases. Management of accounts payable is of importance to any organization since it is viewed as a flexible and inexpensive short term source of financing (Gitman, 2009). A number of metrics and short term financial ratios can be used to measure the performance of payables management. These includes payable turnover ratio, short term debt ratio and days payables outstanding (Bagarogoza & Waal, 2010). This study mainly focused on cash, accounts receivable and accounts payable as the major components of working capital. This is because deposit taking Savings and Credits Cooperative Societies mainly operate in the service sector hence they do not deal directly with inventory management.

Financial performance refers to a measure of how sound a firm uses resources from its primary mode of business to generate revenues. It is a general measure of firm’s financial health over a particular period of time and can be used to compare similar firms across the same industry or to compare performance of industries or sectors in accretion (Ongore & Kusa 2013). These results are reflected in the firm’s return on assets, return on investments, return on equity, accounting profitability and its components (Bagarogoza & Waal, 2010). Return on assets is the commonly used performance measure by most researchers. It is defined as income available to ordinary shareholders divided by the book value of total assets. Return on Asset reveals the efficiency of management in generating income from various sources of the financial institution (Krawish & Al-sa’idi, 2011). An increased ROA is thus attributable to improved management efficiency. Return on equity is defined as the income available to ordinary shareholders divided by shareholders equity (Donaldson, 2001). Ongore and Kusa (2010) explains that ROE signals the effectiveness of a financial institution in utilizing shareholders’ funds. This implies that the better the ROE, the more effective the management is in utilizing the shareholders’ funds. Theoretically, when other factors are held constant, it is expected that the level of investment in working capital impacts on a firm’s financial performance. Excessive working capital investment posts a negative impact on financial performance of a firm and at the same time impacting on its liquidity. Conversely, low investment in working capital impacts positively on firm’s financial performance and at the same time, it exposes a firm to financial risks due to illiquidity problems (Ross, Westerfield & Jordan, 2016). Much of the studies have mainly focused on the effect of working capital management on financial performance of construction, manufacturing and commercial firms. Also most studies have not considered other measures of working capital components such as cash ratio and sort term debt ratio. Instead, they have used measures such as cash conversion and accounts payable payment period. This study bridges this gap by focusing on the effect of working capital management on financial performance of deposit taking SACCOs in Kenya.

Statement of the Problem
Working capital management is a subject of concern in savings and credit cooperative societies (SACCOs). This is ideally because of the fact that SACCOs operate in the service sector where most of their operations are run through utilization of working capital components namely cash, accounts receivable and accounts payable. Without proper management of working capital components, it becomes difficult for SACCOs to run their operations smoothly and meet their day to day obligations. SACCOs ideally undertake the operation of working capital management with the aim of maximizing. This objective can be realized if SACCO directors have proper understanding and training of working capital management. However, the potential aim is not fulfilled by some SACCOs because of particular set of problems in their management. A report by world council of credit unions (2016) indicates that 1 out of every 2 SACCOs in developing countries faced problems with respect to working capital management. Vast majority of SACCOs either maintain excessive or inadequate working capital levels which are inappropriate. If this situation is not checked, the financial performance of these SACCOs will continue dwindling hence SACCO shareholders will not be able to realize value for their money. Considering the importance of working capital management, most studies have not focused on the effect of working capital management on financial performance of deposit taking SACCOs. For example, Mathuva (2010) focused on the effect of working capital management on corporate profitability of firms listed at NSE. Gekure (2014) on the other hand focused on the relationship between working capital management and performance of manufacturing firms listed at NSE. These studies however provide no
evidence on the effect of working capital management on financial performance of deposit taking SACCOs in Kenya. This study therefore seeks to bridge this glaring gap by finding out the effect of working capital management on financial performance of deposit taking SACCOs in Kenya.

**Objectives of the Study**

The study was guided by the following specific objectives:

i. To establish the effect of cash management on financial performance of SACCOs in Kenya

ii. To establish the effect of accounts receivable management on financial performance of SACCOs in Kenya.

iii. To determine the effect of accounts payable management on financial performance of SACCOs in Kenya

iv. To establish the effect of liquidity mix management on financial performance of SACCOs in Kenya.

**Research Hypotheses**

- \( H_0 \): Cash management has no statistically significant effect on financial performance of deposit taking SACCOs in Kenya

- \( H_0 \): Accounts receivable management has no statistically significant effect on financial performance of deposit taking SACCOs in Kenya.

- \( H_0 \): There is no statistically significant relationship between accounts payable management and financial performance of deposit taking SACCOs in Kenya

- \( H_0 \): Liquidity mix management has no statistically significant effect on financial performance of deposit taking SACCOs in Kenya.

**Significance of the Study**

This study will be of great importance to SACCO Board of Directors as it will enable them to set a trade-off between the organization liquidity and its performance. They will also be able to exercise working capital management practices from an informed position. The Sacco Societies Regulatory Authority (SASRA) and other regulatory bodies that are responsible for the licensing, regulation and supervision of deposit taking SACCOs, including policy formulation, monitoring and evaluation will make informed decisions on the basis of the findings, when executing their mandates with respect to management of working capital and financial performance. The study shall have policy implications and recommendations which would be of great value to the government policy makers in development of policies that can create a conducive and enabling environment to savings and credits cooperatives operations in the country. Scholar and researchers would find this study as being of great interest since gaps for further research shall be provided at the end. The findings of this study will add knowledge to the field of financial management on the optimum levels of working capital that should be held by organizations especially SACCOs that would maximize the organizations’ performance in terms of profitability.

**LITERATURE REVIEW**

**Working Capital Management and Financial Performance**

*Kosgey and Njiru (2016)* carried out a study on influence of cash management on the financial performance of SMEs in Nakuru County. The examination on whether cash management had statistically significant impact on financial performance of SMEs was done using linear correlation tests. The study findings revealed that Cash management had statistically significant positive effect on financial performance. This study however differs with the current one in that the study focused on SMEs whose operations differ from that of deposit taking SACCOs. The study by Njeru (2016) sought to find out the effect of cash management on financial performance of deposit taking SACCOs in Mt. Kenya region. A descriptive research design was applied on 92 respondents. The target population was all thirty licensed deposit taking SACCOs in Mt. Kenya region, the sampling technique employed was simple random sampling technique. Information on cash management and financial performance of deposit taking SACCOs in Mt. Kenya region were collected where a questionnaire was employed as a data collection instrument. Primary quantitative data was selected by use of self-administered structured questionnaires. The researcher also used a data collection checklist to collect secondary data derived from the audited financial statements of the SACCOs lodged at the regulator’s website (SASRA). The collected data was analyzed using both descriptive and inferential statistics. The findings indicated a statistically significant positive relationship between cash management and financial performance of deposit taking SACCOs in Mt. Kenya region. This was indicated by positive correlation of 0.584. The sample selected for this study was however too small and the results may therefore not reflect the performance of all deposit taking SACCOs in Kenya.
Accounts Receivable Management and Financial Performance

Duru, Ekwe and Okpe (2014) examined the impact of receivables management on financial performance of food and beverages manufacturing companies in Nigeria. The variables used were accounts receivables and financial performance as measured by return on assets (ROA). Secondary sources of data were used for the period 2000-2011. The hypotheses were analyzed using the multiple regression analytical models. The study results indicated that account receivable had negative and non-significant relationship on financial performance of food and beverages manufacturing companies in Nigeria. This study was however limited to food and beverages manufacturing companies hence the study findings may not be generalized to include that of deposit taking SACCOs in Kenya. Muthava (2010) examined the influence of accounts receivable on corporate profitability by using a sample of 30 firms listed in the Nairobi stock exchange (NSE) for the period 1993 to 2008. The study found out a significant negative relationship between net accounts receivable and profitability as measured by net operating income (NIM). This study however failed to consider other measures of financial performance such as return on assets (ROA) and return on equity (ROE). Deloof (2003) analyzed a sample of 1009 large Belgian firms during the period 1992- 1996. The research found out that there is a statistically significant negative relationship between account receivable collection period and financial performance. His results confirm that Belgian firms can improve their profitability by reducing the number of day accounts receivable are outstanding and reducing inventories. Moreover, he finds that less profitable firms wait longer to pay their bills. Similarly, a research carried out by Garcia and Solano (2007) on the effect of receivable turnover on firm’s profitability where a sample of 8872 Spanish SMEs during the period 1996-2002 revealed that there exist a statistically significant negative relationship between accounts receivable turn over and profitability. These researches were however carried out in countries with different regulations as compared to Kenyan case. The study was also limited to large firms only. It failed to consider the relationship between working capital management and financial performance of small and medium sized firms.

Accounts Payable Management and Financial Performance

Nwakaego and Okpe (2016) conducted a study that sought to determine the effect of accounts payable management on financial performance of industrial/ domestic manufacturing companies in Nigeria. The study used a sample of 8 firms and data relating to accounts payable and financial performance was collected for a period of 12 years from 2000-2011. The data were collected from the annual reports of the companies under study. The research design used here was Ex-post facto research design. Hypotheses were tested using multiple regression technique. The study showed a statistically significant positive and significant relationship between accounts payable and financial performance. This study however considered only the manufacturing firms whose operation is different from commercial firms. The sample considered for the study was also too small and therefore difficult to make generalizations based on these findings. Gul et al. (2013) conducted a study to investigate the influence of accounts payable management on financial performance of small and medium enterprises (SMEs) in Pakistan. A 7 year period time series data from 2006-2012 was used. The data adopted for the purpose of this study was taken from small and medium enterprise authority, tax offices, Karachi Stock Exchange, Bloom burgee business week and the company itself. The explanatory variable of the study was return on assets (ROA) which was used as a proxy for financial performance. Independent variable was average accounts payable payment period. An ordinary least square model was used to determine the relationship between working accounts payable management and financial performance. The results showed that average account payment period have a statistically significant positive association with financial performance. This study differs in the measurement of accounts payable management in that the current study uses short term debt ratio as a measure of accounts payable management whereas this study used average accounts payment period. The study focused on the performance of Small and Medium Enterprises in Pakistan. The economic environment in Pakistan may not be the same as that of Kenya.

Liquidity Mix Management and Financial Performance

Liquidity mix management is seen from two perspectives; that of that of credit creation and liquidity risk management. In creation of liquidity, financial institutions will use idle funds to invest in different portfolio classes. Financial institutions play a vital role of financing businesses in the economy. Companies will therefore establish credit lines with lenders who will be able to assist in times of unfavorable working capital. Without defined credit lines, financial institutions may overstretch its liquidity requirements by lending to these companies. It is therefore the responsibility of financial institutions to invest its idle or excess funds in high quality liquid assets so as to have a buffer in times of distress (Sacco Society Act, 2008). Majakusi (2016) sought to determine the effect of liquidity mix management as measured by current ratio on the financial performance of commercial banks in Kenya using a descriptive research design. The population of the study consisted of 43 commercial banks and a census technique.
was used to collect data for the period 2010-2015. The study used regression model to analyze the data findings from this study indicated that there exist a statistically significant positive relationship between liquidity mix management and financial performance of commercial banks. This study however, used return on asset as a measure of financial performance. It failed to consider other measures such as return on equity.

Conceptual Framework
A conceptual framework is a diagrammatic representation of the relationship between independent and dependent variables. The conceptual framework for the study is shown in Figure 1.

**Independent Variables**
- Working Capital Management
  - Cash Management
    - Cash Ratio

- Accounts Receivable Management
  - Average Collection Period

- Accounts Payable Management
  - Short term Debt Ratio

- Liquidity mix management
  - Current Ratio

**Dependent Variable**
- Financial Performance
  - ROA
  - ROE

**Intervening Variable**
- Operational Efficiency

![Figure 1. Relationship between Working Capital Management and Financial Performance](image)

RESEARCH METHODOLOGY
Research Design
This study adopted a descriptive research design.

Population of the Study
The target population of the study was all the 135 deposit taking SACCOs in Kenya licensed by 2013 divided into 5 membership categories as indicated in Table 2.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Number of SACCOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government based SACCOs</td>
<td>27</td>
</tr>
<tr>
<td>Teachers based SACCOs</td>
<td>32</td>
</tr>
<tr>
<td>Farmers based SACCOs</td>
<td>44</td>
</tr>
<tr>
<td>Private institutions</td>
<td>18</td>
</tr>
<tr>
<td>Community based SACCOs</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>135</td>
</tr>
</tbody>
</table>

Source: SASRA Handbook, 2013

Sampling Procedure and Sample Size
This study adopted purposive sampling in selection of research sample. The selected sample consisted of 56 out of 135 deposit taking SACCOs registered by 2013. The 56 registered deposit taking SACCOs selected for the study had complete data from 2013-2017. The suitability of purposive sampling was to pick only those firms that meet the purpose of the study. Table 3 shows the distribution of 56 deposits taking SACCOs sampled according to membership categories for the purpose of the study.
Table 2. Distribution of Sampled Deposit Taking SACCOs as per Membership Categories

<table>
<thead>
<tr>
<th>Categories</th>
<th>Number of SACCOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government based SACCOs</td>
<td>10</td>
</tr>
<tr>
<td>Teachers base SACCOs</td>
<td>13</td>
</tr>
<tr>
<td>Farmers based SACCOs</td>
<td>18</td>
</tr>
<tr>
<td>Private institutions</td>
<td>8</td>
</tr>
<tr>
<td>Community based SACCOs</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>56</strong></td>
</tr>
</tbody>
</table>

Source: SASRA Website, 2013

Research Instruments
This study made use of a data collection checklist as the research instrument where the information with regard to cash, accounts receivable, accounts payable and return on assets were filled in.

Data Analysis
Multiple linear regression model was used to determine the cause-effect relationship among the variables under study. Estimated linear regression model was used to analyze the data where hypotheses were tested using t-test while the overall significance of the model was tested using F-test at 5% level of significance.

FINDINGS
Test of Overall Significance of the Model
The study sought to determine whether the model variables in overall were significant. The test of overall significance was done by use F-statistic test. If the computed p-value is less than the critical p-value (0.005), then there follows a conclusion that the variable coefficients are significant. The test results of the overall significance were presented in Table 12.

Table 12. Test of Overall Significance of the Variables

<table>
<thead>
<tr>
<th>Test – statistic</th>
<th>Statistic value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>F – test statistic for model 1</td>
<td>670.514</td>
<td>0.000</td>
</tr>
<tr>
<td>F – test statistic for model 2</td>
<td>204.552</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Results from table 12 indicated that model 1 in overall had significant variables since the computed p-value was 0.000 which is less than the critical p-value (0.005), then there follows a conclusion that the variable coefficients are significant. Also the p-value of the F statistic for model 2 was 0.000 implying that the coefficients of the independent variables were significant in overall at 5% significance level.

Model Estimation
The study sought to estimate the relationship between the explanatory variables and the explained variable. The estimation involved use of OLS method in SPSS to obtain a multiple regression model. Two models were estimated as below.

Model 1 (Working Capital Management and Return on Assets)
The dependent variable in this model was return on assets (ROA) while the independent variables were cash ratio, average collection period, short term debt ratio and current ratio. The results on the coefficient estimates and p values of the coefficients were estimated in Table 3.

Table 13. Coefficient Estimates for Model 1

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient Value</th>
<th>Standard error</th>
<th>t statistic</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.304</td>
<td>0.025</td>
<td>-12.114</td>
<td>0.001</td>
</tr>
<tr>
<td>Cash ratio</td>
<td>0.332</td>
<td>0.020</td>
<td>16.679</td>
<td>0.001</td>
</tr>
<tr>
<td>Average Collection Period</td>
<td>-0.003</td>
<td>0.001</td>
<td>-0.168</td>
<td>0.047</td>
</tr>
<tr>
<td>Short term debt ratio</td>
<td>-0.048</td>
<td>0.060</td>
<td>0.809</td>
<td>0.002</td>
</tr>
<tr>
<td>Current Ratio</td>
<td>0.026</td>
<td>0.011</td>
<td>2.379</td>
<td>0.021</td>
</tr>
</tbody>
</table>

R² = 0.981
Results from Table 13 indicated that the constant of the model was -0.304, the coefficient of cash ratio was 0.332, the coefficient of average collection period was -0.003, the coefficient of short term debt ratio was -0.048 while the coefficient of current ratio was 0.026. The coefficient of determination ($R^2$) was 0.981. This implied that 98.1% of the changes in dependent variable is explained by changes in the independent variables. 1.9% of the changes in presumed effect (dependent) variable is explained by the error term. Therefore the explanatory variables were good predictors to return on assets. The model was estimated as below

$$ROA = -0.304 + 0.332X_1 - 0.003X_2 - 0.0048X_3 + 0.026X_4$$

Where: $ROA=$ Financial performance as measured by Return on Assets, $X_1 =$ Cash management as measured by Cash ratio, $X_2 = $ Accounts receivable management as measured by average collection period,$X_3 =$Accounts payable management as measured by average short term debt ratio and $X_4 = $ Liquidity mix management measured by Current ratio

From model 1, one unit increase in cash ratio leads to increase in return on assets by 0.332 units, one unit increase in average collection period leads to decline in the levels of ROA by 0.003262 units, one unit increase in short term debt ratio leads to decline in ROA by 0.0048 units while one unit increase in current ratio leads to increase in ROA by 0.026 units. All the p values of the coefficients from table 13 were less than 0.05. This implies that all the coefficients were significant at 5% level of significance.

Model 2 (Working Capital Management and Return on Equity)

The study also estimated the relationship between ROE and the independent variables using a multiple regression model. The independent variables included cash ratio, average collection period, short term debt ratio and current ratio. The estimates were summarized in Table 14.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient value</th>
<th>Standard error</th>
<th>T statistic</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.218</td>
<td>0.067</td>
<td>-3.246</td>
<td>0.002</td>
</tr>
<tr>
<td>Cash ratio</td>
<td>0.505</td>
<td>0.053</td>
<td>9.506</td>
<td>0.001</td>
</tr>
<tr>
<td>Average collection period</td>
<td>-0.001</td>
<td>0.001</td>
<td>-2.420</td>
<td>0.019</td>
</tr>
<tr>
<td>Short run debt ratio</td>
<td>-0.054</td>
<td>0.160</td>
<td>0.336</td>
<td>0.038</td>
</tr>
<tr>
<td>Current ratio</td>
<td>0.002</td>
<td>0.029</td>
<td>0.087</td>
<td>0.031</td>
</tr>
</tbody>
</table>

$R^2 = 0.94$

From Table 14, the constant of the model was -0.218, the coefficient of cash ratio was 0.505, the coefficient of average collection period was -0.001, the coefficient of short term debt ratio was -0.054 while the coefficient of current ratio was 0.002. The coefficient of determination ($R^2$) was 0.94. This implied that 94% of changes in return on equity is explained by changes in the independent variables. 6% of the changes in dependent variable is explained by the error term. Therefore the explanatory variables were good predictors to return on equity. The model was estimated as below

$$ROE = -0.218 + 0.505X_1 - 0.001X_2 - 0.054X_3 + 0.002X_4$$

Where: $ROE=$ Financial performance as measured by Return Equity, $X_1 =$ Cash management as measured by Cash ratio, $X_2 = $ Accounts receivable management as measured by average collection period,$X_3 =$Accounts payable management as measured by average short term debt ratio and $X_4 = $ Liquidity mix management measured by Current ratio

From model 2, one unit increase in cash ratio leads to increase in return on equity by 0.505 units, one unit increase in average collection period leads to decline in the levels of ROE by 0.001 units, one unit increase in short term debt ratio leads to decline in ROE by 0.054 units while one unit increase in current ratio leads to increase in ROE by 0.002 units. All the p values of the coefficients from table 14 were less than 0.05. This implied that all the coefficients were significant at 5% significance level. The coefficient of the constant term was -0.218. This is the value that influences financial performance when other variables are not present in the model. This shows that the proportionate change in ROE was negative in the absence of other independent variables.

Effect of Working Capital Management on Return on Assets of Deposit Taking SACCOs in Kenya

The study sought to establish the effect of working capital management on financial performance as measured by return on assets (ROA) of deposit taking SACCOs in Kenya.
**Cash Management and Return on Assets**
The study sought to determine the effect of cash management on financial performance of deposit taking SACCOs. The coefficient of cash management was 0.332 (p-value= 0.001<0.05). This implied that there existed significant positive relationship between return on assets and cash management. A unit increase in cash management as measured by cash ratio would increase the return on assets by 0.332 units, holding other factors in the model constant. The null hypothesis that cash management has no statistically significant effect on financial performance of deposit taking SACCOs in Kenya was rejected leading to a conclusion that there is a statistically significant effect of cash management on financial performance of deposit taking SACCOs in Kenya at 5% level of significance.

**Accounts Receivable Management and Return on Assets**
The accounts receivable management was measured by average collection period. From the results in Table 13, the coefficient of average collection period is -0.003 with a p-value of 0.047< 0.05, implying that there existed a significant negative relationship between return on assets and accounts receivable management as measured by average collection period. A unit increase in accounts collection period will result into 0.003 unit decrease in return on assets, holding other factors in the model constant. Therefore the null hypothesis that accounts receivable management has no significant effect on financial performance of deposit taking SACCOs was rejected which leads to conclusion that there is a statistically significant effect of accounts receivable management on financial performance of deposit taking SACCOs in Kenya at 5% level of significance. This is attributed to the fact that the shorter the time the deposit taking SACCO takes to collect its receivables, the greater the present value of the SACCO’S finance. This translates to better financial performance.

**Accounts Payable Management and Return on Assets**
Accounts payable management was measured by short term debt ratio. From the results obtained in Table 13, the coefficient of accounts payable is -0.048 with a p-value (0.002<0.05) implying that there exist a significant negative relationship between accounts payable and return on assets. A unit increase in accounts payable results to 0.048 unit decrease in return on assets, holding other factors in the model constant. Therefore, the null hypothesis that accounts payable management has no statistically significant effect on financial performance of deposit taking SACCOs in Kenya was rejected leading to a conclusion that there is a statistically significant effect of accounts payable management on financial performance of deposit taking SACCOs in Kenya at 5% level of significance. This is attributed to the sense that increased accounts payable levels exposes a firm to financial risks such as inability to pay its debts which translates to reduced financial performance.

**Liquidity Mix Management and Return on Assets**
Liquidity mix management was measured by current ratio. The coefficient of current ratio was 0.026 with a p-value of 0.021<0.05 implying that a unit increase in liquidity mix as measured by current ratio results in 0.026 increase in ROA, holding other factors in the model constant. Therefore, the null hypothesis that liquidity mix management has no statistically significant effect on financial performance of deposit taking SACCOs in Kenya is rejected at 5% level of significance.

**Effect of Working Capital Management on Return on Equity of Deposit Taking SACCOs in Kenya**
The study sought to establish the effect of working capital management on financial performance as measured by return on equity (ROE) on financial performance of deposit taking SACCOs in Kenya.

**Cash Management and Return on Equity**
Cash management was measured by cash ratio. The coefficient of cash management was 0.505 with a p-value of 0.001<0.05 implying that a unit increase in cash management as measured by cash ratio would result in 0.505 unit increase in ROE, holding other factors in the model constant. Therefore, the null hypothesis that cash management has no statistically significant effect on financial performance of deposit taking SACCOs in Kenya was rejected leading to a conclusion that there is a statistically significant effect of cash management on financial performance of deposit taking SACCOs in Kenya at 5% level of significance. This may be attributed to the role that cash plays in enhancing the liquidity position of a firm. Cash increases the liquidity position of a firm hence reducing liquidity risks associated with cash outs.

**Accounts Receivable management and Return on Equity**
The study sought to establish the effect of accounts receivable management on financial performance as measured by return on equity. In Table 14, the coefficient of accounts receivable management was -0.001 with a p-value of
0.019<0.05. This implied that a unit increase in accounts receivable results in 0.001 unit decrease in ROE, holding other factors constant. Therefore, the null hypothesis that accounts receivable management has no statistically significant effect on financial performance of deposit taking SACCOs in Kenya was rejected leading to a conclusion that there is a statistically significant effect of accounts receivable management on financial performance of deposit taking SACCOs in Kenya at 5% level of significance. This may be attributed to improved liquidity of the SACCO which enhances smooth operational efficiency hence translating to better financial performance. This finding is consistent with the cash conversion cycle theory which states that if a firm is able to convert its receivable into cash with a short period of time, then it is said to perform better as compared to the one that takes a longer period.

**Accounts Payable Management and Return on Equity**

Accounts payable management was measured by short term debt ratio. From the results in Table 14, the coefficient of accounts payable management was -0.054 with a p-value of 0.038<0.05, implying that a unit increase in accounts payable management level results into 0.054 unit decrease in return on equity, holding other factors constant. The null hypothesis that accounts payable management has no statistically significant effect on financial performance of deposit taking SACCOs in Kenya was therefore rejected leading to a conclusion that there is a statistically significant effect of accounts payable management on financial performance of deposit taking SACCOs at 5% level of significance. This may be attributed to the fact that high levels of accounts payable exposes the firm to credit risk. This impact negatively to the firm’s short term cash flow position resulting in low levels of financial performance. Also, the study who found out that there exist a statistically insignificant impact of accounts payable and financial performance.

**Liquidity Mix Management and Return on Equity**

The study also established a significant positive effect of liquidity mix on financial performance as measured by ROE. This was indicated by the positive coefficient of 0.02 and a p-value of 0.031<0.05. The results implied that a unit increase in liquidity mix level as measured by current ratio results into 0.02 units increase in financial performance as measured by ROE. The results also indicate that liquidity mix has a statistically significant effect on financial performance of deposit taking SACCOs in Kenya at 5% level of significance. The null hypothesis that liquidity mix management has no statistically significant effect on financial performance of deposit taking SACCOs was rejected. The findings indicate that an increase in liquidity mix levels results into better short term cash flow position of a firm hence enhancing operational efficiency which translates to long term financial performance.

**CONCLUSIONS**

It was concluded that the models used in predicting the effect of working capital management on financial performance of deposit taking SACCOs in Kenya were good and reliable. Cash management was positively correlated to financial performance and hence conclusion was made that an increase in the level of cash management by deposit taking SACCOs would lead to a statistically significant increase in their financial performance at 5% significance level. However, increase in the account receivable management levels by deposit taking SACCOs in Kenya would lead to a statistically significant decrease in the level of financial performance. Also, the study concluded that increase in the accounts payable management levels by firms would lead to a statistically significant decrease in their financial performance. Finally, the study concluded that increase in liquidity mix levels would lead to a statistically significant increase in the financial performance of firms at 5% significance level. Therefore, the final conclusion of the study is that there is a statistically significant effect of working capital management on financial performance (ROA and ROE) of deposit taking SACCOs in Kenya at 5% level of significance.

**RECOMMENDATIONS**

i. The study recommends that firms should increase their cash management levels by putting in place tighter internal control system for cash management so as to increase their financial performance since a higher cash level protects the deposit taking SACCOs against liquidity risk. The study also recommends that SASRA regulator should introduce cash ratios to be deposited within the SACCO regulator. This will enable control of liquidity in deposit taking SACCOs.

ii. The study also recommends that the deposit taking SACCOs should reduce their account receivable collection periods so as to increase their financial performance. This is because a reduction in accounts receivable collection period leads to a reduction in chances of bad debts; By reducing the accounts collection periods, the net present value (NPV) of the deposit taking SACCOs is improved thus translating to better financial performance and increased shareholders’ wealth.

iii. The study also recommends that the deposit taking SACCOs should decrease their level of accounts payable levels so as to increase their level of financial performance. A reduced short term debt ratio results into minimal
chances of a deposit taking SACCOs being exposed to credit risk. For better financial performance, deposit taking SACCOs should minimize its short term debts so as to ensure continued liquidity.

iv. The deposit taking SACCOs should however increase their liquidity mix levels so as to increase their financial performance levels. Higher current ratios implies better liquidity positions for the deposit taking SACCOs.

REFERENCES


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ABSTRACT
Corporate tax planning relates to the utilization of the loopholes in the tax system to reduce tax liability. According to the Tax Justice Network-Africa, Kenya’s corporate sector leads Africa in tax avoidance with the tax avoided each year being estimated at Ksh 106 billion. However, despite enormous tax savings generated through tax planning, there exists mixed evidence about the effect of corporate tax planning on financial performance of firms. This study therefore sought to evaluate the effect of corporate tax planning on financial performance of firms listed at the Nairobi Securities Exchange. The specific objectives were to analyze the effect of corporate tax compliance, capital investment allowances and debt tax shield on the financial performance of firms listed at the Nairobi Securities Exchange. The study used a casual research design to establish the effect of corporate tax planning on financial performance of firms. The target population was the 64 firms listed at the NSE and purposive sampling was used to select 55 firms that had complete data and that were consistently listed within the period of study 2010 to 2015. Secondary data was collected using a checklist from the NSE website, individual company’s website and from NSE reports. A multiple regression analysis was used to analyze the cause-effect relationship between dependent variable and independent variables. Data analysis was done with aid of SPSS version 21.0. T-test and F-test were used to test the significance of regression coefficients and overall significance of the model respectively at 5% significance level. The study established statistically significant positive effect of tax compliance and capital investment allowances on return on assets with coefficients of 0.238 and 0.076, and P-values of 0.009<0.05 and 0.042<0.05 respectively. Further, it was established that debt tax shield had a negative significant effect on return on assets with a coefficient of -0.142 and p-value of 0.038<0.05. The study concluded that corporate tax planning has a significant effect on financial performance of NSE listed firms and recommends that firms should increase their tax compliance, increase expenditure that qualifies for capital investment allowances and reduce use of debt as the cost of debt may have negative effect on return on assets. The findings of this study would be of importance to policy makers such as the Nairobi Securities Exchange, capital market authority and national treasury in formulating policies on tax planning activities and more importantly it would guide management in decided on their tax planning practices and the expected benefits

Keywords: Tax, performance, corporate tax compliance, capital investment allowances, debt tax shield.

INTRODUCTION
Tax is a compulsory contribution to state revenue levied by the government on individual’s income, business profits, value added to the cost of some goods, services, and transactions in order to raise revenue to fund government expenditure (Agoulu, 2004). According to Omotoso (2001), tax is a compulsory charge imposed by a public authority on the income of individuals and companies as stipulated by the government decrees, acts or case laws irrespective of the exact amount of services rendered to the payer in return.

Ernest and Young (2012) describe tax planning as the advanced assessment of the tax implications on various decision alternatives with the objective of minimizing the tax burden or maximizing the benefits. Wahab and Holland (2012) view tax planning as relating to all activities designed to produce a tax benefit while Pasternak and Rico (2008) delineate tax planning as the legal utilization of the tax regime to one's own advantage, to reduce the amount of tax that is payable by means that are within the law and it has to be done before and during the course of business as it entails the preparation to pay tax completely, correctly and economically. Corporate Tax Planning (CTP) relates to the analysis of the financial situation of a business from a tax efficiency point of view so as to plan the finances in the most optimized manner that allows the taxpayer to make the best use of the various tax exemptions, deductions and benefits to minimize their tax liability over a financial year (ITA, 2009).

Noor, Fadzillah and Mastuki (2010) argues that most companies are involved in tax avoidance extensively with the purpose of reducing their income taxes since income tax expenses will reduce their profits. It is important to reduce tax liability legally as this tax savings when invested leads to increase in after tax earnings and growth in shareholders wealth (Desai & Dharmapala, 2009a). Reducing the tax burden through tax saving helps to increase the working capital which can result into growth and profitability of businesses. Tax planning aids in financial
management as it influences investment in some areas and also allows managers to evaluate the tax implications of their investment decisions. This translates into valuable investment decisions and into higher firm value.

Corporate tax planning attempts to reduce tax burden by; use of debt in the capital structure to benefit from debt tax shield, claiming capital investment allowances such as wear and tear allowance (WTA) for non-current assets and investment deductions (ID), investment in export processing zones (EPZs) and compliance with tax laws as provided in the Income Tax Act (AIP, 2014).

The use of debt in the capital structure results into debt tax shield because the interest payments on loan obligations are tax deductible expenses (Pandey, 2009). The advantage of debt tax shield can also be obtained by leasing assets as opposed to outright purchase since the lease payments made under capital and operating leases are tax deductible on the lessee and this reduces taxable income thus improving the firm’s financial performance (AIP, 2014).

While planning for investments, companies should always consider tax credits that can accrue. An increase in a firms fixed assets can result in increased capital allowances and investment in some regions can increase the firm’s capital investment deductions as the Finance Act 2009. The Act introduced Investment Deductions at the rate of 150 per cent for investments above Sh200 million on construction of buildings or purchase and installation of machinery outside the City of Nairobi or the municipalities of Mombasa and Kisumu (ITA, 2009). Investment in EPZs benefits the firms through tax exemptions and tax holidays (KPMG, 2014). Firms should plan their activities to increase their allowable deductions but care should be taken to avoid overcapitalization which would lead to liquidity problems.

Tax compliance reduces exposure to tax problems such as stiff penalties, interest payments, possible shutdown of business and distractions from usual business activities by tax audits. The penalties for non-tax compliance in Kenya are punitive and firms that are not tax compliant may attract hefty penalties and interests which is very expensive to an organization as it negatively impacts on their financial performance. The study evaluated tax planning through tax compliance; capital investment allowances and debt tax shield because tax planning avenues are available to all firms across the different market segments and thus would more accurately represent the tax planning activities.

Tax planning is becoming a major concern of world community. With Tax Justice Network suggesting that global tax revenue lost to tax avoidance exceeds US$255 billion per year. In October 2009 research commissioned by Deloitte indicated that the estimated revenue lost by the UK tax authorities from corporation tax planning activities was up to £2 billion per annum. The report by Deloitte concurred with the Trade Union Congress (TUC), which had concluded that tax avoidance by the 50 largest companies in the Financial Times Stock Exchange (FTSE 100) was approximately £11.8 billion. Commonwealth Association of Tax Administrators (CATA, 2009) posits that Ghana Revenue Authority lost seventy-four million pounds between 2005 and 2007 to the European Union (EU) in tax revenue as a result of tax avoidance by several multinational companies According to Kholbadalov (2012), in Malaysia, the amount of the avoided taxes recorded an increase of 9.38% from RM686.43 million in 2007 to RM750.83 million in 2008, and raised further in 2009 up to RM844.92. Tax Justice Network-Africa (TJNA), indicated in a recent report that Kenya’s corporate sector leads Africa in tax avoidance, estimating that the avoided taxes estimates to KSh106 billion annually.

**Statement of the Problem**

The main goals of every business organization are profit maximization and shareholders wealth maximization. Shareholders are therefore interested in the financial performance of the organizations as this directly impacts on their wealth. Tax planning can be used to enhance the performance of the organizations by utilizing the loopholes provided in the tax regime to reduce tax liability and thus reduce the transfer of resources from shareholders to the government. Corporate tax planning is of fundamental importance to any business as failure to plan taxes may lead to ultimate closure of business and firms that plan well for their taxes are expected to post improved profitability and should have less tax related costs. Many organizations have shown an increased uptake of tax planning with Tax Justice Network USA suggesting that global tax avoided exceeds US$255 billion per year. According to Tax Justice Network-Africa (TJNA), Kenya’s corporate sector leads Africa in tax avoidance, estimating that KSh106 billion annually is lost to tax planning activities. While tax planning is seen to benefit the firm in different ways it also represents a cost and effective corporate tax planning involves a balance between the resultant benefits and costs incurred. Different sectors approach tax planning differently leading to differing levels of tax burdens. Tax planning activities such as corporate tax compliance, claiming capital investment allowances and benefiting from debt tax shield are expected to increase after tax earnings and increase shareholders wealth but despite the significant tax

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savings generated by tax planning activities there is increased decline in profitability of firms listed at NSE with several companies reporting 25% decline in profitability and giving profit warnings for the year 2016 as others report huge losses (NSE, 2016). There is mixed evidence on the implications of tax planning on firms’ financial performance either as a result of tax planning costs outweighing the benefits, different industrial and country context and different sample sizes with different studies giving contradicting results. The study sought to determine the effect of corporate tax planning on financial performance of firms listed at Nairobi Securities Exchange.

General Objectives of the Study
The General objective of the study was to determine the effects of corporate tax planning on the financial performance of firms listed at Nairobi Securities Exchange.

Specific Objectives of the Study
The study was guided by the following specific objectives
i. To determine the effect of corporate tax compliance on financial performance of firms listed at Nairobi Securities Exchange.
ii. To determine the effect of capital investment allowances on financial performance of firms listed at Nairobi Securities Exchange.

Hypothesis
\( H_01: \) Corporate tax compliance has no significant effect on financial performance of firms listed at Nairobi Securities Exchange.
\( H_02: \) Capital investment allowances have no significant effect on financial performance of firms listed at Nairobi Securities Exchange.
\( H_03: \) Debt tax shield has no significant effect on financial performance of firms listed at Nairobi Securities Exchange.

Significance of the Study
The study would be useful to policy makers such as the CMA, NSE and National Treasury (NT) in making policies on issues of tax planning. The findings of the study would have direct policy relevance for shareholders and tax consultants in monitoring and controlling firms’ tax planning activities in order to enhance the firm value. This enables shareholders strike a balance on the expected costs and benefits of tax planning activities to be able to increase shareholders wealth. The findings of this study would make contributions to the existing literature on corporate tax planning and firms performance and would also establish new research gaps that would form basis for further studies in the area. It would also provide reference to researchers in related areas.

Scope of the Study
The study sought to examine the effect of corporate tax planning on the financial performance of firms listed at the NSE in Kenya. The NSE is the capital market located at the capital city of Kenya, Nairobi. The study analyzed the effect of corporate tax compliance, capital investment allowances and debt tax shield on firm’s financial performance. The study used annual reports and financial statements from the NSE handbook for the period covering 2010 to 2015 in order to obtain a better representative return on assets (ROA) of the firms under study.

Limitations of the Study
The study was limited to firms listed at NSE and the findings may not be the same for unlisted firms. The NSE listed firms are majorly large firms and this would limit the generalization of findings to small and medium enterprises.

Assumption of the Study
The study assumed that the audited published information from annual reports and financial statements reflected a true and fair view of the state of affairs of the companies and that the reports were neutral. The study further assumed that the published financial statements are subject to international financial reporting standard number seven (IFRS 7) on complete and full disclosure of all transactions, costs and activities that would affect the readers understanding of the financial statements.
LITERATURE REVIEW
Concept of Corporate Tax Planning
The concept of tax planning is introduced in the Income Tax Act where it is defined as an arrangement of one’s financial affairs in such a way that without violating in any way the legal provisions, full advantage is taken of all tax exemptions, rebates, allowances and other reliefs or benefits permitted under the Act (ITA, 2009). According to the American Institute of CPAs (AICPA), tax planning has two main objectives. The first is to minimize the overall income tax liability, whilst the other is to fulfill financial planning aims with minimal tax results. These goals can be achieved by reducing the income tax resulting from an arrangement or a transaction, shifting the timing of a taxable event or by shifting income to another taxpayer, thus, reducing tax liability (AICPA, 2015).

The practice of tax planning dates back to 1947 when learned judge Hand, in the case Commissioner v Newman, held that there is nothing sinister in arranging ones affairs so as to keep taxes as low as possible for nobody owes any public duty to pay more taxes than the law demands (Kawor & Kportorgbi, 2014). While tax planning is seen to benefit the firm in different ways it also represent a cost. The costs incurred by companies due to tax planning emerge from the current tax planning strategies and lead to what Weisbach (2002) describes as the “under-sheltering puzzle” that is, why firms do not appear to minimize tax liabilities. These costs range from direct costs such as salaries and fees paid to lawyers, accountants and tax advisors (Howell O’Neill, 2012) and indirect costs in form of opportunity cost arising because the taxpayer changes his financing and investment plans in the existence of taxes (Schreiber & Fuehrich, 2007; Howell O’Neill, 2012). TP may also call for corporate restructuring to achieve the desired tax benefit and in some cases may pose potential legal costs if the activities are challenged by a tax administration which can also then lead to reputational costs. Tax planning activities may also present an agency problem issue when managers do not act in the benefit of the shareholders but take tax planning as a chance for rent extraction, constructive accounting and sub optimal investment decisions. This represents the agency view of tax avoidance and may explain to some extent, the reason why tax savings do not trickle down to increased performance for some firms thus failing to achieve the tax planning objectives.

Financial Performance
The financial performance of an organization is of great importance to shareholders and stakeholders as it reflects how well a firm uses assets from its primary mode of business and operations to generate revenues. It is a general measure of firms overall financial health over a given period of time and helps in analyzing how well an organization is achieving the main objectives of maximizing profits and maximizing shareholders wealth. (Pandey, 2010). Financial performance can be enhanced by proper investment and financing decisions of the firm. Tax planning is a key activity in enhancing financial performance as it aims at maximizing the net present value of each transaction from a tax point of view (Jones and Rhoades- Catanach 2005). Measures of financial performance include profitability of the firm through earnings after tax, return on assets, return on equity and this study adopts the return on assets as the measure of financial performance.

Corporate Tax Compliance and Financial Performance
Compliance with tax laws is of great importance to businesses as failure to comply may attract several penalties and interests and also negative image for the organization. Tax noncompliance is a substantive universal phenomenon that transcends cultural and political boundaries and takes place in all societies and economic systems (Nicoleta, 2011). Kirchler (2007) perceives tax compliance as the most neutral term to describe taxpayer’s ability and willingness to comply with tax laws, declare the correct income in each year and pay the right amount of taxes on time. According to Brown and Mazur (2003), tax compliance is multi-faceted measure and theoretically, it can be described by considering three distinct types of compliance such as payment compliance, filing compliance, and reporting compliance. While tax compliance is beneficial to every organization it also represents a cost in form of tax compliance costs (Evans, 2003). Slemrod and Yitzhaki (1996) identified compliance costs as one of the three components of the social costs of taxation and these increased costs may have a negative effect on the financial performance of firms. Such costs may exist when the tax regime changes and with introduction of automated tax systems which may necessitate the recruitment of more staff, training of the existing staff, acquiring of additional assets such as Electronic tax machines or introduction of higher wages for employees who have to be retained for their qualifications (Hijattullah and Pope, 2008).

A study by Osebe (2013) on the an analysis of factors affecting tax compliance in the real estate sector in Kenya found that fines/penalties had positive effect on level of tax compliances while high compliances cost and high opportunity for tax evasion will reduces tax compliance among real estate investors. These findings are attributed to
the effect that fines and penalties would have on the financial performance of the firms thus deterring firms from avoiding taxes due to the negative repercussions. On the other hand increased compliance costs may present a morale for tax noncompliance as firms naturally wish to keep their costs low. The economic theory of tax deterrence as advanced by Allingham and Sandmo’s (1972) that firms have to make a compromise on whether to comply or not comply with tax laws based on the cost to benefit analysis. Hence effect of corporate tax compliance is inconclusive.

**Capital Investment Allowances and Financial Performance**
Capital investment deductions represent an array of allowances that are provided by the Income tax act to induce investment. They are ultimately expected to reduce the taxable income and thus reduce the tax burden of firm’s thus enhancing their performance (Simiyu, 2003). They form a part of tax incentive where tax incentives in Kenya can be grouped into either investment promotion incentives or export promotion incentives. Investment Promotion Incentives include Investment Deduction Allowance which is meant to encourage investment in physical capital assets such as industrial buildings, machinery and equipment, Industrial Building Allowances whose objective is encouraging investment in buildings used for industrial purposes like hotels and manufacturing plants, Mining Deductions Allowance to encourage investors to venture into the mining industry which is very capital intensive and Farm Works Deductions to encourage investment in the agricultural sector. Export promotion incentives program has three main schemes which include the Export Processing Zones (EPZ’s), Manufacture under Bond (MUB) and the Tax Remissions and Exemption Office (TREO). The objective of EPZ’s is to generate and encourage economic activity and foreign direct investments while MUB and TREO regimes were meant to encourage investors to manufacture for export within the country (ITA, 2009).

Mucai, Kinya, Noor, and James (2014) sought to find out the extent to which expenditure on capital assets in tax planning, how tax planning by Capital Structure, how tax planning through Advertisement expenditure and how tax planning through Legal Forms of enterprise influence performance of small enterprises in Embu County. The study found the influence of tax planning by capital structure, tax planning by investment in capital asset and tax planning through advertisement expenditure has no significant relationship with the financial performance of small and medium enterprises in Kenya. These findings may be as a result of small and medium enterprises being privately owned where they are not subject to corporate tax rates but rather to the owners being taxed individually on all incomes both employment and business incomes.

**Debt Tax Shield and Financial Performance**
The tax deductibility of interest payments under most corporate income tax systems makes debt an attractive means of financing the business as it is thought to be cheaper and would therefore increase the financial performance of firms. Capital structure adjustments can be used to reduce the total tax burden on company investment since the taxation of the return on equity and debt capital differs in most countries. At the corporate level, interest payments reduce taxable profits while such a deduction is not feasible in the case of equity financing (Overesch & Wamser, 2010). Auerbach (2002) posits that, typically, tax systems encourage the use of debt rather than equity financing. Oversch and Voeller (2010) carried out a study on companies located in 23 European countries using a rich panel of firm-level financial accounting data of, taken from the Amadeus data base In contrast to other studies, they focused mainly on stand-alone companies and collected detailed information about the tax systems of the considered countries during the period from 2000 until 2005. The empirical results suggest that a higher tax benefit of debt has the expected significant positive impact on companies’ financial performance. On the other hand Keen and de Mooij (2012) analyzed a sample of 14,377 banks from 82 countries across Europe, Asia and the Americas between 2001 and 2009. They found that, on average, the leverage ratio of banks is 88.1%, compared to a ratio of between 40 and 60% for non-financial firms. This is strong indication that the leverage issue is more acute for banks. They studied the impact of taxes on the capital structure of banks and found that, despite capital requirement constraints, the size of the effects of corporate taxation on the financial structure of banks is close to the ones for non-financial firms.

**RESEARCH METHODOLOGY**
**Research Design**
Mugenda and Mugenda (1999) describe research design as a set of decisions that make up the master plan specifying the methods and procedures for collecting and analyzing the needed information. The study employed a causal research design, which according to Kasomo (2006), is a type of design in which the researcher attempts to identify cause effect relationship among variables. This design aided in exploring the effect of corporate tax planning on financial performance of NSE listed firms.
Location of the Study
The study was carried on companies listed at the NSE. The NSE is located in Nairobi the capital city of Kenya. The firms listed at NSE were chosen because they are required by the capital market authority, to publicly disclose their financial statements and annual reports.

Population of the Study
Population refers to an entire group’s events or objects having a common characteristic (Mugenda & Mugenda, 1999). The target population in the study was all the 64 companies listed at NSE, divided into 11 marketing sectors

Sampling Procedures and Sample size
Sampling is the selection from an aggregate or totality on the basis of which a judgment or inference about the aggregate or totality is made (Kothari, 2004). The study used purposive sampling to select the firms that had complete data and that were consistently listed within the period of study 2010 to 2015. The suitability of purposive sampling was to pick only those firms that meet the purposes of the study and 55 firms sampled were from the various market segments of the economy that are listed at the NSE.

Research Instruments
The study employed a checklist as the research instrument to gather information relating to interest and penalties, capital investment allowances, level of investment in non-current assets, level of debt in the capital structure, and interest on debt, earnings before and after tax and return on assets. A checklist was used since it was possible to collect the data on the variables that were of relevance to the research. The checklist was used to collect data obtained from NSE handbook and respective company’s websites.

Data collection Procedures
The secondary data was obtained from the financial statements of the listed companies which were accessible from their websites as per the disclosure requirement by the CMA. Information on financial performance was obtained from the financial statements. Specifically, net profit after tax and the total assets were collected from the financial statements to help in measuring the return on asset (ROA). The data was collected on the variables of interest for the 5 year period beginning 2010 to 2015 which is sufficient period to provide reliable data for this purpose.

Data Analysis
Data analysis entails coding, categorizing, data entry, manipulation and summarization (Mugenda & Mugenda, 1999). Once the data was collected it was organized edited and cleaned. The assumptions of linear regression model of linearity, normality, homoscedasticity and multicollinearity were tested before analyzing the data. The data was analyzed using ANCOVA multiple linear regression model. The hypothesis were tested using t-test while the overall significance of the model was tested using F-test at 5% level of significance The analysis was aided through use of Statistical Packages of Social Sciences (SPSS) Version (21.0).

Model Specification
To determine the effect that the independent variables have on the dependent variable, the following regression model was used.

\[ ROA_i = \beta_0 + \beta_1 D_1 + \beta_2 CIA_i + \beta_3 DTS_i + e_i \]

Where,
- ROA = return on assets
- CIA = capital investment allowances
- DTS = debt tax shield
- i=Firms
- \( e_i \) = error term
- \( \beta_0 \) = Fixed individual effect.
- \( \beta_1, \beta_2, \beta_3 \) = Regression Coefficient of Independent Variables
- \( D_1 \) = dummy variable representing tax compliance
Where 1=for tax compliance and 0=tax noncompliance
RESULTS AND DISCUSSIONS
Diagnostic Tests
Test for Normality
Descriptive statistics were used to test for normality of data. The descriptive statistics computed include the maximum and minimum values, mean, standard deviation and coefficient of skewness and kurtosis. According to Aczel and Sounderpadian (2002), data is normal and unbiased when skewness statistic is between the ranges of ±3. The summary of the descriptive statistics is shown in Table 1.

Table 1. Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>ROA</th>
<th>TC</th>
<th>CIA</th>
<th>DTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.0755857</td>
<td>0.68</td>
<td>3.9546729E+06</td>
<td>2.088E+06</td>
</tr>
<tr>
<td>Maximum</td>
<td>0.52066</td>
<td>1</td>
<td>5.134999E+07</td>
<td>2314867.50</td>
</tr>
<tr>
<td>Minimum</td>
<td>-0.19315</td>
<td>0</td>
<td>153780.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Std. deviation</td>
<td>0.09980729</td>
<td>0.471</td>
<td>1.02799627E+07</td>
<td>4.65558E+06</td>
</tr>
<tr>
<td>Skewness</td>
<td>1.401</td>
<td>-0.786</td>
<td>1.143</td>
<td>2.613</td>
</tr>
</tbody>
</table>

The skewness statistics values were 1.401 for return on assets, -0.786 for tax compliance, 1.143 for capital investment allowances and 2.613 for debt tax shield. The coefficient of skewness for all variables was within the range of ±3, implying that the data on variables was normally distributed. Since the data was normal, it was suitable for use in further analysis.

Autocorrelation Test
Autocorrelation occurs when the variances of the error term are sequentially interdependent. This arises when the values of the error term in one period are related to values in another period and leads to biasness and inconsistency of parameter estimates. Autocorrelation was tested by the use of Durbin Watson (DW) test. A DW of zero implies that there exists positive correlation, while DW of 4 implies high negative correlation level. A DW of value between 0 and 4 implied that there was no autocorrelation. The results are presented in Table 2.

Table 2: Test for Autocorrelation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Durbin Watson</td>
<td>1.948</td>
<td>No autocorrelation</td>
</tr>
</tbody>
</table>

Table 2 indicates that the DW value was 1.948. Since this value was between 0-4, it indicates that there is no autocorrelation between the variables.

Multicollinearity Test
Multicollinearity is the inter correlation among explanatory variables. Multicollinearity leads to large variances and standard errors of OLS estimators which make it more difficult to estimate the true value of the estimator. Multicollinearity was detected using coefficient of determination (R^2). According to Gujarati et al., 2007, multicollinearity is present if the coefficient of determination (R^2) is high in excess of 0.8 or very low of less than 0.1, with few significant t – ratios. The values of the results were presented in the table 3.

Table 3: Multicollinearity Test

<table>
<thead>
<tr>
<th>Test statistic</th>
<th>Statistic value</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>R – squared</td>
<td>0.545678</td>
<td>no multicollinearity</td>
</tr>
<tr>
<td>Adjusted R – squared</td>
<td>0.469</td>
<td></td>
</tr>
<tr>
<td>Std. error of the estimate</td>
<td>0.061</td>
<td></td>
</tr>
</tbody>
</table>

The results from table 3 indicate that the computed value of the coefficient of determination (R^2) is 0.545678. Since this value is greater than 0.1 and less than 0.8, there exists no multicollinearity within the variables. This implied that there was no inter correlation among explanatory variables in the model hence the data was suitable for estimation without occurrence of large variances and standard errors of the OLS estimator.

Correlation
Correlation determines the magnitude or strength and direction of the relationship between two variables. This study used Pearson product moment correlation coefficient (R) to determine the correlation between dependent and independent variables in the model. A correlation coefficient R > ±0.7 implies that the variables are strongly related.
either positively or negatively. The results of the correlation between the dependent and independent variables are presented in Table 4.

### Table 4: Pearson Correlation Analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>ROA</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>1</td>
<td>Perfect correlation</td>
</tr>
<tr>
<td>TC</td>
<td>0.62</td>
<td>Moderate positive correlation</td>
</tr>
<tr>
<td>CIA</td>
<td>0.415</td>
<td>Weak positive correlation</td>
</tr>
<tr>
<td>DTS</td>
<td>-0.32</td>
<td>Weak negative correlation</td>
</tr>
</tbody>
</table>

Table 4 indicates that there exists a moderate positive correlation between tax compliance and return on assets for the companies listed at NSE with a correlation coefficient of 0.62. This implies that a high increase in tax compliance would result into a fairly high increase in return on assets. The results show that there exists a weak positive relationship between capital investment allowances and return on asset with a correlation coefficient of 0.415. This implies that a high increase in the capital investment allowances leads to a low increase in the ROA. The results also show that there exist a weak negative correlation between debt tax shield and return on assets with a correlation coefficient of -0.32. This implies that an increase in debt tax shield leads to a low decrease in ROA.

### Regression Analysis Model

The study used a multiple regression analysis model to explain the relationship between the dependent and explanatory variables. R-Squared was computed to show the strength of the relationship and the regression coefficients were computed and their significance tested by t-test while overall significance of the model was tested by F-test at 5% level of significance. The results of the analysis are presented in Tables 5, 6 and 7.

#### Table 5: Strength of the Model

<table>
<thead>
<tr>
<th>Test statistic</th>
<th>Statistic value</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-squared</td>
<td>0.545678</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.469</td>
</tr>
<tr>
<td>Std. error of the estimate</td>
<td>0.061</td>
</tr>
</tbody>
</table>

Table 5 shows the model summary where R Squared is 0.54567 implying that 54.567% of variation in return on assets is explained by the independent variables while 45.433% are accounted for by other factors outside the model. The model is therefore moderately strong in predicting the return on assets of firms listed at NSE.

#### Table 6: Test of Overall Significance of the Variables

<table>
<thead>
<tr>
<th>Test statistic</th>
<th>Statistic value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-test statistic</td>
<td>1.054</td>
<td>0.0087</td>
</tr>
</tbody>
</table>

Table 6 indicates that the overall model is significant with F-value of 1.054 and p-value of 0.0087 < 0.05 at 5% significance level. It implies that the model can be relied on in explaining the cause effect relationship between ROA and predictor variables.

#### Table 7: Regression Coefficients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.045</td>
<td>1.901</td>
<td>0.006</td>
</tr>
<tr>
<td>TC</td>
<td>0.238</td>
<td>1.728</td>
<td>0.009</td>
</tr>
<tr>
<td>CIA</td>
<td>0.076</td>
<td>0.348</td>
<td>0.042</td>
</tr>
<tr>
<td>DTS</td>
<td>-0.142</td>
<td>-0.650</td>
<td>0.038</td>
</tr>
</tbody>
</table>

R-Squared 0.545678. Adjusted R-squared 0.469

From Table 7, the regression coefficients are 0.238, 0.076 and -0.142 for tax compliance, capital investment allowance and debt tax shield respectively. The constant is 0.045 indicating the return on asset that is independent of the factors in the model. The variables of the study are related using a stochastic linear regression equation of the form: $ROA = 0.045 + 0.238TC + 0.076CIA – 0.142DTS$
DISCUSSION AND RECOMMENDATIONS
The study aimed at determining the effect of corporate tax planning on financial performance of firms listed at Nairobi securities exchange in Kenya. This was achieved by analyzing the effect of corporate tax compliance, capital investment allowance and debt tax- shield on financial performance of firms listed at Nairobi securities exchange. The significance of the regression model in predicting the relationship between corporate tax planning and financial performance of firms listed at NSE was tested at 5% significance level and found to be significant with F-value of 1.054 and P-value of 0.0087<0.05. The coefficient of determination ($R^2$) was 0.545678 which implied that 54.5678% of variations in financial performance of firms listed at NSE would be explained by corporate tax compliance, capital investment allowance and debt tax shield while 45.4322% of variations were explained by other factors not included in the study. This model was fairly reliable in explaining the variations in financial performance of firms listed at NSE.

The effect of corporate tax compliance on financial performance of firms listed at Nairobi securities exchange was tested at 5% significance level. The level of financial performance was indicated by the level of return on assets of the firms. The results showed that there existed a significant positive relationship between corporate tax compliance and return on assets with a coefficient of 0.238 and a p-value of 0.009. This implies that increase in one unit of tax compliance leads to increase in return on assets by 0.238 units holding other factors in the model constant.

The effect of capital investment allowance on financial performance of firms listed at Nairobi securities exchange showed that there existed a significant positive relationship between capital investment allowance and return on assets at 5% significance level. The positive relationship was indicated by the positive coefficient of capital investment allowance of 0.076. This implies that increase in one unit of capital investment allowance leads to increase in return on assets by 0.076 units holding other factors in the model constant.

The effect of debt tax shield on financial performance was tested using t-test at 5%. The results showed that there existed a negative significant relationship between debt tax shield and return on asset. The negative relationship was represented by the negative coefficient of debt tax shield of -0.142. This meant that one unit increase in the debt tax shield led to decrease in return on asset by 0.142 units holding other factors in the model constant.

Recommendations
Based on the findings and conclusions arrived at, the study recommended that;

i. Firms listed at Nairobi securities exchange should increase their tax compliance levels to avoid unnecessary penalties and tax interest costs so as to increase their financial performance.

ii. Firms listed at Nairobi securities exchange should make use of capital investment allowances so as to reduce the taxable income and the amount of taxes paid as this translates to increase in after tax earnings.

iii. Firms listed by Nairobi securities exchange should decrease the level of debt used as the costs of debt may outweigh the benefit of debt tax shield resulting in a reduction in the financial performance.

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INFORMAL FINANCING AND THE USE OF FORMAL FINANCIAL SERVICES AMONG SMALLHOLDER FARMERS IN KENYA

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ABSTRACT
Despite financial inclusion being a key driver of growth and income equality, developing countries continue to have significant proportions population without access and usage of basic formal financial services. Instead, most still subscribe to informal financial services which have low or non-existent entry barriers. In the context of small holder farmers, informal financial services can moderate their access to finance where there are gaps in the formal financial instrumentation. The present study, therefore, sought to determine the moderating effect of informal financial services on use of formal financial services among small holder farmers in Kenya. The target population for this study was small holder farmers from Nakuru, Busia and Kirinyaga Counties in Kenya, sample size of 496 was obtained and selected through purposive and stratified random sampling techniques. Data was collected using copies of a researcher developed questionnaire and analysed using multiple linear regression analysis using STATA. The findings reveal that informal financial services did not have a moderating effect on utilization of formal financial services among small holder farmers. The study recommends that the formal financial institutions develop products and work closely with informal financial services to encourage more utilization of financial services.

Keywords: Financial inclusion, Informal financial services, Formal financial services, smallholder farmers

INTRODUCTION
Background of the Study
Financial inclusion is a purposeful effort to ensure access and availability of financial services such as loans, deposit service, insurance, pension and payments to the bankable citizens (Acharya & Subramanian, 2009). Leeladhar (2006) defines financial inclusion as the expanding outreach of banking or financial services at an affordable cost to a vast section of disadvantaged groups of society, which may provide them with financial cushion for their sustenance as well as social empowerment. Put differently, financial inclusion is the effort to bring the more than 2.5 billion ‘unbanked’ people who are mostly the poor and women - who currently lack access to basic financial services into formal financial networks (Lagarde, 2014). Despite the importance of financial inclusion as a driver of growth and income equality, developing countries continue to have significant proportions of individuals and households without access to basic financial services, with at least 80% of adults in these countries being unbanked compared to a world average of 50%, and a developed countries average of 8% (Chaia et al., 2009; Allen et al., 2014). The low rates of financial inclusion, therefore, partly explains why despite the relatively high returns on investments in developing countries, their growth remains low while poverty and income inequalities are relatively high. Low or non-access to formal financial services could also arise from involuntary exclusion. Involuntary exclusion may be as a result of a range of factors including low incomes or high risk, discrimination, contractual and informational framework to price or the kind of products provided (Claessens, 2006).

Price of financial services may be prohibitively high or the features of the product being offered may not be suitable for certain population groups. For example, micro-entrepreneurs might be unwilling to take out loans that require them to pledge their personal assets as collateral, as it is commonly done in most developing countries. Conversely, Kempson (2006) outlines different underlying reasons or typologies for financial exclusion. These include access barriers such as identity requirements, the terms and conditions of bank accounts, levels of bank charges, physical access problems brought about by bank branch closures and psychological and cultural barriers. A large number of bankable adult populations in Africa seem to have no financial access as well as usage. In other words, it appears that they are being financially excluded from the economy. Recent studies reveal that most adult and bankable citizens in Africa are not fully financially included within the economy (Demirgüç-Kunt & Klapper, 2013). For instance, nearly three billion adults in the world are reported to have been financially excluded (Swamy, 2014). Further, Demirguc-Kunt and Klapper (2012) opine that out of the 50% of banked adults, who have individual or joint accounts at formal financial institutions, only 22% have savings accounts. The situation in Africa is even grimmer; the recent global financial inclusion index shows that “less than a quarter of adults have an account with formal financial institutions (Demirguc-Kunt & Klapper, 2012). This gives apparent exasperating contemplation that majority of African adults in many African countries appears to be financially excluded and perhaps use informal financial channels to save and borrow. They perhaps still save in local boxes (Aderonke & Charles, 2010).
The financial system in Kenya has grown rapidly in the last decade. Though the largest economy in East Africa, it has failed to provide adequate access to banking services to the bulk of the population, and lending is skewed in favor of large private and public enterprises in urban areas. This is evidenced by distribution of bank branches at 93% in urban and rural areas and 7 percent in arid and semi-arid areas (Beck et al., 2010). Kenya has a population of 46 Million people and adults with accounts in formal financial institutions in the year 2014 stood at 55.2%, for formal savings 30% and for formal borrowing 15% according World Bank data (Demirguc-Kunt, Klapper, Singer, & Peter, 2015). This information demonstrates that there is financial exclusion and that the poorer sections of the society, who are mainly found in rural, arid and semi-arid areas, have not been able to access suitable financial services. However, a significant proportion of those with access to formal financial services as well as those who are systematically excluded subscribe to informal financial services which characteristically have low or non-existent entry barriers. Informal finance has been defined as contracts or agreements conducted without reference or recourse to the legal system to exchange cash in the present for promises of cash in the future (Schreiner, 2001).

Historically, this was seen as highly exploitative (Sanderatne, 2003). Some factors such as high transaction costs, Institutional barriers, and numerous bureaucratic requirements endear formal financial seekers to opt for Informal finance (Aryeetey & Hyuha, 1990). It is also sometimes believed that most of the urban demand for savings and credit facilities from informal financial organizations substitute for demand from formal sources. Elements of complementarity may also influence the relationship (Aryeetey & Gockel, 1990). For example, a study on formal and informal institutions’ lending policies and access to credit by small-scale enterprises in Kenya found that credit rationing is significantly higher in the formal financial markets as compared to the informal and semi-formal financial sectors in Kenya (Atieno, 2001). Atieno (2001) found that concern with loan repayment among formal lenders determines the amount of credit a borrower gets while in the informal financial sector, the main determinant is their limited resource base. She concluded that lending terms imposed by the formal financial sector (emphasizing collateral security) ration a large number of borrowers out of the credit market leaving only a few who can afford the required collateral. In contrast, some of the borrowers do not get what they want from the informal sector due to the limited resource base creating a credit gap in the rural markets in Kenya. However, the limitation of this study is that it focused on the informal financial sector landscape in separate geographical areas.

Problem Statement
Usage of formal financial services is still low. The utilization of formal financial services by the Agricultural sector in Kenya is about 38 percent, which is low compared to the 78 percent reported for the manufacturing sector. About 66.9 percent of those who derive livelihoods from Agriculture did not have bank accounts in 2015, and 42.6 did not have access to credit in the same period. Moreover, 21.8 percent of those who derive their livelihood from Agriculture are reported to use informal financial services, while, on average, 16.8 percent did not access insurance services in 2015. Thus on average, 37.1 percent of the Small holder farmers in Kenya had low utilization of formal financial services (Fin Access, 2016). In view of the low utilization of formal financial services by the smallholder farmers in Kenya, there is need to determine the suitable financial inclusion approaches that could raise the level of utilization of the formal financial services among the small holder farmers and hence increase the productivity in the agricultural sector. Otherwise the negative effects of low utilization of formal financial services would impact negatively on agriculture which is an important tool for promoting both national and rural development. This study, therefore, sought to address this issue and establish the moderating effect of informal financial services on utilization of formal financial services among small holder farmers in Kenya.

Objective of the Study
The objective of the study is to determine the moderating effect of informal financial services on utilization of formal financial services among small holder farmers in Kenya.

Research Hypothesis

\[ H_0: \text{There is no significant moderating effect of informal financial services on utilization of formal financial services by the small holder farmers in Kenya.} \]

LITERATURE REVIEW
Gorith’s Theory of Business Refinancing
The study was grounded on the Gorith’s theory of business refinancing (1978) which postulates that credit absorption directly correlates to the rate of business investment, such that with high levels of investment, refinancing is required to fill the gap of more need for funds. The theory also holds that, whenever, business does not attain the much anticipated growth, less need for fresh capital is experienced, hence uptake of credit gets low. The theory has one major strength, that is, need for more funds is driven by the rate of business growth and this obeys the laws of trade cycles in which investment is done during periods of business recovery so that funds are not made idle in dead stocks. However, growth of a business or business recovery must be preceded by some economic activities undertaken in the business environment and this means that business operations must continue, yet some business entrepreneurs seek to wait for recovery to invest. Realities of trade cycles notwithstanding, crave for more funds for business investment generally rises with business growth. Since commercial agriculture is a never ending business cycle, it requires constant refinancing. The demand for funds especially for small holder farmers would, therefore, be continuous even in the absence of formal lending structures. Hence, Goriths theory of business refinancing provides meaningful insight into the role of informal financing on the development of small scale agriculture.

Empirical Review

Degryse and Ongena (2014) conducted a study on informal or formal financing or a blend of the two with evidence on the co-funding of Chinese firms. Using unique survey data, the study found that informal finance is associated with higher sales growth for small firms and lower sales growth for large firms. The study identified a corresponding effect between informal and formal finance for the sales growth of small firms, but not for large firms. Informal finance offers informational and checking advantages, while formal finance offers comparatively inexpensive funds. Co-funding, the concurrent use of formal and informal finance, is the best choice for small firms. The study was limited to Chinese firms.

De Klerk et al. (2013) study in South Africa also established that informal microfinance institutions are widespread, both in urban and in rural communities. These include at least 11 000 ‘stokvels’ – popular rotating savings and credit associations (ROSCAs) – village savings and loans associations (VSLAs) and burial societies. Some stokvels extend credit to members, some invest in assets that can generate income for the members, while some are used only to save funds towards a particular event such as the beginning of the school year. VSLAs, modelled along accumulating savings and credit association (ASCA) lines, are now playing an increasingly important role. The savings and credit groups (SCGs) promoted by Save Act in Kwa-Zulu Natal and the Eastern Cape are good examples. Typically, about two thirds of the savings of these groups is mobilized into loans at any moment. They are a particularly important source of capital for subsistence farmers: in many instances SCGs time the annual distribution of savings and interest to coincide with the beginning of the summer crop planting season, thereby providing the funds necessary to purchase seed and fertilizer, without having to borrow for this high-risk purpose and without needing to generate a flow of cash income to service and repay a loan.

Johnson and Arnold (2012) also found out that informal services in the form of rotating savings and credit associations (ROSCAs) are more widely used than banks, and had remained so in between 2006 and 2009. Their use is positively biased towards women and those with their own phones and own businesses and is now more biased towards those who are educated to secondary level than it was in 2006. This suggests that informal services are, to a degree, complementary to rather than competing with formal and semi-formal services at this stage of financial-sector development. Wachira and Kihiu (2012) in their study further established that distance of separation from a bank continues to pose a big challenge on access to formal financial services. Households have been observed to shift their preference from formal and semi-formal financial services towards informal services. How then can Kenya achieve a more financially inclusive society? Policy makers must first be aware of the implicit factors explaining the huge financial exclusion in most developing countries and the benefits that greater inclusiveness have on the development agenda. However, there is a wide gap particularly in Kenya and Africa in general concerning access constraints and implicit socio-economic factors driving financial exclusion.

METHODOLOGY

The study adopted a cross-sectional survey research design that allowed the collection of data from several cases in different contexts at the same time, while ensuring that a variety of views over the same issue are captured in a short time increasing the external validity of the study. The study covered smallholder farmers in Nakuru, Kirinyaga and Busia Counties of Kenya. These locations are within the same Livelihood Zones (Lawrence, King & Holt, 2011). In this study, a target population of 2,875,325 comprising smallholder farmers from the three counties was used. In sampling small holder farmers, a simple random sampling approach was used. In the first stage, a purposive sample
of three counties of Nakuru, Kirinyaga and Busia was made and a selection of two Sub-counties in each County done. In the second stage, a stratified proportionate to size random sampling (sampling proportionate to the total number of farm families per county) was made for Nakuru, Kirinyaga and Busia respectively with the counties forming the strata. In the third and final stage, the smallholder farmers in each sub-county were selected through snow-ballling. A total of 496 smallholder farmers were selected in Nakuru, Kirinyaga and Busia counties. Data was collected using copies of a researcher developed semi-structured questionnaire. Descriptive, correlation and multiple linear regression analyses were then conducted using stata in order to address the objective.

RESULTS AND DISCUSSION

Utilization of Formal Financial Services

Majority (45.8%) of respondents frequently utilize formal financial services for saving. This concurs with the fact that basic savings products, eliminating account opening costs in Kenya, significantly increased uptake, overall savings, and investment levels among market vendors (Dupas & Robinson, 2013a). Savings accounts for low income households demonstrate strong potential to improve client welfare. Beneficial impacts of savings accounts require account features that help people overcome behavioural biases like fortifying willpower and memory.

<table>
<thead>
<tr>
<th>Utilization</th>
<th>Most frequently</th>
<th>Frequently</th>
<th>Moderate</th>
<th>Seldom</th>
<th>Never</th>
<th>χ²</th>
<th>p&gt;χ²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deposits</td>
<td>10.6</td>
<td>45.8</td>
<td>36.7</td>
<td>6.4</td>
<td>0.4</td>
<td>211.83</td>
<td>0</td>
</tr>
<tr>
<td>Cash withdrawals</td>
<td>9.1</td>
<td>43.9</td>
<td>36</td>
<td>10.6</td>
<td>0.4</td>
<td>187.55</td>
<td>0</td>
</tr>
<tr>
<td>Accessing loans</td>
<td>1.1</td>
<td>4.2</td>
<td>18.9</td>
<td>7.6</td>
<td>68.2</td>
<td>407.02</td>
<td>0</td>
</tr>
<tr>
<td>Input loan</td>
<td>1.9</td>
<td>5.3</td>
<td>1.9</td>
<td>90.9</td>
<td>0</td>
<td>612.46</td>
<td>0</td>
</tr>
<tr>
<td>Insurance</td>
<td>0.4</td>
<td>2.3</td>
<td>1.1</td>
<td>2.3</td>
<td>93.9</td>
<td>902.40</td>
<td>0</td>
</tr>
<tr>
<td>Financial Literacy</td>
<td>0.4</td>
<td>2.7</td>
<td>6.8</td>
<td>1.9</td>
<td>88.3</td>
<td>771.76</td>
<td>0</td>
</tr>
<tr>
<td>Investment Opportunities</td>
<td>0.8</td>
<td>1.9</td>
<td>4.5</td>
<td>2.7</td>
<td>90.2</td>
<td>813.01</td>
<td>0</td>
</tr>
<tr>
<td>Safe documents</td>
<td>0</td>
<td>0.4</td>
<td>1.5</td>
<td>3</td>
<td>95.1</td>
<td>691.79</td>
<td>0</td>
</tr>
<tr>
<td>Pension</td>
<td>1.1</td>
<td>2.3</td>
<td>0.8</td>
<td>0.8</td>
<td>95.1</td>
<td>930.21</td>
<td>0</td>
</tr>
</tbody>
</table>

The findings also indicate that most of the respondents had never accessed loans from their banks (68.2%). Most of the other services are largely never or seldom used; 90.9% of the respondents seldom Input loans. The respondents who never use Insurance services are 93.9%. This is in line with the study by Karlan et al., (2016) which argued that despite the potential of insurance products to provide a “risk floor” for farmers and encourage higher productivity investments and behaviour, uptake at market prices is extremely low so micro insurance is not at scale anywhere except when heavily subsidized by the government. There was also poor uptake of financial literacy services 88.3%, Investment Opportunities 90.2%, safe custody of documents 95.1%, and Pension 95.1%. The results show the need for increased use of formal financial services. Despite the fact that financial inclusion begins with having an account, its rewards stem from actively using that account in the management of risk, utilizing it for savings and making or receiving payments from the account. This study implies therefore, that there is need to increase account ownership as well as assist people who have accounts make better use of them by accessing services.

Utilization of Informal Financial Services

There was need to establish the subscription of farmers to informal financial services so as to determine whether this affected their utilization of formal financial services. As such, the farmers were asked how they accessed financial services without using their bank accounts. The results are given in Table 2.

<table>
<thead>
<tr>
<th>Utilization</th>
<th>Frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family</td>
<td>39</td>
<td>16.8</td>
</tr>
<tr>
<td>Friends</td>
<td>73</td>
<td>31.5</td>
</tr>
<tr>
<td>Chama</td>
<td>89</td>
<td>38.4</td>
</tr>
<tr>
<td>Shylocks</td>
<td>31</td>
<td>13.3</td>
</tr>
<tr>
<td>Total</td>
<td>232</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Informal Access to Financial Services

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The findings in Table 2 indicate that majority (38.4%) of the farmers accessed financial services informally through their chamas while 31.5% used their friends to obtain financial services. Others still sourced financing from their families (16.8%) and also from shylocks (13.3%).

**Moderating Effect of Informal Financial Services on Utilization of Formal Financial Services**

The study also sought to test the moderating effect of informal financial services on utilization of formal financial services among small holder farmers in the three counties. The Informal Financial Services (IFS) was included as a variable in the robust financial inclusion on utilization of formal financial services model and estimated as shown in Table 3. The results in Table 3 indicate that there was a very small change ≤ 1% in $R^2$ when the informal financial services were introduced as a moderator of financial inclusion factors on informal financial services among small holder farmers in the overall model. Thus, it is evident that the inclusion of informal financial services in the model was not sufficient to produce any appreciable change in the $R^2$, hence, the moderating effect was negligible (< 1%). Therefore, based on the moderation rule by Mackinnon et al., (2007), the informal financial services did not have a moderating effect on utilization of formal financial services among small holder farmers. As such it could not be taken as a moderating variable for financial inclusion on utilization of formal financial services among small holder farmers in Kenya. However, it can be seen that informal financial services a complementarity effect on the formal financial services (Aryeetey & Gockel, 1990). The smallholder farmers who used formal financial services also used informal financial services.

**DISCUSSION OF FINDINGS**

The findings revealed that informal financial services did not have a moderating effect on utilization of financial services among small holder farmers according to the moderation rule proposed by Mackinnon et al. (2007).

**Table 3. Moderating Effect of Informal Financial Services on Utilization of Formal Financial Services**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Busia</th>
<th>Nakuru</th>
<th>Kirinyaga</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of respondents</td>
<td>2.358</td>
<td>7.142</td>
<td>6.512</td>
<td>7.615</td>
</tr>
<tr>
<td>(0.78)</td>
<td>(3.75)</td>
<td>(1.35)</td>
<td>(.499)***</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>-12.050</td>
<td>1.395</td>
<td>-3.405</td>
<td>-4.845</td>
</tr>
<tr>
<td>(-1.57)</td>
<td>(0.29)</td>
<td>(-.37)</td>
<td>(-1.28)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>-3.852</td>
<td>-.992</td>
<td>-7.445</td>
<td>-2.987</td>
</tr>
<tr>
<td>(-1.32)</td>
<td>(-.56)</td>
<td>(-2.00)</td>
<td>(-2.09)**</td>
<td></td>
</tr>
<tr>
<td>House hold size</td>
<td>1.529</td>
<td>-.886</td>
<td>-.728</td>
<td>-1.184</td>
</tr>
<tr>
<td></td>
<td>(1.59)</td>
<td>(.72)</td>
<td>(-.71)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>-5.114</td>
<td>-15.564</td>
<td>7.319</td>
<td>(5.26)**</td>
</tr>
<tr>
<td></td>
<td>(4.98)**</td>
<td>(0.134)</td>
<td>12.124</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td>(-0.60)</td>
<td>(-2.68)**</td>
<td>(.72)</td>
<td>(-.71)</td>
</tr>
<tr>
<td></td>
<td>.005</td>
<td>.505</td>
<td>-.026</td>
<td>.139</td>
</tr>
<tr>
<td>Institutional</td>
<td>(.04)</td>
<td>(5.72)**</td>
<td>(.11)</td>
<td>(2.11)**</td>
</tr>
<tr>
<td>Technology</td>
<td>-.21</td>
<td>(.81)</td>
<td>(.22)</td>
<td>(.78)</td>
</tr>
<tr>
<td>Product differentiation</td>
<td>.056</td>
<td>.083</td>
<td>-.370</td>
<td>-.272</td>
</tr>
<tr>
<td></td>
<td>(0.26)</td>
<td>(.42)</td>
<td>(-.97)</td>
<td>(-2.04)**</td>
</tr>
<tr>
<td>Income</td>
<td>1.479</td>
<td>.510</td>
<td>.559</td>
<td>1.279</td>
</tr>
<tr>
<td></td>
<td>(1.89)*</td>
<td>(1.45)</td>
<td>(1.02)</td>
<td>(4.90)</td>
</tr>
<tr>
<td>Land size</td>
<td>2.784</td>
<td>1.351</td>
<td>1.478</td>
<td>1.737</td>
</tr>
<tr>
<td>Informal Financial</td>
<td>(0.79)</td>
<td>(.87)</td>
<td>(.53)</td>
<td>(1.37)</td>
</tr>
<tr>
<td>Services</td>
<td>-4.491</td>
<td>5.546</td>
<td>6.288</td>
<td>-9.85</td>
</tr>
<tr>
<td>F</td>
<td>(-.62)</td>
<td>(1.28)</td>
<td>(-.67)</td>
<td>(-.28)</td>
</tr>
<tr>
<td>F2</td>
<td>2.72</td>
<td>10.85</td>
<td>1.80</td>
<td>13.73</td>
</tr>
<tr>
<td>Adjusted R2</td>
<td>0.2458</td>
<td>0.3183</td>
<td>.0.2169</td>
<td>0.2544</td>
</tr>
<tr>
<td>Sig</td>
<td>0.1553</td>
<td>0.2889</td>
<td>0.0964</td>
<td>0.2359</td>
</tr>
<tr>
<td>0.0032</td>
<td>0.0000</td>
<td>0.0625</td>
<td>0.0000</td>
<td></td>
</tr>
<tr>
<td>No. of Observations</td>
<td>113</td>
<td>292</td>
<td>91</td>
<td>496</td>
</tr>
</tbody>
</table>

*Dependent Variable: Formal Financial Services Utilization
*b. The t-values are in parenthesis. *, **, *** represent significance at 10%, 5%, and 1% respectively.
This was evidenced by the observation that majority of the independent variables in the counties were largely unaltered by the introduction of IFS as a moderating variable. These findings agree with Degryse and Ongena (2014) whose study on informal or formal financing or a blend of the two with evidence on the co-funding of Chinese firms found that informal finance is associated with higher sales growth for small firms and lower sales growth for large firms suggesting that the informal sector promoted utilization of financial services. The study further identified a corresponding effect between informal and formal finance for the sales growth of small firms, but not for large firms. The results are also in agreement with Fridell (2007) investigation on the roles of informal, formal and semi-formal micro credit in Jordan credit that established that accessibility and low application costs are the key advantages of informal credit, while these are often perceived to be disadvantages of formal credit. Informal finance was found to be very flexible since the dominant source of informal credit seems to be family, friends, neighbours. De Klerk et al. (2013) study in South Africa also found that informal financing from savings and credit groups (SCGs) mitigated access to capital and was a particularly important source of capital for subsistence farmers.

CONCLUSIONS
The study concludes that the presence of informal financial services would modify the levels of utilization of formal financial services among small holder farmers in the country. From a theoretical standpoint, the results point out to the fact that the demand for refinancing small holder farming enterprises is high (Gorith, 1978) since commercial agriculture is a never ending business cycle and the demand for funds especially for small holder farmers would, therefore, be continuous even in the absence of formal lending structures. Therefore, avenues of alternative financing such as those in the informal sector still play an important role towards this end. The complementary role of informal financing services is in line with Gorith’s theory of business refinancing (1978), therefore, is seen as filling the gap of more need for funds by providing a source of refinancing.

RECOMMENDATIONS
The moderating effect of informal financial services on utilization of formal financial services among small holder farmers was not established. The study recommends that the formal financial institutions develop products and work closely with informal financial services such as chamas as intermediaries to encourage more financial inclusivity and, hence, more utilization of financial services. The national policy makers should also encourage the registration of chamas and come up with appropriate legislation to anchor their practices on a legal framework.

LIMITATIONS OF THE STUDY
While this study produced meaningful results, it was prone to several limitations which in turn provide avenues for further research. First, the study focused only on three Counties of Busia, Nakuru and Kirinyaga. A study based on three counties limits the generalizability of the results across all Counties. Although industry and area specific research enhances internal validity, consideration should be taken when generalizing to other sectors and the population. Secondly, the results of this study are based on self-reported data of the smallholder farmers. Though they are reliable, information that is generated by respondents is not the only source of information that can explain their levels of utilization of formal financial services. At the same time questionnaire and interview schedules though good tools for data collection, panel data could yield more information. Thirdly, the undertakings by smallholder farmers have long term effects that can only be evaluated through a study for the same smallholder farmers for a long period of time.

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THE ROLE OF KNOWLEDGE RESOURCES IN LEVERAGING COMPETITIVE ADVANTAGE FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT
Knowledge resources are critical sources of competitive advantage in this era of Industry competition. Many large companies, public institutions and non-profit organisations have resources dedicated to internal Knowledge Management (KM) efforts, often as a part of their business strategy, Information Technology (IT), or Human resource management departments. Several consulting companies provide advice regarding KM to these organisations. However, there is little empirical work that has been carried out to articulate how competitive advantage can be attained through knowledge resources. Knowledge management efforts essentially focus on organisational objectives such as improved performance, competitive advantage, innovation, the sharing of lessons learned, integration and continuous improvement of the organisation. Despite the fact that they overlap with organizational learning, these efforts may be distinguished from it by a greater emphasis on the management of knowledge as a strategic asset and on encouraging the sharing of knowledge, thus making Knowledge Management an enabler of organisational learning. This study seeks to investigate the role of knowledge resources as a crucial factor in leveraging entrepreneurial research and education for sustainable development through an extensive literature review in the area of knowledge management. Results portray people, processes and technology as key components used to effectively manage knowledge. Based on these findings it is concluded that knowledge resources are a key driver of organisational performance and a critical tool for organisational survival, competitiveness and profitability. Thus creating, managing, sharing and utilizing knowledge effectively is vital for organisations to take full advantage of the value of knowledge. The study recommends that an organisation should make a deliberate move to link its people, processes, and technology to reap the benefits of knowledge resources for the purpose of its survival.

Keywords: Knowledge management, resources, talent management, processes, people, competitiveness

INTRODUCTION
An organization’s greatest asset is undoubtedly its people. When the right team is sharing the right knowledge, the competitive edge is evident. However, the challenge an organization faces is retaining those people. Coincidentally, the talent employees, who make an organization successful, are also the ones who are looking for the opportunity to grow their careers. They desire upward mobility and those in leadership are obliged to assist them in this quest. To retain these talent workers, there is need to eliminate organizational hierarchies by flattening communication and allowing information to be accessed by all. This way, team members can rely on and learn from the expertise of others, from all levels of the organization. Without the right tools in place, there is an inevitability that those valuable people will eventually move on. But, a knowledge management initiative that allows communication and data sharing between departments offers those go-getters the power to succeed. With access to information that they might not have in an organization that does not have a knowledge management initiative in place, they can add value to the company in ways they could not otherwise. Zhang (2008) has identified key considerations regarding knowledge management: knowledge should be utilized and shared within an organization and stored in its most explicit forms. Knowledge management should be seen as an important enabling factor in innovation and learning and its purpose is to make organizations more efficient and effective, and to be aligned with organizational strategy for the support of achieving organizational objectives (Zhang, 2008) Having the right culture and tools in place to help the talent workers find information will help enable them to grow within the company and hence be retained. The retention of the talent workers contributes greatly to the sustainability of the organization.

PURPOSE OF THE STUDY
The purpose of this study was to assess the role played by knowledge resources in offering competitive advantage to an organisation for sustainable development

METHODOLOGY
A systematic review methodology was adopted for this study. This is appropriate in understanding a concept from various empirical studies. The authors did an extensive review of existing literature on knowledge management and drew conclusions guided by the reviewed works.
The Concept of Knowledge

Armstrong and Taylor (2014), defines knowledge as what people understand about things, concepts, ideas, theories, procedures and practices. It can be described as know-how or, when it is specific, expertise. Ryle (1949) distinguished between ‘knowing how’ and ‘knowing that’. ‘Knowing how’ is the ability of a person to perform tasks, and ‘knowing that’ is holding pieces of knowledge in one’s mind. Now, as in the past, people use face-to-face and “hands-on” methods to convey their “knowhow” or tacit knowledge to others (Hansen, Nohria & Tierney, 1999). According to Blackler, (1995), rather than regarding knowledge as something that people have, it is suggested that knowing is better regarded as something that they do. He also noted that: knowledge is multifaceted and complex, being both situated and abstract, implicit and explicit, distributed and individual, physical and mental, developing and static, verbal and encoded. Explicit knowledge can be relatively easily formulated using words, figures and symbols, and it can be digitized.

This type of knowledge can also be relatively easily communicated to others using Information Communication and Technology (ICT). On the other hand, Tacit knowledge is the kind of knowledge that is difficult to transfer to another person by means of writing it down or verbalizing it. It is the unwritten, unspoken, and hidden vast storehouse of knowledge held by practically every normal human being, based on his or her emotions, experiences, insights, intuition, observations and internalized information. Tacit knowledge is rooted in action (practice) and is related to specific contexts (Polanyi, 2009). It is difficult to communicate this type of knowledge to others in the form of information, because it is difficult to codify or digitize. More often than not, tacit knowledge is an organization’s most important strategic resource, because it is difficult for other organizations to acquire and use it, and because it is embedded in the specific problems an organization has to solve. Tacit knowledge can therefore be described as an important strategic capability of organizations. Additionally, there are two other important categories of knowledge: hidden knowledge and implicit knowledge (Kirzner, 1982; Grant, 2003). Hidden knowledge is summed up as “what we do not know we do not know”, which many claim constitutes the basis for creativity and innovation (Kirzner, 1982). It has also been described as the management of ignorance, which is the key issue for companies as it is for society (Grant, 2003), and has been referred to as previously unthought-of knowledge. Kirzner (1982), asserts that this type of knowledge provides opportunities for developing something that is creative and new, explaining that people do not know what it is that they do not know. Implicit knowledge is the knowledge an organization possesses, and which is spread throughout various departments, but which is not utilized or put into productive practice, because knowledge boundaries prevent assimilation of what an organization knows. It may also be difficult to integrate this knowledge into the larger social system, because there are academic, social, economic, professional and cultural boundaries that prevent this.

Knowledge Resources

Knowledge resources (KR) are non-tangible organizational resources that can be classified into three main components: human resources; structural resources; and relational resources: The mere identification of competitive factors, opportunities and threats, as suggested by Porter (1980), is not enough for an efficient company strategy. There is need to determine which competences and resources are available in the organization in order to make accurate assessments of a company’s strategic competences. As different companies develop different distinctive competences, the most important question is whether the company has appropriate competences in order to reach its targets. The concept of competitiveness based on competences was developed in 1959 and further developed by Barney in 1986. He views the firm as a collection of individual unique resources which are increasingly knowledge-based (Barney, 1986). At the heart of this knowledge based resources are the human resources who refer to internal stakeholders, such as senior managers and employees, and to their attributes, that is knowledge, abilities, skills, experiences and innovativeness. These are becoming critical resources for organisations, particularly because they contribute to the ability to respond and adapt to a changing environment. Structural resources consist of all those things that remain in the organisation when the employees have left the building and are in some way owned or controlled by the organisation. Structural resources include ‘intellectual property’ and ‘infrastructural resources’. Intellectual property is owned by the company and protected by law and includes elements such as patents, trademarks and copyrights. Infrastructural resources consist of organisational characteristics such as methods and procedures and the organisational context provided to individuals to achieve strategic objectives. Therefore, structural resources include, but are not limited to, culture, processes, routines, and information and networking systems. Relational resources include the organisation’s brand and image in the marketplace, as well as its relationships with external stakeholders (such as government, customers, partners and retailers, suppliers, residents, etc.). Some of these resources are not owned by the organisation, but are relationships that are significant and require management. This tripartite classification of knowledge resources is known as intellectual capital and is a framing...
device for understanding Knowledge Resources (KR) and related elements. As a result, the concepts of knowledge resources and intellectual capital embrace all kinds of non-tangible organisational resources, either formally owned or used, or informally deployed and mobilized. Knowledge resources can be viewed as the containers that store the explicit knowledge for sharing purposes and identify learning objects, articles, books, software programs and informal messages as examples of these resources.

Knowledge Management
Knowledge Management is the process of capturing, distributing, and effectively using knowledge (Davenport & Prusak, 1998). It can also be viewed as the process of creating, sharing, using and managing the knowledge and information of an organisation. It refers to a multidisciplinary approach to achieving organisational objectives by making the best use of knowledge. Knowledge management also refers to the systematic management of an organization's knowledge assets for the purpose of creating value and meeting tactical & strategic requirements. It consists of the initiatives, processes, strategies, and systems that sustain and enhance the storage, assessment, sharing, refinement, and creation of knowledge. It implies a strong tie to organizational goals and strategy, and it involves the management of knowledge that is useful for some purpose and which creates value for the organization.

Evolution of Knowledge Management
Knowledge has always been an important subject. It is considered a valuable resource for organizations and individuals, a precondition for success and a response to modern challenges. Although the growing significance of intangible assets was recognized during the second half of the 20th century, it was not until the last two decades of the 20th century that concepts of knowledge management and organizational learning became popular. The concept and terminology of Knowledge Management emerged within the management consulting community. With the onset of the Internet, those organizations quickly realized that an intranet, an in-house subset of the Internet, was a wonderful tool with which to make information accessible and to share it among the geographically dispersed units of their organizations. Not surprisingly, they quickly realized that in building tools and techniques such as dashboards, expertise locators, and best practice (lessons learned) databases, they had acquired an expertise which was in effect a new product that they could market to other organizations, particularly to organizations which were large, complex, and dispersed. However, a new product needs a name, and the name that emerged was Knowledge Management. The term apparently was first used in its current context at McKinsey in 1987 for an internal study on their information handling and utilization (McKinsey & Koenig, 2011). Knowledge Management went public, as it were, at a conference in Boston in 1993 organized by Ernst and Young (Prusak, 1999). Today, remarkable development of information and communication technologies (ICTs) is affecting various aspects of work and everyday life. New tools have emerged and are being used for data gathering, storing and analysing. Information and knowledge is shared quickly among individuals and groups within an organization through various channels, (sometimes) even without a formal Knowledge management programme. The traditional workplace is diversifying, creating a need for team-based, collaborative, and digitally-connected work environments. With the way the talent pool is spread across countries, the perfect fit for a company might not be local and might not be willing to relocate. The right knowledge management solution therefore allows teams to share and communicate company data without being in the same building. The talent pool is no longer restricted. Companies can grow their teams with the best candidates, no matter where they are, gaining the upper hand on hiring the best to ensure success.

Importance of Knowledge Management
Knowledge Management (KM) can be viewed as an activity aimed at creating the information environment that is favorable to successful research and development, rich, deep, and open communication and information access and to deploy it broadly across the firm. It is clear that we are in the post-industrial information era in which we are all information workers. Peter Drucker once commented that the product of the pharmaceutical industry wasn’t pills, it was information. The research domain, and in particular the pharmaceutical industry, has been studied in depth with a focus on identifying the organizational and cultural environmental aspects that lead to successful research (Koenig, 1992). The salient aspect that emerges with overwhelming importance is that of rich, deep, and open communications, not only within the firm, but also with the outside world. The logical conclusion, then, is to attempt to apply those same successful environmental aspects to knowledge workers at large, and that is precisely what KM attempts to do. Managing knowledge resources in an organization is as significant as other assets are managed. In this competitive era, knowledge management is a central factor that is necessary for an organization to achieve success. Globally, managers are endeavoring hard to share and transfer knowledge within and outside the purview of their organizations. In spite of the increasing interest and trends in knowledge management and knowledge sharing, organizations face certain issues and challenges.
Knowledge Management Strategies
Hansen et al (1999) identified two approaches to knowledge management strategy: the codification strategy and the personalization strategy. In the codification strategy, knowledge is carefully codified and stored in databases where it is explicit and can be accessed and used easily by anyone in the organization. Knowledge is obtained from the person who developed it, made independent of that person and re-used. It is stored in electronic form to allow many people to search for and retrieve codified knowledge without having to contact the person who originally developed it. In the personalization strategy, knowledge is largely retained by the person who developed it and is shared mainly through direct contact. This strategy involves ensuring that tacit knowledge is passed on. The sharing is achieved by creating networks and encouraging personal communication between individuals and teams through conferences, workshops, communities of practice, brainstorming and one-to-one sessions.

DISCUSSION
The emergence of knowledge-based economies has placed an importance on effective management of knowledge. The effective management of knowledge has been described as a critical ingredient for organisations seeking to ensure sustainable strategic competitive advantage. To strengthen their innovation potential, companies need to increase investment devoted to knowledge creation and innovation, so that they can build new products, services, or procedures (Grimsdottir & Edvardsson, 2018). Simply put, knowledge management allows organizations to get the right information to the right people at the right time. Given the rapid rate at which consumers’ expectations and the industry landscape changes, defining the right information, the right person, and the right time can be tricky, if not impossible. An effective knowledge management strategy enables an organization to create, apply, and share information, breaking down silos and increasing usage of valuable data. The right strategy sustains organizational objectives as technologies evolve, keeps companies on the bleeding edge of industry trends, and pushing one step ahead of the competition at all times. In order to be successful and enjoy competitive advantage, organizations heavily depend on knowledge that has become a resource and critical success factor for the organizations (Yi, 2009). The reason of increased importance of knowledge lies in the fact that effective management of knowledge in an organization brings many positive outcomes that lift the organization to the sphere of success. Literature demonstrates that knowledge is the most important precursor for continuous innovation and success (Drucker, 1999). The benefits of being a knowledge-intensive organization does not end here, as effective and prudent utilization of knowledge accumulated from the pool of knowledge residing in an organization also results in increased productivity, amplified performance, and improved innovation capability (Lin, 2007). Knowledge management is as important as other assets and resources for the survival and success of the organization.

With the growing importance of knowledge management in organizations, facilitation of tacit knowledge sharing among individuals (which is usually centered on sharing experiences, skills, and knowhow) has been a topic of interest for organizations (Taylor, 2007). However, sharing and transfer of knowledge is a challenge because of the unstructured nature of the tacit knowledge and many hindrances that impede the successful flow of knowledge. Previous research has elaborated many factors in the form of enablers, facilitators, motivators, inhibitors, barriers, and deterrents, which have an insightful effect on the tacit knowledge-sharing behavior of individuals (Li, 2010). One way to encourage individuals to share knowledge is to integrate reward for knowledge sharing into the culture of the organization. Research findings of Durmusoglu, Jacobs, Zamantili Nayır, Khilji, & Wang, (2014) revealed that knowledge is gained in the organization when the rewards are linked with the organizational culture. Moreover, when an organization rewards individuals for sharing knowledge in an organization, the individuals are motivated to share knowledge, and in turn, they learn from each other, thereby resulting in organizational learning. Research to date emphasizes the importance of rewards and motivation for knowledge sharing and transfer by clarifying the lack of rewards and motivation as barriers to knowledge sharing and transfer. Extrinsic and intrinsic motivations are not only antecedents to knowledge sharing, but also predictors of knowledge-sharing behaviors. Therefore, in order to facilitate knowledge sharing, organizations should develop an appropriate reward system, as well as sufficient motivation. Managing and utilizing knowledge effectively is vital for organisations to take full advantage of the value of knowledge. The attention and importance given to the acquisition of KM in literature as well as practice in the past years is also of necessity due to changes in the environment such as increasing globalization of competition, speed of information and knowledge aging, dynamics of both product and process innovations, and competition through buyer markets (Greiner, Bo¨hmann & Krcmar, 2007). In a knowledge based economy, KM is increasingly viewed as critical to organisational effectiveness and performance. Knowledge Management is an important and necessary component for organisations to survive and maintain competitive keenness and hence it is essential for managers and executives to consider KM as a prerequisite for higher productivity and flexibility in both the private and the public sectors. Many organisations have realized that technology-based competitive advantages are short-
lived and that the only sustainable competitive advantages they have are their employees and so to remain at the forefront and maintain a competitive edge, organisations must have a good capacity to retain, develop, organise, and utilise their employee competencies (GroÈnhaug & Nordhaug, 1992). The realization came that processes and technology alone are not sufficient to steer an organisation but its human resources are very fundamental for organizational success. Therefore, in order to manage knowledge effectively, attention must be focused on three key components: People, Processes and Technology.

Knowledge is an essential part of KM. Baloh, Desouza and Paquette (2011) contend that without having knowledge to manage, there would be no knowledge management. Knowledge basically refers to a collection or a body of information. This could mean that the information is embedded in the form of theories, processes, systems, or it could be voiced in form of opinions, theories, ideas and analysis. Essentially, the focus of KM is to connect people, processes, and technology for the purpose of leveraging knowledge. The first component of KM, people, is the source of knowledge. The ability of humans to think innovatively and uniquely, together with experiences and talents, make humans valuable sources of knowledge. People are the creators and consumers of knowledge because individuals consume knowledge from various sources on a daily basis, as well as creating knowledge. Fundamentally, KM starts with, revolves around, and ends, with people. It is therefore pertinent to consider people in KM strategy and implementation. People encounter evolving knowledge needs on daily basis and these needs should be met through tools, processes, systems and protocols to seek, incorporate and apply applicable knowledge. According to Drucker (1999), workers (people) need to be able to seek out knowledge, experiment with it, learn from it, and even teach others as they innovate so as to promote new knowledge creation. Having a KM program that recognizes the importance of people in an organisation is very vital for success.

The second component of KM is processes. Baloh et al. (2011) define processes, as mechanical and logical artifacts that guide how work is conducted in organisations. Processes govern work structures in organisations and are critical to the functioning of the organization hence it is imperative for a KM program to recognize their importance. Processes could be made of, and executed by, humans, machines, or a combination of the two. An essential requirement for KM is to be able to understand work processes and how to map them. By so doing, inputs, outputs, workforce, resources and work being conducted in a given process can be easily described. Mapping of processes helps to illustrate what is really going on in the organisation and how tasks are being accomplished. Knowledge needed to achieve tasks can then be expressed and necessary technology or human intervention can be positioned to meet these needs with the aim of increasing effectiveness and efficiency in the organisation. Technology, the last component of KM, is a critical enabler and significant component of a KM plan. With the advances in Information and Communication Technologies (ICTs), KM can be accomplished through technological solutions. ICTs facilitate collaboration between people and teams which are geographically dispersed. ICTs also facilitate KM activities through the codification of knowledge as well as rich and interactive forms of communication through the Internet. Whereas technology is important and can considerably enable KM, it is imperative to state that it is not a solution in and of itself. Technology does not make organization share knowledge, but rather, it facilitates the exchange if people want to share it. Putting an ICT-based KM system in place is not in and of itself going to make people utilise it, but the success of KM initiatives involves taking account of the socio-cultural factors which inhibit people’s willingness to share knowledge, such as conflict, trust, time or concerns about loss of power or status.

CONCLUSION
Knowledge Management (KM) is an important issue in the 21st century and its execution has become a necessary process for organizations to reach a level of sustainable development. Firms should treasure their own KM activities and accomplish the goal of sustainable operation through the promotion of effective KM activities. The study has depicted effective management of knowledge as a critical ingredient for organisations seeking to ensure sustainable strategic competitive advantage. It has also brought out the fact that processes and technology alone are not enough to drive an organization and showed that an organisation’s people (workers) and the knowledge they possess are critical in ensuring the success of an organization. Consequently, in order for an organisation to realize meaningful success, attention must be paid, not only to the processes and technology, but also on its workforce (the people who are the sources of knowledge).

RECOMMENDATION
From the findings of this study, it is recommended that an organization seeking to ensure sustainable strategic competitive advantage should design a method of creating, organizing, leveraging (sharing) and applying knowledge
resources. An organisation should make a deliberate move to link its people, processes, and technology to reap the benefits of knowledge resources for the purpose of its survival and development.

REFERENCES

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USE OF PEOPLE-TECHNOLOGY HYBRID FOR INNOVATION AND CREATIVITY IN KENyan HOTELS

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ABSTRACT
Technology application in hotels has highly contributed to product innovations and efficient service delivery processes. This has in turn changed the relevance of employees in service delivery systems. While many studies report the importance of technology in hotels productivity and efficiency, few attempts have been made to evaluate the integral impacts of technology on other system elements such as people. This study focused on evaluating the combined impact of technology and people integration on hotels innovation levels. The objectives were; to determine the significance of people as a major resource for hybrid, determining the importance of technology in facilitating a hybrid organization and to evaluate the relevant theories applied in developing a people-technology hybrid model. Secondary data was used in the methodology to get information. The population used was 21 journal articles of previous researchers. It used exploratory and descriptive research designs. Content analysis was used where information was organized in a check sheet showing work of previous researchers, similarities and difference in opinion, their contributions and gaps identified. The conclusions showed how hybrid applications in hotel industry can largely be devoted to handle dissatisfied people of the hotel. Unfortunately results indicated hotel decision makers didn’t seem to realize importance of hybrid technology for the purpose of developing business strategies and, therefore it was generally not used in hotels for high-level decision-making. The hotel industry should apply the people-technology hybrid concept to improve their sales revenues and also hospitality researchers to focus their studies on hybrid of people and technology.

Key words: Hotel, People-Technology Hybrid, Creativity, Innovation, Transformation, Hospitality

INTRODUCTION
Hybrid technology is the combination of people and technology in the organization which grants the firm a unique ability to leverage both internal and external resources. The restaurant and hospitality industry have been moving towards and linked to technological and digital advancements for decades and are seeking to become even more personalized, connected, responsive and tailored to the individual experience. In these last decades, we have seen major swings through the incorporation of not only technology but also scientific growth. During these years, the traditional format or formula allowed computers and intranets to establish a presence to assist in controlling systems compatibility with human direction (Jasonos, M &McComick, 2017).

Technology include aspects such as Information technology, online platforms, and social media, has dominated world market. It has provided an opportunity of engaging and facilitating resources from customers and employees, through this firms have been able to get valuable information such as ideas from employees, feedback from customers which has enabled them build on the strength and also improve on the weaknesses (Bilgihan, Okumus, Khal Nusair, & Joon-Wuk Kwn, 2011; Chahal & Kumar, 2014; Hammidi et al., 2015; Zhang, Kandampully, & Bilghian, 2015). People in the organization include the customers and employees who makes up integral resources to the hotel firms (Gruman & Saks, 2011; Kusluvan, Ilhan, & Buyruk, 2010). The persons who work within the organization are internal resource of the firm and they majorly consist of the employees (Berry, Carbone, & Haeckel, 2002; O'Reilly & Pfeffer, 2000). To enhance good performance then the hotel firms have to facilitate a suitable service climate, culture, and freedom to be able to gain in terms of their ability and creativity (Akroush et al., 2013; O'Reilly & Pfeffer, 2000). The people who are regarded as being external to the organization include loyal customers, who always talk positive about the organization and are ready to spend their resources in the organizational product at any particular price and time. (Bansal, Mendelson, & Sharma, 2001; Bartlett & Ghoshal, 2013; Kandampully, Zhang, & Bilghian, 2015; Menguc, Auh, Fisher, & Haddad, 2013).

Objectives
i. To determine the significance of people as a major resource for hybrid organization
ii. Determining technology as an important facilitator of a hybrid organization
iii. To evaluate the relevant theories applied in developing a people-technology hybrid model

METHODOLOGY
The researcher used secondary type of data where information was collected from various researchers, the sources involved journal articles previously researched on globally and also some of the hospitality Information Technology books were used to help with information relevant to the study. The population was 21 journal articles and the researcher used 11 of the articles as the sample size based on the relevance to the topic of review while the research design used were descriptive and exploratory studies. The researcher then collected and organized the work in a check-sheet showing the information coverage from various authors regarding their context they used the variables and the findings of their work. A table was formed (Table 1) with rows and columns to analyze the results from various authors.

Content Review
The literature review of people-technology was done by assessing the work of the previous researchers in regard to the year in which their work were published and also in terms of how relevant they are to the topic of the study, some objectives were formulated to assist in enhancing the scope of the study.

Significance of People as a Major Resource in a Hybrid Organization
Customers and employees contribute to creativity and innovation through feedback, while employees can give comments which may be ideas for improving the hotel products and process. For any organization to succeed in achieving its goal and objectives then the creative mind of its internal and external people must be involved and through that then Innovation will be significantly achieved (Prahalad & Ramaswamy, 2003). People can be provided with the various technological platforms which can enable them to be innovative (Bugshan, 2014; Lee, Olson, & Trimi, 2012; Zhang et al., 2015). The firms or hotel industries which are only focusing on technology for the innovation is likely not achieve a greater success because its not possible for technology alone but only when people such as employees are involved is when the success of the innovation can be realized. (Fairbank & Williams, 2001; Im & Workman, 2004; Lazarevic, 2012; Zhang et al., 2015). Creating a mechanism to allow firms to tap into people's creative minds thus has become a strategic priority of many leading hospitality organizations.

The customers in the century were viewed as being individual and not easy to get a forum where he can interact with other customers but in the current world customers are very social and they have various ways which can be able to interact such as use of word of mouth where they can easily share their experience of the hotels product with other customers (Gligorijevic & Luck, 2012). Customers who are very social represent the voices and concerns of many of them who may not be able to share but they are of the same minds (Bugshan, 2014; Zhang et al., 2015). Hotel industry consider engaging and enabling social customers so as to have that as an effective strategy and the idea generation can result when the employees are well catered for hence enabling them to be able to read the customer need (Lages & Piercy, 2012). Employees who are directly interacting with the customers are the ones who can get to learn more about the customers (Schneider & Bowen, 1985).

The hotel firms should to select and recruit right employees well qualified hence and able to understand customers’ requirements so they can get their expectations met by the organization, the employees should be given a conducive environment and appropriate reward schemes that is able to motivate employees hence will be able to work for the betterment of the organization (Bowen, 2016). Hotels should have mechanisms put right in place where their customers can be able give their feedback after the consumption of the products and services. The people within the organization are supposed to be well taken care of and nurtured so that their creative minds can be exploited, this will enable the organization to utilize them in terms of their creativity and innovation and this can be supported by having an appropriate culture, climate in the organization. (Kim, Im, & Slater, 2013; O'Reilly & Pfeffer, 2000).

Determining technology as an important facilitator of a hybrid organization
Technological improvement and the inclusion of the Internet and social media within business models have changed the way hotels operate and conduct business. Recently most of the firms have only related technology with the productivity aspect of the firm but the current firms have realized the importance of considering customers as well (Jaakkola & Alexander, 2014). This can be attributed by the fact that focus is shifting from productivity to service and this makes the firms to not only concentrate on what is being offered but also how it is offered (Ordanini & Parasuraman, 2010). The firm enhancement of the various aspects of technology such as social media and Information Technology to its customers has brought a lot of impact on how they perceive an organization and also providing them with a platform in which they can be able to interact with other customers.
Table 1: Findings showing the previous studies conducted by various researches in the context of people hybrid technology or the related areas

<table>
<thead>
<tr>
<th>Authors</th>
<th>Contribution</th>
<th>Similarities</th>
<th>Difference in opinion</th>
<th>Gap</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newman &amp; Brownell, 2008</td>
<td>Applying communication technology</td>
<td>Technology enhances creativity</td>
<td>Introducing instant email and messaging</td>
<td>The people(customers, Employees) is not included</td>
<td>Efficiency in operation</td>
</tr>
<tr>
<td>Law et al., 2008</td>
<td>Comparison of theoretical models to understand the acceptance behavior</td>
<td>Behaviour enables understanding of technology acceptance</td>
<td>Behavior of information systems</td>
<td>The supplier side is not included in the theory</td>
<td>Perceived enhancement Attitude towards use</td>
</tr>
<tr>
<td>Revell et al., 2012</td>
<td>Technology unleashing people’s creativity</td>
<td>Technology enhances productivity</td>
<td>Peoples creativity</td>
<td>The supplier side is not included in the theory</td>
<td>Enhancement of productivity Encourages learning</td>
</tr>
<tr>
<td>Michel et al., 2013</td>
<td>A supportive service culture</td>
<td>Creativity leads to financial success</td>
<td>Creative minds</td>
<td>Technology and supplier side not included</td>
<td>Financial success</td>
</tr>
<tr>
<td>Comison &amp; Villar-Lopez, 2014</td>
<td>Strategy for implementing quality innovations</td>
<td>Innovation leads to organizational success</td>
<td>Organizational innovation</td>
<td>People and the management side is not included</td>
<td>More rewards and success to the organization</td>
</tr>
<tr>
<td>Bowen &amp; Scheider, 2014</td>
<td>Empowering service climate</td>
<td>A good service climate leads to job satisfaction</td>
<td>Employee creativity</td>
<td>Technology, people and supplier side not included</td>
<td>Boost employees job satisfaction Shaping of customers behavior</td>
</tr>
<tr>
<td>Bilghad &amp; Nejad, 2015</td>
<td>Embracing People as key resource in the organization</td>
<td>Good relationship among people is a resource to the organization</td>
<td>Innovation</td>
<td>The technology and supplier aspect not included</td>
<td>Enhances redesigning of services Create good relationship</td>
</tr>
<tr>
<td>Carlborg et al., 2015</td>
<td>Integrating people and technical factors</td>
<td>People and technical factors integration</td>
<td>Creative innovation</td>
<td>The supplier side is not considered</td>
<td>Gain of market leadership</td>
</tr>
<tr>
<td>Cherikov et al., 2015</td>
<td>Employee and Customer empowerment</td>
<td>Empowerment of people enhances efficiency in operations</td>
<td>Competitive advantage</td>
<td>The technology aspect is missing</td>
<td>Improves operating efficiency And customer service</td>
</tr>
<tr>
<td>Liu &amp; Mattila, 2015</td>
<td>Affectively committed customers exhibit a strong motivation</td>
<td>Committed customers makes a positive relationship with employees</td>
<td>Organizational citizenship behavior</td>
<td>The technology aspect is not included</td>
<td>Enhances positive relationship with hotel frontline employees Maintenance of positive attitude at work</td>
</tr>
<tr>
<td>Kandampully et al, 2016</td>
<td>People hybrid technology</td>
<td>Intermarriage of people and technology enhances improved service and satisfaction</td>
<td>Creativity and innovation</td>
<td>The supplier side( the management) is not included</td>
<td>Customers’ behaviors shaped by providers. Improvement of service to customers. Job satisfaction to employees</td>
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</tbody>
</table>
The various technological platforms provided by the organization can enable it offer a very stiff competition to its competitors which can make it difficult for them to match or cope, technology should be harnessed to both the people internal and external to the organization so as to realize the goal by involvement of everybody. Hotel industry and any other hospitality outlet management or the owners prefer technology as an integral aspect that maintain a close contact between customers and any other stakeholder (O'Connor & Murphy, 2004). Due to changes that the technology has enhanced most of the hotels would prefer use of mobile devices a method of innovating competitive services and this can enable them to stand very strong in the market (Kim, Park, & Morrison, 2008).

Technology adoption is progressive in hotel industry where the customers are provided with platforms where they can be able to communicate and even give their feedback regarding the level of their delightment or dissatisfaction (Law & Jogaratnam, 2005). This has made most of the hotel management to move fast into the adoption of technology so as to be able to better their services so as to realize a good return on their investment and also enhance efficiency in their operation. Some of the previous researchers discovered that technological systems such as Hotel Information Systems enhances productivity of the employees thereby translating to customers being served according to their expectations (Buhalis & Law, 2008). There is high transition of the way service is being done from the traditional systems to modern systems where in some cases such as hotel room reservations customers are being able to access the hotel details from their personal mobile phones and they can process their room reservation and check-in, this makes them feel motivated when they are facilitated with such systems.

Customers can connect to one another via social networks thus creating communities of co-innovators where they can be able to give their views in which service can be improved so as to meet their satisfaction. (Parmentier and Mangematin, 2011). When hotel firms engage their customers in the online platforms by addressing their concerns and also partnering with them in terms of giving special packages with online discounts given (Bugshan, 2014). We also argue that virtual platforms provide an ideal medium for nurturing the co-innovation experience, leading to the all-important trusting relationship between customers and the firm (Bugshan, 2014). Previous studies in some world class chain hotels such as Marriott, Starbucks, Disney, and Starwood has been able to cling as the market leaders because of their consistent improvement in terms of innovation. These hotels also has mechanisms of strengthening this competitive advantage by providing encouraging co-creation of products and service through exciting the online platforms for their customers hence making them attracted (Akaka et al., 2012; Hamedi et al., 2015). Technology has also been highly invested on by Starwood Hotels which has focused on mobile check-in technology and they have done away with room keycards substituting them with keyless entry using their mobile phone devices (Chahal & Kumar, 2014). All these discussed instances shows the need of the firms to enhance new technological systems so as to be able to appeal to a large number of customers and also be able to engage them, this can be done by involving them in the co-creation and innovation of the hotel in terms of the products and services, this will be able to add value to the organization (Edvardsson, Tronvoll, & Gruber, 2011). Technology is an integral aspect in the organization and when adopted and then combined with the customers and the employees in the organization, this makes the relevance of people technology hybrid model which can explain well the impact that can be realized such as the creativity and innovation.

**Critical Review on People-Technology Hybrid Theories**

This study examined relevant theories that explain people hybrid adaption technology in restaurants and hotels. The theories were viewed based on their popularity, application in Science and utility in Measurements The identified were; Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), The Decomposed Theory of Planned Behavior (DTPB), People technology hybrid organization model, this study looked at the model best for explaining people-hybrid technology to enhance creativity and innovation in the hotel. The findings of this study revealed that if the key objective is to predict behavioral intention to use Hotel Information System (HIS), the TAM is preferable. However, if the key objective is to explain behavioral intention to use HIS, the DTPB is preferable. People technology hybrid model is most preferable when there is need of combining people and technology. Technology is an important strategic asset for hospitality organizations to improve organizational performance and strategic competitiveness. However, adoption and diffusion of technology are complex processes, which are affected by a number of internal and external factors. As a result, understanding the factors affecting a hospitality organization's technology adoption behavior is of paramount importance to both practitioners and academia. The researcher adopted the people-technology hybrid organization model as it is the one which best explains the importance of linking people and technology so as to help in unleashing creativity and innovation.
The Technology Acceptance Model (TAM)

The first model under investigation in this study is the TAM. The TAM, firstly proposed by Davis (1986), was meant to predict and explain an individual’s Information Technology acceptance (Davis, 1989; Davis et al., 1989; Wang and Qualls, 2007). The TAM adapts the Ajzen and Fishbein’s (1980) theory of reasoned action (TRA) as a basis for specifying the casual linkage flow in a sequence from beliefs, attitude towards use, and behavioral intention to use IT. Behavioral intention to use is determined jointly by attitude towards use and perceived usefulness of IT, perceived usefulness also influences attitude towards use of IT directly. Meanwhile, perceived ease of use directly affects both perceived usefulness and attitude towards use of IT.

To represent the antecedents of user acceptance, the TAM focuses on two factors, perceived ease of use and perceived usefulness (Adams et al., 1992; Davis, 1989; Davis et al., 1989). Specifically, behavioral intention to use is influenced by two key determinants: (1) perceived ease of use and (2) perceived usefulness. Davis (1989) conceptualized perceived ease of use as “the degree to which a person believes that use of a particular system would be free of effort” but perceived usefulness as “the degree to which a person believes that use of a particular system would enhance his/her job performance”.

The employees’ Hotel Information System acceptance (TAM) setting, the TAM suggests that employees are more willing to accept HIS if HIS is perceived to be easy to understand, learn, or operate, and is perceived to have associated benefits and time costs, including maximizing their productivity, efficiency, and customer satisfaction and minimizing the time to complete a task. That is, as HIS has a well-designed user interface, employees are likely to believe that HIS usage is free of effort. Also, as HIS has useful functions, employees are likely to believe that HIS usage is useful for their job.

In the hospitality/tourism contexts a few prior studies have recently applied the TAM and its extended versions to understand and explain the acceptance behavior of IT. For instance, Morosan and Jeong (2008) examined users’ perceptions of hotel reservation websites: hotel-owned and third party through extended TAM. Their results revealed that perceived usefulness was a key predictor of users’ attitude towards use of a hotel-owned websites, while perceived ease of use was a key predictor of users’ attitude towards use of third-party websites. Both perceived playfulness and attitude towards use were two key predictors of users’ behavioral intention to use hotel reservation websites. Among the different models that have been proposed, the TAM appears to be the most widely accepted among IT/IS researchers. The main reason for its popularity is perhaps its parsimony as well as its wealth of recent empirical support (Lin, 2007).

Theory of Planned Behaviour

The second Technology model under investigation in this study is the TPB. The TPB is an extension of Ajzen and Fishbein’s (1980) TRA, which has its main goals the prediction and understanding of human behavior. The TPB postulates that behavioral intention to use is jointly determined by three factors of attitude towards use, subjective norms, and perceived behavioral control. Each antecedent is in turn generated by a number of beliefs and evaluations. Attitude is an individual’s overall positive or negative evaluation of a particular behavior after the evaluation of the perceived consequences of an act (Fishbein and Ajzen, 1975). The TPB predicts that the more favorable an individual evaluates a particular behavior, the more likely the individual will intend to perform that behavior. Subjective norms are the extent to which an individual feels that significant others want him/her to perform the behavior in question (Fishbein and Ajzen, 1975). The more an individual perceives that others significantly think he/she should engage in the behavior, the greater the individual’s level of motivation to comply with those others. Lastly, perceived behavioral control reflects perceptions of internal and external constraints on behavior (Ajzen, 1991). In the employees’ HIS acceptance context, perceived behavioral control describes employees’ perception of the availability of skills, knowledge, resources and experiences necessary for using HIS. In the employees’ HIS acceptance setting, the TPB suggests that employees are more willing to accept HIS if they have a positive attitude towards the use of HIS, want to comply with other important people’s (e.g., peers and superiors) opinions on the use of HIS, and have the requisite skill, knowledge, resource, and experience.

The Decomposed Theory of Planned Behaviour

The third Technology model under investigation in this study is DTPB which was first created by Taylor and Todd (1995) and focuses on identifying various belief factors that influence three determinants of behavioral intention to use (1) attitude towards use (2) subjective norms and (3) perceived behavioral control. The DTPB was also examined without including its last construct (i.e., actual behavior) (Fig. 1). To understand the relationship between
belief structures and antecedents of behavioral intention to use, several studies have examined the approaches to decomposing attitudinal, normative, and control beliefs (e.g., Lin, 2007; Taylor and Todd, 1995). Using the TPB to provide a basic structure in this study, the DTPB decomposes attitude towards use by incorporating (1) perceived ease of use, (2) perceived usefulness, and (3) compatibility, which serve as antecedents of attitude towards use (Lin, 2007; Taylor and Todd, 1995). Particularly, the underlying casual relationships among perceived ease of use, perceived usefulness, and attitude towards use follow those specified by above the TAM (Davis, 1986; Davis et al., 1992; Morosan and Jeong, 2008). Decomposed theory of planned behavior; CTM, competing theoretical model.

Regarding the compatibility construct, personal innovativeness is an individual’s inherent innovative personality with regard to new technologies, which is defined as the users’ receptivity to use HIS in this study (Tornatzky and Klein, 1982). According to the innovations literature, compatibility refers to “the degree to which an innovation is perceived as being consistent with the existing values, previous experiences, and needs of the potential adopter” (Rogers, 1995, p. 223). The more a new technological innovation is perceived as consistent with present value systems and procedures of the potential adopter, the more likely it will be adopted (Moore and Benbasat, 1991). Thus, employees who consider HIS to be compatible with their work style and all aspects of work need to express a high willingness to use HIS.

Regarding the normative belief structures, previous studies have suggested different approaches to the decomposition of normative belief structures into relevant referent groups. For example, Taylor and Todd (1995) as well as Huang and Chuang (2007) viewed subjective norms as including two influences: (1) peers’ influence and (2) superiors’ influence. In hotels, managers’ perspectives generally affect adoption of IT (Lam et al., 2007). And peers and superiors have a profound effect on employees’ technology acceptance (Burnkrant and Page, 1988). This study hypothesizes that the importance of decomposition for normative belief structures will be related to the possible divergence of opinions among the referent groups. Therefore, in the employees’ HIS acceptance context, measures of subjective norms should consider interpersonal influences. Particularly, because the expectations of peers and superiors may be expected to differ in a hotel’s organizational setting, this study suggests that decomposition is included in two referent groups of peers and superiors’ influence. Additionally, perceived behavioral control is determined by the factors of self-efficacy and technical support. Moreover, the underlying casual relationships among attitude towards use, subjective norms, perceived behavioral control, and behavioral intention to use follows those specified by the TPB.

**People-technology hybrid organization model**

The researcher adopted this model (Figure 1) which was proposed by Kandampully et-al, 2016 to show the benefits of creativity and innovation which is as a results of combination of people and technology in the organization. The theory is derived through the extension of Service Theory which explains the unique importance of people and technology. Other theories which are also related include Technology Acceptance Model (TAM) where the elements such as behavioral intention to use and perceived ease of use in Technology by people within the organization, TAM explains the variables which determines the Technology acceptance by people. People hybrid technology explains how technology and people can be combined to unleash creativity and innovation.

People refers to the customers and the employees of the organization, technology refers to the online platforms, Information Technology and Social media. People must be provided with the appropriate climate for working with the technology such as through training on the usage and also motivating the ones who have performed exemplary and this will encourage the employees to use Technology systems effectively

Kandampully et al. used the model to measure the level of creativity and innovation that results from the intermarrying people and technology, through this a lot of sales revenue can be realized because customers will be able to give their feedback at the online platforms and various forms of social media, the management of the hotel can take measures against negative feedbacks so as to correct the situation and also reward the employees who are delighting the customers.

This model is very appropriate as it focuses on the importance of matching the people and technology so as to enhance creativity and innovation, this in the long run will result into more sales revenue to the hotel Kandampully et al. however failed to focus on the supply side i.e., the role of the hotel and restaurant owners or the directors because they play an integral role such as facilitating the technological facilities and systems in the organization. The study is also limited by lack of empirical evidence. The model can be measured by use of the variables of the
study topic i.e. the first variable being technology which can be organized into 3 indicators such as Social media, Information Technology and Online platforms. People can also be measured by use of the two major indices that is Customers and Employees, then the supply side can also be introduced which can be represented by the Management. The researcher intend to use the model to show the effect it has on the supply side and also the outcome in the hotel performance i.e. how it can yield more revenues to the hotel.

People–Technology Hybrid Organizational Model

![Diagram of People-Technology Hybrid Model](image)

**Figure 1: People-technology hybrid model. Source: Kandampully et-al. (2016)**

The proposed model

The researcher proposes a model which will be able to accommodate the supply side to be represented by the management of the organization as the previous researchers have not put that into consideration, as the people-technology hybrid cannot be realized if the management aspects which facilitate even the technology are not included. The researcher also intends to include the benefits realized through creativity and innovation which may include new product development, New Processes. The model is an extension of Kandampully et al. (2016) which its utility of measurements are Technology, People, creativity and innovation, technology is denoted by Information Technology, Social media and Online platforms while people aspects are customers and employees. The new model seeks to address the other aspect of people that is the management who facilitates the required conditions for the technology, employees and customers to work effectively, this can be done through providing adequate resources to finance the various technological systems such as the Hotel Information Systems, the management can also facilitate resources to provide motivation to customers who participate actively in their various online and social media platforms. The model can be applied by the various hotel managements to develop new processes and products through integration of people and technology to come up with a hybrid that will enhance creativity and innovation

From the proposed model (Figure 2) the following questions can be constructed:
1. How does the hotel management and Information technology integration affects new product development
2. What are the effects of hotel management and Information technology relationship on new process development
3. How does the customer and social media relationship affects creativity and innovation
4. What are the effects of employee and Information Technology integration on creativity and innovation
5. How are the effects of customer and mass media interactions on creativity and innovation

Another study shall be done later based on the above model so as to give more justification by use of empirical findings through data collection and then analysis shall also be done.
<table>
<thead>
<tr>
<th>Model</th>
<th>Author and Year</th>
<th>Popularity</th>
<th>Foundations of the Theory</th>
<th>Application in Science</th>
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</thead>
<tbody>
<tr>
<td>People- technology hybrid</td>
<td>Kandampully et al., 2016</td>
<td>The model is yet to be applied by other researchers</td>
<td>The theory was derived through extension of the Service theory, which explains the unique importance of people and technology</td>
<td>Enhancement of creativity and innovation through combination of people and technology</td>
</tr>
<tr>
<td>Theory of Planned Behavior(TBP)</td>
<td>Lin, 2007</td>
<td>The theory has been used by Chuang and Haung who viewed subjective norms two influences which include peers and superiors</td>
<td>The theory was developed through the extension of Theory of Reasoned Action by Fishbein and Ajzen, 1980 which explains the factors affecting the behavioral intention to use such as attitude toward use and subjective norms</td>
<td>It postulates that behavioral intention to use is jointly determined by 3 factors of attitude towards use, subjective norms and perceived behavioral control</td>
</tr>
<tr>
<td>Decomposed theory of Planned Behavior(DTPB)</td>
<td>Taylor &amp; Todd, 1995</td>
<td>The theory has been used by scholars such as Lin, 2007 to examine the approaches to decomposing attitudinal, normative, and control beliefs</td>
<td>It was derived from Theory of Planned Behavior which tries to explain the prediction and understanding of human behavior</td>
<td>Identification of various belief factors of people that influence 3 determinants of behavioral intention to use such as attitude towards use, subjective norms and perceived behavioral control</td>
</tr>
<tr>
<td>Technology Acceptance Model(TAM)</td>
<td>Davis, 1986</td>
<td>It has been used by Adams et al 1992, they explained behavioral intention is determined jointly by attitude towards use and perceived usefulness</td>
<td>The theory is developed from Theory of Reasoned Action which explains the linkage in beliefs, attitude towards use and perceived usefulness</td>
<td>TAM was conceived to predict and explain an individual Informational Technology Acceptance</td>
</tr>
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</table>
CONCLUSION
The researcher draws facts based on Table 1 that most of the previous authors focused more on either the side of technology or people aspect and not a combination of the two except Kandampully et al. (2016) and this has not yielded much to the hotel industry in terms of creativity and innovation, the people when not empowered through motivation to use the available technology then they may fail to render efficient services and also the same applies to technology if the management fails to enhance the advancement in the technology by investing in the latest technology which is on the trend. The authors acknowledge the importance of either the technology or people in their studies. In Table 2, the various theories which have been addressed by the researcher have focused on the people’s behavior in regard to employees and customers but they have not addressed the management aspect which does play an integral role in any organization. The proposed model seek to address the gaps identified by including the variables missing in the other models such as management and also addressing some of the benefits which can be realized through creativity and innovation.

RECOMMENDATIONS
People-Technology hybrid is a concept which should be applied in the hotel industry so as to bring together the technological systems and people who are both internal and external members of the organization, this will enable the hotels to yield a unique creativity and innovation that will result into more sales revenue to the hotels. The hospitality researchers should also change their focus from conducting studies based on either the technology or people aspect only but instead study the hybrid of people and technology.

REFERENCES

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ABSTRACT
Safari destination is synonymous with Kenya in tourism circles worldwide due to its main two products namely; wildlife and coastal beach. However, cultural and sex tourism products are becoming prevalent to tourist, such that the tourism industry is facing different challenges towards child sex exploitation by tourists (CSET) in Kenya. The purpose of this research was to find the determinants leading to child sex exploitation by tourists in Mombasa North Coast, Kenya. The study also sought to investigate the determinants that contribute to tourists to exploit children sexually at Mombasa North Coast. The research adopted descriptive design. The target population was the children involved in sex industry for the research with a sample size of 271. The study used purposive sampling method to 102,712 children (CBS 2004) from the target population who are involved in tourism sex industry. The study used both primary and secondary data which was collected by use of questionnaire survey and direct observation. The analyzing of qualitative data was done by using a presented format in thematic content analysis. The quantitative data was analyzed by use of descriptive and inferential statistics through the help of statistical packages for social sciences (SPSS) whereby chi-square ($\chi^2$), ANOVA and descriptive tests were performed. The research found out that the growth of tourism sector in Mombasa North Coast has no proper controls especially those affecting children aged between 6 and 18 who make up 96.8% majority which revealed that CSET is widespread at the Mombasa North Coast tourist circuit. The study concludes the major factor leading to the widespread of CSET in Mombasa North Coast is poverty followed by illiteracy peer pressure and modern technology. Since, the CSET affects the community and the children through socio-economic life; the government through the tourism ministry has to strengthen the legal framework to be strictly followed by all stakeholders in the tourism sector in order to curb such illegal practices in Kenya, Mombasa North Coast tourist circuit.

Keywords: Children, Sex, Tourist, Determinants, Mombasa North Coast

INTRODUCTION
Tourism and travel industry is one of the largest sector in terms of revenue and people are involved in both occupational and participation (WTO, 2012), whereby people travel from one place to another to do different activities for business and leisure, but not consecutively year around. It is estimated by United Nations World Tourism Organisation tourism and travelling sector will create 296 million jobs by 2019 (ILO, 2010) therefore, linkages are connected between tourism organizations along the global value chain. The tourism and travelling sector in Kenya improved its performance in 2018 as compared to 2017. International visitor arrivals increased by 14.0 per cent from 1,778.4 thousand in 2017 to 2,027.7 in 2018. The number of hotel bed-nights increased by 20.1 per cent from 7,174.2 thousand in 2017 to 8,617.9 thousand in 2018. International conferences held expanded by 6.8 per cent to 204 in 2018 compared to 191 in 2017. Visitors to national parks and game reserves rose by 20.3 per cent to 2,868.9 thousand in 2018. Overall, total tourism earnings increased from Ksh 119.9 billion in 2017 to Ksh 157.4 billion in 2018 (Economic survey, 2017). This remarkable recovery in the tourism sector was due to improved security, successful conference tourism and aggressive marketing in the domestic and international markets (Economic survey, 2018) also owing to stable political environment (‘Handshake’ between the President and the former Prime Minister), withdrawal of travel advisories from foreign countries which lead to investors’ confidence.

According to Sindiga (1996), tourism in Kenya is partially concentrated in parts of the country, wildlife tourism is based in the country’s hinterland like national parks and game reserves while beach tourism at the coast which makes it the leading tourism regional attraction according to hotel bed-night occupancy indicators (43.1%) in the whole country (Economic survey, 2018). The orientation of tourism in Kenya is both international and domestic. However, of recent domestic tourism is doing well because most of the local people have started to embrace travelling to parts of the country to see the scenery and have relaxation. International tourists come from Germany, Switzerland, United Kingdom and Italy (Economic survey, 2018). Tourists are taken to urban towns due to tourism facilities and nightlife’s, however, at the coast most of such areas are adjacent to rural communities who are
extremely poor whereby the youth move to such areas in search of jobs as tour guides and other related tourism activities (Mwakisha, 1995). According to Mwakisha (1995), they are employed in lowly jobs and do menial jobs which cannot sustain them which leads them to loiter around in the tourist facilities. In such a case, the parents send their children to such areas and meet the tourists who start engaging them in sex in return they get something for their upkeep and for their parents who are old such that they cannot do any income generating activities. This is how children are introduced to sex tourism at the coast. Mwakisha (1995), there is migration from rural to urban areas who exhibit different behaviour to the community’s social behaviours. Children who are born out of wedlock some becomes street children who are subjected to sexual tourism. The result of this migration more illegal structures or informal settlements are set up leading to more bars, nightclubs and hotel and restaurants which have no regard to social impacts in the community and attracts more tourism.

Mombasa North Coast of Kenya is overcrowded by immigrants especially Nyali, Mtwapa and Bamburi which becomes unattractive to some tourists and security issues which is a gate way to Lamu and Tana River counties which have security challenges, in this regard more are heading to the South Coast of Kenya (Economic survey, 2018). In such a situation, there is a conflict of resources between the locals and the tourists at the North Coast. Such scenario which was witnessed in 1839 during the famine (Spear (1978), whereby daughters and wives were surrendered to Arabs for the exchange of foods, it is now still flourishing between the local community and the tourists. According to Wojcicki (2002), prostitution in Kenya dates back to early 20th century. In the 1930s, the Bahava women migrated to urban areas to practice prostitutions and benefited by building houses, buying land and paying school fees, while the Haya women migrated to Nairobi and Mombasa to practise prostitution in 1920s called Wazi Wazi in Nairobi to help their fathers who had no finance and later they became household heads and property owners (White, 1991). Prostitution practiced in towns is seen as of economic value and the local community have no problem with it if practiced in urban areas (Wojcicki, 2002). According to Dzoro (2001), Christianity and Muslim which was introduced to Mijikenda by Kraft and Rebman and the Arabs respectively did not support child sex exploitation. Also, the Mijikenda would not propose to underage girl for marriage which was traditionally wrong (Corat, 1993). The tourists at the coast are involved in child sex exploitation (UNICEF, 2001; Onyango, 2002). The first study on CSET in Kenya was conducted in 2004 and highlighted children’s involvement in sex tourism (Onyango, 2004). According to Wong-grunwald (2005) the study on child sex exploitation by tourists was disturbing. The study revealed that by enforcing various laws and code of conduct, it is regarded as anti-tourism and some government officials tolerated the vice, although they understand the effects of child sex tourism (CST) which is manifested as child sex exploitation by tourists (CSET) (world vision, 2004).

Problem Statement
Kenya’s tourism started from the colonial era when settlers travelled to Kenya to partition the country for their own economic reasons and also for the coastal strip for relaxation by enjoying sand, sea, sun and sex. However, the coast has continued to attract more tourists (43%) than any other region in the country and performed commendably well in 2018 with annual bed capacity of 43.1% countrywide, the major source of tourists to the coast are domestic tourists, Europeans and Asians (Economic survey, 2018). Despite the growth of tourism sector, the coastal people still are among the poorest in the country with the poverty index of 57.6% (CBS, 2005), with no employment opportunities for the community this has led to children dropping out of school to assist their parents to make a living, they engage in sex with tourists to assist them. Although, tourism contributes positively to the economy its impact is on local community whereby it transforms the social-economic set up of the local culture which includes sex exploitation of children by tourists, whereby the product is increasingly accepted by tourists (Kasati, 2003). According to Dzoro (2001), the study which was done at Kaloleni revealed that Coastal beaches affects children socially and they drop from schools to migrate to the Coastal towns. According to Amref (2006), girls aged between 12 and 14 years are lead to tourist hotels and villas whereby they are being exploited sexually by tourists with the promise of economic benefits and some kind. In reference to the above, it is therefore imperative to explore the determinants that contributes to tourists to exploit children sexually in Kenya at Mombasa North Coast tourist circuit, since the previous studies done did not come up with adequate factors leading to CSET.

LITERATURE REVIEW
Introduction
Child sex exploitation is rising in most developing countries which depends on tourism like the Caribbean, Thailand and Cambodia (Brohman, 1996), offering this emerging product due to competitiveness in tourism industry.

International tourists and globalization
Tourism and travel is whereby people move from one place to another for a particular period for leisure among others. In leisure places tourists meet the locals and engage in anti-social behaviours (Schwab, 2005). According to Tepelus (2004), sex tourists are adult male from developed countries who moves to developing countries where laws and regulations on child sex are not enhanced by law enforcers. American worldwide contributes 25% of sex tourism (Tepelus, 2004). The tourism sector in Kenya improved performance in 2018 by total earnings increasing by 31.3 per cent to 157.4 billion in 2018 (Economic survey, 2019).

Domestic tourists
Domestic tourists are Kenyan nationals plus foreigners working or living in Kenya who visit Kenya’s attractions place. According to Economic survey (2019), bed-night occupancy in hotels, lodges and other rooming houses by Kenyan residents occupied more than half of the total bed-nights in 2018. The hotel bed nights’ capacity grew by 19.5 per cent to 26,500.6 thousand in 2018, showing the significance of domestic tourism (Economic survey, 2019).

Tourism products and attractions in Kenya
Kenya is recognized in tourist products namely; wildlife tourism and beach tourism and of late cultural tourism like the Maasai culture. The most visited areas are the Coast, wildlife parks and reserve (Economic survey, 2019). In this regard most of investors have undertaken to develop tourism and hospitality facilities at the Mombasa North Coast which has long term effect in the socio-economic impacts to the local communities especially the child. Kenya is divided into tourism circuits to be visited by tourists (Wanyama, 2006), namely Coastal circuit which consists of north coast and south coast with various tourist products in the parks and reserves and beaches. Other tourist’s circuits includes; Western Kenya, Northern Kenya; South Rift: North Rift and Central Kenya, in in all these circuits, according to Wanyama (2006), children under age are involved in sex tourism and most of them are heading to the Coast for the vice.

Global child sex exploitation
Child sex tourism is a global problem and it is difficult to ascertain the exact number of children and tourists involved in sex tourism (Raven, w.2009). The CSE is a global challenge to tourist stakeholders which has a big effect to the children. The most affected children are from dysfunctional families and previous victims of domestic violence, sexual abuse, children affected by migration, children with disabilities and children of sex workers (Eurochild, 2011). The USA military servicemen far from home are considered to have sexual services from the local population especially from Asian countries (Alexis, 2009). Thailand, Cambodia, India, Brazil and Mexico have been identified as the leading countries in child sex tourism.(Rogers, 1989). In Thailand 90% are female while in Sri Lanka 90% are male, and in Philippines, young boys account for 60% of child prostitutes. In South East Asia women are subjected to become concubines and bonded according to the society. In North African countries it is argued that prostitution of children in Algeria, Djibouti, Saudi Arabia is due to temporary child marriages where offenders reportedly offers high prices for virgins as the culture values chastity and/ or purity highly. same applies to some parts of the Kenyan society (Hall, 1991).

Kenya child sex exploitation
In Kenya the protection of children from sexual exploitation is found in the Children’s Act 2001 and the sexual offence Act 2006, which criminalizes child prostitution. In a recent study by UNICEF, the Coastal towns of Malindi, Mombasa, Kilifi and Diani are reported to have 10,000 to 5,000 underage girls exploited by tourists and an estimated 30,000 girls aged from 2 to 4 are sexually exploited in beaches, hotels and private villas (UNICEF and GOK (2006). According to this study, the figures cited above have doubled due to poverty and immigration to towns to look for a living. The UNICEF study ranks Italians, Germans, Swiss, Ugandans and Tanzanians as most involved in CSET, whereby 30% are residents and 70% are foreigners.

METHODOLOGY
The study was conducted in Mombasa North Coast tourism circuit from Nyali to Mtwapa in Mombasa and Kilifi Counties in Kenya (Appendix 1). The Coastal strip is a mixture of different ethnic communities: Mijikenda estimated to be 1.2 million (CBS, 2004) (the Wagiriama, Wadigo, Wachonyi, Wakauma, Wajibana, Waribe, Warabai, Waduruma And Wakambe) (Sindiga, 1996); Waswahili;, Asians; Arabs; European residents and Kenyans from upcountry (Spear, 1978) who likes to stay in urban areas. The other ethnic groups at the coast are Ormas, Pokomos, Bonis, Munuyuyayas, Wailwanas, Malokotes, Sanyes, Watas, Bajanis and Taitas (Janmohamed, 1976).

Economical activities
The Coastal strip of Kenya, the national poverty index stands at 57.6% and the socio-economic indicators reveal that more than half of the population lives in absolute poverty for example, Kilifi and Malindi poverty level is more than 65%, furthermore, less than 13% of the population is in wage labour (Kilifi district development plan, 2002). The major economic activities at the coastal strip is tourism and its related activities with few formal employments at Bamburi and Vipingo industries and in the government circles. In such a case unemployment and poverty may lead children to engage in child sex tourism. Therefore, children have adopted the foreign lifestyle affecting and influencing their behaviours, although, elders have tried to keep their identity without success (Mwakisha, 1995).

**Popular tourist areas at the coast**

The coastal strip of Kenya is popular to tourists because of its proximity to various attractions which include: National parks and Game reserves, the Tsavo East and Tsavo West national parks, tropical forests in Africa - the Arabuko Sokoke, and the Shimba Hills game reserve; Marine parks include Watamu, Malindi, Mombasa and Kisite Mpunguti; Museums, fort Jesus Museum, Gede ruins, Shimoni slave caves and Vasco da Gama’s pillar. This has increased the number of tourists to the coastal strip and making children to become beach boys and girls and also tour guides. In such situation, children are involved in anti-social activities including CSET (Jacobson, 1995).

**Research Design**

Descriptive research design was applied for both quantitative and qualitative approaches to determine associations between the variables used in the study (Chissim, 1996). The descriptive survey research was utilized to allow the researcher to undertake the insight of the phenomenon under study and also provides accurate descriptive analysis of the characteristics of a sample which can be used to make inferences about populations (Kerlinger, 1973). The target population of the children consisted of 271 for the study from 22 tourist hotels (KAHC, 2016). The area was selected due to its rapid growth in tourism and hospitality infrastructure put in place (Economic survey, 2018).

Purposive sampling method was used for the study. According to Maxwell (1996) purposive sampling is a strategy in which particular persons or events are selected intentionally in order to provide vital information that cannot be received from other choices. The method was used to recruit key informants for the interviews and where all possible samples have same probability of being selected, free of biasness. The approach was used since there was no list of the children of the study population (Fowler, 2013). In this case targeting children’s who had the desired information about sex tourism and who were willing to share with the researcher.

The targeted population was all the 102,712 children (CBS 2004) who had the knowledge of CSET activities so that to establish their perception about CSE. A sample size of 271 was selected using convenient sampling to 115 male and 156 female children’s, since even using a 10% representation was high to select the sample. Majority of the children came to hotels to look for tourist’s other places like beaches. 10% of employees in tourist hotels, 20 females and 15 males were selected using purposive sampling method to assist in identifying the children who comes to the hotels. According to KAHC (2018) Coastal region has 44 registered tourist’s hotels, therefore, by using convenient sampling 22 hotels were selected for the study (Appendix II).

Descriptive analysis test was used which includes means, percentages and frequency distributions. Inferential analyses comprise of chi-square, exploratory factor analysis, Kaiser-Meyer-Olkin (kmo) and Bartlett’s test of Sphericity and ANOVA test. However, quantitative data were entered and analysed using SPSS (version 21.0). Chi-square ($\chi^2$) and ANOVA tests were performed at 95% confidence limit and the p-value of statistical significance set at $p < 0.05$ ($\alpha = 0.05$), which is the accepted level of confidence. Qualitative data were organized into various headings like summarizing, consolidating, merging and harmonizing information.

**RESULTS AND DISCUSSION**

**Educational Level for children**

Out of the 271 children respondents, 54.2% (n=147) had secondary education. Those with primary education accounted for 17.3% (n=47) and A level holders of education accounted for 22.1% (n=60) while those with education none at all accounted for 6.3%. Specifically, 42.4% (n=115) children interviewed were male and 57.6% (n=156) were female (Figure 6.3). However, there was no significant difference in the levels of education in the gender ($\chi^2 = 3.546; \text{df} = 3; p = 0.199$) (Table. 1).

**Factors Contributing To CSET**
Majority of children respondents the factors that contribute to tourists exploiting children sexually are poverty (47.2%, n=128) followed by peer pressure, illiteracy, modern technology, culture and other factors who accounted for 19.9% (n=54), 14.8% (n=40), 8.5% (n=23), 7.0% (n=19) and 3.3% (n=9), respectively (Figure 6.1). Female gender contributed more to poverty factor (54.7%, n=70) than male gender which contribute only 45.3% (n=58) for poverty factor ($\chi^2 = 12.7$; df = 5; p = 0.04). Peer pressure for sexual exploitation accounted for 59.3% and 40.7% by female and male gender, respectively ($\chi^2 = 2.782$; df = 1; p = 0.671). Illiteracy factor accounted for 54.5% (n=23) for female gender and 42.5% (n=17) male gender ($\chi^2 = 6.125$; df = 1; p = 0.02). As for modern technology factor, constituted 65.2% (n=15) and 34.8% (n=8) of children respondents by female and male gender respectively ($\chi^2 = 5.981$; df = 1; p = 0.02). While, culture factor accounted for 64.7% (n=11) for female gender and 35.3% (n=6) for male gender ($\chi^2 = 11.562$; df = 1; p = 0.672). Five respondent (55.6%) by female and 44.4% (n=4) by male gender contributed other factors ($\chi^2 = 1.641$; df = 1; p = 0.041) (Table 1; Figure 1).

Figure 1: Factors contributing to CSET
Table 1. Children’s background information and determining factors for CSET

<table>
<thead>
<tr>
<th>Children’s background and sex exploitation</th>
<th>Gender</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td></td>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Citizenship</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kenya</td>
<td>41</td>
<td>35.7</td>
<td>152</td>
<td>97.4</td>
<td>3.098</td>
</tr>
<tr>
<td>Non-Kenyan</td>
<td>74</td>
<td>64.3</td>
<td>4</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>13</td>
<td>11.3</td>
<td>4</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>15</td>
<td>13.1</td>
<td>32</td>
<td>20.5</td>
<td>3.546</td>
</tr>
<tr>
<td>Secondary</td>
<td>59</td>
<td>51.3</td>
<td>88</td>
<td>56.4</td>
<td></td>
</tr>
<tr>
<td>A level</td>
<td>28</td>
<td>24.3</td>
<td>32</td>
<td>20.5</td>
<td></td>
</tr>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5</td>
<td>2</td>
<td>1.7</td>
<td>5</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td>6 – 10</td>
<td>25</td>
<td>21.8</td>
<td>36</td>
<td>23.1</td>
<td>7.164</td>
</tr>
<tr>
<td>11 – 15</td>
<td>30</td>
<td>26.1</td>
<td>35</td>
<td>22.5</td>
<td></td>
</tr>
<tr>
<td>16 – 18</td>
<td>58</td>
<td>50.5</td>
<td>80</td>
<td>51.2</td>
<td></td>
</tr>
<tr>
<td>Determinants that contribute to tourists’ exploit children sexually</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poverty</td>
<td>58</td>
<td>50.5</td>
<td>70</td>
<td>44.9</td>
<td>7.342</td>
</tr>
<tr>
<td>Illiteracy</td>
<td>17</td>
<td>14.8</td>
<td>23</td>
<td>14.7</td>
<td></td>
</tr>
<tr>
<td>Culture</td>
<td>6</td>
<td>5.2</td>
<td>11</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>Modern technology</td>
<td>8</td>
<td>7.0</td>
<td>15</td>
<td>9.6</td>
<td>7.342</td>
</tr>
<tr>
<td>Peer pressure</td>
<td>22</td>
<td>19.1</td>
<td>32</td>
<td>20.6</td>
<td></td>
</tr>
<tr>
<td>Other, specify</td>
<td>4</td>
<td>3.4</td>
<td>5</td>
<td>3.2</td>
<td></td>
</tr>
</tbody>
</table>
Inferential Statistics

Correlation Analysis

The study conducted a correlation analysis to investigate the existence and nature of relationship on the factors that contribute to tourists exploiting children sexually and CSET. This section presents correlation analysis results conducted.

Table 2. Summary of the findings

<table>
<thead>
<tr>
<th>Source: researchers’ data (2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table 2. Summary of the findings</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td><strong>CSET</strong></td>
</tr>
<tr>
<td><strong>Poverty</strong></td>
</tr>
<tr>
<td><strong>Illiteracy</strong></td>
</tr>
<tr>
<td><strong>Culture</strong></td>
</tr>
<tr>
<td><strong>Modern Technology</strong></td>
</tr>
<tr>
<td><strong>Peer Pressure</strong></td>
</tr>
<tr>
<td><strong>Source:</strong> researchers’ data (2018)</td>
</tr>
</tbody>
</table>

There is a positive relationship between CSET and poverty illiteracy as indicated by a Pearson correlation coefficient of .663**. This relationship was found to be statistically significant as the significant value was 0.000 which is less than 0.05. Moreover, a Pearson correlation coefficient of .731** and .611** indicate a strong and positive relationship between CSET and culture and modern technology respectively. This relationship was found to be statistically significant as the significant value was 0.001 which is less than 0.05. There is a positive relationship between CSET and peer pressure as indicated by a Pearson correlation coefficient of .444**. This relationship was found to be statistically significant as the significant value was 0.000 which is less than 0.05.

Regression Analysis

To establish individual effect of independent on dependent variable the study conducted a regression analysis. The results are summarized in tables 3, 4, and 5. Table 3 shows the coefficient of the constants and regression equation.

Table 3. The Coefficients of the constants and regression equation. Source: research data (2018)

<table>
<thead>
<tr>
<th>Coefficients model</th>
<th>unstandardized coefficients</th>
<th>standardized coefficients</th>
<th>t</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>std. error</td>
<td>beta</td>
<td></td>
</tr>
<tr>
<td>1 (constant)</td>
<td>.106</td>
<td>.117</td>
<td>-</td>
<td>-0.555</td>
</tr>
<tr>
<td>Poverty (x1)</td>
<td>.487</td>
<td>.087</td>
<td>.211</td>
<td>4.480</td>
</tr>
<tr>
<td>Illiteracy (x2)</td>
<td>.591</td>
<td>.143</td>
<td>.196</td>
<td>4.116</td>
</tr>
<tr>
<td>Culture (x3)</td>
<td>.395</td>
<td>.118</td>
<td>.211</td>
<td>3.001</td>
</tr>
<tr>
<td>Modern Technology</td>
<td>.423</td>
<td>.099</td>
<td>.261</td>
<td>4.222</td>
</tr>
<tr>
<td>Peer Pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
From table 3, the study established the following regression equation.

\[ y = 0.106 + 0.487x_1 + 0.591x_2 + 0.395x_3 + 0.423x_4 + 0.37290 \]

Holding other factors constant then CSET would be 0.106. A unit increase in poverty results to a 0.487unit increase in CSET, holding other factors constant. A unit increase in illiteracy leads to a 0.591 increase in CSET, a unit increase in culture results in a 0.395-unit increase in CSET, holding other factors constant. A unit increase in peer pressure results to a 0.487-unit increase in CSET, holding other factors constant. Table 4.3 also indicates that the all the predictors are statistically significant at \( \alpha=0.05 \) since \( p \) values are less than 0.05(poorverty \( (\text{p}=0.00) \), illiteracy \( (\text{p}=0.00) \), culture \( (\text{p}=0.003) \) modern technology \( (\text{p}=0.003) \), peer pressure \( (\text{p}=0.003) \).

**Model Summary**

The model summary table 4.3 indicates an \( r^2 \) of 0.669. This implies that 66.9% of the variations in the dependent variable \( y \) are explained by the variations in the independent variables \( x_1, x_2, x_3 \) and \( x_4 \). This means that they can be used to predict CSET, and therefore a multiple regression model is an efficient predictor.

**Table 4. Model summary**

<table>
<thead>
<tr>
<th>Model</th>
<th>( r )</th>
<th>( r^2 )</th>
<th>( \text{adjusted } r^2 )</th>
<th>( \text{std. error of the estimate} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.818a</td>
<td>.669</td>
<td>.652</td>
<td>.37290</td>
</tr>
</tbody>
</table>

a. predictors: (constant) CSET, poverty, illiteracy, culture, modern technology, peer pressure

**Source:** research data (2018)

**ANOVA**

The study further tested the significance of the model by use of analysis of variance (ANOVA) technique. The findings are tabulated in table below. From the ANOVA statics, the review set up the relapse demonstrate had a significance level of 0.2% which means that the information was perfect for making a conclusion on the population parameters as the estimation of significance level (\( p \)-value) was fewer than 5%. The ANOVA table 5 reports an \( F \) test value of 78.333 which is significant at \( p \) value 0.002<0.05. This is an indication that poverty, illiteracy, culture, modern technology and peer pressure have a significant effect on CSET. The significance value was less than 0.05 indicating that the model was significant.

**Table 5. ANOVA**

<table>
<thead>
<tr>
<th>Model</th>
<th>sum of squares</th>
<th>df</th>
<th>mean square</th>
<th>( F )</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>18.861</td>
<td>6</td>
<td>3.14352</td>
<td>58.213</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>14.31</td>
<td>265</td>
<td>.054</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>12.0952</td>
<td>271</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. dependent variable: CSET

**Source:** research data (2018).

**DISCUSSION**

**Factors contributing to children’s involvement in CSET**

It became necessary to identify the factors that influence child sex exploitation by tourists in Mombasa North Coast tourism circuit. The children were therefore asked to state the factors that they considered as contributors to child sex tourism. In this regard interaction with tourists was considered contributors to CSET activities alongside other factors that were mentioned by the children as discussed below. The findings revealed that poverty is the main factor of CSET. Accordingly, literature reviewed revealed that the poverty index estimates that the proportion of people living in poverty in Mombasa North Coast has increased rapidly resulting to worsening of some key social indicators including child sexual exploitation. It was argued that the community members consider the school environment as the place where the children learn about CSET activities from their pressure as second contributor to CSET.

Illiteracy was also mentioned as a factor that contributes to CSET. A majority of the respondents had achieved primary level of education and above, this seems to suggest that the children of Mombasa North Coast do not have...
illiteracy problem, or that the type of illiteracy mentioned as a factor in CSET is not a matter of attaining basic education in primary and post primary levels of education. another possibility is that since only 15% of the interviewed acknowledged being direct participants in CSET, probably most of CSET victims are uneducated. However, Deb (2006), is of the opinion that considering illiteracy as a cause of child sex abuse is a myth but he argues that all children from all backgrounds are equally vulnerable to child sex exploiters. His opinion can however be contested by arguing that parental illiteracy plays a great role in a child’s predicaments. Herath and Sharma (2007) contend that most children who have been reported to experience child abuse and exploitation are found to experience acute poverty, low literacy among parents, inadequate education facilities, and non-enforcement of child protection and criminal laws. This shows that the initial cause of child sex exploitation is parental illiteracy rather than the child’s literacy levels. this can be supported by the fact that the interaction between the children and the tourists becomes more likely for children with upper primary and secondary levels of education, that is, between tourists and children who have some basic level of education rather than children who have not gone to school or are in lower primary.

Another important factor that contributes to CSET is modern technology. When one of the children who acknowledged being active in CSET was asked to provide the research enumerators with her contacts, she instead gave them her names and requested them to find her details in ‘Facebook’. Discussions with children revealed that modern smart phones with internet are avenues by which the tourists get in touch with the children. Most children with phones will communicate with the tourists via mobile phone chat features such as to go and safari chats in addition to the normal sms (small message send) chat services. Thus, the contribution of modern technology to activities such as CSET cannot be over emphasized. A few children also mentioned culture as a factors contributing to CSET.

In summary, the study revealed the fundamental factor influencing CSET is poverty followed by illiteracy and peer pressure. The government officials also not enforcing the laws in place due to corruptions and no political goodwill to eradicate the CSET in Mombasa North Coast. The consequences of CSET include school drop outs, unwanted pregnancies, diseases like HIV&AIDS and child drug abuse among others. This continued trend makes the region lag behind in terms of development and increase in poverty level among the local community.

CONCLUSION
Based on the above discussions, the following has been concluded; first, the local community at Mombasa North Coast often tolerates inappropriate or even illegal tourist behaviour because of the ‘hand-outs’ they receive from tourists. Children involved in CSET are victims of circumstances including poverty which stakeholders take advantage to promote CSET, since there are many children at Mombasa North Coast who are in vulnerable to CSET there are readily available for cheap sexual activities and also they can be used to an illegal activity like drug abuse among others. In such circumstances tourists have no respect to the cultural and traditional values of the local community. On the other hand, since tourists are positioned to spend relatively large amount of money, their motives are rather based on acquaintance and leisure. Finally, the government officials fail to enforce laws to prohibit the CSET at Mombasa North Coast as required by the law. However, to formulate the child sex policy strategy the government should invite professional body in tourism to inject professionalism in tourism like Tourism Professional Association (TPA).

RECOMMENDATIONS
In order to eradicate CSET at Mombasa North Coast, there is need to adopt deterrent measures apart from curative measures and may be adopted at different levels. The government should have a tourism policy on sustainable tourism to local community focusing on children which is tourism sustainability and intendeds to involve and improve the living standard of the children by generating and retaining revenue in the local community through employment. There should be skills training and entrepreneurship activities within the community to the children by assisting them to go back to learning schools/institutions and have programs to retain them for future life. For further research, there is need to conduct research in the relationship between child drug abuse and child sex exploitation; entrepreneurship opportunities for children at Mombasa North Coast; and, development of tourist education/learning programmes for the children at Mombasa North Coast.

REFERENCES
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Raven, w (2009), Treating The International Child Sex Tourism Industry As A Crime Against Humanity. (Southwestern Journal Of International Law [Vol. 24; Page362)
Rogers, 1989


**APPENDICES**

**Appendix II: Mombasa North Coast Tourist Hotels**

<table>
<thead>
<tr>
<th>Serial Number</th>
<th>Tourist Hotel</th>
<th>Number of Employees</th>
<th>Serial Number</th>
<th>Tourist Hotel</th>
<th>Number of Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>White Sands Beach Resort</td>
<td>19</td>
<td>12</td>
<td>Salama Beach Resort</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>Sai Rock Beach Resort</td>
<td>6</td>
<td>13</td>
<td>Le Solei Beach Club</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Milele Beach Hotel</td>
<td>7</td>
<td>14</td>
<td>Mombasa Paradise Club</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>Dolphin Beach Hotel</td>
<td>9</td>
<td>15</td>
<td>Sun N Sand Resort</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>Flamingo Beach Hotel</td>
<td>17</td>
<td>16</td>
<td>Travellers’ Beach Club</td>
<td>51</td>
</tr>
<tr>
<td>6</td>
<td>Mombasa Continental Hotel</td>
<td>16</td>
<td>17</td>
<td>Bamburi Beach Hotel</td>
<td>27</td>
</tr>
<tr>
<td>7</td>
<td>Paradise Beach Hotel</td>
<td>8</td>
<td>18</td>
<td>Kahama Hotel</td>
<td>15</td>
</tr>
<tr>
<td>8</td>
<td>Coral Beach Hotel</td>
<td>8</td>
<td>19</td>
<td>Severin Sea Lodge</td>
<td>21</td>
</tr>
<tr>
<td>9</td>
<td>Palm Beach Hotel</td>
<td>9</td>
<td>20</td>
<td>Neptune Beach Hotel</td>
<td>16</td>
</tr>
<tr>
<td>10</td>
<td>Nyali Beach Resort</td>
<td>22</td>
<td>21</td>
<td>Bahari Beach Hotel</td>
<td>9</td>
</tr>
<tr>
<td>11</td>
<td>Voyager Beach Hotel</td>
<td>18</td>
<td>22</td>
<td>Mombasa Beach Hotel</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>350</strong></td>
</tr>
</tbody>
</table>

*Source: KAHC 2016*
EFFECTIVENESS OF MONETARY POLICY INTERVENTION ON EXCHANGE RATE VOLATILITY IN KENYA

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Chuka University, P.O Box 109-60400, Chuka

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ABSTRACT
Despite the monetary policy intervention in foreign exchange markets by Central bank of Kenya to stabilize the exchange rate and to reverse the growth in the country’s trade deficit through increased competition, Kenya has been facing wide fluctuations in US dollar to Kenya shilling exchange rates since the adoption of a floating exchange rate system in 1993 resulting to increased exchange rate risk. Other than the high volatility of exchange rate, there has been a continuous depreciation of Kenya shilling to US dollar. Depreciation of home currency decreases return on investment when investing internationally. This study aimed at evaluating the effectiveness of monetary policy on exchange rate volatility in Kenya using GARCH (1, 1) model. The specific objectives of the study were; to determine the effectiveness of net foreign exchange intervention, 91-day Treasury bill rate, Central bank rate and inflation on exchange rate volatility in Kenya. A descriptive longitudinal time series research design was used. Monetary policy intervention was found to be effective in reducing exchange rate volatility by use of foreign exchange intervention and Treasury bill rate. A unit decrease in 91-day Treasury bill rate decreases the exchange rate volatility by 2.5790 units while a unit increase in foreign exchange intervention decreases the volatility by 0.3042 units. Central bank rate has no effect on volatility. The finding of this study is of great significance to monetary policy makers and society at large. Since non-sterilized intervention was found to result into monetary policy dilemma, policy makers should strive for a policy mix that will ensure stable exchange rates by stemming out any excessive volatility in the exchange rate to avoid further depreciation and fluctuation on exchange rate. A combination of a stable exchange rate environment and a competitive currency will attract investment, increase aggregate output and expand country's economic prosperities.

Keywords: Foreign Exchange Rate, Foreign Exchange Intervention, Central Bank Rate, 91day Treasury Bill rate.

INTRODUCTION
Background of the Study
Exchange rate is an important indicator of economic growth of a country and its volatility has significant impact on international trade. Unpredictable changes in exchange rates may reduce international trade by increasing the risks of importing and exporting. Equally, by increasing the risk of investing in foreign assets, exchange rate volatility may retard the flow of capital between the countries. Central Bank’s principal object is formulation and implementation of monetary policy directed to achieving and maintaining stability in the general level of prices, that is, low inflation and to sustain the value of the Kenya shilling (CBK, 2015). Monetary policy is defined as any conscious action undertaken by the monetary authorities to change the quantity, availability or cost of money (Shaw, 1973). Monetary policy implementation focuses on instruments, operating targets, and policy goals. The instruments of monetary policy are manipulated to achieve preferred values of an operating target. Instruments are the variables directly controlled by the Central Bank. Intermediate target variables fall between operating targets and goals in the sequence of links that run from policy instruments to real economic activity and inflation (Walsh, 2010). According to CBK (2015), the main target variables for monetary policy are inflation and output.

After the breakdown of the Bretton Woods system of fixed exchange rates in 1973, the Articles of the International Monetary Fund (IMF) were amended to provide that members would collaborate with the Fund and other members to assure orderly exchange arrangements and to promote a stable system of exchange rates (Neely, 2005). Monetary policy through Central Bank directs intervention to counter disorderly market conditions, which has been interpreted differently at different times. Often, excessive exchange rate volatility or deviations from long-run equilibrium exchange rates have incited intervention (Calvo & Reinhart, 2002; Kathryn, 1993). The liberalization of capital flows in the last two decades and the enormous increase in the scale of cross-border financial transactions which was developed by General Agreement on Tariffs and Trade (GATT), have increased exchange rate movements (Clark et al., 2004). Currency crises in emerging developing countries and market economies are special examples of high exchange rate volatility for instance the Zimbabwe’s 2008 hyperinflation (Ellyne & Daly, 2013). In addition, the transition to a market-based system in Central and Eastern Europe often involves major adjustments in the international value of these economies’ currencies.
According to Kinyua (2001), Central Bank of Kenya pursued a somewhat passive monetary policy from 1966 when it was created to 1970. One of the reasons being that the bank had not then acquired sufficient experience in the management of monetary policy and also the Kenyan economy had no severe macroeconomic problems to resist during this period. During 1970-1980 Kenya faced major difficulties in the form of 1973 oil crisis and the coffee boom of 1977/78 that threatened her ability to sustain the commendable 6-8 percent annual economic growth rate as it used to enjoy in the 1960’s. The country had to confront emerging and severe constraints on the balance of payments. This was due to the collapse of the Bretton woods system of fixed exchange rates in 1971-1975, thus the balance of payments and domestic prices came under increasing pressure.

In mid-1992 there was liberalization of the economy where interest rate controls were removed and exchange rate made flexible, ushering in a new era in monetary policy where open market operations (OMO) was the main tool and minimal reliance on reserve requirement (Gichuki, Oduor & Kosimbei, 2012; Moki, 2014). After liberalization, there was almost no intervention by CBK in the foreign exchange market. As result, Kenya was categorized among developed countries as a free floater (Corazon, 2014). The control of inflation became a major focus of monetary policy to reign in the consequences of relaxation of monetary policy that followed the run up to Kenya’s first multiparty election in 1992 and increase in international oil prices occasioned by the first Gulf war.

A new institutional framework for conducting monetary policy was formalized with the amendment of the CBK Act in 1996 which targeted more on monetary base. The principal objective of the CBK was stipulated as formulation and implementation of monetary policy directed to achieving and maintaining stability in the general level of prices (Rotich, Kathanje & Maana, 2008). The behavior of monetary policy focused on the conduct of the broad monetary aggregate, M2, defined as currency in circulation and term and non-term domestic currency deposits with banks. In 1998, the Bank had shifted to a much broader monetary aggregate, M3, defined as M2 plus foreign currency deposits held by residents, as its intermediate target.

The stated exchange rate policy of the CBK has been and continues to pursue a market determined exchange rate, only intervening in smoothing out erratic movement, servicing external obligations and achieving targeted level of foreign exchange reserves. Nevertheless, there have been instances where strong lobbying from non-traditional exporters for a depreciated exchange rate put pressure on the CBK to influence the market exchange rate in the short run. There were also occurrences where depreciation pressures coming from speculative tendencies occasioned by fragile donor relations and large food importation to mitigate adverse effects of drought could have led CBK to intervene in the foreign exchange market to reduce pressures on domestic inflation (Rotich et al., 2008). Annual changes in monetary aggregates, since early 1990s, decelerated to low levels and were sustained through 2000 before picking up slightly in the run up to the 2002 elections which has kept increasing up to 2015.

According to Ndungu (2000), exchange rate policy in Kenya moved slowly between two major regimes namely; fixed exchange rate from 1974 to 1992 and from 1993 Kenya has fully adopted flexible exchange rate with a continuous depreciation of Kenya shilling to US dollar. Since the adoption of a floating exchange rate system in 1993, no available evidence has been achieved in realizing the objective for which the foreign exchange market was liberalized. Large volatilities in exchange rates have since characterized Kenya financial market (Kiptoo, 2007). From 1993 until 2015, the US dollar to Kenya shilling averaged 74.564 reaching an all-time high of 106.8 in October of 2011 followed by 106.7 in September 2015 and a record low of 35.9 in January of 1993 (World Bank data, 2015). The depreciation of 2011 was attributed to the debt crisis in the euro zone, pressures from Kenya’s balance of payment and due to arbitrage in the local money market (Corazon, 2014). According to republic of Kenya (2015), the depreciation of 2015 was attributed to various factors which include; US strengthening the dollar, high demand for dollar for financing development projects where payment is made in dollars which makes its price to increase, increased external borrowing by the government, distortion of the current account due to insecurity in the country and increased government expenditure which in turn increases GNP resulting to inflation and BOP deficits.

Kenya works under the policies of floating exchange rate but its foreign exchange market is inefficient (Muhoro, 2003 & Kimani, 2013). Its economy face increasing openness and globalization day by day and market forces of demand and supply are unable to adjust into a stable exchange rate thus making the exchange rate of her currency volatile. This provokes the Central Bank of Kenya to intervene in the foreign exchange market through a monetary policy. The main question of interest is whether monetary intervention achieves its objectives of reducing volatility and sustaining the value of the Kenya shilling.
Statement of the Problem
A stable foreign exchange rate is necessary in reducing the exchange rate risk for short-term payment flows, maintaining the competitiveness of the domestic (export) industry and in protecting the balance sheets of domestic firms and enterprises against depreciation (Chmelarova & Schnabl, 2006). Like many developing countries, Kenya is vulnerable to inflationary pressures, currency instability and balance of payments crises. Therefore, one of the policy objectives of monetary policy is to stabilize the price level including the foreign exchange rate which is the price of a currency and to maintain a sound market-based financial system (Kinyua, 2001). However, regardless of CBK use of various monetary policy transmission mechanisms like net FOREX intervention, central bank rate (CBR) and open market operations to bring about exchange rate stability, Kenya has been facing wide fluctuations of US dollar to Kenya shilling exchange rates from the average long run equilibrium exchange rate since the adoption of a floating exchange rate system in 1993 (Kiptoo, 2007). Other than the high volatility of exchange rate, the other major problem is that there has been a continuous depreciation of Kenya shilling to US dollar reaching an all-time high of 106.8 in October 2011 and 106.7 in September 2015.

If exchange rate fluctuations are not predictable, increasing exchange rate volatility could lead to risk-averse agents to cut down their international trading activities (Chit et al., 2010) due to increased risks of importing and exporting and retard the flow of capital between the countries due to increased risk of investing in foreign assets. Again, sharp movements of the nominal exchange rate in the short-term can impact inflation via the import prices pass-through effects (CBK, 2015). In addition, exchange rate volatility has frequently been associated with economic crisis and may be a signal of lack of policy credibility (Calvo & Reinhart, 2002). Most available studies in Kenya have concentrated on the effectiveness of monetary policy on inflation and economic growth which are the major targets of the monetary policy using vector autoregression (VAR) models leaving a gap on monetary policy effect on exchange rate volatility. Exchange rate volatility influences inflation and economic growth and thus should be incorporated in monetary policy (CBK, 2015). This study therefore, seeks to evaluate the effectiveness of monetary policy against its policy goal of stabilizing the exchange rate using a longer time series data by applying generalised autoregressive conditional heteroscedasticity (GARCH) model which has been largely unexplored by the literature.

Objective of the Study
The general objective of this study is to examine the effectiveness of monetary policy intervention on exchange rate volatility in Kenya.

Specific Objectives
i. To determine the effectiveness of net foreign exchange intervention on exchange rate volatility in Kenya.
ii. To establish the effectiveness of Central bank rate on exchange rate volatility in Kenya.
iii. To establish the effectiveness of 91-day Treasury bill rate on exchange rate volatility in Kenya.
iv. To find out the moderating effect of inflation rate on effectiveness of monetary policy on exchange rate volatility in Kenya.

Research Hypotheses

\[ H_{01}: \text{Net Foreign exchange intervention has no significant effect on exchange rate volatility in Kenya.} \]
\[ H_{02}: \text{Central bank rate have no significant effect on exchange rate volatility in Kenya} \]
\[ H_{03}: \text{91-day Treasury bill rate have no significant on exchange rate volatility in Kenya.} \]
\[ H_{04}: \text{Inflation rate has no significant moderating effect on exchange rate volatility in Kenya.} \]

Significance of the Study
High fluctuation of exchange rate in Kenya is noticeably making economic activity more risky as uncertainty rises. This is not good for the economy. The study result will be highly relevant in the formulation and implementation of an effective monetary policy that will promote exchange rate stability and improve the welfare of the people. Therefore, the study will be of great significant to investors, government, policy makers, business people, future scholars and society at large. Investors will use the findings as a tool in portfolio allocation, risk management and as an input in derivative asset pricing in short term risk management. Government will use the study as a benchmark for comparison of past years monetary policies and review them basing on results found in the study thus enabling them formulate and implement an optimal monetary policy to reduce exchange rate volatility and inflation. Business people, like entrepreneurs, bankers, international financial institutions and markets can use the findings from this research to aid them in implementing their organizational management duties. The study is significant to policy makers since it will shed some new light on the appropriate monetary policy to be undertaken and their impact on...
exchange rate. The study will also be important to FOREX dealers, private sector and the public as a whole, to understand the degree of responsiveness of exchange rate to changes in different monetary policy tools. In addition, future scholars will be able to use the findings for further research either to develop themes or for literature review.

Scope of the Study
The study will use monthly data on US Dollar-Kenya shilling exchange rate, net foreign exchange intervention data by Central bank, central bank rate (CBR) and 91-day Treasury bill rates and analyse it using GARCH(1,1) model. All the data will run over the period January 1997 to June 2016. The data will run from January 1997 which is the period after a new institutional framework for conducting monetary policy was formalized with the amendment of the CBK Act in 1996 to target more on monetary base with the principal objective of the monetary policy directed to achieving and maintaining stability in the general level of prices. It will end in June 2016 for convenience on the availability of updated data. The study will focus on the US dollar-Kenya shilling exchange rate since US dollar is the most commonly used currency to settle international transactions.

LITERATURE REVIEW
Foreign Exchange Intervention and Exchange Rate Volatility
Dominguez and Frankel (1993) examine the effect of intervention by regression estimation. Their work takes the independent variable to be the differentials in expected rates of the return between domestic and foreign assets and uses ex post changes in exchange rate to measure investors’ expectation. By assuming that investors choose their portfolio allocation to optimize a function of mean and variance of ending period wealth, their findings generally support the effectiveness of intervention through portfolio balance and expectation channels. Kim, Kortian and Sheen (2000) analyzed intervention by the Reserve Bank of Australia on foreign exchange markets from 1983 to 1997. They included control variables in mean and variance equations which were different measures of foreign exchange intervention, plus day of week and holiday dummies. Using exponential GARCH models, large interventions have a stabilizing influence in the foreign exchange market in terms of direction and volatility.

Moreover, Fatum and Hutchison (2002)’s and Fatum and Hutchison (2003)’s reports on the effectiveness of intervention, using daily data from Bundes Bank, the Bank of Japan, the European Central Bank, and the Federal Reserve, find official intervention to be effective when used selectively and directed toward short-term objectives. Similarly, Simatete (2004) examines the effect of central bank intervention on the Zambian kwacha. She used a GARCH (1, 1) model in order to estimate the effect of intervention on the mean and variance. She found that central bank intervention in the foreign exchange market increases the mean but reduces the volatility of the Zambian kwacha. This finding supports the ‘speculative bandwagon’ and a ‘leaning against the wind’ strategy. These studies however they have no harmony on which channel of intervention works although they have discussed on sterilised intervention mostly signalling and portfolio balance channels.

To add on that, Behera, Narasimhan and Murty (2005) explored the relationship between exchange rate volatility and central bank intervention in India. The study uses monthly data on Rupee-Us Dollar bilateral exchange rate and RBI intervention in Indian foreign exchange market plus other control variables which included; net foreign institutional investment inflows, interest rate and inflation differentials of India and US over the post-reform period, June 1995 through December 2005 and a dummy variable. The study used GARCH(1,1). It found that the intervention of RBI is effective in reducing volatility in the Indian foreign market. However, the result is not supporting the theoretical positive association between exchange rate return and RBI intervention. Thus the reserve bank intervention has been reducing the extent of fluctuations of exchange rate rather than changing the direction of the rupee movement against the US dollar.

Correspondingly, Simwaka and Mkandawire (2006) studied the effectiveness of foreign exchange market interventions carried out by the Reserve Bank of Malawi. They used monthly data of net sales of foreign exchange and exchange rate data over a four year period. The results confirm that net sales of dollars depreciate, rather than appreciate the Malawian currency (kwacha). The study also finds that the Reserve Bank of Malawi intervention reduces the volatility of the kwacha. This infers that the Reserve Bank of Malawi actually achieves its objective of control fluctuations of the kwacha. Kihangire (2011) support this view using data from 1993 to 2010 and analyzing it based on a structural vector autoregression (VAR) model that Bank of Uganda’s (BOU) direct intervention in the IFEM reduces exchange rate volatility. However, this method has a problem of omitted variable bias.
Also, Kembe (2013) supports that intervention reduces exchange rate volatility in Kenya. He carried out an event study although not specified, on the impact of central bank intervention on the volatility of the US Dollar, Euros, and Sterling Pounds against Kenya Shilling over the period 2009 to 2011. Net intervention was defined as the net purchases of the US dollars by the CBK. The study used ANOVA to do its data analysis where variance analysis was used in the instances where CBK intervened in the market and in those days where CBK did not intervene and it was found to be effective. However, due to the tendency for foreign exchange rate data to be skewed in terms of distributions or volatility clusters, the use of simple descriptive statistics such as the standard deviation method has been found not effective as a measure of its volatility (Bollerslev, 2002).

However, Baillie and Osterberg (1997) using GARCH research found little evidence that the different types of foreign exchange intervention have had much effect on the conditional mean of exchange rate returns in the spot US exchange rates and some evidence that intervention is associated with slight increases in the volatility of exchange rate returns from 1985 to 1990. Likewise, Chang and Taylor (1998) used high frequency data on exchange rates and interventions for their analysis and conclude that intervention has a very little effect on volatility. To add on that Aguilar and Nydahl (2000) examine the impact of intervention on the level and volatility of the Swedish Krona (krona-dollar and krona-mark rates) from January 1993 to November 1996. They use a bivariate GARCH model and the implied volatility approach from currency options. They find no significant effect for the exchange rate level and only weak evidence for a reduction in volatility for the whole period. When Fatum and King (2004) use high frequency data set to test the effectiveness of intervention on exchange rate during 1995 and 1998 but control for currency co-movements of CAD/USD exchange rate against the U.S. dollar, the findings find no significant. However, Fatum and King (2005) find intervention to have a systematic impact on exchange rate volatility when aggregating intervention operations at the daily level. There is evidence that intervention was associated with changes in direction and smoothing of exchange rate. However, the effects are weakened when controlling for currency co-movements, against the USD, thus suggesting that controlling for currency co-movements is important in assessing the effectiveness of intervention.

The above findings differ from the findings of Brandner et al. (2001) who investigated the effectiveness of intervention in the European Monetary System by using daily data of intervention activity of six European Central banks, covering period from August 1993 to April 1998. They used exponential GARCH and Markov Switching ARCH in testing for intervention. The results revealed that even in the same institutional framework, intervention does not seem to affect the means and variances in a consistent and predictable manner. Hutchison (2003) found intervention supported by Central Bank interest rate change and intervention coordination to have greater impact but does on comment on the direction of influence. Eger and Lang (2005) investigated the impact of daily official foreign exchange interventions on the exchange rates of two EU candidate countries, namely Croatia and Turkey for the periods from 1996 to 2004 and from 2001 to 2004, respectively. Using a variety of GARCH models, the results reveal that both the Croatian and the Turkish central bank’s interventions influence to some extent, the level of the exchange rate during the period studied. Moreno et al. (2013) find that foreign exchange intervention can affect exchange rate returns and volatility, although the effects may be short-lived. Echavarria et al. (2013) found that, in Colombia, the exchange rate responds differently to intervention following preannounced rules.

On the other extreme, Dominguez (1998) analyzed a long time series of daily data in the context of various GARCH "generalized autoregressive conditional heteroskedasticity" specifications. She used the event study to test the relationship between exchange rate returns and intervention and macro announcements which were represented by dummies. She found that secret interventions generally increase volatility. Moreover, Morana and Beltvatti (2000) support this argument by concluding that the intervention is not particularly effective, with the spot rate only changing in the intended direction for 50% of the time and that usually intervention is associated with increases in volatility. Similarly, Doroodian and Caporale (2001) analysed the effectiveness and the impact of Federal Reserve intervention on US exchange rates, using daily measure of exchange rate intervention in the yen/dollar and mark/dollar exchange market for the period 1985 to 1997. By using GARCH model, they found that intervention is linked with a significant increase in the intraday conditional variance at both exchange rates.

In summary there is no harmony among empirical studies on the effect of FOREX intervention on the exchange rates. In addition, findings vary by time period, data source and even estimation method used. Thus, this study seeks to determine the effectiveness of FOREX intervention against the monetary policy goal of stabilizing the exchange
rate using a time series study by applying GARCH (1,1) model in measuring volatility, a longer monthly time series data and control variables to avoid overestimation.

**Central Bank Rate and Exchange Rate Volatility**

Gichuki et al. (2012) wanted to determine the optimal monetary instruments between interest rates and reserve money in influencing the conduct of monetary policy for Kenya, employing stochastic IS-LM model using a quarterly data covering the period 1994 to 2010. Variables used in the model include gross domestic product, M3, and CBK overdraft interest rate. The study established that the interest rate (CBR) is a superior policy instrument over reserve money in meeting Kenya's monetary policy objectives. In addition, Corazon (2014) wanted to establish the effect of monetary policy on economic growth and exchange rate in Kenya using VAR model covering the period 1997 to 2013. The study used credit to the private sector, Central Bank Rate, treasury bills (TB), short-term interest rate (INBK), lending rate (LR) and the nominal effective exchange rate (NEER) as measures of monetary policy shocks. The study noted that the interest rate channel followed by the credit channel to be the most effective channels in influencing economic growth.

Conversely, Obondi (2013) examined relationship between foreign exchange rate and CBR for the period from June 2006 to August 2013 using a regression model. From the findings, the study concluded that central bank rates have no significant effect on nominal exchange rate since they have a weak positive relationship to the foreign exchange rate and thus cannot be used to predict the movement of the foreign exchange rate.

**91-Day Treasury Bill Rate and Exchange Rate Volatility**

Zettelmeyer (2004) examine the impact of monetary policy on exchange rate; evidence from three small open market economies which were Australia, Canada and Zealand during 1990s. The three countries have a high degree of openness both in terms of trade and capital flows; floating exchange regime in the sense that no particular level of exchange rate was targeted by policy makers and they use formal inflation targets. The study used three month Treasury bill rate as a measure of policy shocks. The study established that a contractionary shock will appreciate exchange rate. Also, Cheng (2006) uses VAR techniques to analyze the monetary transmission mechanism in Kenya. The study examined how variations in the short-term interest rate (Treasury bill rates and interbank rates) account for fluctuations in output, prices, and the nominal effective exchange rate. The study used monthly data for the period 1997 to 2005. The study found that variations in the short-term interest rate account for significant fluctuations in the nominal exchange rate and prices, while accounting little for output fluctuations.

Kathanje et al. (2007) in their analysis of the monetary policy function for Kenya during the period 1997 to 2006 used monthly data on REPO rate, Interbank rate and Treasury bill rate as a measure for monetary policy shocks. The study established that CBK has been successful in controlling inflation, at least for the greater period in the sample. Moreover, Tobias (2011) used GARCH model to test the effect of short term interest rate on the volatility of the foreign exchange rate using Treasury bill rates from August 1991 to December 2007. The findings revealed that there exists a link between short term interest rates and the volatility of foreign exchange rate in Kenya.

Another study by Cheruiyot (2012) examining the effect of monetary policy tools in countering inflation in Kenya for the period between 2006 and 2011 using a multivariate model used 91-day Treasury bill rate, exchange rate, money supply (M3) and REPO rate as measures of monetary policy effect. The study conclude that, 91-day Treasury bill rate, exchange rate and money supply are effective in controlling inflation whereas REPO rate has little effect on the level of prevailing retail prices in an economy.

Gichuki and Moyi (2013) examined the monetary condition index for Kenya using a quarterly time series data from 2000 to 2011. The study employed a simple aggregate demand function for the computation of monetary condition index. They used 91-day Treasury bill rate, credit to private sector, and real exchange rate as measures for monetary policy transmission. The study concluded that the three variables are the main channels of monetary transmission in Kenya. Moki (2014) also used Treasury bill as a measure of monetary policy shock to determine the effect of monetary policy in controlling inflation in Kenya. To add on that, Maina (2014) sought to investigate the impact of interest rate channel of monetary transmission mechanism in executing monetary policies in Kenya. The study used a monthly data covering the period between 1993 to 2013. VAR model was used in analysis. Treasury bill rates and REPO rate were used as the measure for monetary policy shocks. The study found that there exists significant influence of interest rate channel of monetary transmission shock to GDP c and CPI (inflation). The study further established that REPO rates had a significant influence on nominal effective exchange rate.
Moderating Effect of Inflation on Effectiveness of Monetary intervention

Kenya’s monetary policy operates under inflation targeting monetary framework. Therefore, other than monetary tools effect on exchange rate, the level of inflation will also affect the exchange rate volatility. Ndung’u (1999) measured whether the exchange rate is affected by monetary policy in Kenya. The study employed co-integration analysis on quarterly time series data from 1970 to 1995. The study further assessed whether the monetary effects are permanent or transitory. The study established that excess money supply fed into the cyclical movements of the real exchange rate, implying that monetary shocks affect the real exchange rate. In addition, the study revealed that growth in money supply and inflation depreciates nominal exchange rate. Further analysis established that the nominal exchange rate is determined by the real income growth, rate of inflation, money supply growth, and cycles in the real exchange rate movements, the co-integrating factors and shocks. In addition, Sundavist (2002) claimed that the differences in anticipated inflation that are embedded in the nominal interest rates affect the future spot rate of exchange. Moreover, Utami and Inanga (2009) examined the influence of inflation rate and interest rate differentials on exchange rate changes based on the international Fisher effect theory in Indonesia using quarterly and yearly data for the interest, inflation differentials and changes in exchange rate over a five year period from 2003 to 2008 using four foreign countries namely: the USA, Japan, Singapore and the UK and Indonesia as the home country. The result revealed that interest rate differentials have positive but no significant influence on changes in exchange rate for the USA, Singapore and the UK, relative to that of Indonesia. Inflation rate differentials have negative significant influence on changes in exchange rate for Japan.

Mahmood and Bashir (2015) also investigated the impact of interest rate, inflation rate and money supply on exchange rate volatility in Japan. The results revealed that both short run and long run relationships exist between inflation and exchange rate volatility. High money supply and increase in interest rate raises the price level (inflation) which leads to increase in exchange rate volatility. Equally, Ebiringa & Anyaogu, (2014), using historical data on Nigeria from 1971 to 2010 established a significant short-run and long run positive relationship between inflation and exchange rate. Moreover, they displayed that interest rate exhibited a negative relationship with exchange rate. Concerted effort of all monetary authorities is therefore required to ensure that periodic variation in inflation is kept at the barest minimum for stability in exchange rate regime to be achieved.

In conclusion, most of the available studies have investigated the effect of monetary policy on inflation and economic growth where in measuring monetary policy shocks they included 91-day Treasury bill rates together with REPO rate or/and interbank rates. However, this study used 91-day Treasury bill rate and CBR since they forms the basis for the setting of commercial bank lending rates and other market rates respectively (Cheruiyot, 2012; Ndiarangu et al., 2013) and also included Net FOREX intervention as one of monetary tools. Most researchers have used VAR model in their estimation however, the current study used GARCH model in analysis.

Theoretical Literature Review

Monetarist and Keynesian Theories on Monetary Policy Transmission

In the monetarists’ theory, the monetary transmission mechanisms influence the economy through the wealth channel and financial asset prices (Meltzer, 1995). A contraction of monetary policies leads to decline in stock prices through reduced demand resulting to overall decrease in individual wealth since there are limited capital gains from stocks. This will lead to a fall in aggregate demand. An expansionary monetary policy will result to an increase in demand for financial assets which in turn will lead to an increase in individual wealth, thus increasing expenditure and aggregate demand. With a contractionary monetary policy, consumers demand will fall and therefore will reduce spending in stock markets which will lead to a fall in stock prices (Patinkin 1965; Walsh, 2010).

According to Keynes, interest rate channel is the main channel for monetary policy transmission. A contractionary monetary policy will result to an increase in interest rates leading to crowding out of local investments. This increases unemployment and lowers aggregate demand due to low consumption levels (Mishkin, 1996). Keynes also supports monetary policy transmission through exchange rate channel with adoption of expansionary monetary policy interest rates fall this leads to capital outflows since domestic interest rates are lower than foreign interest rates thus causing a depreciation of the local currency (Walsh, 2010). The depreciation makes local goods competitive in the world market since they become cheaper and thus an appreciation of the exchange rate.

Purchasing Power Parity and Mundell-Fleming Model

PPP is based on the concept of “law of one price (LOOP)”. LOOP indicates that identical good/services should sell for the same price in two separate markets when there are no transportation costs and no differential tax rates in the
two markets. Purchasing Power Parity (PPP) by Cassel (1918) indicates that exchange rate between one currency and another is in equilibrium when their domestic purchasing powers at that rate of exchange rate are equivalent hence the exchange rate tends to be established at the point of equality between the purchasing powers of the two currencies. In absolute term PPP indicates that exchange rate between two countries should equal to the price ratio of similar goods and services in both countries. This implies that exchange rate must change to adjust to the change in the prices of goods in the two countries (Ebiringa et al (2014)). Therefore, when one country’s inflation rate rises relative to that of another country it results to decreased exports and increase in imports thus depressing the country’s currency. The theory attempts to confirm inflation and exchange rate relationship by asserting that changes in exchange rate are caused by the inflation rate differentials(Kara & Nelson, 2002). For example, if a country experiences a hyperinflation it will experience at the same time a corresponding external depreciation of its currency. Therefore, domestic inflation will rise with real exchange rate depreciation.

According to Mankiw (2006) and Blanchard(2006), Mundell-Fleming model is an economic model first set forth by Robert Mundell and Marcus Fleming. The model is an extension of the IS-LM model. In the IS-LM, interest rate is the key component in making both the money market and the good market in equilibrium. Under the Mundell-Fleming framework of small economy, interest rate is fixed and equilibrium in both markets can only be achieved by a change of nominal exchange rate. Mundell (1968) and Fleming (1962) argue that the exchange rate enters the macroeconomic framework of interest and output determination because changes in exchange rates affect competitiveness. Under a system of floating exchange rates, the exchange rate is set by market forces and is allowed to fluctuate in response to changing economic conditions. An increase in money supply shifts the LM curve downward. This directly reduces the local interest rate and in turn forces the local interest rate lower than the global interest rate (DeGrauwe, 2000). This depreciates the exchange rate of local currency through capital outflow. (Hot money flows out to take advantage of higher interest rate abroad and hence currency depreciates.)

The depreciation of the currency follows from the interest rate parity condition. The depreciation makes local goods cheaper compared to foreign goods and increases export and decreases import. Hence, net export is increased. Low interest rate also leads to increase in investment. Increased net export and investment leads to the shifting of the IS curve to the right resulting to increase in equilibrium income. This shift continues to the right until the local interest rate becomes as high as the global rate. At the same time, the BOP is supposed to shift too, as to reflect depreciation of home currency and an increase in current account or in other word, the increase in net export. These increase the overall income in the local economy. A decrease in money supply causes the exact opposite of the process (Young &William, 2004). To conclude, these theories support a relationship between exchange rate, interest rate differentials and inflation differentials. This again, justifies why they should be included in the analysis model. Mundell- Fleming model also supports the influence of exchange rate through unsterilized intervention, that is, monetary policy channel.

Conceptual Framework
The conceptual framework in figure 1 displays the interrelation among variables used in the research study diagrammatically.
METHODOLOGY
The research used a descriptive longitudinal time series research design. A longitudinal study follows the same sample over time and makes repeated observations. Sampling design used was non-probabilistic purposive sampling since it allows a study to use cases that have some specific characteristics with respect to the objective (Kombo & Tromp, 2006). The variables used in this study were: Kenya shilling to US dollar exchange rate returns (ERT), net FOREX intervention (INV), central bank rate (CBR), 91-day Treasury bill rate (TB) and Inflation rate (INF). It has been observed by researchers like Cheng (2006), Ndirangu et al., (2013), Gichuki et al., (2013), Maina and Moki (2014) that monetary policy transmission in Kenya can be measured by the above variables. Logarithmic returns are the most frequently used because they have more suitable statistical properties than rates. The percentage logarithmic returns are calculated as follows:
\[ \text{Return}_t(\text{ERT}) = (\ln \text{Er}_t - \ln \text{Er}_{t-1}) 100 = \ln \left( \frac{\text{Er}_t}{\text{Er}_{t-1}} \right) 100. \]
Where, \( \text{Er}_t \) is exchange rate (Ksh/US dollar) in time \( t \) and \( \text{Er}_{t-1} \) is the exchange rate at time \( t-1 \).

Model Specification
The basic version of Ordinary Least squares estimation required that research on time varying volatility to remove volatility estimates from asset return data before specifying a parametric time series model for volatility by assuming that volatility is constant over some interval of time. However, according to Engle (2001), it is expected that there will be heteroscedasticity in financial time series data since in financial data some periods are riskier than others, that is, the expected value of error terms at sometimes is greater than others. Moreover, these risky times are not scattered randomly across quarterly or annual data. Instead there is a degree of autocorrelation in the riskiness of financial returns. Engle (1982) proposed the class of Autoregressive Conditional Heteroskedasticity (ARCH) models that capture the serial correlation of volatility. This led to the Generalized ARCH model (GARCH) introduced by Bollerslev (1986). GARCH is an efficient way to model volatility in high frequency econometric time series. More importantly, GARCH models of exchange rate volatility allow the empirical testing of the effectiveness of intervention on both level and volatility of exchange rate to be carried out simultaneously on both the mean and conditional volatility of exchange rate returns (Edison and Liang, 1999).

Therefore, the model becomes;
\[ \text{ERT}_t = \alpha_0 + \alpha_1 \ln \text{INV}_t + \alpha_2 \Delta \ln \text{CBR}_t + \alpha_3 \Delta \ln \text{TB}_t + \alpha_4 \Delta \ln \text{INF}_t + \epsilon_t. \]
where,
\[ \epsilon_t | \Omega_{t-1} \sim N(0, h_t). \]
\[ h_t = b_0 + b_1 \ln \text{INV}_t + b_2 \Delta \ln \text{CBR}_t + b_3 \Delta \ln \text{TB}_t + b_4 \Delta \ln \text{INF}_t + \alpha \epsilon_{t-1}^2 + \beta h_{t-1}. \]
where, \( b_o, \alpha, \beta > 0 \) and \( \alpha + \beta < 1 \).

Equation (1) represents the mean equation in which the dependent variable is rate of logarithmic return on nominal exchange rate \( \text{(RET}_{100} \) ) during a month. It is assumed that the average return depends on net intervention (INV), central bank rate (CBR) and 91-day Treasury bill rate (TB). Further, it is also assumed that the random disturbance term in the mean equation \( (\epsilon_t) \) has a conditional normal distribution with mean zero and variance \( (h_t) \) and are modeled as normally distributed conditional on the information set \( \Omega_{t-1} \) available at time \( t-1 \). Here, \( \Omega_{t-1} \) \( \tilde{Y} \) indicates all the (lagged) information available to the participants in the foreign exchange market at time \( t \). The monetary policy is expected to reduce the extent of fluctuations of the exchange rate and change direction of shilling movement against the US dollar. According to theory, the intervention of a central bank is said to be effective if the coefficient \( \alpha_1 \) is positive and significant. Thus, Kenya shilling depreciates against the US Dollar as the net US dollar purchases increase. That is, the purchase (or sale) of the US dollar results in depreciation (or appreciation) of the Kenya shilling. Also a decrease in interest rate should decrease the mean exchange rate return. Thus, Kenya shilling depreciates against the US Dollar as interest rate decreases. Therefore, coefficients \( \alpha_2 \) and \( \alpha_3 \) should be negative. The coefficient of inflation rate \( \alpha_4 \) is expected to be positive that Kenya shilling depreciates against US Dollar with increase in inflation rate thus increasing the exchange rate mean return.

In equation (2), the conditional volatility depends on the same set of determinants as that of the mean equation (i) plus two more determinants; past disturbance \( \alpha \epsilon_{t-1}^2 \) and the lagged variance \( \beta h_{t-1} \). According to Dominguez (1998) foreign exchange intervention is regarded as successful, if intervention significantly reduces the volatility of the exchange rate. Besides, Schwartz (1996) stated that unsuccessful foreign exchange intervention is likely to increase exchange rate volatility. CBK intervention is said to be effective if an increase in net purchases of dollars lowers the
volatility of the monthly Kenya shilling to US dollar returns. Hence, the expected sign for $b_1$ is negative. Also, CBR and 91-day Treasury bill rate will be effective if decreasing them lowers the volatility of the monthly Kenya shilling to US dollar returns. Therefore, the expected sign for $b_2$ and $b_3$ is positive. Inflation is also expected to increase volatility hence $b_4$ is expected to be positive.

RESULTS AND DISCUSSIONS
Unit root and Normality test
The presence of unit roots for all the variables in the mean equation were tested by applying Augmented Dickey Fuller (ADF) and Philips Perron (PP) tests. All variables were found to be stationary at 5% level of significance after taking the second difference. The use of standard ARCH/GARCH model requires testing the distribution of the dependent variable. If the series is not normally distributed then GARCH model is found to be applicable in analyzing the data. Histogram-stat test for normality was applied where descriptive statistics of the exchange rate return including skewness and kurtosis measures were computed. The exchange rate return series was found to be positively skewed. This shows the presence of volatility in the return series implying that depreciation in the exchange rate occurs more often than appreciation. The probability of JB statistic was 0.000< 0.05 thus, the null hypothesis that the series is normally distributed was rejected. The non-normality of the return series justifies the use of ARCH and GARCH model.

ARCH Effects and Volatility Clustering Test
Before estimating ARCH and GARCH model it is necessary to test for the residuals of the mean equation to check whether they disagree with the assumptions of the OLS. ARMA equation was estimated by an econometric model which was built by applying OLS technique after which the estimated residuals are obtained. The assumptions underlying the GARCH model are that the time series under consideration must exhibit heteroscedasticity as well as autocorrelation. It is expected that there will be heteroscedasticity in financial time series data since in financial data some periods are riskier than others, that is, the expected value of error terms at sometimes is greater than others (arch effect). Moreover, these risky times are not scattered randomly across quarterly or annual data but riskier periods may be followed by other riskier one and less risk period followed other less risk periods (Volatility Clustering). Ljung- Pierce Q-statistic of the squared deviations ($Q^2$) and Lagrange Multiplier ARCH test (ARCH-LM test) were employed. The Ljung-Box Q-statistic for squared residuals as well as the ARCH-LM test confirms the presence of ARCH effect since their F-probabilities (0.00) are less than 0.05; hence the null hypothesis of zero ARCH effect in the residuals is rejected. Again, a line graph for exchange rate return residual was plotted to verify the presence of volatility clustering. Both the test revealed that there is heteroscedasticity, autocorrelation and volatility clustering in the exchange rate return series and that it follows a non-normal distribution. Once ARCH has been found in the investigated data, it justifies the use of GARCH models. The inverted AR root for mean equation was 0.24 which is inside the unit circle, that is, between -1 and 1. Therefore, the mean equation is well defined.

Estimated GARCH (1, 1) Model
To measure the effect of monetary policy intervention on both the level and volatility of the US Dollar-Kenya shilling exchange rate a GARCH model with exogenous monetary policy intervention data in both the conditional mean and variance equations as proposed by Engle (1982), Bollerslev (1986), and Baillie and Bollerslev (1989) was used. The effect for monetary policy intervention on the exchange rate level is captured by the mean equation of GARCH model while on volatility is captured by variance equation as shown in Table 1. As a result of exchange rate risk that an investor encounters when investing internationally, it is observable that the volatility of exchange rate affects the expected returns of an investment. Depreciation is supposed to increase exchange rate return because it makes local goods cheaper compared to foreign goods thereby increasing export and decreasing import. In other word it makes local goods to be more competitive (Mundell, 1968 and Fleming, 1962). Therefore, an increase in exchange rate return could be interpreted to mean that the currency has depreciated and a decrease in returns means an appreciation of the local currency. Therefore, the variance equation measures the degree of volatility (fluctuation) while the mean exchange rate return equation gives us the direction of the movement of fluctuations. The GARCH (1,1) model is shown in Table 1.

Table 10 shows parameters of the variables in the mean and variance equation together with the p-values of $Z$ – statistics. The coefficient of LNINIV, ∆LCBR, ∆LNTB and ∆LNINF in mean equation are -0.9863, 0.0715, -1.5696 and 0.2464 respectively while for equation variance are -0.3042, 1.3515, 2.5790 and 1.2159 respectively. The constant of the mean equation is 1.5315 with a p-value of 0.2293 > 0.05 therefore, not significant. The coefficient of
autoregressive term is 3.7265 with the p – value of 0.0011< 0.05. This implies that the mean of exchange rate return is influenced by previous information available in the market. Exchange rate level is affected by this information.

The constant term in variance equation is 4.3853 with a p-value of 0.0113< 0.05. This shows that it’s positive and significant to mean there some unconditional volatility which is not dependent on any factor equal to 4.3853. The coefficient for ARCH term is 0.5733 with a p- value of 0.0000< 0.05 and that of GARCH term is 0.2566 with a p-value of 0.0006 < 0.05. The ARCH term measures volatility from previous period measured as a lag of the squared residual from the mean equation and the GARCH term measures the last period’s forecast variance. The volatility characteristic of financial time series was therefore successfully captured by the GARCH (1, 1) model. The estimated results for the GARCH model reveal that the null hypotheses of no present of ARCH effect and of no present of GARCH effect were rejected since the coefficients of lagged squared residuals and lagged conditional variance have positive signs as expected and significant. These results show that monetary policy intervention leads to an increase in exchange rate volatility and uncertainty. This means that, past disturbances and information available to the participants in the foreign exchange market in previous period highly increases exchange rate volatility and uncertainty because intervention gives the market participants more concern about the stability of the market and the persistence of the intervention policies.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>Z- Statistics</th>
<th>P-Value</th>
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<tr>
<td>Mean Equation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>1.5315</td>
<td>1.2739</td>
<td>1.2022</td>
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<tr>
<td>ΔLCBR</td>
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<td>0.89023</td>
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<td>0.9360</td>
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<tr>
<td>ΔLNTB</td>
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<td>0.6074</td>
<td>-2.5842</td>
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<td>ΔLNINF</td>
<td>0.2464</td>
<td>0.3294</td>
<td>0.7479</td>
<td>0.4545</td>
</tr>
<tr>
<td>AR</td>
<td>0.2565</td>
<td>0.0688</td>
<td>3.7265</td>
<td>0.0002</td>
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<tr>
<td>Variance Equation</td>
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<td>2.5321</td>
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<td>0.1081</td>
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<tr>
<td>ΔLNINF</td>
<td>1.2159</td>
<td>0.3728</td>
<td>3.2620</td>
<td>0.0011</td>
</tr>
</tbody>
</table>

Wald stat = 0.8299 Inverted AR Roots = 0.24

Therefore, lagged volatility has more significant effect on the current volatility. These findings support the theoretical arguments concerning the risk of exchange rate intervention according to Schwartz (1996). All these results confirm the adequacy of this GARCH model. The conditional mean equation and variance equation are thus specified as follows:

\[ ERT_t = -0.9863 INV_t - 1.5696 TB_t + 0.256546AR(1) + \varepsilon_t \]
\[ h_t = 4.3853 - 0.3042INV_t + 2.5790TB_t + 1.2159INF_t + 0.5732\varepsilon_{t-1}^2 + 0.2566h_{t-1} \]

**Effect of Net Foreign Exchange Intervention on Exchange Rate Volatility**

From conditional mean equation in Table 10, the coefficient of FOREX intervention (INV) is - 0.9863 and the p-value is 0.0488 < 0.05. The result implies that holding other things equal, an increase in net foreign exchange intervention by one unit would lead to a decrease in mean return of foreign exchange rate by 0.9863 units. This shows that purchase (sale) of the US dollars would cause an appreciation (depreciation) of the Kenyan shilling. However, the result does not support the theoretical positive association between exchange rate return and FOREX intervention. In the variance equation, the FOREX intervention coefficient was - 0.3042 and significant as its p-value was 0.0274 < 0.05. This implies that an increase in net foreign exchange intervention by one unit would lead to a decrease in foreign exchange volatility by 0.3042 units holding other things equal. This shows that an increase in net purchases of US dollars by CBK in the foreign exchange market would result to a decline in the volatility of exchange rate. The mean and variance equation results could be interpreted that an increase in net purchases of US dollars reduces the levels of fluctuations of the exchange rate and appreciates the Kenya shilling against the US dollar. This result supports the description of CBK FOREX intervention as ‘leaning against the wind’. Meaning it is
acting to slow or correct excessive trends in the exchange rate. This study is consistent with empirical studies such as Simatete (2004), Egert, Lang, Behera et al. (2005), and Kihangire (2011) which concluded that an increase in FOREX intervention reduces the exchange rate volatility and changes the level of exchange rate. The result also supports the findings of Kembe (2013) that FOREX intervention reduces exchange rate volatility in Kenya. On contrary, other empirical studies such as Baillie and Osterberg (1997), Morana and Beltvatti (2000), and Doroodian and Caporale (2001) did not support the notion that FOREX intervention reduces the exchange rate volatility.

Therefore, holding other thing equal, a unit increase in net foreign exchange intervention would be effective in reducing volatility of exchange rate in Kenya by 0.3042 units and at the same time would decrease the exchange rate return against the expectations of the investors (leaning against the wind) by 0.9863 units thus leading to appreciation of Kenya shilling. This effect can be direct through the change in supply of Kenya shilling or US dollar thus affecting the demand of currency in the FOREX market or indirect through interest rate channel by changing the domestic money supply precisely the same way as when the CBK buys a treasury bill on the open market. Both direct and indirect effect act in the same direction. The only difference between the direct and indirect effects is the timing and sustainability (Stephen, 2005). The direct effect will occur immediately with central bank intervention since the CBK will be affecting today’s supply of shillings or dollars on the FOREX market. The indirect effect, working through money supply and interest rates, may take several days or weeks.

Effect of Central Bank Rate on Exchange Rate Volatility
CBR coefficient in mean equation was positive (0.0715) against the expectation and insignificant since its P-value was 0.9360 > 0.05. Again the CBR coefficient in Variance equation is also positive (1.3515) and insignificant since its P-value was 0.5401 > 0.05. Therefore, CBR was found to be insignificant both in the mean and variance equations. Meaning that, CBR has no significant effect on the direction and volatility of exchange rate. The study in Kenya by Obondi (2013) also support that there is insignificant relationship between CBR and exchange rate.

Effect of 91-Day Treasury Bill Rate on Exchange Rate Volatility
The coefficient for 91-day Treasury bill rate was -1.5696 and significant since its p-value is 0.0098 < 0.05. This implied that an increase in TB by one unit leads to a decrease in mean return of foreign exchange rate by 1.5696 units. Meaning that, a decrease in 91 treasury bill rate by one unit increases the mean exchange rate return by 1.5696 holding other thing equal. This follows that a decrease (increase) in 91-day Treasury bill rate depreciates (appreciate) Kenya shilling against the US Dollar. The theory under Mundell- Fleming model and empirical result like (Yutaka, 2011) seems to support that a decrease in interest rate results to depreciation of domestic currency. Also, the TB coefficient in variance equation was 2.5790 with a P-value of 0.0424 < 0.05. Meaning that, increasing (decreasing) 91-day Treasury bill rate by one unit increases (lowers) the volatility of the monthly Kenya shilling to US dollar returns by 2.5790 holding other thing equal. This is in consisted with empirical study of Zettelmeyer (2004) about the relationship between exchange rate volatility and interest rate.

Therefore, holding other things equal, 91-day Treasury bill rate is seen to be more effective in reducing the exchange rate volatility since a unit change in 91-day Treasury bill rate influence the exchange rate volatility by 2.5790 units and at the same time change the level of exchange rate return by 1.5696 units while a unit change in INV influences the volatility and level of exchange rate by 0.3042 and 0.9863 units respectively. The 91-day Treasury bill rate affects the exchange rate through an indirect method. The indirect intervention traverses from open market operations to change the domestic money supply, to changes in domestic interest rates, to changes in exchange rates due to new rates of returns. The problem with this method is that it may take several weeks or more for the effect on exchange rates to be realized because the low interest rate has to increase investment and net export returns which will result to increased domestic money supply and hence appreciation of the Kenya shilling. Another problem with indirect method is that to affect the exchange rate the central bank may need to change interest rates away from what it views as appropriate for domestic concerns at the moment.

Moderating Effect of Inflation Rate on Effectiveness of Monetary Policy
Moreover, it is observed that the coefficient of inflation is 0.2464 in the mean but insignificant since its P-value is 0.4545 > 0.05. This could be because change in exchange rate return mostly affects the external market other than the internal market. Thus inflation does not affect the mean of exchange rate return. In the variance equation the coefficient for inflation is 1.2159 which is positive and significant since its P-value 0.0011 < 0.05. This implied that an increase (decrease) in inflation rate by one unit leads to an increase (decrease) of foreign exchange volatility by 1.2159 units holding other thing equal. This means that decreasing inflation rate lowers the volatility of the monthly...
Kenya shilling to US dollar returns, that is, it reduces exchange rate volatility. According to Keynesian theory, inflation rate and interest rate are inversely related. This implies, reducing interest rate in order to reduce exchange rate volatility would increase inflation which will affect unemployment and GDP growth while reducing inflation in order to reduce exchange rate volatility will increase the interest rate. In the model it is observed that a unit increase in inflation would result to an increase in volatility by 1.2129 units and a unit decrease in 91-day Treasury bill rate would reduce exchange rate volatility by 2.5790. Since CBK is entrusted to maintain domestic price stability, maintaining appropriate interest rates, a low unemployment rate and GDP growth, monetary policy intervention in the FOREX market will often interfere with one or more of its other goals. Therefore, inflation affect the effectiveness of monetary policy on exchange rate volatility since monetary actions for controlling exchange rate volatility negates inflation control. This dilemma of monetary policy results in CBK choosing to sterilize its interventions so as to cause a change in the exchange rate while at the same time leaving the money supply and hence interest rates unaffected.

A sterilized central bank intervention occurs when a CBK counters direct FOREX intervention with a simultaneous offsetting transaction in the domestic market through open market operations. Therefore, since INV and TB affect money supply in opposite direction, monetary policy makers can chose a policy mix that would ensure stable exchange rates by stemming out any excessive volatility in the exchange rate to avoid further depreciation and fluctuation on exchange rate and at the same time leave money supply and interest rates unaffected. Sterilizing intervention could have a short run and still a long run effect on exchange rate volatility. A temporal effect would occur if CBK make a direct intervention in the FOREX market, over a short period of time, this will definitely change the supply or demand of currency and have an immediate effect on the exchange rate on those days. A more lasting impact would occur if the intervention could lead investors to change their expectations about the future. Therefore, if CBK wants to affect expectations should announce the FOREX intervention while hiding its offsetting open market operation. That is, it should not say whether it will sterilize intervention. Thus, investors may think that the FOREX intervention will lower the future dollar value and thus may adjust their expectations.

CONCLUSIONS
The main objective of this study was to evaluate the effectiveness of monetary policy against its policy goal of stabilizing the exchange rate. The results from GARCH model confirmed monetary policy intervention to be effective in reducing exchange rate volatility by use of FOREX intervention and 91-day Treasury bill rate. The results revealed that CBR has no significant effect on the mean and variance of exchange rate return, thus it is not an effective monetary policy for reducing the volatility of exchange rate in Kenya. It was found that inflation affect the effectiveness of monetary policy on exchange rate volatility since monetary actions for controlling volatility negates inflation control. This study further confirmed the assumption that Kenya as a small open economy tends to have high and persistent exchange rate volatility as in the case in most open emerging countries. It was found that INV can influence exchange rate in the short run without affecting domestic money supply while TB directly affect domestic money supply and interest rate. Changing the money supply will affect the average interest rate in the short-run and the price level, and hence inflation rate, in the long-run. This interferes with other goals of monetary policy. Thus using each of the monetary tools individually will result to non-sterilised intervention which may not be the best for the country. This dilemma of monetary policy results in CBK choosing to sterilize its interventions by countering the effect of INV with that of 91-day treasury bill rate so as to cause a change in the exchange rate while at the same time leaving the money supply and hence interest rates unaffected.

RECOMMENDATIONS
In general, the research confirmed that monetary policy has been effective to some extend to control exchange rate volatility. Based on these findings the following recommendations are made:

i. Since both INV and TB affected the volatility of exchange rate in opposite direction and non-sterilized intervention results into monetary policy dilemma, policy makers should strive for a policy mix that will ensure stable exchange rates by stemming out any excessive volatility in the exchange rate to avoid further depreciation and fluctuation on exchange rate. This is recommended since stable exchange rates will ensure certainty, helping investors to make accurate planning and reduce operational risk. At the same time, competitive exchange rates will help to ensure that the goods remain competitive relative to foreign markets. A combination of a stable exchange rate environment and a competitive currency will attract investment, increase aggregate output and expand country's economic prosperity.

ii. This study reviewed that inflation has a significant effect on exchange rate volatility and thus has been found to be having an important policy implication in controlling volatility of exchange rate in Kenya.
Thus monetary policy should strive to target the level of inflation which reduces exchange rate volatility since by reducing inflation indirectly exchange rate volatility is reduced.  

iii. Central bank rate was found to be an ineffective monetary policy for controlling exchange rate volatility and the mean of exchange rate return. Therefore policy makers aiming at reducing the volatility should rely more on alternative policy rather than CBR.

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ENTERPRISING EDUCATION AND TRAINING COMPETENCIES

ASSESSMENT OF THE HUMAN RESOURCE CAPACITY BUILDING INTERVENTIONS NEEDED TO SUPPORT THE BIG FOUR AGENDA ON FOOD SECURITY AND NUTRITION IN KENYA

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ABSTRACT
Government has the cardinal responsibility of to ensure food security to its citizens since this has direct effect on the social and economic stability of a country. The four pillars of food security are food availability, ease of access, proper utilization, and long-term stability. Food security is a measure of the existence of physical and economic access to enough, safe and nutritious food to meet dietary needs. Although there has been a lot of research on the area of food security, there is very little if any documented empirical evidence on assessment of the capacity of the human resources to deliver on the food security agenda. The current study assessed the human resource capacity building interventions needed to support the big four agenda on FNS. Objectives were: (1) the requisite knowledge, skills and competency gaps that affect achievement of food security and nutrition in Kenya; (2) work environment factors that affect the capacity of employees to support achievement FNS in Kenya; (3) the extent to which the legal, policy and regulatory framework on human resource capacity building support achievement of food security and nutrition in Kenya. The study used descriptive research design. Purposive sampling was used. The main data collection tool was a written self-administered questionnaire. Quantitative data was analyzed using SPSS software to generate descriptive statistics and graphical representations of the data. Qualitative data was thematically and content wise analyzed to reveal emerging thematic issues to guide the reporting on open ended items. The study concludes that knowledge skills, competencies; policies, Legal and regulatory framework; and work environment all have a positive and significant effect on the human resources ability to deliver the FNS mandate.

Keywords: Capacity, competencies, interventions Food security, Knowledge skills

INTRODUCTION
Government has the cardinal responsibility of to ensure food security to its citizens since this has direct effect on the social and economic stability of a country. According to the United Nation’s Food and Agriculture Organization, the four pillars of food security are food availability, ease of access, proper utilization, and long-term stability. Food security is a measure of the existence of physical and economic access to sufficient, safe and nutritious food to meet dietary needs (FAO &WHO, 2003). It is “the condition where all people at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preference for an active and healthy life” (FAO, 1996 UNCTAD, 2008). Article 43 of the Constitution of Kenya 2010 states that every person has the right to be free from hunger and the right to adequate food of acceptable quality. One of the thematic areas of Kenya’s ‘Big Four Development Agenda’ is to ensure 100% food and nutritional security for the population by the year 2022.

World statistics indicate that one in every nine people in the world is affected by hunger, that is in about 795 million people, every ninth person, is undernourished, including 90 million children under the age of five The vast majority of them (780 million people) live in the developing regions, notably in Africa and Asia and are likely to be small holders whose meagre harvests are not enough to feed their families and achieve a balanced diet. (Giz.de, 2019, United Nations, 2017) Depending on the region considered, the share of undernourished people differs considerably, ranging from less than 5 per cent to more than 35 percent United Nations, 2017). Moreover, a large part of the food is getting lost between the field and the plate due to since there is no coordination between storage, processing and marketing (Giz.de, 2019). The global population is estimated to reach almost 10 billion people by 2050 and hence demand for food is growing inexorably. According to expert opinion from 2012 to 2050 global food production should be increased by at least 50% in order for every one of the populaces to be fed. The crux of the matter is the surface are for agriculture is limited on per capita basis, arable and grazing land are also scarcer and water is even more scarce (Giz.de, 2019). It is therefore important to assemble all arsenals machinery to enablers the achievement of food and nutritional security to avert a world crisis. To do so this study has focused on the duty bearers in the public sector organizations responsible to the agenda of food and Nutritional Security.
Indicators of food insecurity in a given region can include numbers of “hungry” or malnourished people, of underweight children and of people “suffering from micronutrient deficiency”. The United Nations Second Sustainable Development Goal (2015) states that countries should end hunger, achieve food security, improve nutrition and promote sustainable agriculture by 2030. It is notable that 14.5 million people in Kenya suffer from chronic food insecurity, 30% of all children are stunted, 13% are moderately wasted and 7% moderately underweight (GoK, 2011). According to the Food and Nutrition Security Policy, the government desires that all Kenyans access food in sufficient quantity and quality for optimal health (GoK, 2011). Causes of food insecurity include among other factors, population growth, changing tastes, climate change, and water scarcity, troubled farmers lack of knowledge, skills, and attitudes of service providers.

Human resource capacity is key to attainment of food security. Notably Knowledge, skills and attitudes, of key staff in food security, legal and regulatory frameworks and work environment have all been found to have a major influence on the capacity of service providers to offer the requisite service to achieve food security. Several authors opine that the capacity of an individual to perform in a particular sphere is dependent on the asset base and also the capacity to use the said assets productively. The capacity can be at various levels including the individual level, the organization level as well as at the level of the community. Assets are commonly categorized as physical or environmental, managerial assets, human or technical assets, financial, economic and social assets. (Green and Haines 2002; Mathie and Cunningham 2003, Lowe and Schilderman 2001). The current study concerned itself with human assets and their capability to deliver on the food and security mandate.

Human Resource Capacity Development
The study on “Human Resource Capacity Building Interventions Needed to Support the Big Four Agenda on Food Security and Nutrition in Kenya” is in tandem with SDG #2 which seeks to: End hunger, achieve food security and improve nutrition, and promote sustainable agriculture. “Capacity development is the process by which individuals, groups and organizations, institutions and countries develop, enhance and organize their systems, resources and knowledge-all reflected in their abilities, individually and collectively- to perform functions, solve problems and achieve desired objectives” (MoH, 2019).

The current study has conceptualized capacity building to include knowledge skills and attitudes, legal and regulatory framework, and work environment. Capacity development can be analogized by the game of football. It must be done as a team including the players themselves, managers, policy makers and the other stakeholders. Performance will be constrained if there exists a lack of coordination in this regard. Experts have acknowledged that efforts to promote development and improve food security in poor countries will not be successful without qualified local individuals and institutions to provide right incentives for motivating and managing the efforts. Governments therefore have the task of to ensure the right capacity (IFPRI, 2006).

Knowledge, Skills and Competency
Knowledge refers to the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. Skills refer to the ability to apply knowledge and use know-how to complete tasks and solve problems. Can be cognitive or practical. Competence means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. Competency is defined by Parry (1998) as a cluster of related knowledge, attitudes, and skills that affect a major part of one’s job. Similarly, Davis et al. (2004) state: “Competencies encompass clusters of skills, knowledge, abilities, and behaviors required for people to succeed”. According to Burke (1990), “Competencies embody the ability to transfer skills and knowledge to new situations within the occupational area”. There is a growing popularity for the notion of competence as integrated capabilities (Biemans et al. 2004). Mulder (2001) summarizes definitions of competencies as, "Competencies are capabilities, capacities or potentials and can be understood as characteristics of persons, teams, work units or organizations which enable them.

Work Environment
The term work environment is used to describe the surrounding conditions in which an employee operates. The work environment can be composed of physical conditions, such as office temperature, or equipment, such as personal computers. It can also be related to factors such as work processes or procedures (Amaravathi, Parimalam, & Ganguli, 2013). Haynes (2008) asserts that Workplace environment is also an important factor that has a significant impact on an employee’s performance. It fulfills the employee’s intrinsic needs and social needs and
forms the basis of the desire to stay or leave the organization. It is also the determinant of the quality of work and performance levels.

**Policies Legal & Regulatory Framework**
The word policy refers to any standard, statement, or procedure of general applicability, while regulations are standard, statement (which may include a policy statement), or procedure of general applicability to a group of people, organization, county or country. Governments provide the legal and policy frameworks that are necessary for successful and sustainable management of national development agenda. It is important for every country to have the necessary national policy strategy that can help them achieve their national agenda. The Government of Kenya has often responded to food and security challenges by performing three major policy interventions: these include Supply, prices and income related policies (Pelling & Holloway, 2006).

**Problem Statement**
Capacity building is as important as capital investment and infrastructure (Mati, 2008). UNESCO (2006) reports that capacity building focuses on increasing an individual and organization’s abilities to perform core functions, solve problems, and objectively deal with developmental needs. It is notable that 14.5 million people in Kenya suffer from chronic food insecurity. It is also estimated that 30% of all children are stunted, while 13% are moderately wasted and 7% moderately underweight. According to the Food and Nutrition Security Policy, the government desires that all Kenyans access food in sufficient quantity and quality for optimal health (GoK, 2011). Similarly, the United Nations second Sustainable Development Goal (2015) states that countries should end hunger, achieve food security, improve nutrition and promote sustainable agriculture by 2030. Likewise, Article 43 of the Constitution of Kenya 2010 states that every person has the right to be free from hunger and the right to adequate food of acceptable quality. This is in line with Kenya’s Vision 2030 which focuses on creating a “Globally competitive and prosperous country with a high quality of life by 2030”. One of the thematic areas of Kenya’s ‘Big Four Development Agenda’ is to ensure 100% food and nutrition security for the population by the year 2022. The agricultural sector contributes 16% of GDP to Kenya’s economy and its key objective is to achieve national food security.

Despite several initiatives having been put in place to overcome food insecurity, a lasting solution still remains elusive. The country continues to witness significant post-harvest losses, low agriculture productivity, lack of diversity in food products and weather-shock constraints. Research has mainly focused on efficiency in food production, marketing, distribution, food nutrition, managing grain reserves and storage, but it appears that there is scanty research evidence on the role played by human resource capacity building in all these aspects. Consequently, there is growing need to address human resource capacity specifically in knowledge, skills and competency gaps, work environment and legal, policy and regulatory frameworks guiding capacity building and how these affect achievement of the food security and nutrition agenda in Kenya. Furthermore, there is limited knowledge on human resource capacity building initiatives in the Counties to support the aspects of post-harvest losses from pests and diseases, high cost of agriculture inputs, food safety and post-harvest losses. Many of Africa’s agricultural and rural development problems have been related to misguided policies, weak institutions and a lack of well-trained human resources. A critical factor in meeting the challenge of ensuring food security in Africa is human resource development through knowledge building and information sharing.

**PURPOSE OF THE STUDY**
The study investigated the role of capacity building in supporting the achievement of the Big Four Agenda on Food and Nutrition Security and, while also examine the human resource gaps that impede Kenya’s achievement of the big four agenda on food and nutrition security specifically the study explored the requisite knowledge, skills and competency gaps that affect achievement of food security and nutrition in Kenya; Identified the work environment factors that affect the capacity of employees to support achievement of food security and nutrition in Kenya; and Analyzed the extent to which the legal, policy and regulatory framework on human resource capacity building support achievement of food security and nutrition in Kenya.

**Operationalization of Variables**
Skills and Competencies have been operationalized by aspects such as post-harvest management, food production, food distribution, Irrigation management, large scale farming, small holder production, value addition, knowledge management and management of SME’s. Legal and regulatory Framework is operationalized by awareness and availability of capacity building policies and initiatives. Work environment has been operationalized by availability of resources and hierarchy levels and considerations within the county. Food and Nutritional security have the four
main dimensions of availability, Access, utilization and stability. The current study has however taken a unidimensional approach of the concept of food and nutritional security.

LITERATURE REVIEW

Human Resources Capacity influence on Food & Nutritional Security

Development experiences of the last decades have made it clear that human resources are ultimately a key factor behind any progress that has been made Errata, (1989). However well developed, institutions are only as effective as the people who work in them. One of the worst bottlenecks on development in Africa has been the shortage of trained personnel. The development of human resources is essential for food security in Africa. An educated and informed populace is fundamental to any policies and strategies to reduce poverty, excessive population growth, environmental degradation and other factors that are most often the direct causes of hunger. This is especially true in the low-income, food-deficit countries of Africa where there is an urgent need for human capacity development and for increased knowledge and information about food production.

Food production and rural development, particularly in those countries with significant food security inadequacies, require appropriate and up-to-date technologies which, according to sustainable development criteria and local food traditions, promote modernization of local production methods and facilitate transfer of technology. Full benefit from these technologies will require training, education and skill development programmes for local human resources. (FAO, 1996). Many of Africa's agricultural and rural development problems have been related to misguided policies, weak institutions and a lack of well-trained human resources. A critical factor in meeting the challenge of ensuring food security in Africa is human resource development through knowledge building and information sharing.

Relevance of Knowledge, Skills, Competencies on Food & Nutritional Security

Previous studies have demonstrated that personnel tasked with the fulfilment of any goal or agenda require the necessary knowledge skills and competencies. Indeed, there can never be any economic development without the human resource, which is a major factor of production. The agriculture sector is labor intensive and therefore requires human resource development (Gitu, 2006). In light of this, the study will aim to explore the requisite knowledge, skills and competency gaps that affect achievement of food security and nutrition in Kenya. Webb and Rogers (2003) assert that for food security to be achieved communities need to the ability and competencies to execute and perform numerous functions, starting with ensuring that food is available and accessible for all in a sustainable manner and that people can and do utilize foods adequately. Additional critical functions relate to reducing vulnerabilities and increasing resiliency for the entire community (Webb and Rogers 2003, FFP 2003).

Information, education and training allow farmers to make use of new farming knowledge and technologies. Research shows that both formal education and non-formal training have a substantial effect on agricultural productivity. A study in Nigeria in (1992) found that an increase in the average education of farmers by one year increased the value added to agricultural production by 24 percent. In Burkina Faso, a (1993) study found that crop yields were 25 to 30 percent higher for farmers who participated in training programmes than those who did not participate. As farming becomes more and more complex and greater crop yields are required to feed more people, farmers' knowledge and information need to be constantly up-graded. It is especially critical that farmers know about environmentally sound farming practices so that the natural resource base is maintained for food production for future generations. The staffs of the organizations that support farmers, such as government extension agencies, non-governmental organizations and agri-businesses, also need up-to-date knowledge and information about improved farming (FAO, 2019).

Work Environment in achievement of Food and Nutritional Security

Workplace environment is also an important factor that has a significant impact an an employee’s performance; fulfilling their intrinsic, extrinsic and social needs form the basis for their stay in an organization as well as being the key determinant of quality in work and performance levels (Haynes, 2008). Work environment refers to everything that forms part of employees’ involvement with the work itself, such as the relationship with co-workers and supervisors, organizational culture, room for personal development, furniture and ICT equipment. Kenya continues to make significant progress in recognizing the direct impact a conducive work environment has on employee performance and actualization of goals. It is imperative that the factors that constitute a positive work
environment are fully understood and cultivated to compliment various initiatives that have been put in place by both the National and the County governments to address the perennial problem of food insecurity.

Legal and Regulatory Framework and Food Security
A legal framework is a set of rules, procedural steps, or test often established through precedent in the common law through which judgments can be determined. The government process can be difficult to understand and navigate. Two of the most common misunderstandings of government oversight is understanding the difference between laws and regulations. Laws and regulations are similar in that they both try to specify and organize what the authorizing body feels is standard operating procedure. The Government of Kenya outlined its commitment to improving the performance of the Public Service by developing its Human Resource Strategy Framework for the Public Service (2017) through the Ministry of Public Service, Youth and Gender Affairs and the Directorate of Public Service Management (DPSM). As part of its strategic objectives, the framework aims to strengthen Human Capital capacity to meet the current and future needs of Public Service organizations for effective and efficient delivery of services.

As part of its situational analysis the framework outlines Human capital as important in achievement of the Kenya Vision 2030 and organizational goals. The Government has established various training institutions to provide an environment in which public servants continuously learn and acquire new ideas, improve their competences, skills, behavior and attitudes, key of which being the Kenya school of Government. However, the Public Service continues to experience skills and competency gaps in critical and specialized technical skills. The Human Resource strategic framework is a recent document, consequently the study will also seek to analyze the extent to which the legal, policy and regulatory framework on human resource capacity building supports achievement of food security and nutrition in Kenya.

RESEARCH METHODOLOGY
The study used descriptive research design. The current study used the descriptive design because the researchers felt it would capture the needs of the current research. Purposive sampling was used to select a county in each of the 8 former provinces based on a criteria of ensuring geographical, political, and ethnic and ease of accessibility. The procedure resulted in sampling of the County Governments of Mombasa, Kijiado, Makueni, Kirinyaga, Kisumu, Kakamega, Uasin Gishu, and Isiolo. Primary data was collected from staff working in the agriculture and Nutrition. Secondary Data was garnered from printed documents from the county Governments and from the online databases and websites. The main data collection tool was a written self-administered questionnaires. Quantitative data was analyzed using SPSS software to generate descriptive statistics and graphical representations of the data. Qualitative data was thematically and content wise analyzed to reveal emerging thematic issues to guide the reporting on open ended items.

RESULTS, FINDINGS AND INTERPRETATION
Response rate
The study targeted a sample size of 240 respondents from which 222 filled in and returned the questionnaires making a response rate of 93%. This response rate was excellent to make conclusions for the study as it was representative enough. According to Mugenda and Mugenda (2003), a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent. Based on the assertion, the response rate was an excellent one. This response rate can be attributed to the data collection procedures, where the researcher, through the administration pre-notified the potential respondents before carrying out the research.

Sample Profile
Information on this aspect is related particularly to respondents ‘gender, age, education level, number of years working in the organization, level in the institution and the counties involved. These details are discussed each one separately in the following sections. Majority of the respondents were male 58% (129) while 42% (93) were female between the ages of 31-60. It is also noted that the respondents were fairly literate with most of them with education levels above the O’ Levels and a great number (44%) with degrees. The figure below is a representation of respondents per county.
Awareness, Of Objectives the Big Four Agenda on Food Nutrition and Security in Kenya
The respondents were tested on their level of awareness of food and nutritional security and 77% indicated that they were aware and 23% responded not aware. When queried on the objectives of the agenda on food security and nutrition the following were the responses given. This demonstrated that over 94% of the respondents were indeed aware of the objectives stipulated in the agenda.

Extent of Achievement of Big Four Agenda on Food Security and Nutrition has been Achieved

Figure 3 depicts the extent to which Big Four Agenda on Food Security and Nutrition has been achieved. The study revealed that the agenda on food nutrition had been achieved to a moderate extent 48% and to a small extent 28%, this suggested that a lot remains to be done with relation to realization of the agenda. Indicatively the overall perception is that there is moderate achievement of the food security agenda. The explanation given by the respondents here indicate that most farmers depend on rain fed agriculture and the rains are often unpredictable hence moderate achievement. Climate change is another issues that was raised as drought and floods are being experienced. Other issues include lack of farm inputs. Distribution of relief food is a factor too noting other
communities do not engage in activities that may generate food but overly on food and nutritional security. Work is ongoing in the counties including dam constructions, policy development hence the levels cannot be adequate just yet. The following challenges were also highlighted lack of funds, few capacity building sessions, inadequate staff numbers, corruption, lack of political goodwill infrastructure and even traditional beliefs about food and agriculture in general. Several Barriers were also highlighted to affect achievement of the agenda key among them being attitude change among farmers on use of new technology, facilitation for extension officer’s knowledge skills gaps among communities and service providers and weak institutional capacities.

**Knowledge Skills and Competencies Required to Achieve the Big 4 Agenda on Food Security & Nutrition**

The respondents were asked to rate their current knowledge, Skills and Competencies in the Nutrition and diet, post-harvest technology, food production, food distribution, irrigation, large scale farming, small holder farming management, value addition, knowledge management and Management of SMES. Figure 4 herein indicates that overall the respondents rate their knowledge in the mentioned areas at figures above 50% the only area that seems to be below average is in the area of Irrigation.

**Response on Non-Training interventions required**

The respondents were asked to list the non-training interventions that would ensure food and nutrition security. The key issues highlighted included adequacy of funding, availability of transport to ease mobility, benchmarking, mentoring, security creation of food reservoirs. Other issues mentioned included attitude change, reduction of wastage, change of attitude on overreliance and dependence on food crops like maize. Further responses were gathered when respondents were given chance to list other factors that may influence food security and issues raised included addressing the issue of the aging workforce in the agriculture sector, alignment of CIDP to the FNS agenda, fighting corruption by Government agencies and motivation.

**Legal, Policy and Regulatory Framework**

In this section the respondents were tested on the extent to which legal and regulatory framework and policies affected food and nutritional security. Figure 5 illustrates the rating of the legal and regulatory framework and the extent to which it affects the delivery of the Big four agenda on food security and nutrition.
Policies
Figure 6 depicts the extent to which policies affect achievement of Big Four Agenda on Food Security and Nutrition.

![Policies Chart]

Figure 11: Policies

County Policies on Employee Capacity Building
Figure 7 represents perceptions on whether the counties have policies that support employee capacity building initiatives. Vast majority 49% of the respondents feel that their counties lack policies that guide human resource capacity building initiatives whereas 41% felt there were adequate policies.

![County Policies Chart]

Figure 12. Presence of policies that support staff capacity building on food security and nutrition

Work Environment
In this section respondents were required to assess the adequacy of work environment as an enabler of the achievement of the big 4 agenda. Issues discussed here include extent to which work environment affects achievement of Big four FNS, organizational hierarchy and availability of finances to implement FNS agenda. Respondents were also required to provide a listing of the work environment factors that influence achievement of FNS agenda. Figure 8 depicts the extent to which the work environment affects the capacity of the human resource staff to achieve FNS.

![Work Environment Chart]

Figure 13: Work environment

Results indicated by 75% of the participants allude to the fact that work environment will go along way in enabling the achievement FNS by the duty bearers who are either agricultural staff or the nutrition staff.
Financial Resources
Figure 9 depicts the extent to which financial resources affect the achievement of the Big Four Agenda on Food Security and Nutrition.

Financial resources affect the human resources capacity to deliver on the FNS agenda at 66%, whereas 30% of the respondents opined that financial resources had a low to very low extent of influence. On the County Government Hierarchy 63% gave positive responses ranging from moderate to very great extent. This indicates that existence of hierarchy blocks affects FNS achievement. Figure 8 reflects extent to which hierarchies may influence FNS relationship. Work environment factors that would influence achievement of the FNS agenda included adequate and timely facilitation including infrastructure, office equipment, office space, transport, internet connectivity.

CONCLUSIONS AND RECOMMENDATIONS
Achievement of FNS is a key agenda forming the current world development discussions. Governments across the globe are seeking opportunities and avenues to ensure that their citizens are food secure. The current study was to assess the human resource capacity building interventions needed to support the big four agenda on FNS. Three specific objectives were used to guide the study. These included (1) the requisite knowledge, skills and competency gaps that affect achievement of food security and nutrition in Kenya; (2) work environment factors that affect the capacity of employees to support achievement FNS in Kenya; (3) the extent to which the legal, policy and regulatory framework on human resource capacity building support achievement of food security and nutrition in Kenya.

All three variables of the study returned positive verdict that there exist a positive and significant relationships between the dependent variables and the independent variables. The study therefor concludes that knowledge skills competencies of duty bearers are key to the achievement of FNS big 4 agenda, legal policy and regulatory frameworks are key to achievement of big agenda on FNS and that work environment influences achievement FNS. The study established that the workforce is highly elite with ranges between Level education, Masters and PhD qualification. This was seen across the counties and none of the counties seemed to be deficient. The respondents were also found poses key skills that are core to the achievement FNS in the areas of Nutrition and diet management, post-harvest technology, food production, food distribution, large scale farming, small holder farming, value addition and management of SME’s. More focused capacity building initiatives are however required in the areas of climate smart agriculture, modern agriculture techniques, management of natural resources, post-harvest management and resource mobilization.
There exist discrepancies on the awareness levels of the staff on capacity building policies in the counties. Vast majority 49% of the respondents feel that their counties lack policies that guide human resource capacity building initiatives whereas 41% felt there were adequate policies. This points to a lack of policy coordination and direction in county institutions. We also conclude that work environment is key to achievement of the FNS big 4 agenda. Assessments were done on financial resource abilities; county hierarchy blocks were found to affect FNS. We conclude the work environment in the counties as currently constituted is not adequately enabling the duty bearers deliver on their mandate of ensuring FNS. The study also concludes that there are interventions that are not training, or skills related but that are fundamental to achievement of FNS. Whereas Human resources capacity needs may be achieved by enhancing policy implementation and work environment an integrated approach involving national government, County and private sector operators.

To ensure achievement of food and Nutritional security we recommend that the County and National Government actors take deliberate efforts to retool and re skill the agricultural staff in areas of value addition, climate smart agriculture post-harvest management and resource mobilization. We also recommend creative resource mobilization strategies that can enable counties to fund their FNS initiatives these can include partnerships and linkages with non-state actors. We also recommend a joint effort among Government and non-government actors, staff and employers at sensitization in the various policies and policy initiatives that enhance capacity building of the human resource.

REFERENCES

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ABSTRACT
Kenyan universities have transformed over the years from centres excluded for elites to centres continuously filled with masses of students seeking higher education. Due to such unforeseen changes, it has seen various universities in Kenya, especially public universities grapple with the large numbers in a bid to accommodate them and deliver quality education for a future sustainable citizenry. The government supports higher education through the vision 2030, social pillar, however it has also admitted through its ministry of education of the limited budget set aside for higher education posing the question on how these universities will sustain the ever-increasing demand for services by its customers. On the other hand, some of these universities have been known for enterprising culture, however past studies have not shown evidence of the contribution of digital entrepreneurship on these enterprising culture. This study investigated the role of digital entrepreneurship on the enterprising culture of Kenyan universities specifically, digital production and distribution through digital media. The study used literature review to investigate the existing market situation where the criteria used for obtaining secondary data was literature up to ten years old on digital entrepreneurship. The study found out that there exists a relationship between digital entrepreneurship and enterprising culture among universities in Kenya. The study developed a conceptual model for further validation through empirical study.

Keywords: Digital transaction, Digital distribution, Digital products

Background of the Study
Kenyan universities have transformed over the years from centres excluded for elites to centres continuously filled with masses of students seeking higher education (Oanda & Jowi, 2012). Due to such unforeseen changes, it has seen various universities in Kenya, especially public universities grapple with the large numbers in a bid to accommodate them and deliver quality education for a future sustainable citizenry. Some of the universities in the country already set pace as innovators and are known for entrepreneurial activities practised within their institutions, for instance, Moi university and Egerton universities are known for agricultural products, Jomo Kenyatta University of Agriculture and Technology is known for technological and agricultural innovation whereas Kenyatta University has made efforts to come up with a funeral home that is servicing the larger community, a petrol station, a beach hotel and a shopping mall in a bid to embrace enterprising culture. Further, digital platforms have been adapted to facilitate processes as well as education in universities.

The rapid spread of digital technologies with new functionalities has changed competitive environments, and operational strategies of organizations where various businesses are currently experiencing downsizing, solo companies, structural and processual changes (Bharadwaj, Sawy, Pavlou, & Venkatraman, 2013). New digital technologies such as social media, big data, mobile and cloud solutions technologies have given led to new ways of production, development and deployment over open standards and shared technologies (Markus & Loebecke, 2013). Digital entrepreneurship is gaining interest in recent research as various opportunities for entrepreneurs have risen out of technological developments and advances in infrastructure. This has shifted the society’s attention to new digital business models and little concern is given to emerging issues such as the opportunities and challenges that may arise as a result of digital entrepreneurship as well as the critical success factors that would ensure the such models are not just a passing trend but a tool towards the creation and sustainability of entrepreneurial culture among businesses (Sascha et al., 2019).

Universities in Kenya
Currently, there are 74 universities of which 31 are public, 6 public constituent colleges, 18 private chartered, 5 private constituent colleges and 14 Institutions with a Letter of Interim Authority (LIA), (CUE, 2017). In Kenya, there has been continuous focus on universities seeking for more effective systems to address the increasing dissatisfaction of stakeholders on quality assurance phenomenon, (Siringi, 2017). The Kenya medium-term plan 2013-2017, emphasizes that university education system is a catalyst towards achieving a transformed economy and thus emphasis should be made to make it focused, competent and knowledge-based in addition to delivering accessible, fair, appropriate and good quality training for a sustainable and competitive economy. However, there has been an acute decline of public funds allocated to universities even when the number of institutions and students
enrolled has continued to increase. The reduction in provision of financial resources to universities against increased enrolments has culminated to an increasingly common view that these institutions give low quality training, (British Council, 2016). Due to competition, these universities are forced to source for alternative mean to either improve or maintain exemplary service delivery and this has led to most of these universities opting for digital technology to satisfy service delivery needs. Currently, most universities are moving from the traditional academic roles to current innovative roles that incorporate entrepreneurial thinking in a bid to attract external resources and survive in the highly competitive environment (Etzkowitz, 2014).

**Statement of the Problem**

Even though the government of Kenya has been supporting higher education through the vision 2030 social pillar, it has also admitted through its ministry of education of the limited budget set aside for higher education posing the question on how these universities will sustain the ever-increasing demand for services. And as some of the Kenyan universities have been known for enterprising culture, these universities have embraced digital platforms in service delivery, but these platforms are only used for informational purposes rather than also for transactional purposes. There is no national strategy embracing digital growth and digital entrepreneurial capacity in institutions, however it recognizes the business value of digital technology and seeks to strengthen the innovation and entrepreneurship ecosystem (KIEP, 2018). In support of this view, WDR (2016) in their report called for a shift in focus from viewing digital technology as a challenge to entrepreneurs but also as an opportunity by governments to implement best climate in terms of digital service occupation, growth and development. The concept of digital entrepreneurship can be integrated into research in universities in Kenya to address the growing concerns for enhancing not only enterprising culture but also economic sustainability of these universities. This is thought so as digital entrepreneurship provides motivating factors that can promote economic growth, job creation and innovation. Digitization has led to less definition of products and services leading to continuous evolution of products and services (Allison et al, 2014; Zhao & Collier, 2016). While the developed world enjoys an enabling environment for digital technology, entrepreneurs in the developing world continue to grapple with issues such as lack of appropriate skills for digital entrepreneurship, regulatory barriers, intellectual property protection rights, and infrastructural needs in terms of affordable, reliable and fast access digital infrastructure. This puts digital ventures, especially highly innovative startups in the developing world at risk (WDR, 2016). However, with the continuous nurturing of critical factors, universities may play a critical role in the positive development of entrepreneurial culture. As a result of past research gaps on the role of digital entrepreneurship in universities, the current study embarked on a review of extant secondary literature for investigation on digital entrepreneurship and its role on the enterprising culture in universities. This paper thus sought to address three concerns: What is the role of digital production in the promotion of enterprising culture in universities? What is the role of digital distribution on enterprising culture and what are the impacts of digital distribution on enterprising culture by universities?

**Research Objectives**

This study established the role of digital entrepreneurship in promotion on enterprising culture in universities. Specifically, it investigated role of digital production and digital distribution on enterprising culture by universities

**LITERATURE REVIEW**

**Entreprising culture**

Culture in organization context is an important facilitator for employees improved performance as it influences their attitudes and behavior (Abdullah, Musa, & Azis, 2017) and continuous adjustment of culture promotes further creativity and innovation among employees (Ardichvili & Cardozo, 2000). As conceptualized by Schein (2010) culture in organizations may be of three dimensions including basic assumption, social agreement on value as related to the culture and an artifact. Although not seen, it is believed to be in existence and the acts or behaviors of organization members is evaluated against the set values and standards, that are unique and not easy to imitate by organization outsiders. Entrepreneurial has been viewed as a type of culture that possesses entrepreneurial attributes and characteristics. While organizational culture may be dormant, enterprising culture is surrounded by environmental dynamics and hence it includes risk-taking, innovation, and creativity as main behaviors (Bradley, Wiklund, & Shepherd, 2011). Entrepreneurial culture may consist of high level of entrepreneurial awareness, access to extended social networks, prior knowledge of markets and market education (Ardichvili & Cardozo, 2000).

The importance of entrepreneurship has been identified as a significant driver towards economic development and as such is now considered integral to educational and training opportunities. This is due to the basis that education and training goes a long way in cultivation and nurturing of entrepreneurs to successful growth of business and
eventually, the economy (Henry, Hill & Leitch, 2003). Further, entrepreneurial culture has been acknowledged by various researchers as a major determinant of any enterprise’s success and for it to be fostered in any organization, holistic and integrative approach is necessary (Zhao & Collier, 2016). In the university set up, past studies such as Kalenyuk and Dyachenko (2016) argued that university involvement in entrepreneurial activities such as new product or service involvement does not make it necessarily an entrepreneurial university and that a more holistic approach is significant in promoting entrepreneurial culture by universities. Laban (2016) highlights that disjointed perspective towards entrepreneurial culture has over the past been as a result of competing definitions and lack of conceptual clarity, which poses as a main challenge towards progression.

In the context of digital entrepreneurship, technological advancements continue to impact entrepreneurial culture such that organizational learning becomes a necessity at a high degree. For instance, Digital entrepreneurs with their new ways of doing business had an enormous effect on the whole world, especially in the last decade. Google, Facebook, Microsoft and Apple not only completely changed the business world, but also shaped the way we communicate with each other in everyday life, (Le Dinh, Vu & Ayayi, 2018). Computing and information storage has now become easier in addition to it being more flexible and economical as cloud services are continuing to evolve and the internet transforms towards the so-called Internet of Things (IoT). For instance, researchers have predicted that by 2020, IoT technology is expected to be implemented in 95 per cent of electronics for new product designs (Richter, Kraus & Boucnenk, 2015; Panetta, 2017).

**Digital Entrepreneurship**

Digital entrepreneurship is defined as the development of new products and services through internet enabled platforms or digitally transforming of existing systems and processes of a venture (World Development Report, 2016). It has also been defined as the creation of new ventures as well as renovating of existing undertakings by use of novel digital technologies to improve business operations, invent new business models, sharpen business intelligence, and engage with customers and stakeholders (European Commission, 2015). In the context of enterprising culture, digital entrepreneurship may refer to the continuous development of product and services through digital platforms, as well as digital transformation of systems involved, with an aim to achieve the goals of the venture.

When explored, digital entrepreneurship plays a critical role to various sectors of the economy including: work life balance, where employees may work in virtual spaces enabling an entrepreneur leverage the costs of operations that are slowly leading to closure by firm; it may be significant in the promotion of gender equity, social and economic inclusion owing to the fact that digital entrepreneurship depends greatly on skills rather than the entrepreneur’s demographics. In the recent past digital entrepreneurship has set pace on its contributory role of sustainable development through the development of applications that aid in agricultural processes, follow up with stock exchange, updates on road conditions, match market supply and demand of product and services and therefore improve on economic efficiency and opportunities (WDR, 2016). Zhao and Collier (2016) support that digital entrepreneurship promotes economic growth, job creation and innovation by many states and major assumptions promoting these growth is the fact that digitization has led to proliferation of market space and boundaries leading to flexibility and greater market scope; also the fact that digitization has led to less definition of products and services leading to continuous evolution of products and services.

**Digital Production**

Production in essence initialises the value chain from the point raw materials are sourced to the point where they are distributed and eventually consumed by customers. Digital production is production process with the support of digital technologies which may include computerized networks, databases and virtual reality based on customer demands, (Kumar, Madhukar, Sunil & Kumar, 2016). Other researchers opine that digital production is a set of technologies used in reducing time and cost incurred during production, customerisation, increased quality and response of the product to the market, (Kozna,Varga & Soos, 2019). Digital production has in various ways promoted the variation of products from original inputs in terms of product design, product distribution, consumption, reuse and return. Past studies have indicated that this has been achieved more so in entrepreneurship through products such as artificial intelligence, robotics, 3D printing and advanced computing (World Economic Forum, 2017). Based on the argument of WEF (2017) digital production accelerates the creation of value to consumers and in relation to the universities, digital production would facilitate value creation to satisfy the increased demand for products and thus promote enterprising culture by universities.
**Digital Distribution**

Digital distribution platforms refer to platforms that are used by content providers to support the transfer of the crucial firm’s products to end-users. Extant researchers opine that digital innovations, like new distribution platforms also change business models as firms have to adapt their business to a new environment, (Ojala, 2016). Digitalization of distribution platforms provides new opportunities for firms developing such platforms (Parker, Van Alstyne & Choudary 2016; Ojala & Lyytinen 2018) and has helped firms delivering their digital services and content through these platforms to end-users (Belleflamme & Toulemond 2016).

Digital platforms integrate stakeholders to an organization and present an opportunity of interaction between developers, customers and prospects for strategic alliances. Indeed, this has continuously resulted to improved business models, innovation as well as value creation that deliver compelling customer experience (Kozna *et al*, 2019). Use of new platforms necessitated by digital entrepreneurship may be a success factor; however, this is determinant with the extent of alignment between platform-based business models and organization culture. The adoption of digital distribution can only succeed if some of the success factors like digital infrastructure, competence, awareness, readiness and adaptive policies are factored (Accenture Research, 2016). Kenyan universities have employed digital platforms for interaction with students, materials for course facilitation and library services. However, has this improved on the enterprising culture by universities in Kenya?

**METHODOLOGY**

The study used secondary literature of the existing marketing situation. The researchers ensured that majority of the literature covered were from sources up to ten years old. The key words considered during the secondary literature search were digital entrepreneurship, enterprising culture, entrepreneurial culture, digital production and digital distribution. The secondary literature considered were both for local and global contexts.

**RESULTS**

Previous studies such as Docters, Tilstone, Bednarczyk and Gieskes (2011); Kumar *et al*, (2016) have pointed out that even though digitization of delivery channels have brought about the modification of business models, it is important for the firms to incorporate the digital channels alongside the traditional distribution channels, this is due to easier adaptation to new technologies as well as facilitate integration of customer bases of techno savvy and techno resistant customers. Bhusry and Rajan (2011) further supported that technology intervention was an effective intervention on the enhancement of teaching, research and administrative factors in universities. For universities to adopt digital entrepreneurship, it is necessary to identify the indicators that can lead to an enterprising culture that not only benefit the universities but also their key stakeholders in general. There is need to highlight the opportunities, challenges and success factors of digital entrepreneurship that when combined with an enterprising culture lead to economic sustainability.

This paper suggests several areas that promotion of this idea can be anchored on: the role of digital entrepreneurship in the promotion of enterprising culture in universities; the role of digital transactions, digital distribution and digital products on enterprising culture by universities. Past studies have also shown a significant impact of entrepreneurial culture on organizations. Ardichvili and Cardozo (2000) notes that organizational effectiveness is influenced by organizational culture and entrepreneurship in development and implementation of new strategies. Seifari and Amoozadeh (2014) said that learning and innovation are essential requirements for organizations seeking survival and effectiveness. Abdullah *et al* (2017) found out organizational culture has a positive effect on entrepreneurial characteristics which are built through some dimensions; innovation ability, the ability to take the risk, and proactivity.

**RECOMMENDATIONS FOR FUTURE RESEARCH**

There is need for a multidisciplinary based approach towards addressing the question of digital entrepreneurship which needs to inform conceptualization, empirical research and the corresponding activities that address the economic sustainability of universities in Kenya.

Secondly, there is the implied role of digital products and digital distribution that need to be brought in so as to support the adoption of an enterprising culture among universities to realize the dream of sustainable economic development. Thirdly, while the authors invite suggestions towards efforts to improve this model, there is need for collaborative research on various aspects of this model so as to inform policy and practice.
This study recommends the conceptual model given below.

![Conceptual Model]

Digital Entrepreneurship

- Digital Production
- Digital Distribution

H_1: Digital production has no effect on enterprising culture among universities in Kenya
H_2: Digital distribution has no effect on enterprising culture among universities in Kenya

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ABSTRACT
Throughout the ages, educational institutions have endeavored to produce individuals with creative thinking capabilities manifested in problem-solving and development of innovations deemed instrumental in solving societal problems. The demand for a work force endowed with creative thinking abilities has led educational policy makers around the world to align their educational goals and curricula in ways that foster development of creative thinking abilities among learners in schools. The importance of equipping learners with creative thinking skills cannot be overemphasized. Creative thinking is one of the most sought educational outcomes in the 21st century as a response to the demand for innovations and technological advancement in addressing challenges of the global economy. However, despite the importance of creative thinking skills there are concerns that secondary schools in Kenya are not equipping learners with this competence. The study assessed the teaching creative thinking skills among students in public secondary schools for sustainable development in Nyeri County. The schools were stratified into three groupings; namely, boys only, girls only schools and mixed-sex secondary schools. The study adopted the descriptive survey research design and the target population consisted of 58,424 students enrolled in 221 secondary schools. Multistage sampling was used to select 22(10%) of the schools and the sampling formula by Krejie and Morgan was used which gave a sample of 299 respondents who were equally distributed in the 22 sampled schools. data was collected using a standard rating scale with 10 items in a likert scale. the study established that the creative thinking abilities of the girls’ was, moderate while that of the boys was low. However, t-test indicated that the difference was not statistically significant. Comparison of creative thinking according to school category revealed that the creative thinking skills were moderate in boys’ and girls’ only secondary schools and low in mixed secondary schools. The results therefore, seem to suggest that there are schools factors that could be contributing to the students’ acquisition of creative thinking skills. The analysis of variance indicated that creative thinking skills of learners in boys, girls and co-educational secondary schools were largely the same. The study established that the student had on a general scale low levels of creative thinking abilities which gave the impression that public secondary schools are deficient in opportunities that exposure learners to engagements in creative thinking. It was recommended the need of transformative change to introduce creativity in the education system, so as to address the worldwide demand for innovativeness in today’s workplace.

Keywords: Creative thinking, Creativity, 21st century skills,

INTRODUCTION
All over the world education systems are increasingly highlighting the importance of what is referred to as the 21st century skills with a view to equip learners with competencies to deal with the challenges of everyday life (De Brabandere, 2005). Creative thinking ability is one of the 21st century skills that is strongly emphasized in the contemporary global economy. The Jomtien world education conference held in Thailand underscored the significance of an educational curriculum that is relevant to the changing needs of the populace. In particular, it was observed that learners at all levels and all parts of the world need to be equipped with appropriate life skills in order to function competently in information-based economies United Nations Educational, Scientific and Cultural Organization (UNESCO, 2012). In addition UNESCO (2012) and the United Nations Development Programme (UNDP)(2013) drafted a Creative Economy Report that underpinned the creation of novel growth approaches that inspire originality and invention in the quest of comprehensive, justifiable and viable development in the developing countries of the world.

The global economic crisis has induced corporations to adopt new approaches of using limited resources and striving to ensure that the production remains unaffected. Puccio, Mance and Murdock (2011) observe that in successful establishments, managers must possess effective problem solving skills incorporating creative thinking and harnessing their innovativeness towards economic, social and cultural changes. Schools are the advantaged institutions where the creative capacities of individuals can be nurtured (Crouply, 2009). A similar view is held by Antonietti and Cesa-Bianchi (2003) who argued that schools have two contrasting situations in regard to development of creative thinking skills among learners, firstly, the school atmosphere may enhance or attenuate the acquisition of creative thinking skills among learners, secondly, the instructional methods and the academic
ambience constructed by the teachers may impact positively or negatively on students development of creative thinking skills. Tan and Majid (2011) state that teachers play an important part since they are expected to identify and nurture conditions that encourage creative thinking, through selection of stimulating teaching learning experiences that can model and inspire the learners’ education and creativity; it is therefore pertinent that educational stakeholders modify the schools’ educational, social and physical setups with a view of enhancing the learners creative thinking competencies.

An educational report in Britain developed by the NACCCE (1999) underscored the centrality of creative thinking as an educational outcome. The report recommended the need for teachers to motivate their learners to realize their potential in creativity and to give them the confidence to explore and experiment. In addition teachers were to assist pupils to find out their individual strengths in creative thinking and must stir their inquisitiveness and resourcefulness (NACCCE, 1999).

Kampylis and coll (2009) reports that in Scotland Her Majesty’s Inspectorate of Education (HMIE) emphasized the importance of students beaviours such as independence, genuineness, honesty and reverence in promoting development of creative thinking abilities. The report encapsulated the advantages of creative thinking skills and the relevance of the school environment in the child’s development. In particular the teachers’ perceptions as agents of change are expected not only to demonstrated and understanding of creative thinking but also recognize and facilitate creativity in instruction and the daily life of the learners by molding contextual antecedents that stimulate creative thinking (Kampylis & coll., 2009). However, the report acknowledged that the rigid structure of formal education may be a major impediment to teachers’ flexibility towards presenting learners with alternative experiences to their students. Additionally, teachers recounted that teacher training programmes emphasized acquisition of content in subject areas and overlooked equipping the teacher trainees with competencies to impart creative thinking strategies in instructional situations. Further, it was observed that even where teachers had sufficient understanding pertaining the model of creative thinking, they lacked suitable tools to assess the learners’ creative thinking skills. Emir and Bahar (2003) and Yenilmez and Yolcu (2007) assert that this dissonance between theory and teachers’ professional practice seems to question the relevance of the current structure of the educational contexts, the curriculum, instructional methodologies, teacher/student relationships and the educational objectives in equipping learners with skills relevant in the 21st century.

Savage and Fautley (2007) point out that though teachers have the mandate to guide instructional processes in schools and nurture inspirational student/teacher relationships; school factors and teacher characteristics have undoubtedly been identified as major barriers to learners development of creative thinking abilities. Chief among these is that teachers own creativity has not been appraised and it is unlikely that they can foster skills, in which they demonstrate obvious deficiencies, lack original thinking, employ rigid and traditional instructional approaches, have low problem solving skills and lack the innovativeness of enriching the classroom environment with materials from the learners’ environment.

Everyone is born with a latent creative thinking ability and as children participate in play, their imagination is stirred and prompts them to experiment new situations and prospects. However, if the children are consistently reprimanded and arbitrary cautioned they can dread making errors if they are hardly recognized for originality in their thinking. A study by Craft (2005) states that creativity and innovativeness in instruction in seven counties in Europe established that teachers encouraged their students to conform to stated methods of behaviour and discouraged them from engaging in what they perceived as risky, playful or adventurous behaviours. Morais and Azevedo (2011) argued that since school programmes are essential in developing learners’ creative thinking abilities; training persons who are capable of thinking and generating novel ideas, assessment of teachers creative thinking is an important starting point for any policy formulation in teaching creative thinking in schools. Kuo and Hwang (2014) states that problem solving is a composite process that comprises of and critical thinking and use of logical reasoning. Munandar (2012) adds that advancement in technological and increase in the world population against a background of diminishing natural resources; creatively and innovativeness occupies a central position in the adaptation of mankind to find inventive solutions to challenges of living. Creative thinking typically necessitate self-regulation, thinking and metacognition

Socrates (470–399 BC), writing popularized emphasized that the best instructional practice was through utilization of skilled questioning for in-depth exploration of concepts occasioning value-added understanding (Ferrari, Cachia & Punie, 2009). A worthy query can enable the learner to think discernibly and naturally loop in response in class
between learners and their teachers and thus guide the teaching learning process in a learner centred way. A number of approaches to instruction are considered to help learners acquire creativity. According to Kaufman and Beghetto (2009) creative thinking enables learners to use their resourcefulness to generate concepts, inquiries and hypotheses, through experimenting with different options and evaluation of own ideas in comparison to those of their peers. Sternberg (2012) adds that one characteristic of the creative thinking requires learners to comprehend how to question or dare traditional knowledge and voice their individual appreciative imagination. Thus creative thinking represents a form of liberty in freeing an individual from inconsistent distraught knowledge and substituting it with more coherent and innovative thinking (Sternberg, 2012). According to Csikszentmihalyi (2002) creative thinking, need to respect Vygotsky’s concept of area of proximal growth with teachers’ provision of suitable support frameworks. In this regard sensitivity to cultural orientations may be very significant. Learners should be guided to establish creative thinking habits and link them to broader instructional goals that are clearly measurable as educational outcomes.

Statement of the Problem

Throughout the ages, educational institutions have endeavored to produce individuals with creative thinking capabilities manifested in problem-solving and development of innovations deemed instrumental in solving societal problems. The demand for a work force endowed with creative thinking abilities has led educational policy makers around the world to align their educational goals and curricula in ways that foster development of creative thinking abilities among learners in schools. The importance of equipping learners with creative thinking skills cannot be overemphasized. Creative thinking is one of the most sought after 21st century learning consequence as a response to the demand for innovations and technological advancement in addressing challenges of the global economy. The competition in the global scene dictates that only those economies that are capable to produce novel innovations, technological advancement and improvement can remain relevant in the socio-economic agenda in the contemporary global scene. However despite this worthy recognition there are doubts pertaining to the impartation of creative thinking competencies among learners in public secondary schools in Kenya. This study to assessed the level of creative thinking abilities among learners in secondary schools from Nyeri Counties in Kenya.

Hypotheses of the Study

H01: there was no statistically significant difference in creative thinking skills among boys and girls.
H02: there was no statistically significant difference in creative thinking skills among students from different school categories in Nyeri County.

METHODOLOGY

The research employed a descriptive research design to assess the creative thinking skills of students in public secondary schools in Nyeri County, Kenya. There were 221 secondary schools with a total enrollment of 58,424 students, who were distributed as follows, 31198 girls and 27226 boys (Nyeri County Education Office, 2018). The schools were stratified into three groupings; namely, boys only, girls only schools and mixed-sex secondary schools. According to Kothari (2011) in a descriptive study a sample of 10% of the population is sufficiently dependable for a large population. Consequently, 10% of the schools from each school category were randomly selected to give a sample distribution as follows, two boys, three girls and seventeen mixed-sex secondary schools. The total number of secondary schools that were sampled for the study was 22. Sample size was determined by a formula developed by Krejcie and Morgan (1970) which yielded 299 respondents, 146 boys and 153 girls. Therefore, the sample size used was 299 respondents who were equitably distributed in the 22 sampled schools. Data was collected by use of questionnaires administered to the sampled students. Questionnaires were considered appropriate due to the large number of respondents involved and because the students could competently respond to the items in the instrument. The questionnaire gathered data on the respondents’ creative thinking abilities and consisted of 10 items on a likert scale, ranging from strongly agree, agree, not sure, disagree and strongly disagree. This instrument was adopted with modifications from the Psychosocial Competence Scale developed by Dindigal and Aminabhavi (2007). The responses obtained were used to rate the level of the respondents creative thinking abilities by computing a mean score on a scale of 1-5. The mean scores were categorized into low, moderate and high. The minimum score was 1 and the maximum was 5. The respondents who scored below 3.0 were believed to have a low level of the creative thinking, 3.0 – 3.9 designated moderate levels while scores of 4.0 and above reflected high level of creative thinking skills (Welch, 2011). The data analysis was further conducted to compute, percentages, frequencies, means and standard deviations for descriptive and inferential analysis. The questionnaire was piloted in two schools using a random sample of 26 students and a reliability coefficient of 0.801 of was obtained using Cronbach’s coefficient alpha. According to Fraenkel and Wallen (2003) in descriptive studies, a reliability coefficient of 0.70 and above is obtained using Cronbach’s coefficient alpha.
considered appropriate for the internal consistency of the items. The computer programme SPSS version 20 was used to analyse the collected data.

RESULTS AND DISCUSSION

Students Creative Thinking Skills According to Gender

In order to assess the creative thinking skills among learners in public secondary schools, the sampled respondents indicated their opinions on a questionnaire with ten items in a five point likert scale. The responses were used to compute a mean score ($\bar{x}$) and a standard deviation (s) of creative thinking ability for the respondents on a scale of 1 to 5. The findings are provided on Table 1.

Table 1. Creative Thinking according to Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean Score ($\bar{x}$)</th>
<th>Std. Deviation (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>114</td>
<td>2.9621</td>
<td>.51864</td>
</tr>
<tr>
<td>Female</td>
<td>139</td>
<td>3.0507</td>
<td>.49231</td>
</tr>
<tr>
<td>Total</td>
<td>253</td>
<td>3.0108</td>
<td>.50527</td>
</tr>
</tbody>
</table>

Data presented on Table 1 shows that creative thinking skills of girls was ($\bar{x} = 3.0507, s = .49231$), boys ($\bar{x} = 2.9621, s = .51864$), the overall combined mean score for both gender was ($\bar{x} = 3.0108, s = .50527$). These figures indicate that the boys’ level of creative was low while girls had a moderate level of creative thinking abilities, the overall level of creative thinking was rated a moderate. These findings concur with Bender et al. (2013) who asserted that research on gender effects on creative thinking demonstrates that females are marginally endowed higher with creative thinking potential compared to males. Bender et al. (2013) asserts that research on the contributing factors to the observed differences has largely produced mixed findings and hence inconclusive. Volf and Tarasova (2013) pointed out that absence of gender disparities in regard to creative thinking indicates that there is no evidence to presume that differences exist among the two gender across the states of human development, namely, childhood, adolescence and adulthood in terms of their creativity. In order to establish if the gender differences in creative thinking were statistically significant the researcher tested the first research hypothesis (H0), which was;

H0: there was no statistically significant difference in creative thinking skills among boys and girls.

The study further computed the independent sample t-test in order to establish whether there were significant differences in the creative thinking mean scores obtained for either gender (Table 2).

Table 2. t-test on Creative Thinking Skills among Boys and Girls in Nyeri County

<table>
<thead>
<tr>
<th></th>
<th>Levene’s Test for Equality of Variances</th>
<th>Student’s t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig</td>
</tr>
<tr>
<td>creative mean</td>
<td>.115</td>
<td>.735</td>
</tr>
<tr>
<td>Equal variances assumed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 indicates that the level of significance was .166 was more than the p-value (.05), thus there is no significant difference between the two groups. Therefore we accept H0 (at $\alpha = .05$) and conclude that the levels of creative thinking abilities among boys and girls in public secondary schools in Nyeri County were largely the same. These results are in agreement with Pagnani (2011) who observed that empirical investigations on gender dissimilarities among children and adults creative thinking established no significant differences. Similarly, Runco et al. (2010) reported that the majority of studies clearly indicate an absence of gender related differences in creative thinking thus suggesting that creative thinking ability are largely the same for males and females.

Students Creative Thinking Skills according to School Categories in Nyeri County

To assess the creative thinking skills difference in creative thinking skills among students from different school categories in Nyeri County, the researcher computed the mean scores on boys’ only schools, girls’ only schools and co-educational (mixed) secondary schools. The findings are summarized on Table 3.

Table 3. Creative Thinking Skills according to School Categories
Table 3 indicates that the mean scores and standard deviations of creative thinking skills among students in secondary schools in Nyeri County according to school category. Girls’ only schools recorded the highest mean score ($\bar{x} = 3.1073, s = .59215$), this was followed by boys’ only schools with mean score ($\bar{x} = 3.0755, s = .43710$), the mixed secondary schools came last with mean score ($\bar{x} = 2.9985, s = .52450$). These mean score indicate that the creative thinking skills were moderate in boys and girls’ only secondary schools and low in mixed secondary schools. The results therefore, seem to suggest that there are schools factors that could be contributing to the students’ acquisition of creative thinking skills. These results are in agreement with Razak (2010) who holds that creativity can be improved through practice and awareness, pointing out that opportunities and exposure to engagement in creative thinking increases learners’ aptitudes. The dissimilarities in creative thinking skills observed in the three school categories could therefore be as a result of contextual factors in the schools which could have influenced the levels of creative thinking of learners. As emphasized by Mellou (1996) the most authoritative opportunity of promoting creativity among learners is through provision of an everyday creative environment, at home school and social settings. A study by Rao (2003) found that the students’ place of residence was found to play a significant role in nurturing creative thinking because of varied experiences need by the learners. The low levels of creative thinking abilities among learners give the impression that public secondary schools are deficient in opportunities that exposure learners to engagements in thinking creatively. Consequently the observed low levels of creative thinking abilities among learners may be credited to the learner’s home environment, sociocultural background and the high school curriculum content.

To establish whether significant statistical differences existed among students’ creative thinking abilities in the three categories of schools, the researcher tested the second research hypothesis which was;

H02: there was no statistically significant difference in creative thinking skills among students from different school categories in Nyeri County.

To test this hypothesis, one way Analysis of Variance (ANOVA) was computed. The statistical relationship between the levels of creative thinking among learners in boys, girls and mixed public secondary schools was presented as shown in Table 4

Table 4. Analysis of Variance of Creative Thinking Skills according to School Category

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>.598</td>
<td>2</td>
<td>.299</td>
<td>1.092</td>
</tr>
<tr>
<td>Within Groups</td>
<td>83.971</td>
<td>307</td>
<td>.274</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>84.568</td>
<td>309</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4 shows the shows that the results yielded p-value = .337 which was more than the alpha value $\alpha > 0.05$ indicating that the differences in learners creativity in the three categories of schools was not statistically significant. Therefore the null hypothesis was accepted and it was concluded that the creative thinking skills of learners in boys, girls and co-educational secondary schools were largely the same. De Bono (2008) asserts that creative thinking skills can be learnt and can be reinforced through teaching or training. Consequently, the observed lack of differences in creative thinking among learners in different school categories could be due to similarities in the secondary school environments which could be stimulating students creative thinking in the same way. Razak (2010) agrees with such view and adds that creative thinking can be enriched through practice and awareness. This point out is that opportunities and exposure to engagement in creative thinking increases learners aptitudes.

SUMMARY

The study established that the student had on a low levels of creative thinking which gave the impression that public secondary schools are deficient in opportunities that exposure learners to engagements in creative thinking.
RECOMMENDATIONS
The study recommended the need of transformative change to introduce creativity in the education system, so as to address the worldwide demand for innovativeness in today’s workplace.

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EFFECT OF DISCOVERY TEACHING APPROACH ON SCIENTIFIC CREATIVITY AMONGST STUDENTS OF CHEMISTRY IN PUBLIC SECONDARY SCHOOLS IN IMENTI NORTH SUB-COUNTY, KENYA

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ABSTRACT
Discovery teaching approach has been effective in enhancement of scientific creativity in mathematics, chemistry and biology but its effectiveness in promoting scientific creativity amongst students of chemistry in secondary schools has not been strongly established. The study sought to investigate the effect of Discovery Teaching Approach on Scientific Creativity amongst students of chemistry in public secondary schools in Imenti North Sub-county. The research used quasi-experimental design, particularly Solomon Four Group Design. The study was conducted in four County Girls’ Only Public Secondary Schools. Purposive sampling technique was used to select the participating schools. A sample of 186 Form Three students participated in the study. Chemistry Creativity Test (CCT) and Chemistry Class Creativity Observation Schedule (CCCOS) were designed for data collection. Means, standard deviations, t-test and analysis of variance (ANOVA) were used in data analysis. Bonferroni post hoc test was used to show existence of differences amongst groups. Hypotheses were tested at alpha (α)=0.05 level of significance. The study findings indicated that students exposed to Discovery Teaching Approach acquired higher mean scores in scientific creativity abilities than those exposed to Traditional Teaching Approaches. Application of Discovery Teaching Approach is more effective in improving students’ scientific creativity than Traditional Teaching Approaches. The study concluded that Discovery Teaching Approach improved Scientific Creativity in Chemistry amongst Public Secondary School students. The findings of the study would be significant to the curriculum developers at Kenya Institute of Curriculum Development (KICD) in advising the teachers on the approaches for teaching chemistry in relation to scientific creativity. It is recommended that chemistry teachers use Discovery Teaching Approaches in teaching chemistry to produce creative individuals with enhanced ability to solve day to day problems.

Keywords: Recognition, traditional teaching approaches, Chemistry.

INTRODUCTION
Science education provides human resource development for various countries. This is because science education is related to the enhancement of important pillars of development such as health, food, agriculture, industry and technology (Mitchell, 2012; King, 2011). According to the Kothari Commission of India as cited in Mukhopadhyay (2011), one of the important objectives of science education is to develop Scientific Creativity amongst learners. In Kenya, science education is also instrumental in the development of scientific creativity as students interact with the apparatus and develop various skills in the course of learning science (KIE, 2006). This is achievable through use of proper instructional approaches in chemistry. Chemistry teaching involves use of different teaching approaches, methods and strategies. Discovery Teaching Approach (DTA) is an inquiry based instructional approach through which students interact with their environment by exploring and manipulating objects, wrestling with questions and controversies or by performing experiments (Brown & Ausburn, 2006). Teaching by DTA enhances scientific creativity. Various models of discovery approach include open discovery, guided discovery, incidental and problem based learning (Bruner, 2009). Hybrid of open and guided discovery model has been adopted for the current study.

Scientific creativity refers to the level at which a student is sensitive to chemistry problems, recognizes relationships between patterns, general scientific observations and scientific concepts and is flexible in thinking when solving problems in chemistry. Obote (2016) defines scientific creativity as the ability to recognize the gaps in the problem, or the information, creating ideas or hypotheses, testing and developing these hypotheses and transmitting the data. Okere (1986) as cited in Ndeke (2003) gives psychological definitions of scientific creativity as an individual’s possession of the ability to be sensitive to scientific problems, to recognize relationships between patterns and general observations and scientific concepts and to have flexibility in reasoning. According to Christopher (2014), Discovery Teaching Approach encourages Scientific Creativity and discourages plain retention of facts. Akinyemi and Afolabi (2010) investigated the effect of Constructivist Practices through guided discovery approach on Students’ Cognitive Achievement in Nigerian Senior Secondary School Physics Students. Their findings were that guided discovery approach enhanced students’ recognition of relationships between methods and solutions and use them to make conclusions. Though Discovery Teaching Approach has been effective in enhancing scientific
creativity in other science subjects among secondary school students, there is limited literature on the effect of Discovery Teaching Approach on scientific creativity in Chemistry. To fill this gap, the present study investigated the effect of Discovery Teaching Approach on scientific creativity among the students of chemistry in Imenti North.

Theoretical Framework
The study was guided by Gardner’s Theory of Multiple Intelligence (1993) and Okere’s Model of Scientific Creativity formulated in 1986. The Theory of Multiple Intelligence postulates that individuals have creative abilities that are domain-specific. According to the theory, logical-mathematical intelligence comprises of the capacity to analyze problems logically, carry out mathematical operations, and investigate issues scientifically. The aspects of the logical-mathematical intelligence form the basis for sensitivity to science problems, recognition of relationships of patterns, general scientific observations and concepts in science and flexibility in reasoning. Okere’s model of scientific creativity outline four main tenets of sensitivity, recognition, flexibility, and planning in the process of finding solutions to particular scientific problems. Sensitivity is the ability to identify incorrect solutions, formulae, calculations and fallacious statements. Recognition is the ability to identify relationships, patterns, and similarities among concepts and use them to further generate hypotheses. Flexibility enables the learner to generate a variety of solutions to a problem even when not required to do so. To develop these abilities, learners should be given opportunities to interact with their learning environment and explore as is the case with DTA. The model maps the psychological definitions of these dimensions of Scientific Creativity into scientific meaning. Figure 1 shows the interactions of psychological definitions and scientific meanings of scientific creativity.

<table>
<thead>
<tr>
<th>Psychological definitions</th>
<th>Scientific definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity to problems</td>
<td>Design of investigations</td>
</tr>
<tr>
<td>Recognition of relationships</td>
<td>a) Reformulating general statements</td>
</tr>
<tr>
<td>Flexibility in reasoning</td>
<td>b) Criticizing experimental procedures</td>
</tr>
<tr>
<td>Planning</td>
<td>c) Describing sequence of investigations</td>
</tr>
<tr>
<td></td>
<td>d) Devising and describing investigations</td>
</tr>
</tbody>
</table>

Figure 1: The Mapping of Psychological Definitions of Creativity on to Scientific Meanings (Okere, 1986).

Research Hypothesis
There is no statistical significant difference in recognition of relationships between patterns, general scientific observations and scientific concepts in chemistry between students exposed to Discovery Teaching Approach and those exposed to Traditional Teaching Approaches.

LITERATURE REVIEW
Discovery Teaching Approach is an inquiry-based approach in which students are given a question to answer, a problem to solve, or a set of observations to explain, and then work in a largely self-directed manner to complete their assigned tasks and draw appropriate inferences and outcomes, discovering the desired factual and conceptual knowledge, and developing skills in the process (Prince & Felder 2006). Open and guided models of discovery have been adopted for the present study. Several studies have been carried out in different parts of the world with regard to Discovery Teaching Approach. Abdullah, (2015) investigated the effect of guided discovery approach in teaching creativity in Japan and found out that guided discovery approach enhances creativity in science. Rinita, Prasojo, and Arifai (2018) investigated on improving senior high school students’ creativity using discovery learning model in Sumatra and reported that Discovery Teaching Approach increases students’ Recognition of relationships and Flexibility in reasoning. In their study in Kenya, Otiende, Abura and Barchok, (2013) found that discovery learning
stimulated students’ Recognition of relationships between patterns and concepts. This study sought to investigate the effect of DTA on scientific creativity amongst students of chemistry in public secondary schools in Imenti North.

Traditional Teaching Approaches are the common approaches used in the normal classroom teaching. They are teacher centred, where the teacher controls the learning environment, is the source of knowledge and causes learning to occur (Theroux, 2004). In Traditional Teaching Approaches, some teachers believe that lessons should be teacher-centered, where the teacher is the expert and the authority in presenting information (Ahmad & Aziz, 2009). Traditional Teaching Approaches adopt expository methods such as lecture, drilling, memorization, demonstration and discussion. These are the common day to day methods of teaching.

Scientific Creativity has many definitions. According to Obote (2016), Scientific Creativity is the ability to recognize the gaps in the problem or the information, creating ideas or hypotheses, testing and developing these hypotheses and transmitting the data. It is the ability to find new problems and the ability to formulate hypotheses involving some addition to our prior knowledge. Okere (1996) as cited in Obote (2011), and Runco and Garret (2012), outline four tenets of Scientific Creativity as sensitivity to scientific problems, Recognition of relationships, Flexibility in reasoning and planning for an investigation. Sensitivity is the ability to be aware of the problems and think of possible solutions to the problem (Obote & Njagi, 2016). Flexibility means generation of a large number of response and ideas across different categories, which in turn simplifies problem solving (Darlington, 2015). Recognition of relationships is the ability to recognize relationships, patterns, similarities and connectivity among concepts and retrieving of the earlier experiences whenever one encounters a new situation or problem (Bruner, 2009). Yohan (2015) asserts that creativity has a connection with pattern recognition which enables one to draw analogies between seemingly very different topics. Once learners are able to recognize relationship of facts, patterns and ideas in a particular observation, they are able to generate the hypothesis necessary for solving the problem (Akinbobola & Afolabi, 2010).

Learners with the Recognition abilities are able to use earlier experiences to solve new problems based on the already established trends, patterns and connectivity between existing knowledge and newly encountered information (Erdogan & Akkanat, 2014). Akinbobola and Afolabi (2010) assert that if the learner is allowed to discover relationships, make his own generalizations and draw conclusions, he or she becomes more creative in solving problems. Pattern recognition is important in predicting possibilities (Hodgkinson, Langan-Fox and Saddler-Smith, 2008). Recognition of relationships is expressed in a science classroom when a learner is able to recognize relationships between everyday observations and the concepts acquired from science lessons (Ndeke & Okere, 2012). The ability to recognize relationships between patterns, general observations and scientific concepts in chemistry can be improved in the classroom by use of discovery teaching approach. For instance, earlier studies have shown that use of discovery teaching approach is effective in promoting scientific creativity among secondary school science students (Akinbobola & Afolabi, 2007; Ali, 2013). Rahman (2017) studied the use of discovery learning to encourage creative thinking in physics students of Khairun university of Ternate and reported that discovery approach enhances students’ Scientific Creativity.

RESEARCH METHODOLOGY

The study used Quasi-experimental research design and in particular Solomon Four-Group Non-Equivalent Group design. The design assessed the effects of the experimental treatment relative to control conditions, interaction between pre-test, treatment conditions and posttests. Figure 2 shows Solomon Four Group Non-Equivalent Control Group design used in the study.

Group I (E1) …….O₁……X…………………………O₂
Group II (C1) …….O₃…………………………O₄
Group III (E2) …….X…………………………O₅
Group IV (C2) ………………………………..……….O₆

Figure 2: Solomon Four Group, Non-Equivalent Control Group Design

E₁ & E₂ - Experimental groups one and two
C₁ & C₂ - Control groups one and two
O₁ & O₂ - Pre-tests
O₂,O₄,O₅,O₆- Post-tests
X - Treatment
___ - Use of non-equivalent groups
The schools were randomly assigned to four groups. E1 and E2 were taught through DTA and C1 and C2 were taught through TTA. Before treatment E1 and C1 were pre-tested (O1 & O3). After treatment all groups were post-tested (O2, O4, O5 and O6). O5 and O6 ruled out any interactions between pre-testing and treatment.

Study Population
The study targeted students in Public Secondary schools in Imenti North Subcounty and the accessible population was the 4862 form three students.

Sampling Procedures And Sample Size
The participating schools were purposively sampled from a list of County Public Secondary Schools within Imenti North Sub-county. Students from the sampled schools were randomly assigned to experimental groups (E1 and E2) and control groups (C1 and C2). In schools with more than one stream, one of the streams was randomly selected by use of simple random sampling for data analysis (Barchok, 2011). Table 1 shows the summary of the sample size.

<table>
<thead>
<tr>
<th>Table 1. Number of Schools and Number of Respondents in each School</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Girls schools sampled</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

The actual sample size for the study was 186 students.

Data Analysis
The data was analyzed using both descriptive and inferential statistics. Descriptive statistics included means and standard deviations. Inferential statistics included t-test and one way analysis of variance (ANOVA). Hypotheses were tested at (α)=0.05 level of significance. t-test and ANOVA were used to determine if there was any significant difference in recognition between those exposed to DTA and those exposed to TTA. Table 11 shows the independent samples t-test on CCT

<table>
<thead>
<tr>
<th>Table 11. The t-test of Pretest Mean Scores on Students' Recognition Levels Based on CCT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal variances assumed</td>
</tr>
<tr>
<td>1.370</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
</tr>
</tbody>
</table>

Results in Table 11 show that there was no significant difference in the mean scores of the two groups t (91) =1.370, p>0.05. The value of t_{critical} > t_{computed}, indicating that the means of the two groups were not different. The frequency data from CCCOS was also analyzed. Results are presented in table 12.

<table>
<thead>
<tr>
<th>Table 12. Analysis of Students’ Recognition Frequencies in CCCOS before Exposure to DTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Array</td>
</tr>
<tr>
<td>Ra1</td>
</tr>
<tr>
<td>Ra2</td>
</tr>
<tr>
<td>Ra3</td>
</tr>
<tr>
<td>Ra4</td>
</tr>
<tr>
<td>Ra5</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Key: Ra - Recognition Arrays,

Data presented in Table 12 shows the frequencies of students’ observable reactions during the lesson before exposure to DTA. Control group C1 had a mean frequency of 5.243 and experimental group E1 recorded frequency of 5.5 out of the possible maximum frequency scores of forty. Thus control and experimental groups registered almost the same mean frequencies before the treatment indicating similarity in recognition levels before treatment.
RESULTS AND DISCUSSION

To determine the effect of DTA on recognition, mean score for each group was calculated. Table 13 shows the posttest mean scores and standard deviations on recognition of relationships based on CCT.

Table 13. The posttest mean scores and standard deviations on recognition based on CCT

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>47</td>
<td>4.00</td>
<td>2.275</td>
</tr>
<tr>
<td>E1</td>
<td>46</td>
<td>5.98</td>
<td>2.226</td>
</tr>
<tr>
<td>C2</td>
<td>46</td>
<td>3.65</td>
<td>2.183</td>
</tr>
<tr>
<td>E2</td>
<td>47</td>
<td>6.57</td>
<td>2.144</td>
</tr>
<tr>
<td>Total</td>
<td>186</td>
<td>5.05</td>
<td>2.523</td>
</tr>
</tbody>
</table>

Results in table 13 show that the mean score for experimental group E2 was the highest at 6.57 followed by experimental group E1 at 5.98. Control group C1 had a mean of 4.0 and control group C2 had 3.65. To find out whether the means were significantly different for the four groups, one way ANOVA was conducted and results were as presented in Table 14.

Table 14. Analysis of Variance of Posttest Mean Scores on Recognition of Relationships Based on CCT.

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>290.560</td>
<td>3</td>
<td>96.853</td>
<td>19.875</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>886.902</td>
<td>182</td>
<td>4.873</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1177.462</td>
<td>185</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Information in Table 14 show that there was a significant difference between the means of the four groups, $F(3,182) = 19.875 \ P<0.05$, $F_{\text{critical}} \prec F_{\text{computed}}$ Which shows that the means of the four groups were different. Therefore, the null hypothesis ($H_0$) which stated that there is no statistical significant difference in recognition of relationships between patterns, general scientific observations and scientific concepts in chemistry between students exposed to DTA and those exposed to TTA is rejected. To investigate which groups showed significant difference, Bonferroni Post Hoc test of multiple comparisons was carried out. Results are presented in Table 14.

Table 15. Comparisons of Posttest Scores on Recognition of Relationships in Chemistry Based on CCT.

<table>
<thead>
<tr>
<th>(I) type of Group</th>
<th>(J) type of Group</th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>E1</td>
<td>-1.978*</td>
<td>.458</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>C2</td>
<td>.348</td>
<td>.458</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>E2</td>
<td>-2.574*</td>
<td>.455</td>
<td>.000</td>
</tr>
<tr>
<td>E1</td>
<td>C1</td>
<td>1.978*</td>
<td>.458</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>C2</td>
<td>2.326*</td>
<td>.460</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>E2</td>
<td>-.596</td>
<td>.458</td>
<td>1.000</td>
</tr>
<tr>
<td>C2</td>
<td>C1</td>
<td>-.348</td>
<td>.458</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>E1</td>
<td>-2.326*</td>
<td>.460</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>E2</td>
<td>-2.922*</td>
<td>.458</td>
<td>.000</td>
</tr>
<tr>
<td>E2</td>
<td>C1</td>
<td>2.574*</td>
<td>.455</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>E1</td>
<td>.596</td>
<td>.458</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>C2</td>
<td>2.922*</td>
<td>.458</td>
<td>.000</td>
</tr>
</tbody>
</table>

*The mean difference is significant at the 0.05 level.

Results in table 15 show that the mean difference of groups C1 versus E1(1.978) and E2(2.574) and C2 versus E1(2.326) and E2(2.922) were significantly different as $P<0.05$. No statistical significant difference between E1 and E2 (0.596) and C1 and C2 (0.348) as $P>0.05$. Hence DTA had significant effect on recognition of relationships. Recognition posttest data frequencies obtained from CCCOS were also analyzed and results presented in Table 16.

Table 16 indicates the frequencies of students’ observable responses during the lesson after the exposure to DTA. Experimental groups recorded higher frequencies than control groups. Experimental group E1 had a frequency of
15.004 and experimental group E2 recorded a frequency of 16.569. Control groups C1 and C2 recorded 5.864 and 6.549 respectively. This was out of the possible maximum frequency scores of forty. The qualitative data collected by Chemistry Classroom Creativity Observation schedule (CCCOS) supplemented the quantitative data collected by CCT in highlighting the qualitative aspects of recognition that could not be fully captured quantitatively. The data in CCCOS gave descriptions of the learners’ reactions and activities during the lesson that provide an in-depth understanding of recognition as an aspect of scientific creativity.

**Table 16. Analysis of Students’ Recognition Frequencies Data in CCCOS after the Treatment.**

<table>
<thead>
<tr>
<th>Array</th>
<th>Behavioural reactions by learner in the course of the lesson exhibited as follows:</th>
<th>Frequency levels</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ra1</td>
<td>Recalls facts, ideas, formulae and topics studied earlier</td>
<td>4.128 14.936 5.128 16.553</td>
<td></td>
</tr>
<tr>
<td>Ra2</td>
<td>Identifies patterns, relationships and similarities</td>
<td>6.213 14.106 7.234 18.361</td>
<td></td>
</tr>
<tr>
<td>Ra3</td>
<td>Associates earlier experiences with the current</td>
<td>5.340 15.851 8.085 16.106</td>
<td></td>
</tr>
<tr>
<td>Ra4</td>
<td>Responds by Citing related ideas from other topics</td>
<td>7.298 16.064 5.978 14.851</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>5.864 15.004 6.549 16.569</td>
<td></td>
</tr>
</tbody>
</table>

Key: Ra - Recognition Arrays

The results of this study have shown that there was a statistical significant difference in recognition of relationships between patterns, general observations and scientific concepts in chemistry between students taught by use of DTA and those taught using TTA. Experimental groups recorded higher scores than control groups. In CCT, experimental group E1 scores increased from 4.09 to 5.978 out of the possible maximum score of ten. Frequency data for experimental group E1 in CCCOS also improved from 5.5 to 15.004 out possible maximum score of forty. Experimental group E2 achieved 6.574 out of ten in CCT and 16.569 out of forty in CCCOS respectively. The increase in performance is attributable to the treatment, showing that DTA enhances recognition of relationships amongst students of chemistry. This implies that DTA is more effective in enhancing students’ recognition of relationships between patterns, general observations and scientific concepts in chemistry than TTA.

These finding are consistent with Hodgkinson, Langan-Fox and Saddler-Smith (2008) who studied intuition as a fundamental bridging construct in the behavioural sciences in Britain and reported that Discovery Teaching Approach promotes pattern recognition which is important in predicting possibilities in scientific problems. The findings also corroborate those of Cheng (2011) who investigated infusion of creativity in design amongst high school students in Indonesia and concluded that Discovery Teaching Approach nurtures students’ ability to make connections between scientific observations and trends, and how to use them to formulate and test hypotheses to make conclusions on newer problems. The findings are also in agreement with Otunde, Barchok and Abura (2013) in a related study in Kenya. The researchers studied the effect of discovery method on secondary school students of physics and found out that use of discovery experimental teaching method increases students’ Recognition of relationships, which enables the learners to form correct concepts. It is however, established from the data in table 13 and 16 that the level of Recognition of relationships is generally low amongst the students.

**CONCLUSION**

Students’ exposure to DTA improved their acquisition of recognition of relationships as one of the scientific creativity constructs. This has the implication that use of DTA in teaching of chemistry enhanced acquisition of scientific skills and abilities in comparison to Traditional TTA. This is because DTA provides a rich environment for learners to explore and interact with hence developing the requisite skills. As a result, teaching by DTA produces learners who are better problem solvers, not only of chemistry problems but also for day to day problems.

**RECOMMENDATIONS**

Based on the findings of this study, the following recommendations were made:

The universities and secondary school diploma teacher training colleges should design curriculum favouring integration and use of DTA in relation to enhancement of recognition as a scientific creativity construct.
The universities and KICD should focus on scientific creativity as a major component of the curriculum and provide instructional impetus to its teaching.

REFERENCES


*****
SOCIAL FACTORS AFFECTING UTILIZATION OF GUIDANCE AND COUNSELLING SERVICES AMONG STUDENTS IN NATIONAL SCHOOLS IN MERU AND THARAKA NITHI COUNTIES, KENYA

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Department of Education, Chuka University, P. O. Box 109-60400 Chuka
Corresponding Email: ruthnkathamanyara@gmail.com

ABSTRACT
Guidance and counselling is a process of helping the individual find solutions to own problems and accept them. Guidance and counselling services in secondary school are part of a broader delivery system, designed to assist students to deal with educational, personal, social, mental, emotional and other similar problems. The provision of guidance and counselling to all students in secondary schools in Kenya, is fundamental to the success of the government’s overall education development strategy. However, various social factors may hinder student’s willingness to engage counselling services in solving the inherent problems, which is still a persistent problem, facing education in Kenya. The purpose of this study was to investigate social factors affecting utilization of guidance and counselling services among students in national schools in Meru and Tharaka Nithi counties, Kenya. The study was conducted using descriptive survey research design and the target population was 3702 subjects comprising of 4 head teachers, 4 guidance and counselling teachers and 3694 students. The sample size for this study was 377 respondents comprising 4 head teachers, 4 guidance and counselling teachers and 369 students, selected through purposive and stratified random sampling. Questionnaires were the main data collection instruments. Quantitative data was analyzed using SPSS version 20. Descriptive statistics was used to analyze quantitative data. The study established that the social factors affecting utilization of guidance and counselling services included negative attitude towards guidance and counselling, family influence, gender dispositions, social stigma associated with help seeking was negating students from effective utilization of guidance and counselling services. The study makes the conclusion that guidance and counselling in Kenyan national schools need to be reemphasized to address social factors that affect its utilization. the study recommends that the ministry of education should introduce mandatory in-service training in guidance and counselling for all teacher counsellors who do not have basic training in guidance and counselling.

Keywords: Social Factors, Utilization, Students, National Schools

BACKGROUND
Guidance is giving advice or suggestions or directions or instructions to people who have problems, spiritual, social, educational, economic or psychological. Guidance involves personal assistance (Makinde, 1993). counseling like guidance includes giving more than advice to a person. It is purposeful understanding of a person in order to promote self-understanding in that person. It involves listening to people, giving attention to their problems and offering suggestions that can bring out solutions (Bhathnagar & Gupta, 1999). Guidance and counseling services prepare students to assume increasing responsibility from their decision and grow in their ability to understand and accept the results of their choices (Kaucha,2011). The ability to make such intelligent choices is not innate but, like other abilities, must be developed. Guidance is a process that consists of a group of service offered to an individual to assist them in securing the knowledge and skills needed in making adequate choices, plans and interpretation essential to satisfactory adjustment in diverse areas. (Sindabi, 1991).

The services are therefore designed to result in efficiency which requires the individual to make adjustments in order to be an effective member of the society. Counselling is a process that helps an individual analyze him/herself by relating his capabilities, achievements, interests and mode of adjustments to new decisions made. Muasya (2014) opined that, Guidance and Counselling services are essential in secondary schools, colleges and universities where most of the adolescents congregate. The goal of Guidance and counseling is to make it possible for an individual to see and explore his/her unlimited endowed options. Scholars such as Odeck (1999), Ipaye (1995), Makinde 1984) opined that that he major service areas of guidance and curriculum and school life choices, vocational guidance and counseling which assist the individual to choose and prepare for an occupation that is compatible with interests and aptitudes, and personal and social guidance and counseling which assist the individual to behave appropriately in relation to other members of the society.

The importance of guidance and counseling in schools is presented by Ndichu (2005) when he states that: high school years are a period of academic, social, personal, emotional and intellectual growth from most adolescents. By resolving physical, emotional, social and academic difficulties of the students and by helping the students
understand their learning strengths and weaknesses through guidance and counseling, their academic achievement can be improved and their own overall development can be achieved.

The concept that institutions, especially schools should promote the efficient and happy lives of individuals by helping them adjust to social realities through guidance and counseling is global phenomenon. In United States of America where counseling has its roots, Guidance Movement was started due to humanitarian concern to improve rights of those people adversely affected by Industrial Revolution of the mid to late 1800s (Gladding, 1988). People needed occupational guidance in order to cope with challenges in life. As noted by Mc Leod (2000) the provision of counseling in a systematic way in educational settings in England was first developed by in the mid 1960’s partly as the process of rendering services to students who needed assistance in making decisions about important aspect of their education choices of courses, careers or decisions regarding interests and abilities and choices in secondary.

The utilization of guidance and counseling services in schools in Africa has been hampered by multicultural diversity, historical religious, socio-economic status and even school related factors over the years (Egbochuku, 2000). In school, there are young people of different ages, sex interests and life orientations. Robinson (2002) observed that the diversity in student culture, beliefs and values and social relations may be responsible for differences in the uptake of guidance and counseling services in schools. Research conducted in Eastern and Southern Africa reflects cite disparities in the participation of boys and girls in school Guidance and Counselling services. The factors contributing to the differences in the utilization of Guidance and counseling among boys and girls has not received much focus in research. There is a gap in knowledge in this area reflecting a need for studies focusing on how socio – cultural factors influence students utilization of guidance and counseling. Any effective guidance programme, therefore, should take note of the effect these problems may have on participation of boys and girls. Considering the different impact that socio- economic and cultural factors may have on the future and general lives of boys and girls, there is a need to be sensitive to this reality when we provide guidance services.

Statement of the Problem
Students joining national schools experience personal challenges ranging from cultural shock due to the multicultural diversities of the previous and the present environment, unmet expectations, social maladjustments like indulgence in drug abuse, lesbianism, and homosexuality, all resorting to erosion of morals. This leads to difficulties in personal, social and academic adjustments. Issues of student unrest have emerged as major concerns of parents and education stakeholders in the national schools. This raises question as to whether guiding and counseling services are effectively utilized in helping students to adjust to life in a national school. Socio-cultural factors affecting utilization of guiding and counseling services have inadequately been explored. It is against this background that this study seeks to investigate socio-cultural factors affecting utilization of guidance and counseling services among students in National Schools in Meru and Tharaka-Nithi Counties.

Purpose of Study
The purpose of this study was to establish the socio-cultural factors affecting utilization of guidance and counseling services in National Schools in Meru and Tharaka-Nithi Counties, Kenya.

Objectives of the study
To investigate social factors affecting the utilization of guidance and counselling services among students in National schools in Meru and Tharaka-Nithi Counties.
To find out cultural factors affecting the utilization of guiding and counselling services among students in National Schools in Mweru and Tharaka-Nithi Counties.
To determine strategies that can be adopted to enhance utilization of guiding and counselling services by students in National Schools in Meru and Tharaka-Nithi counties.

METHODOLOGY
The study was conducted using descriptive survey research design. As explained by Gall, Borg and Gall (1996), in this design, the researcher does not manipulate the variables under study but instead, examines the variables in their existing condition. Therefore, the researcher conducted the study within the existing students’ socio-cultural backgrounds in National Schools and the effects these variables have on students’ utilization of guiding and counseling. In this study, the variables of interest included socio-cultural as the independent variable and student utilization of guiding and counseling as the dependent variables. Since the study did not manipulate these variables,
the researcher just collected information on the state of affairs based on the respondents’ socio-cultural underpinnings making the design appropriate for the study.

The study was carried out in National Secondary School in Meru and Tharaka-Nithi Counties. There are four national schools in the two counties namely Meru School and Saint Mary’s Girls in Meru County and Chogoria Girls’ and Ikuu boys’ in Tharaka-Nithi County. The study location was chosen because issues of examination malpractices and students’ unrest have emerged as major concerns of parents and education stakeholders in the national schools in the region (KNEC, 2013 & MOE, 2013). The target population for the study was 3702 subjects and 4 head teachers, 4 guidance and counseling HODs and 3694 students in four National Schools in Meru and Tharaka-Nithi Counties (Meru and Tharaka-Nithi County Education Offices, 2013). The data were coded and analyzed using the Statistical Package for Social Sciences (SPSS 20) which yielded descriptive statistics such as frequency tables, pie charts and bar graphs.

**FINDINGS**

The study sought to establish the distribution of students by class and gender. Results obtained are in Table 1.

<table>
<thead>
<tr>
<th>Class</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percentage</td>
</tr>
<tr>
<td>Form 1</td>
<td>37</td>
<td>22.0</td>
</tr>
<tr>
<td>Form 2</td>
<td>41</td>
<td>25.0</td>
</tr>
<tr>
<td>Form 3</td>
<td>43</td>
<td>26.0</td>
</tr>
<tr>
<td>Form 4</td>
<td>45</td>
<td>27.0</td>
</tr>
<tr>
<td>Total</td>
<td>166</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The results show that the proportion of boys that took part in the study was slightly higher than that of girls. This means that there was fair distribution in enrolment of male and female students in schools studied.

**Social Factors affecting Utilization of Guidance and Counseling Services**

The first objective of the study aimed at investigating social factors affecting utilization of guidance and counseling services among students in national schools in Meru and Tharaka Nithi counties. The findings obtained from teachers and students are shown in Table 2.

<table>
<thead>
<tr>
<th>Social factors</th>
<th>Teachers’ responses</th>
<th>Students’ responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SA</td>
<td>A</td>
</tr>
<tr>
<td>Negative attitudes towards guidance and counseling</td>
<td>78%</td>
<td>12%</td>
</tr>
<tr>
<td>Family Influence</td>
<td>43%</td>
<td>20%</td>
</tr>
<tr>
<td>Gender Dispositions</td>
<td>62%</td>
<td>34%</td>
</tr>
<tr>
<td>Social Stigma</td>
<td>23%</td>
<td>37%</td>
</tr>
<tr>
<td>Self esteem</td>
<td>23%</td>
<td>30%</td>
</tr>
<tr>
<td>Fear of lack of confidentiality</td>
<td>76%</td>
<td>24%</td>
</tr>
</tbody>
</table>

The findings of the study show that 78% of teachers and 675 of the students strongly agreed that negative attitudes towards guidance and counseling among students affect utilization of the service. The findings of this study seem to agree with Khaemba’s (1986) study that showed that many students do not feel part of and parcel of the guidance and counseling programme and are not free to seek guidance and counseling services in school. Ubana (2008) in her research study on the attitude of secondary school students towards guidance and counseling services in Yakkur...
local government area Cross River state came out with the findings that students attitude towards guidance and counseling services was negative and that sex of the students and the geographical location of the school had no significant influence on the students attitudes towards guidance and counseling services. The attitude of students towards guidance and counseling was considered important issue in the effective administration, implementation of guidance and counseling practices in national schools given the difference in cultural diversity.

Positive attitudes would mean better utilization of guidance and counseling services in such settings. Attitudes are predispositions which have developed through a long and complex process. A student’s attitude towards guidance and counseling can therefore be described as a tendency to react favorably or unfavorably towards seeking guidance and counseling. It is evident that when so defined, attitudes cannot be directly observed, but must be inferred from overt behavior both verbal and non-verbal. Despite the recognition of the importance of student’s positive attitude towards successful guidance and counseling, principals’ and teachers’ counselors have not done much to improve the ambivalent attitude towards seeking help among the students.

Table 8 indicates that majority (43%) strongly agreed that the family (aggregate of all internal and external conditions affecting the existence, growth and welfare of children) had an influence on the students’ attitudes towards seeking guidance and counseling in schools. This was followed by (20%) agreed, (17%) undecided, (15%) disagreed and (5%) strongly disagreed. However, majority of students (38%) were non-committal (undecided) on whether their families had an influence on the way they participated in guidance and counseling. Family influence is the extent to which the parents or any family members are involved in the guidance and counseling plans of their children. This is through giving or providing information to their children that will support the children’s disposition towards accepting to utilize school guidance and counseling services. It includes the extent to which the parents give encouragement, responsiveness, approval and financial support. Teachers and students differed in their opinion regarding family influence on students’ utilization of guidance and counseling. While the teachers felt that the family had influence, the students were if the contrary opinion. Home environments vary in many aspects such as the parent’s level of education, economic status, occupational status, religious background, values, interests and parents’ expectations for their children among others. Students coming from different home environments re affected differently by such variants.

The results in Table suggested that majority (62%) of the teachers and 72% students have more or less the same perception about the effects of gender on delivery of guidance and counseling services. It has been found that students may not be very comfortable when being counseled by counselors of the opposite sex (Maithya,1996). It is clear that guidance and counseling in schools may be affected by student gender dispositions. Levant (1990) reported four gender roles characteristics that can contribute to men’s avoidance of therapy. First, men have difficult admitting that a problem exists. Second, they have difficult asking for help. Third, they have trouble distinguishing between the various emotional states. Finally, they may be trained to for intimacy. Butcher, Rouse and Perry (1998), Garland and Zigler (1994) found that women are more likely to make use of counseling services than men without regard to age or sexual orientation. Swanson (1993) reported that females tend to have more positive attitudes toward seeking professional psychological help than males and Pederson & Vogel (2007) reported that men experiencing high gender role conflict were more likely to self-stigmatize and less likely to self-disclose. This study did not establish whether a significant difference between male and female students attitudes towards seeking psychological help existed but rather established that gender dispositions was a factor influencing students utilization of guidance and counseling.

The results further shows that 60% of the teacher respondents and 65% of the students respondents agreed that social stigma associated with help seeking may be a factor inhibiting students from effective utilization of guidance and counseling services. Social stigma is defined as the fear that others will judge a person negatively if she or he sought help for a problem (Dean & Chamberlain,1994).Perception of public stigma have also been found to contribute to the experience of self-stigma, thus influencing help seeking attitudes and eventually help-seeking willingness (Vogel, Wade & Hackler,2007).Men experiencing high gender role conflict are more likely to self-stigmatize and less likely to self-disclose thus high self-stigma and less disclosure then leads to less positive attitudes and subsequently less willingness to seek help (Pederson & Vogel 2007).Thus, generally, there seems to be perception that social stigma has an influence on students utilization of guidance and counseling as reported by both teacher and students.
Self-esteem has been reported to be an important psychological barrier to seeking guidance and counseling services among students. This was strongly agreed to by 23% of the teachers while another 30% agreed to this view. Only 21% of the respondents disagreed while 24% strongly disagreed and 2% undecided. This view was closely followed in terms of popularity by 56% student that strongly agreed, 32% was closely followed in terms of popularity by 56% students that strongly greed, 32% agreed, 3% undecided, 6% disagreed While 4% strongly disagreed. Fisher, Nadler and Whicher-Alagan (1982) suggested that seeking help from another entails an implicit analysis of the costs and benefits to one's self esteem. Seeking help from another to some degree means admitting that one cannot deal with the problem on one's own and, as such, can be an admission of inadequacy. Research by (Nadler, 1991) on barriers to help seeking behavior has underlined the role of threat to self-esteem as a central factor affecting help seeking behavior. Seeking help is often perceived as indicative of personal weakness. As a result, an individual may refrain from seeking help in order to maintain positive self-esteem. Thus, a person may decide not to seek help in order to maintain a positive self-image. Yeh (2002) found that collective self-esteem negatively predicted attitudes toward counseling in Asian population.

The results in Table 8 show that all respondents strongly agreed that fear of lack of confidentiality is one of the reason for not utilizing the counseling services among students in national schools. This might emanate from the culture and the way students are socialized in general and absence of either female or male teacher counselors in particular. Researchers Komiya (2000) and Kelly (1998) have identified fear of negative evaluation from others and fear of having to discuss painful emotions as reasons that make some individuals avoid seeking counseling. Seeking help from another person often involves strong emotions and clients may fear having to experience painful emotions. Even after seeking help, many clients withhold emotions they have been afraid to express to a counselor. In a study examining emotional expression specifically, Komiya (2000) found that reluctance to seek counseling was greater for individuals who were not open about their emotions. From these findings it can be said that for a of negative evaluation by other peers was a silent factor affecting students ‘attitudes towards seeking guidance and counseling. This could be attributed to anxiety toward other people’s opinion, apprehension over personal mistakes, indifference toward other peoples’ opinion and indifference toward impression that one makes others.

CONCLUSIONS
This study makes the conclusion that:
Guidance and Counseling in Kenyan Secondary Schools need to be emphasized to address social stigma, gender stereotyping and negative attitudes associated with help-seeking. Cultural factors such as ethnicity that brings about differences in cultural diversity, deep rooted cultural practices, community beliefs, taboos, and myths may be prohibiting students from in seeking guidance and counseling. A variety of strategies such as developing school Guidance and Counseling be made an examinable subject and spearheading advocacy on the importance of guidance and counseling and teacher-counselor training.

RECOMMENDATIONS
In view of the fact that guidance and counseling services play a significant role in enhancing behavior in national schools due to the multi-ethnic diversity, the researcher makes the following recommendation:
Involvement of all stakeholders including parents, teachers, and opinion leaders in sensitizing the community to shun social issues such as social stigma, gender stereotyping and negative attitudes associated with help-seeking. There is need to plead with students to avoid cultural inclinations such as ethnicity, deep rooted cultural practices, community beliefs, taboos and myths that otherwise deter them from seeking guidance and counselling. There is need to make Guidance and Counselling an examinable subject, enhance advocacy and mandatory in-service training in guidance and counselling for all teacher counsellors who do not have basic training in guidance and counselling.

REFERENCES


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NEED ASSESSMENT FOR PSYCHOLOGICAL COUNSELLING INTERVENTIONS IN SECONDARY SCHOOLS: CASE STUDY OF MARIMBA GIRLS SECONDARY SCHOOL IN MOMBASA COUNTY, KENYA

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ABSTRACT
There has been suggestion to entrench guidance and counselling programs in schools as a result of frequent indiscipline and poor academic performance in most of secondary schools in Kenya. However, Teachers Service Commission and Ministry of Education Science and Technology are yet to incorporate fully-fledged guidance and counselling departments maned by full time trained counsellors in secondary schools. The study investigated need assessment for psychological guidance and counselling in secondary schools; a case study of Marimba secondary school, in Mombasa County, Kenya. The study objectives were; to establish the family background where students retire after school, to establish student’s source of sexuality education at home, and establish student’s intimate desire from home environment concerning their study at home. The study population was 843 respondents from Marimba secondary school in Mombasa County, Kenya. Stratified and random sampling method was used to obtain a sample of 240 students who participated in this research. The participants were drawn from Form 1 to Form 4. Open ended questionnaire was used to correct information from the respondents. Test retest method was used during pilot study to get data that was used to compute reliability coefficient of the questionnaire. Data analysis after pilot study yielded a reliability coefficient of 0.83. The validity of the questionnaire was assessed by other experts in the field of study from Mt. Kenya University, Mombasa Campus. Data analysis was done using descriptive statistics that included percentage to compare the summarised data. Data analysis was done with assistance of Statistical Package for Social Sciences (SPSS) computer programme version 20.0. The research finds show that there is need for personal student’s psychological guidance and counselling in schools to help them deal with psychological issues that emanate from home environment. The researcher recommended that TSC in conjunction with MoES&T speed up establishment of fully-fledged guidance and counselling departments in each school that should be manned by full time trained counsellor capable of dealing with personal guidance and counselling to students at all time and even extend their services to significant others in students’ life.

Keywords: guidance and counselling, family background, psychological issues, sexuality, needs assessment.

INTRODUCTION
Bucy, Meyers and Swerdlik (2002) reports that, education reform initiatives in the U.S. have expanded the mission of schools to take care of the need of the holistic learners in all aspect of their life in school that include and not limited to; academic, social, and emotional and health issues. Kourkoutasa and Theodoros (2015) reports that there is need for holistic school-based education for children at risk and their families in many of the schools in Europe. Evidence shows that teachers can effectively assist students at risk or with difficulties, when they are adequately guided and supported by well-trained school counsellors (Kourkoutasa & Theodoros, 2015). Education in general aim at assisting students become more productive members of the society. Nova (2010) argues that, it is necessary to change guidance and counselling from a specific population tailored services to a comprehensive model that incorporate programs and services to all students in the school. The guidance and counselling should be orientated from an ancillary, crisis-oriented service model to a proactive, comprehensive model that is more preventative and responsive ever-changing needs of all students in a school.

In developed countries, the duties of school counsellors may include; providing instruction on psychological and social issues, vocational guidance, assisting students mediate conflicts with significant other people they interact with, provide referrals, recommendations, and education to parents about mental health concerns (Wright, 2011). Counsellors often help special needs students integrate into classrooms and may oversee programs that address requirements for students with special needs or learning difficulties (Wright, 2011). According to American School Counsellor Association. (2011), diagnosable mental health conditions affect 21% of U.S. children between the ages of 9 and 17, but only 20% of these children obtain a diagnosis and receive treatment in any given year. Some schools in USA invites in school psychiatrists who are able to prescribe medication to students although parental permission is typically required.
Nzeleni (2015) regards guidance and counselling in South Africa as a guide that leads students into various entrepreneurial activities that are important for sustainable self-reliance and self-worth. It is through guidance and counselling that students are able to achieve and live fulfilled lives. Guidance and counselling services look at the holistic development of the learner by taking into account the psycho-social, intellectual, emotional and physical development aspects of the learner within the context of the learner’s environment. According to Maree and van der Westhuizen (2011), The context of guidance and counselling services in South Africa is not stable because of various political, economic, and sociocultural factors. Counselling in South Africa has largely evolved around individual needs but in essence the government policies advocates for cultural sharing and collective needs (Maree & van der Westhuizen, 2011).

Nzeleni (2015), argues that in South Africa, the majority of the educators and education officials know that guiding and counselling are two important practices that all institutions need. The necessity arises from the fact that the prevailing life styles have created learners and educators who continuously require guidance and counselling services. Personal and psychological counselling that aims at assisting students’ family and personal issues in secondary schools is yet to take root in Kenya (Kirangari, 2010). However, according to Wambu and Fisher (2015), the government’s emphasis on guidance and counselling program implementation in Kenyan schools has led to rapid increase in the number of trained school counsellors in secondary schools but ambiguity in counsellor’s role in counselling role persist.

Kanga (2017) advocates for strengthening of individual counselling, training of peer counsellors and gender balance in the appointment of school counselling personnel to enhance students adjust to the school environment. According to Odeleye (2017), psychological and social guidance are neglected aspect of guidance and counselling. The researcher argues that teachers should also be concerned with students’ psychological welfare and love their students for they are like parents who are supposed to nurture their children with parental love. Lack of cooperation from administration is the main serious challenge to success of guidance and counselling in schools. This is followed by uncooperative staff members and students unwilling to discuss their problems is also seen as a serious challenge. Other challenge of counselling in schools is heavy teaching load and inadequate facilities for the teacher counsellor (Nyaegah, 2011).

According to Simatwa and Ajowi (2010) reports, majority of counsellors in schools are females and counselling sessions are short and inappropriate as the sessions are scheduled during lunch break or at the end of the lesson after school at 4.00 pm. They also argue that, the emotional and psychological status of many learners in the 21st century has been vastly affected by various aspects including substance abuse, domestic poverty, teenage issues, physical disabilities, domestic violence and early pregnancy among others such factors. The consequences of this distress are dire and far-reaching. Wambu and Fisher (2015) recommended implementation of organized comprehensive guidance and counselling programs that addresses the needs of all students.

Statement of the problem
Education in contemporary times require turning research and milestones into enterprises for solving recalcitrant societal problems for healthy, secure and wealthy livelihoods creation. There is therefore need to focus our attention to mental health which is important in all sectors of life and especially in learning institutions for smooth teaching and learning activities for better academic performance in a safe environment. There has been a lot of emphasis put on improving school environment to the extent that home environment has been neglected especially for day scholars who leave school after 4.30 pm only to appear in school the next morning. What students encounter after school is an issue that affect their behaviour in and outside school environment that school administration usually fail to address. The current study therefore was developed to investigate psychological counselling needs that emanate from home environment for students of Marimba secondary school in Mombasa county, Kenya.

Objective of the Study
The study investigated need assessment for psychological guidance and counselling for marimba secondary school students in Mombasa County, Kenya.

Research Questions
The research study was guided by the following questions;
Who do students stay with at home after school?
What happened to the missing parent(s)?
Who do students turn to for sexuality information when at home?  
What is the major concern of students when at home concerning their education?  

RESEARCH METHODOLOGY  
They study employed survey research design where a total of 843 respondents were targeted for the study. Stratified sampling method was used to get students from Form 1 to Form 4 and random sampling procedure was used to choose 60 respondents from each level which gave rise to a sample of 240 students. Questionnaire that contained closed ended and open-ended questions was used to collect data from the students. The pilot study was carried out in a school from within Mombasa county and the data gathered was used to determine the reliability and validity of the instruments. The analysis of the data from the pilot study yielded Pearson correlation coefficient of 0.83 which was above the recommended reliability coefficient of 0.7 for social studies recommended (Mugenda and Mugenda, 2003). The validity of the instruments was assessed by other experts in the department of social studies from Mt Kenya University and was judged to have enough content validity and face validity to capture the variables being measured. Data was analysed with the assistance of Statistical Package for Social Sciences (SPSS) computer programme version 20.0. Respondents were assured of confidentiality of information obtained and the name of the school changed to safeguard the source of the information. The researcher also sought permission from the school administration to carry out the study and respondent’s permission was also sought before the study commenced.

RESULTS AND DISCUSSION  
Question one was designed to seek information on the person who play important role of a guardian to the student at home after school each day. Data obtained was analysed and summarised in Table 1.

<table>
<thead>
<tr>
<th>Parent</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both Biological Parents</td>
<td>125</td>
<td>52.1</td>
<td>52.1</td>
<td>52.1</td>
</tr>
<tr>
<td>A Biological &amp; Stepparent</td>
<td>22</td>
<td>9.2</td>
<td>9.2</td>
<td>61.3</td>
</tr>
<tr>
<td>Single parent</td>
<td>56</td>
<td>23.3</td>
<td>23.3</td>
<td>84.6</td>
</tr>
<tr>
<td>Grandparent</td>
<td>11</td>
<td>4.6</td>
<td>4.6</td>
<td>89.2</td>
</tr>
<tr>
<td>Sibling</td>
<td>9</td>
<td>3.8</td>
<td>3.8</td>
<td>92.9</td>
</tr>
<tr>
<td>Uncles &amp; Aunts</td>
<td>17</td>
<td>7.1</td>
<td>7.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 1 shows that 23.3% of students live with single parent and 7.1% live with uncles and aunts. The Table also show that 52.1% of students live with their biological father and mother. According to Hyunjoon (2008), the relationship between single parenthood and children’s education can vary across societies, depending on broad family and other social structures surrounding single parenthood. Rapid single parenting in Korea according to the researcher has rapidly increased requiring further understanding and implications of this rapid family change for children’s well-being in a context where the welfare of family members has primarily relied on family ties. Single parent also tends to get less involved in their children’s education as had been shown by limited supervision of their children’s school work. Parental overall relationship with their children also affect children’s psychological wellbeing and therefore educational outcome (Astone & McLanahan, 1991 cited by Hyunjoon, 2008). The lowest level of parental involvement has been associated with single parent families (McLanahan & Sandefur, 1994).

Table 1 also shows that 4.6% of the sampled students were being raised by their grandparents. Thomas, Konstantina and Panagiotis (2014) reveals statistically significant differences in the awareness of middle school and high grandparents regarding whether their grandchild utilized the academic services of tutoring, pull-out classes, and study skills classes. According Thomas et al (2014), students taken care by grandparents used the services less than other students in the institution where the study was carried out. Both groups of grandparents requested for support groups for their grandchildren to address behaviour and provide assistance with school work. In another study by Carmen (2012), involving African American grandparents conveniently sampled from four high schools and five middle schools in a southern urban school district in USA, grandparents indicated that they required support groups for their grandchildren to address behaviour and provide assistance with school work. Findings from the Backhouse (2009) study revealed that grandparents experience a significant degree of role identity conflict in their grandparent-as-parent role. The loss of their traditional grandparent role, together with the shift in commitment to the grandparent-as-parent role, has resulted in a space of difference between the ideal and the real of being a grandparent. The identity conflict appeared to have consequential impact grandparents’ self-esteem and self-
verification processes. Many grandparents assume the role of primary caregiver of their grandchildren when they already experiencing financial difficulties. Most grandparent caregivers do not want to become involved in the formal child welfare system nor and prefer not to have a legal relationship with the children, instead they informally raise the children. The reason for these informal relationships is that although most caregivers sense that the arrangement is permanent, they hope that the children will be raised by the parent at some point in the future (Minkler, 1999 cited by Carmen, 2012).

The second question was designed to investigate the cause of the missing parent(s). The findings in Table 1 shows that 52.3% of the students in the school lived with both biological father and mother. The researcher therefore went further to ask students what happened to be missing parent(s). The data generated was summarised in Table 2.

<table>
<thead>
<tr>
<th>Missing parent</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead</td>
<td>29</td>
<td>25.2</td>
<td>25.2</td>
<td>25.2</td>
</tr>
<tr>
<td>Divorced or Separated</td>
<td>48</td>
<td>41.7</td>
<td>41.7</td>
<td>67.0</td>
</tr>
<tr>
<td>Don't Know</td>
<td>9</td>
<td>7.9</td>
<td>7.9</td>
<td>74.8</td>
</tr>
<tr>
<td>Nature of Work</td>
<td>29</td>
<td>25.2</td>
<td>25.2</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>115</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table 2 shows that the highest cause of the missing parent(s) is divorce and separation (41.7%) followed by death and nature of work at 25.2% each. There were students who did not know what happened to the missing parent(s) at 7.9%. According to Oyeroni, Olaolu, Fadokun and Omiyale (2018) study that examined the effects of marital crises and divorce on the academic performance of adolescent in the senior secondary schools in Ogun State, Nigeria, marital crises and divorce has significant negative impact on adolescent academic performance. The study also affirmed that the effect of marital crises and divorce have negative effects on both male and female adolescent students’ behaviour. Muritala (2014) designed a study that investigated the impact of divorce on academic performance of senior secondary students in Ilorin metropolis kwara state, Nigeria. The study adopted a survey method of research and the finding show that there was significant age difference among students of divorce based on academic performance. The finding also shows that, there was a significant negative correlation between student of divorce and academic performance. It was recommended that government should provide rehabilitative program for the students of divorced family in schools so that they can adjust in their academic performance.

Table 2 also shows that 25.2% of the sampled students indicated that the missing parent(s) was dead. Grant (2018) argues that, the death of a parent in childhood may adversely affect adult development that include negative effects on attachment, the ability to form and maintain healthy relationships, and disruption of the family system. Adults with early parental loss are more likely to experience depression, anxiety, and substance use disorders, and use maladaptive coping strategies, including increased levels of self-blame, self-medication, and emotional eating (Høeg et al., 2016 cited by Grant, 2018). According to Bergman, Ulf and Hanson (2017), the death of a parent is a highly stressful life event for bereaved children. Several studies according to Bergman et al (2017) show an increased risk of mental ill-health and psychosocial problems among affected children. They also argue that, relatively brief interventions can prevent children from developing more severe problems after the loss of a parent, such as traumatic grief and mental health problems. Quick interventions are required for both children’s and remaining caregiver’s health. The third question sought information on who was responsible for teaching students sexuality education in home environment. The information obtained was analysed and summarised in Table 3.

<table>
<thead>
<tr>
<th>Source of sexuality education</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Cousin</td>
<td>12</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Brother</td>
<td>10</td>
<td>4.2</td>
<td>4.2</td>
<td>9.2</td>
</tr>
<tr>
<td>Mother</td>
<td>50</td>
<td>20.8</td>
<td>20.8</td>
<td>30.0</td>
</tr>
<tr>
<td>Father</td>
<td>9</td>
<td>3.8</td>
<td>3.8</td>
<td>33.8</td>
</tr>
<tr>
<td>Sister</td>
<td>24</td>
<td>10.0</td>
<td>10.0</td>
<td>43.8</td>
</tr>
<tr>
<td>Aunt</td>
<td>27</td>
<td>11.2</td>
<td>11.3</td>
<td>55.0</td>
</tr>
<tr>
<td>Nobody</td>
<td>108</td>
<td>45.0</td>
<td>45.0</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>240</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
Information in Table 3 shows that majority of sampled students (45%) have no access to sexuality education at home environment and only 20.8% of sampled students got information from their mothers on sexuality. Fathers are minimally involved with teaching their daughters at 3.8%. African Population and Health Research Center (APHRC, 2017) reports that, comprehensive sexuality is important because it ensure healthy sexual and reproductive lives for the adolescent. According to Kalinga (2010) adolescents in secondary schools in Thika District lack adequate information about sex. The researcher attributed this inadequate to over-reliance on peers for information about sex, as well as information from peers being unreliable. Most of the information according to the researcher is often misleading. Consequently, most of the sexually active students do not use any form of protection during sexual intercourse, and that exposed them to the risk of contracting HIV/AIDS, sexually transmitted diseases, or getting unwanted pregnancies, which could result to school dropout or health complications as young girls attempted abortion.

APHRC (2017) report that, sexual education includes information on arranged age appropriate topics and should be geared to fostering knowledge, attitudes, values and skills to enable adolescents to develop positive views of their sexuality. The report explains that comprehensive sexuality education should encourage active engagement among participants to improve learners’ knowledge and self-confidence; positively change attitudes and gender norms; strengthen decision-making and communication skills and build self-efficacy; and increase contraceptive use among sexually active adolescents. However, education-sector policies are largely promoting HIV education and focusing on abstinence, resulting in a limited scope of topics offered in school. Life skills subject that is supposed address the widest range of topics that are integrated is not examinable, and hence there is little incentive for students and teachers to give these topics high priority. According to AVERT (2010), teachers in Kenya shun teaching of life skills and HIV/AIDS education. A study by Onyango (2009) shows that teachers’ preparation to teach HIV/AIDS education is insufficient among pre-service teacher trainees in colleges in Kenya. AVERT (2010) report also indicate that most teachers complain lack of enough knowledge and adequate skills to handle comprehensive sexuality education in schools. The fourth question was designed to investigate what is the major concern of students emanating from home. The information obtained was analysed and summarised in Table 4.

### Table 4. Students’ Major Concern

<table>
<thead>
<tr>
<th>Students’ concern</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Want boarding school</td>
<td>104</td>
<td>43.3</td>
<td>43.3</td>
<td>43.3</td>
</tr>
<tr>
<td>Fees payment to be paid on time</td>
<td>35</td>
<td>14.6</td>
<td>14.6</td>
<td>57.9</td>
</tr>
<tr>
<td>Parent’s attention</td>
<td>32</td>
<td>13.3</td>
<td>13.3</td>
<td>71.3</td>
</tr>
<tr>
<td>More revision materials</td>
<td>26</td>
<td>10.8</td>
<td>10.8</td>
<td>82.1</td>
</tr>
<tr>
<td>Nothing</td>
<td>43</td>
<td>17.9</td>
<td>17.9</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>240</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 4 shows that 43.3% of the sampled students want to be in a boarding school while 13.3% of the learners want more attention from their parents. There could be many reasons why the sampled students want to be in boarding school other than the love of education. When put into account that 47.9% of sampled students do not live with both or one of their biological parents, there could be a possibility of mistreatment of the student at home but this remain speculative at the moment. Mombasa is an urban centre where people come to work while other parents seek employment outside the country and thus have little time for their children. This mainly leave little time for parents and their children to bond and this could be the reason students want more parental attention as they feel neglected. Table 4 also show that 17.9% of sampled students had no major concern that bothered them. While this can be interpreted that students have been adequately catered for, there is also a possibility that the students had already given up. This require counselling interventions which the counsellor in the school should be able to offer.

**SUMMARY AND CONCLUSION**

The study sought to investigate need assessment for psychological counselling interventions in secondary schools. The finding of the study shows that there are psychological issues that student have that require counselling interventions. The study established that psychological issues students have emanate from home background require professional counselling that can also be extended to students’ guardians. The researcher therefore recommends that schools be provided with a full-time qualified counsellor to deal with students’ psychological issues and which can be extended to parents or guardians for free.
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RELATIONSHIP BETWEEN ACADEMIC COUNSELLING ON MATHEMATICS ANXIETY AND PERFORMANCE IN MATHEMATICS AMONG GIRLS IN PUBLIC COUNTY SECONDARY SCHOOLS IN EMBU EAST AND WEST, KENYA

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ABSTRACT
The study focused on the relationship between academic guidance and counselling services on mathematics anxiety and performance among girls’ in public secondary schools in Embu East and West Sub-counties, Kenya. Correlation research design was used. The study was conducted on students and teachers at secondary school level. The sample size from six schools had respondents consisting of 285 students and twelve Heads of Department, getting a total sample size of 297. The instruments reliability was tested using Cronbach’s alpha coefficient, and a correlation coefficient of 0.84 was obtained. Methods of analysing of data used for descriptive statistics were frequencies and percentages. The inferential statistics were analysed using linear regression analysis. The analysis was facilitated by the statistical package for social sciences (SPSS). The researcher found out that there exists a significant relationship between academic guidance and counselling services on mathematics anxiety and performance in mathematics. It was concluded that academic counselling on mathematics anxiety is related to performance in mathematics. Panic and worry are significant factors of mathematics anxiety. The study recommends that the teacher counsellors should be encouraged to offer academic counselling on mathematics anxiety to girls in secondary schools to improve their performance in mathematics. It is hoped that these findings would sensitize teacher counsellors and the Ministry of Education on the importance of academic guidance and counselling in helping girls improve in mathematics.

Keywords: Academic Counselling, Girls, Counsellor, Mathematics Anxiety, School, Secondary School

INTRODUCTION
Guidance and counselling services in schools are important in helping students in academic issues. One of the most important subjects of knowledge for a student is the field of mathematics. According to Odili (2006), the importance of mathematics to individuals in the daily activities is so enormous that its knowledge is an indispensable tool for a successful balanced life on earth. According to Furner (2017), teachers and professional school counsellors should be encouraged to work together to alleviate mathematics anxiety. He argued that learners need to feel confident in mathematics since we are in the era that relies so much on technology, problem solving, science and mathematics.

A study done by Eysenck et al (2007) in the United Kingdom showed that anxiety impairs efficient functioning of a goal directed activity in learning. They postulated that anxiety can also increase attention to threats in a learning environment. Also, a research done by Ayatollah and Venkatesan (2009), comprising of 140 high school students in Kamataka state, India, revealed that there are significant relationships between levels of mathematics anxiety and performance in mathematics. The study showed that students who have high mathematics anxiety tended to get fewer scores in mathematics. However, the ones who had low mathematics anxiety tended to achieve high score in mathematics. They argued that mathematics anxiety is an emotional problem which interferes with a person’s ability to learn mathematics and therefore may result as an intellectual problem. According to a report by Counselling and Wellness Centre (2016), mathematics anxiety can be alleviated by academic counselling. Hence, there is need for such relationships to be known so that girls are informed of the factors that determine their performance in mathematics. This can be done through academic counselling and will enable girls respond accordingly on the right feelings towards mathematics.

Mathematics anxiety is often considered when examining student’s problems in mathematics (Ashcraft, 2002). According to Rothman and McMillan (2003) gender has a statistically significant influence on achievement in numeracy. The report showed that achievement of females was lower than that of males. Also, the fraction of males to females who score in the top five per cent in high school mathematics is mostly a constant at two to one (Xie & Shauman, 2003). The Koech commission of inquiry report, Republic of Kenya(1999) came up with several recommendations, some of which were that guidance and counselling be offered by professionally trained and mature members of staff; peer counselling be established in educational and training institutions and peer counsellors be trained on physical development, family planning, STDs, HIV- AIDS and communication.
It is in line with government policy to help secondary school girls to achieve in mathematics by utilizing academic counselling. According to a research in Kenya by Wasanga, Ogle and Wambua (2011) girls have consistently underachieved in mathematics. They argued that new innovative ways of teaching mathematics to girls and boys need to be developed and implemented. A study by Njoroge (2005) reveals that school guidance and counselling are essential ingredients in resolving students’ academic issues. Sindabi (2007) suggests that the purpose of academic counselling programme is to assist students in the development of meaningful educational and career goals.

According to Bernard and John (2003), educators should introduce positive interventions in form one in secondary schools, and should conduct further research to determine why girls, more than boys detest learning mathematics. However, over the years from 2003 up to date the performance in mathematics in Kenya is still wanting especially among the girls in secondary schools. Ng’ang’a (2011) argues that most girls do not seek guidance and counselling. He notes that girls think that guidance and counselling services are meant for a particular category of people. Girls therefore need to be sensitized on the importance of receiving and seeking guidance and counselling services.

Muola and Mwania (2013) postulate that establishment and strengthening of academic counselling is necessary because it is emerging that the general guidance and counselling programmes in learning institutions cannot adequately address students’ academic needs. Therefore, individual counselling on mathematics anxiety among other issues would probably enhance achievement and motivation, improving performance in mathematics. The study looked at the relationship between academic counselling on mathematics anxiety and performance in mathematics among girls in public county secondary schools in Embu East and West Sub-counties, Kenya.

**Statement of the Problem**
The introduction of guidance and counselling services by the Ministry of Education in secondary schools in Kenya was geared towards helping students including those that have academic challenges. However, the issue of poor performance in mathematics had been a persistent problem. Records in Embu East and West Sub-counties education office showed that there was poor performance in mathematics especially among the girls. Mathematics anxiety may have had an effect on performance in mathematics. Therefore, there was need to find out whether or not secondary school girls in Embu East and West Sub-counties were being helped to learn mathematics better by use of academic counselling. Therefore, the study attempted to fill that gap by investigating the relationship between academic counselling on mathematics anxiety and performance in mathematics among girls in public county secondary school in Embu East and West Sub-counties, Kenya.

**Research Hypotheses**
There is no statistically significant relationship between academic counselling on mathematics anxiety and among girls in public county secondary schools in Embu East and West Sub-counties, Kenya.

**Significance of the Study**
It was hoped that the findings of the study would sensitize teacher counsellors on use of academic counselling to help girls who may experience mathematics anxiety to enhance performance in mathematics. The study would add knowledge and valid literature about academic counselling on mathematics anxiety relating to the impact on performance in mathematics among the girls in secondary schools. The findings would help the Ministry of Education realize importance of academic counselling to improve girls’ performance in mathematics.

**LITERATURE REVIEW**
One of the areas of concern with regard to performance in mathematics is that of mathematics anxiety. According to American Library Association (2003), Mathematics anxiety is a feeling of frustration about the inability to perform mathematical functions. The level at which it is experienced differs from one individual to another. The symptoms of mathematics anxiety include passive behaviour, panic, and lack of confidence especially when handling mathematics activities. The individual, in a number of times feels helpless, tense, worried, and fearful and also feels uncomfortable with mathematics. The reaction of mathematics anxiety can range from seemingly minor frustration to overwhelmingly emotional and physiological disruption.

According to a study done in United Kingdom by Amy, Kayleigh, Denes and Dowker (2012), secondary school students experience mathematics anxiety. Girls showed higher levels of mathematics anxiety than boys and that high levels of mathematics anxiety were related to poorer levels of performance in mathematics. The report suggested that girls may have had the potential to perform better than the boys in mathematics but this was hampered by their
higher levels of mathematics anxiety. A study done by Sunita and Muhammedunni (2013), in India, revealed that mathematics anxiety is high among girls as compared to boys. The results were consistent to those given by Ayatollah and Venkatesan (2009) which postulate that females score higher on mathematics anxiety than males. The anxiety can be felt by different people even those with mathematics experience including college level professors. They argued that mathematics anxiety is caused by several factors. Such include a punishment by the parent or teacher for failing to master a mathematics concept. The same can occur when one is embarrassed in front of a sibling or group of peers after having failed to solve a mathematics question correctly. Another cause to it is timed tests. Students feel comfortable when they do their homework but may feel helpless when doing a mathematics examination. This may happen since the student feels that the outcome of the examination will affect their grade, their career and future.

In Ghana, research done by Nyako, Kwarteng, Akapo, Rita and Nkansah (2013), showed that females are more likely to score higher on mathematics anxiety than the males by using the scale developed by Bindak (2005). There are several ways that a girl who experiences mathematics anxiety can be helped. One of the ways to help a girl to overcome mathematics anxiety would be through positive reinforcement. The helper can review what can be solved correctly by the girl, and use it as an encouragement to perform better. The student can also be surrounded with accomplished and optimistic students. One-on-one tutoring can also be of great help to the girl. Smith (2004) postulates that teachers demonstrate their own interest in mathematics in order to raise a girl’s motivation in mathematics as a means of helping girls reduce their mathematics anxiety. Hence, it is helpful for a teacher to be creative and innovative to initiate mathematical activities like maths games, models, and projects among girls to reduce their mathematics anxiety.

A study done in Tanzania by Siti and Rohani (2010) revealed that there is a negative and significant correlation between mathematics anxiety and students grades. The study argued that higher levels of mathematics anxiety were associated with low student grades. They also noted that the form three students experienced higher levels of mathematics anxiety than form one students. According to a study done by Syokwaa (2014) in Lang’ata Sub County, Kenya, there is a correlation between anxiety levels and academic performance. The study revealed that high anxiety levels had a negative impact on the quality of academic results recorded by students. The study revealed that girls were more prone to higher anxiety levels when they were compared to the boys. According to rational emotive behaviour theory counselling approach, by Albert Ellis, thoughts cause feelings, and so a girl should control thoughts of fear in the mind in order to control mathematics anxiety.

RESEARCH METHODOLOGY
Research Design
This study adapted correlation research design used to evaluate associations of academic counselling and performance in mathematics. This was done by comparing the academic counselling and grades achieved.

Sampling Procedure and Sample Size
Purposive sampling was used to get response from the heads of mathematics and the guidance and counselling departments since they had the relevant information required. The simple random sampling was adopted to get the respondents from the form three students. Questionnaires disbursed to the sampled schools were in proportionate with the population and then the sampled students were given the questionnaires randomly.

<table>
<thead>
<tr>
<th></th>
<th>Total Number</th>
<th>Sample</th>
<th>Sampling type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools</td>
<td>8</td>
<td>6</td>
<td>Purposive</td>
</tr>
<tr>
<td>Heads of counselling department</td>
<td>8</td>
<td>6</td>
<td>Purposive</td>
</tr>
<tr>
<td>Heads of mathematics department</td>
<td>8</td>
<td>6</td>
<td>Purposive</td>
</tr>
<tr>
<td>Students</td>
<td>1156</td>
<td>285</td>
<td>Simple Random</td>
</tr>
<tr>
<td>Total</td>
<td>1180</td>
<td>303</td>
<td></td>
</tr>
</tbody>
</table>

Data Analysis Procedure
The data was analysed using the Statistical Package for Social Sciences version 20. The analysis was done using both descriptive and inferential statistics, using frequencies and percentages. The hypotheses were tested using
inferential statistics analysed using linear regression. The results and inferences obtained from respondents’ information were compared with the documented data.

### Table 21. Methods of Data Analysis

<table>
<thead>
<tr>
<th>Research questions</th>
<th>Independent</th>
<th>Dependent</th>
<th>Statistical Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ho1: There is no statistically significant relationship between academic counselling on mathematics anxiety and performance in mathematics that exist among secondary school girls.</td>
<td>Mathematics anxiety</td>
<td>Performance in Mathematics</td>
<td>Frequencies Percentages</td>
</tr>
</tbody>
</table>

### RESULTS AND DISCUSSION

#### Academic Counselling on Mathematics Anxiety and Performance in Mathematics among Girls in Public Secondary Schools

#### Table 22. Coefficients of Variables

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>3.311</td>
<td></td>
<td>22.593</td>
<td>0.000</td>
</tr>
<tr>
<td>Counselling helps girls not to panic when answering mathematics questions($X_1$)</td>
<td>0.044</td>
<td>0.063</td>
<td>0.047</td>
<td>0.145</td>
</tr>
<tr>
<td>Counselling helps girls overcome worry when handling mathematics.($X_2$)</td>
<td>0.009</td>
<td>0.060</td>
<td>0.010</td>
<td>0.145</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Performance in mathematics ($Y$)

From the information in Table 2, the value of $t$ is 22.593 which is greater than 2.00 and the value of $P$ is 0.000<0.05. Therefore, the researcher rejected the null hypothesis that there is no statistically significant relationship between academic counselling on mathematics anxiety and performance in mathematics. Hence, the researcher concluded that there is a significant relationship between academic counselling on mathematics anxiety and performance in mathematics.

It can be seen from data in Table 2, that the unstandardized coefficient Beta is 3.311, then it is concluded that 1% increase in mathematics anxiety lowers performance by 3.311%. This can also mean that 10% increase in mathematics anxiety lowers performance in mathematics by 33.11%. Also, from the table it is seen that the value of $t$ for panic factor is 0.703, which is higher than that of worry factor, which is 0.145. This means that factor of panic is related to performance more than the factor of worry. Hence, more girls are negatively influenced by panic factor than they are affected by worry factor on the performance in mathematics.

The regression equation was:

$$Y=3.311+0.044X_1+0.009X_2$$

Where; $Y$ = Performance in Mathematics

$X_1$ = level of Panic

$X_2$ = level of worry

Also, from information in Table 2, it can be inferred that panic and worry in a mathematics class are symptoms of mathematics anxiety. The researcher also concluded that panic and worry in a mathematics class are the main signs of mathematics anxiety which lowers performance in mathematics. According to Dickson (2015) some of the main signs of anxiety are panic and worry. He argues that the factors of worry and panic can be addressed and alleviated by guidance and counselling.

According to a study by Ayatollah and Venkatesan (2009), comprising of 140 high school students in Kamataka state, India, there are significant relationships between levels of mathematics anxiety and performance in mathematics. The study showed that students who have high mathematics anxiety tended to get fewer scores in
mathematics. However, the ones who had low mathematics anxiety tended to achieve high score in mathematics. Siti and Rohani (2010) assert that there is a negative and significant correlation between mathematics anxiety and students grades. The study revealed that higher levels of anxiety were associated with low student grades.

CONCLUSIONS AND RECOMMENDATIONS
According to the findings above, the following conclusion was arrived at:
Academic counselling on mathematics anxiety is related to performance in mathematics. Panic and worry are significant factors of mathematics anxiety.

In accordance to the study findings, the researcher recommended both the professional and teacher counsellors should be encouraged to offer academic counselling on mathematics anxiety to girls in secondary schools to improve their performance in mathematics. The services would include those based on panic and worry when answering mathematics questions and handling mathematics activities.

REFERENCES
Siti, H.M. & Rohani, A. (2010). Anxiety in Mathematics Learning among Secondary School learners: A Comparative study between Tanzania and Malaysia; Procedia-Social and Behavioural Sciences

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ROLE OF FIELDWORK IN GEOGRAPHY PERFORMANCE: A CASE STUDY OF EDUCATION STUDENTS OF THE UNIVERSITY OF NAIROBI

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ABSTRACT
The term "fieldwork" refers to educational and in this sense, geographical activities conducted in a field setting outside the normal classroom environment. It is very key to geographical studies and had previously been mandatory for all students undertaking geography since it has been established that fieldwork enhances the performance of students by translating classroom theories into reality. However, with the introduction of different other modes of learning, some of which do not allow time for fieldwork, not all students have the privilege of being exposed to fieldwork. Coupled with this is the inability of some learners to meet the finance requirements of fieldwork. Using a quantitative approach, this study set out to test the hypothesis that: students who are exposed to fieldwork do not significantly perform better than those who are not exposed to fieldwork at the end of the academic year. The study used systematic random sampling with a random beginning to select geography students in their third and fourth year of study, from the school of education and the school of open and distance learning of University of Nairobi. A total of 170 students were sampled. The examination scores of these students was analyzed using chi square and Pearson product moment of correlation. The study found that fieldwork exposure was effective in improving students' performance in Geography. This study recommends that; fieldwork should be made mandatory in all Universities where geography is a discipline, and that the Universities find a way of financing the fieldwork so that all students could be exposed to it.

Keywords: Fieldwork, geographical activity, normal classroom environment, geographical studies, educational, performance, reconnaissance.

INTRODUCTION
Geography is all about the interaction of people and their environment, hence fieldwork plays a central role in helping us to explain this interaction while making it possible to understand more fully the environment in which we live. Thus fieldwork makes geography come to life by putting concepts learnt in the classroom into real life context, while enabling students to grasp how geography literally shapes the world around us. Fieldwork has therefore been considered as one of the most enjoyable form of teaching and learning because it provides a variety of teaching modes. Accordingly, fieldwork is an essential part of geographical studies (Gold & Haigh, 1992; McEwen, 1996b). Thus virtually all lecturers in geography recognize the importance of fieldwork as a vital mode of teaching in the subject. Field studies provide the opportunity to experiment with a wide variety of different modes of course delivery and have a valuable role as a vehicle for the integration of many theoretical and practical concepts taught within a geography degree (Kern & Carpenter, 1984, 1986; Lonergan & Andresen, 1988; McQueen et al., 1990; Gold et al., 1991; Gold & Haigh, 1992; McEwen, 1996b).

Importance of Fieldwork
So what is field-work? The term field-work is a compound word made up of two words; field and work. Field has been defined as ‘any place where supervised learning can take place through first-hand experience, outside the constraints of the four walls of a classroom setting’ (Lonergan & Andresen, 1988, Sampath, Panneerselvam, & Santhanam. (2006). This definition implies that ‘field’ must be outside a classroom. The term "fieldwork" therefore refers to educational activities conducted in a field setting. (Gold, Jenkins, Lee, Monk, Riley, Shepherd, & Unwin, 1991). Tal and Morag (2009), describe field study as students’ experiences outside the classroom at the interactive locations designed for educational purposes.

Fieldwork has got key attributes which include: out of class locality, in core being the direct and firsthand experience of a phenomenon, and lastly, any fieldwork must have both educational or pedagogical nature and purpose aimed at enhancing teaching and learning in an area of the curriculum. Given these three attributes, a scholarly definition of field-work, and which sets it apart from other forms of outings, must include the key attributes mentioned above. In this paper, field-work is defined as educational activities conducted in a field setting outside the normal classroom environment (Lonergan and Andresen, 1988).
Field experience contributes immensely to the overall development of students as qualified practitioners in all aspects of geography. This is because a great deal of research in geography and any other discipline for that matter tends to be field-work based (Gold, et al 1991). Despite this acknowledged importance attributed to fieldwork, not all geography students at the University of Nairobi (UoN) get exposed to it. The UoN has different categories of students as categorized by their modes of study. The school of education offers mandatory fieldwork and practical geography which form an integral part of the course units taught within the discipline. However, the school of open and distant learning mainly uses print and audio materials for instructions. It also provides support services to the learners in the form of minimal face to face tutorials and counselling. Given the limited number of tutorial contact hours and inadequate laboratory facilities open and distant learners are neither subjected to practical geography nor exposed to mandatory fieldwork.

Challenges Inhibiting Fieldwork Exposure
As much as fieldwork is key to geographical studies, there are challenges that hinder its actualization in most universities. The major challenge to fieldwork is financial constraints. Before the students proceed to the field, the members of academic staff from that Department are first of all required to carry out a reconnaissance field survey in the designated areas of study so as to make arrangement for students’ accommodation, organize field lectures with relevant field officers, arrange for guided tours in the field, and to approve site visit among other tasks. The University is therefore expected to cater for subsistent and accommodation for academic members of staff, drivers, mechanics and other support staff. The University also caters for field materials, field facilitation fees, game park charges and other institutions of interest. A combined budget covering both fieldwork and reconnaissance survey can be as high as Kenya shillings 900,000.00. This figure far much exceeds the Departmental vote allocation for the entire academic year. This high cost of field work makes it expensive for the universities to meet the vote. For this reason, part of the fieldwork vote is transferred to the students who are already financially pressed. Universities therefore try to reduce the cost of fieldwork by drastically reducing the number of days allocated for field study from the senate approved 14 days to as low as 5 days. This compromises the quality as well as the coverage of fieldwork sites. Previously, Geography students would be allocated loans to help ease the burden by HELB. Unfortunately this is no longer the case as students are expected to meet their own cost of subsistence and accommodation. Quite a number of students therefore find fieldwork funding a daunting tasks. Other challenges include: finding accommodation at a cheap cost for all the students, unexpected costs from the assigned field officers from other organizations, who expect to be given a token of appreciation, which is not always approved by the University accounting system, accidents resulting from handling tools and equipment, difficult terrain and poor weather conditions among others.

This paper set out to establish the contribution of fieldwork towards students’ performance by comparing the results of those students exposed to fieldwork against the results of those students who were not exposed to mandatory fieldwork. Thus the study set out test the following hypothesis.

Research Hypothesis
The guiding hypothesis was;
HO: Fieldwork does not significantly contribute towards the overall performance of geography students.

METHODOLOGY
The study adopted a quantitative approach which involves the use of inferential statistics.

Sampling
The study used systematic sampling with a random beginning to select from two categories of students; those from school of education and those from school of open and distance learning, in their final year of study. From each list 30% of the students were samples from cohorts of 2015-2019. The total number of students sampled from the category of open and distance learning was therefore 100. This constituted 30% of the students registered and examined for Geography during the reference period. From the school of education, 70 students were sampled to constitute 30% of students registered and examined during the same period. The total number of students sampled from the two categories of students was therefore 170.

Data Collection
Secondary data was obtained from examinations records from the school of education and the school of open and distance learning, covering the period 2015-2019. Examination grades obtained by the learners in the sample were extracted, compiled and subjected to data analysis.
Data Analysis
The data collected was subjected to chi-square analysis and bi-variate Pearson product moment correlation. The aim of the statistical analysis was to determine whether fieldwork exposure significantly improved students’ performance in geography. Chi square: This is a non-parametric test of significance, which is used to determine whether the observed frequencies significantly deviate from the expected frequencies.

\[ x^2 = \sum \frac{(O_i - E_i)^2}{E_i} \]

Where:
(O) is observed frequencies,
(E) is expected frequencies
X Squared is computed value of chi square

The test produces a value for Chi square value of chi-square which is then checked against the theoretical value of Chi square, to determine the level of significance that has been reached. The level of significance was set at 0.05 level, at which the decision was reached to reject the null hypothesis. The performance of students who were exposed to field study were compared to those of distance learners who were not exposed to compulsory field study. The contingency table for this comparison (chi-square analysis) is presented in table 1 below:

Table 1: Chi-Square contingency table for fieldwork exposure against examination performance

<table>
<thead>
<tr>
<th>Categories of students</th>
<th>Performance in terms of %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70-100%</td>
</tr>
<tr>
<td>School of Education (Exposed to fieldwork)</td>
<td>25</td>
</tr>
<tr>
<td>Open and Distance Learners(Not exposed to fieldwork)</td>
<td>10</td>
</tr>
<tr>
<td>TOTAL</td>
<td>35</td>
</tr>
</tbody>
</table>

Degree of Freedom= 3; Computed value of \( x^2 \) (Chi square) = 19.23; Critical value of \( x^2 \) (Chi square) at 5% level of significance = 7.82.

The results of Chi square
When the data presented in the contingency table was subjected to chi-square analysis, it was found that the calculated values of chi square of 19.23 to be much higher than the critical value of chi square (7.82) and hence the results does not support the null hypothesis that fieldwork exposure does not significantly improve students’ performance in Geography. This implies that the difference observed in the performance of the two categories of students was significant and could not be said to have arisen due to chance variation. It was therefore concluded that there were underlying factors accounting for the observed variations.

Bi variate analysis: Pearson
The same data was further subjected to bivariate analysis using Pearson product moment of correlation. Bi-variate statistics was used to determine the strength and the direction of the relationship between exposure to fieldwork and performance in the examination between the two categories of students. Table 2 shows the marks scored by students exposed to fieldwork and those who were not exposed from 2015 to 2019. From the table below, it is evident that the students who are exposed to fieldwork had a higher mean score (65%) as compared to those who were not exposed to fieldwork (56%).

Table 2: Percentage mean score performance by fieldwork exposure

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>X (exposed to fieldwork)</th>
<th>Y (Not exposed to fieldwork)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>67</td>
<td>60</td>
</tr>
<tr>
<td>2016</td>
<td>66</td>
<td>49</td>
</tr>
<tr>
<td>2017</td>
<td>62</td>
<td>53</td>
</tr>
<tr>
<td>2018</td>
<td>73</td>
<td>61</td>
</tr>
<tr>
<td>2019</td>
<td>57</td>
<td>56</td>
</tr>
</tbody>
</table>

Mean of x = 65; Mean of y = 56
A test of correlation using Pearson coefficient established that there was medium positive correlation between fieldwork exposure and students performance (r = 0.423). Pearson coefficient of determination (r squared) revealed that approximately 18% of the variability in examination performance between the two categories of students was accounted for by exposure to fieldwork.

DISCUSSION OF FINDINGS
This discussion on the findings focuses on two key sub areas as found in the study. In the first instance, the study found that there was a significant difference between the results of the two categories of students. The implication of the finding was that there could be other factors, other than exposure to fieldwork, which may contribute to these differences in performance. According to Bowa, (2008), other factors which contribute to poor performances especially in Open and Distance learning include; learners’ characteristics; age, marital status, family size, entry academic qualification, and learners engagement in supplementary sources of income. In the same study, he also established that learner support services did not contribute significantly to academic performance of distant learners because the services were either not adequately provided or because learners lacked easy access to the services. Thorpe, (1987) and Evans, (1994) also established that distant learners study part time and need to balance a range of responsibilities. This gives rise to conflicting commitments in which study assumes a lower priority than family and work commitments. To the contrary, most students in the school of education undertake full time study and are much younger. The age of most students in open and distance learning range between 20-51 years with a mean of 36 years (Bowa, 2008). Those in the school of education tend to range between 17-25 years. The younger students perform better in examinations possibly because they are better able to access more learner support services because they have got fewer extra-curricular social commitments as compared with their older counterparts (Bowa, 2008).

The second area of discussion regards the correlation between exposure to fieldwork and students performance. The results revealed that there was a medium positive correlation between fieldwork exposure and students performance (r = 0.423). 18% of the variability in examination performance between the two categories of students was attributable to fieldwork exposure. Though the figure may appear low to those who may not appreciate the value of fieldwork, it should be noted that fieldwork exposure remain core in geographical studies. Fieldwork creates; ‘Awareness and understanding of, and concern and eventual responsibility for, ‘real places’… through direct contact. There is not and there cannot be any substitute for the immediacy of field experience … Indeed, it may be argued that fieldwork is as intrinsic to the learning and teaching of geography as clinical practice is to medicine. (Pearce, 1987, p. 35)’’.

Fieldwork remain important to geographers. Jones, (1969) strongly advocates that when we train and seek to inspire a new generation of geographers, we must by principle and by example remind them that the great discoveries and advances in geography have been made by men and women who went to look and think in the field. Nundy, (2001), on the other hand has also provided three major benefits of fieldwork which we cannot ignore. These include:

A positive impact on long-term memory due to the memorable nature of the fieldwork setting. Affective benefits of the fieldwork experience, such as individual growth and improvements in social skills; and, Reinforcement between the affective and the cognitive, with each influencing the other and providing a bridge to higher order learning. Armstrong (1989) also reinforces that fieldwork equips learners with social skills necessary for future careers. This is because it inculcates in the students the ability to become independent workers. This encourages individual growth and work ethics which are key in any working environment.

The pedagogic benefit of fieldwork has also been established in a study conducted in Kenya, Zimbabwe and Gambia. This study concluded that fieldwork was effective in terms of both teaching and learning (Robson, 2002). This is because fieldwork breaks the boredom thus making teaching and learning more exciting, realistic and clear. Consequently, students are able to relate geographic theory and geographic reality. For geographers, fieldwork still offers the best opportunity; to demonstrate physical processes, to induce the elucidation of geographical course effect by the students and, most importantly to inspire them to travel always with investigative eyes.

RECOMMENDATIONS
This study recommends that:
Establishments be made as to why a larger proportion of geography students enrolled in open and distance learning perform poorly; Fieldwork should be made mandatory for all geography students irrespective of their mode of study; Further research to establish other underlying factors that contribute to the differences in performance between
geography students exposed to fieldwork and those who are not exposed; and, Universities explore ways and means of sourcing funds to enable all students undertaking geography to be exposed to fieldwork experience.

REFERENCES

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ABSTRACT
Mathematics is a product of man's inquiry on natural phenomena which awakens logical thinking contrary to accumulation of facts to satisfy man’s curiosity to subdue the environment. Inadequacy of qualified personnel especially in mathematics and scientific fields implies insufficiency in food production, insecurity, poor health services and may slow technological upbeat in a country. Science process skills are basic concepts which do nurture cognitive and affective skills akin to problem solving abilities, creativity and favourable attitudes towards mathematics and science. The study investigated the Effectiveness of Integrating Science Process-Skills in Teaching Mathematics on Students’ Problem Solving Abilities and Achievement by Gender in Secondary Schools in Tharaka-Nithi County. Solomon Four Group Design was utilized where eight schools participated with four Boys’ schools and four Girls’ schools. Piloting was done in Embu County in a school not participating in the main study to ascertain the reliability and validity of instruments. Data analysis was facilitated using a Statistical Package for Social Sciences (SPSS) Version 19.0. Descriptive statistics and inferential statistics such as t-test, and ANOVA were utilized. Hypotheses were tested at \( \alpha = 0.05 \) level of significance. The findings established that integration of science process-skills in teaching mathematics significantly improved the students’ abilities irrespective of gender. The study findings recommend all stakeholders, policy makers, curriculum developers and teachers to embrace integration of science process skills for meaningful learning towards technological realignments in Kenya. Suggestions are made on how adopt and appreciate integration of science process skills in teaching to nurture students’ potentiality in creativity, problem solving and empower their computational skills.

Keywords: Science-Process Skills, Problem-Solving Abilities, Achievement, and Gender Parity

INTRODUCTION
Education provide standards to good citizenry in search for solutions to social problems inclusive of corruption, gender discrimination and emerging issues like global warming, religious radicalization and terrorism (Cakiroglu, 2007; Frykholm & Glasson, 2005). Modern civilization and technologies are yearning for problem solving abilities and creativity to underpin in provisions of holistic and quality education that promotes cognitive and affective domains of the learners to meet the demand of 21st century (Republic of Kenya, 2007). Mathematics education is imperative towards sustainable technological growth without compromising the safety and sustainability of natural environment (Aydogdu, 2014). Mathematics is conceptualized as the nature of numbers, patterns, procedures and relationships of functions empirically (Fresham, 2002). It is well utilized in banking, medicine, aviation, climatic change monitoring and demographic feasibility studies (Gedik, Ertepınar & Geban, 2002). Acquisition of computational and algorithmic skills makes a strong foundation for learners not only in secondary but also higher learning institutions. Science process skills are broad transferable abilities which scientist utilizes when studying or investigating natural phenomena. American Association for the Advancement of Science (AAAS, 2001) identified at least twelve science process skills which include: observing, measuring, classifying, communicating, predicting, inferring, questioning, controlling variables, hypothesizing, formulating models, designing experiment and interpreting data. Integration of Science Process-Skills in teaching methods has been noted to improve students’ performance in chemistry and biology (Chebii, 2008 & Myers 2004). They stir student cognitive abilities towards problem solving and improving their perception and understanding of concepts in learning irrespective of gender (Ozgelen, 2012). Problem solving abilities empowers the learner to formulate logical axioms in probing and analyzing problems encountered.

Theoretical Framework
The study was anchored on two theorems: Polya’s Theorem of Problem Solving and Sternberg’s Triarchic Theory of Intelligence. Polya postulated a four steps theorem in 1954. In the first step the learners pinpoint the problem to be worked out in question, check on conditions and limiting bounds. In the second step, the learner devises a plan or path to be taken before inclining to a single possibility of direct reasoning and application. Third step calls for planning and the execution of plan layout. Once the plan layout matures it is written down and carried out carefully.
observing necessary skills. Flexibility of mind and persistent trials to the problem from different viewpoints is encouraged. In the fourth step Polya proposed a need of looking back for the result to be verified or checked against the original problem. Polya posits that problem solving is a means of developing the logical aspect of thinking in development of the intelligence and abilities to solve everyday problems. By adopting Polya’s Theorem researcher integrates science process skills to develop the learners’ logical thinking in solving problems encouraging divergent thinking to understand mathematics concepts.

The Sternberg’s Triarchic Theory of Intelligence is framed on Cognitive Psychology and was formulated in 1985. Sternberg advocated for integration of intelligence and creativity in adapting and modifying environment to fit human needs. Triarchic Theory is composed of three fundamental principles: analytical, creative, and practical intelligence. Analytical intelligence involved essential abilities to problem-solving: designing experiments, collecting data, analyzing data given, comparing and contrasting new ideas. Analytical intelligence calls for skilled critical thinking when handling problems. The learner is able to pick the correct formula, tools, and necessary equipment to tackle the problem at hand. Sternberg Triarchic Intelligence Theory has great implications in teaching and learning in mathematics especially in high school as it encourages the development of multisensory learning approaches. The current study contextualized Sternberg’s Triarchic Theory to reflect in learning mathematics to blend environments within one’s socio-cultural experiences. Analytical ability was applied as a relative abstract idea for academic achievement through analyzing, evaluating, and contrasting information in solving problem. Creative ability was applied in novel tasks and unique situations in learning. Practical abilities were applied in everyday adaptations, and selections strategies to solve problems. Analytical, creative, and practical abilities were integrated depending on problem being solved. Figure 1 shows the interactions of Analytical, Creative, and Practical abilities in meaningful learning as adapted from Sternberg (2000). The study investigated the effectiveness of integrating Science Process Skills in teaching mathematics on students’ problem solving abilities and achievement by Gender in Tharaka Nithi County.

LITERATURE REVIEW
Meaningful education is a construct of knowledge-based development in human resource and technology advancement for optimum utilization of natural resources to solve socioeconomic. It enhances solutions to problems such as corruption, gender discrimination and emerging issues like religious radicalization and terrorism (Cakiroglu, 2007; Frykholm & Glasson, 2005; Davis & Krajcik, 2005). The importance of mathematics education is imperative
in countries anticipating sustaining technological growth without a compromise on environmental safety (Aydogdu, 2014). Acquisition of computational skills and algorithmic skills at secondary level make a strong foundation for higher education. Mathematics permeates through human life as father of sciences and technology. It is closely related to one’s daily life (Saha 2007).

Science process skills are broad transferable abilities which scientist utilizes when studying or investigating natural phenomena. Integration of Science Process-Skills in teaching methods has been noted to improve students’ performance in chemistry and biology (Chebii, 2008 & Myers 2004). They awaken and stir student reasoning levels towards problem solving hence improving their perception and assimilation of concepts in learning (Ozgelen, 2012). Science process skills form the basis on which creativity is anchored (Fah, 2004). Creativity is learner’s ability to be sensitive to a problem, recognise relationship among concepts and being flexible in thinking in search of a solution to a given problem. According to a study carried out by Aktamis and Ergin (2008) on the influence of science process skills towards creativity, attitudes and academic achievements in Turkey reported that acquisition of science process skills had positive effects on students’ achievement levels. Acquisition of science process skills improve not only students’ perceptions on problems they encounter in daily life but also improving self-image concept fostering divergent thinking while learning. Achievement in mathematics may be demonstrated by learner’s abilities to recall, comprehend, and analyse problems in learning experiences or in examinations. Integrating of science process skills in teaching may not only improve learner’s metacognitive skills but also a remedy to foster problem solving abilities, creativity, favourable attitudes and academic achievement according to Catherine, Sethlomo, Calvin and Holmes (2011).

Methodology
The study applied Solomon Four Group Design. The figure 2 shows Solomon’s Four Group Design as adapted from Shuttleworth (2009).

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre test</th>
<th>Treatment</th>
<th>Post test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental- E₁</td>
<td>01</td>
<td>X</td>
<td>02</td>
</tr>
<tr>
<td>Control - C₁</td>
<td>03</td>
<td></td>
<td>04</td>
</tr>
<tr>
<td>Experimental- E₂</td>
<td>_</td>
<td>X</td>
<td>05</td>
</tr>
<tr>
<td>Control - C₂</td>
<td>_</td>
<td></td>
<td>06</td>
</tr>
</tbody>
</table>

Figure 2: Solomon’s Four Non-Equivalent Control Group Design

E₁ & E₂ Experimental groups
C₁ & C₂ Control groups
(O₁O₂) Observations at pretest phase
O₃O₄O₅₀₆ Observations at post-test phase
(X) Indicates treatment
(----) Indicates the use of non-equivalent groups.

The schools were randomly assigned to four groups. Groups E₁ and E₂ taught through integrated science process skills module while groups C₁ and C₂ were taught conventionally. Prior to treatment groups E₁ and C₁ were exposed to pre-test (O₁ and O₁). After five weeks of instructions all the groups were post-tested (O₂O₄, O₅ and O₆). The post-test O₅ and O₆ assisted in ruling out any interaction between pre-testing and treatment.

Study Population
The study targeted student population in public secondary school in Tharaka-Nithi County and accessible population was 4068 Form three students.

Sampling Procedure and Sample Size
Stratified random sampling was used to draw the eight schools involved of which four were Boys’ only schools and other four Girls’ only schools. Simple random sampling was applied to assign the schools to experimental groups (E₁ & E₂) and control groups (C₁ & C₂). In schools with more than one stream in form three, all students participated but a simple random sampling was once again used to select one of the streams for data analysis. Table 1 shows the summary of the sample size.
Table 1: Summary of the Sample Size:

<table>
<thead>
<tr>
<th>Group</th>
<th>Group Type</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Experimental</td>
<td>49</td>
<td>34</td>
<td>83</td>
</tr>
<tr>
<td>II</td>
<td>Control</td>
<td>43</td>
<td>36</td>
<td>79</td>
</tr>
<tr>
<td>III</td>
<td>Experimental</td>
<td>51</td>
<td>46</td>
<td>97</td>
</tr>
<tr>
<td>IV</td>
<td>Control</td>
<td>34</td>
<td>35</td>
<td>69</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>177</td>
<td>151</td>
<td>328</td>
</tr>
</tbody>
</table>

Results of ISPS on Student’s Problem Solving Abilities

The first objective of the study was to determine the effectiveness of integrating science process skills in teaching mathematics on students’ problem solving abilities in secondary schools. In the study Integrating Science Process Skills (ISPS) referred to confluations of basic scientific concepts and ideas during learning experiences in mathematics. They include: measuring, graphing, observing, hypothesizing, communicating, controlling, comparing predicting and inferring. To find out the effects of integrating science process skills on problem solving abilities, students were subjected to PST after five weeks of treatment. The scoring of PST was structured from 0 to 25. The score attained by a participant was converted to 100%. PST post-test scores and standard deviation are presented in Table 2.

Table 2. Posttest Mean-scores and SD on PST

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>83</td>
<td>65.30</td>
<td>10.04</td>
</tr>
<tr>
<td>C1</td>
<td>79</td>
<td>41.33</td>
<td>12.63</td>
</tr>
<tr>
<td>E2</td>
<td>97</td>
<td>61.86</td>
<td>9.74</td>
</tr>
<tr>
<td>C2</td>
<td>69</td>
<td>38.70</td>
<td>10.93</td>
</tr>
</tbody>
</table>

Results presented in Table 2 indicate that group E1 and E2 achieved mean scores of 65.30 and 61.86 respectively while control groups C1 and C2 had 41.33 and 38.70 respectively. Higher performance by experimental groups could be attributed to intervention of ISPS. To determine whether the difference was statistically significant on problem solving abilities, analysis of variance (ANOVA) was run. Results are presented in Table 3.

Table 3. ANOVA on PST Post-test

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>45042.935</td>
<td>3</td>
<td>15014.312</td>
<td>128.349</td>
<td>0.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>37901.501</td>
<td>324</td>
<td>116.980</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>822944.436</td>
<td>327</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The information in Table 15 indicates that there was a significant difference between the means of four groups (F (3,327) = 128.349, p < 0.05). This led to rejection of the first null hypothesis (H₀₁) which stated that there is no statistical significant difference in problem solving abilities between students exposed to science process-skills and those not exposed to it. To find out which group differed, Bonferroni test of multiple comparisons was carried out. Bonferroni test was preferred due to its ability of flexibility in manipulations, simplicity in computations and use with other types of statistical test like means, and t-tests and ANOVA. Bonferroni also assumes all tests have orthogonal traits and do not take into account whether the findings are consistent with past research (Keppel & Wickens, 2004). The results are shown in the Table 4.

The results in Table4 show that the means difference on groups E1 against C1, and E1, against C2 are significant. On comparing C1 verses E1, E2 are significant. C2 verses E1 and E2 had a significant different. Also on comparing E2 verses C1 and C2 show significant different. Finally, when comparing C2 against E1 and C1 and E2 a significant different existed. This suggests that ISPS had significantly influenced students’ problem solving ability in learning mathematics. ISPS treatment improved learners’ problem solving abilities than CIA. ISPS can help close the gap in problem solving abilities in learning mathematics and provide students with the needed ability to solve problems in examinations. The findings of the present study are consistent with the results obtained by Fah (2008) in a study on influence of science process skills, logical thinking Abilities and attitudes towards science in Malaysia. Results indicated that there was a significant correlation among science process skills, logical thinking abilities. The
The present study is consistent with the findings by Ango (2002) in a study on extent of secondary teachers’ mastery of science process skills and their use on enhancing positively students’ abilities to solve problems in mathematics and other subjects. The report indicated that mastery of science process skills enhanced students’ abilities to solve general problems in mathematics.

**Table 4: Bonferroni Post Hoc on PST post-test**

<table>
<thead>
<tr>
<th>(I) Group</th>
<th>(J) Group</th>
<th>Mean D (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>C1</td>
<td>23.97209*</td>
<td>1.70005</td>
<td>.000</td>
</tr>
<tr>
<td>E2</td>
<td>C1</td>
<td>3.44553</td>
<td>1.61721</td>
<td>.203</td>
</tr>
<tr>
<td>C2</td>
<td>E1</td>
<td>26.60555*</td>
<td>1.76203</td>
<td>.000</td>
</tr>
<tr>
<td>E1</td>
<td>C2</td>
<td>-23.97209*</td>
<td>1.70005</td>
<td>.000</td>
</tr>
<tr>
<td>E2</td>
<td>C2</td>
<td>-20.52656*</td>
<td>1.63913</td>
<td>.000</td>
</tr>
<tr>
<td>C1</td>
<td>E2</td>
<td>2.63346</td>
<td>1.78217</td>
<td>.843</td>
</tr>
<tr>
<td>E1</td>
<td>C1</td>
<td>-3.44553</td>
<td>1.61721</td>
<td>.203</td>
</tr>
<tr>
<td>C2</td>
<td>E2</td>
<td>23.16002*</td>
<td>1.70333</td>
<td>.000</td>
</tr>
<tr>
<td>E1</td>
<td>C2</td>
<td>-20.52656*</td>
<td>1.63913</td>
<td>.000</td>
</tr>
<tr>
<td>C1</td>
<td>E2</td>
<td>2.63346</td>
<td>1.78217</td>
<td>.843</td>
</tr>
</tbody>
</table>

* The mean difference is significant at the 0.05 level.

**Effects of ISPS on Student’s Achievement**

In order to determine effects of integrating science process skills in teaching approaches on students’ mathematics achievement posttest scores were analyzed as presented in Table 9.

**Table 9: Mean Scores and SD on MAT**

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>83</td>
<td>56.27</td>
<td>11.0112</td>
</tr>
<tr>
<td>C1</td>
<td>79</td>
<td>36.90</td>
<td>7.4809</td>
</tr>
<tr>
<td>E2</td>
<td>97</td>
<td>55.16</td>
<td>10.6592</td>
</tr>
<tr>
<td>C2</td>
<td>69</td>
<td>36.17</td>
<td>9.84132</td>
</tr>
</tbody>
</table>

Results shown in Table 9 indicate that groups E1 and E2 attained 56.27 and 55.16 respectively while groups C1 and C2 had 36.90 and 36.17 respectively. E1 and C1 gained 34.94 and 18.99 respectively in the posttest against pretest. However experimental groups outperformed control groups. To determine whether difference was statistically significant, ANOVA was run. The results of in Table 10.

**Table 10: ANOVA on MAT**

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>29738.587</td>
<td>3</td>
<td>9912.862</td>
<td>100.997</td>
</tr>
<tr>
<td>Within Groups</td>
<td>31800.632</td>
<td>324</td>
<td>98.150</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>61539.220</td>
<td>327</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results in Table 10 indicate that a statistically significant difference exists between the groups (F3, 327 = 100.997 P<0.05). The results led to rejection of the fourth null hypothesis (H04) which stated that there is no statistical significant difference in mathematics achievement between students exposed to science process-skills and those not exposed to it. To determine which groups differed Bonferroni test of multiple comparisons was run. Results are shown in Table 11.

The results in Table 11 show that there existed significant differences in groups E1 Versus C1 and E verses C2 were significant. These results suggest that the intervention of ISPS had positive effects on students’ achievement levels in learning mathematics. This implied that ISPS had positive effects in improving achievement among high students in mathematics. The students exposed to science process skills outperformed those not exposed. ISPS was
effective in enhancing students’ achievement in mathematics. Present research findings have indicated that science process skills do influence achievement in mathematics this concurs to the findings of a study by Fah (2008) on influence of science process skills, logical thinking abilities, attitudes towards science, and locus of control on science achievement among form four students in Malaysia who reported that science process skills highly influences academic achievement.

Table 11. Bonferroni Post Hoc on MAT

<table>
<thead>
<tr>
<th>(I) Group</th>
<th>(J) Group</th>
<th>Mean D (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>C1</td>
<td>19.36633</td>
<td>1.55722</td>
<td>.000</td>
</tr>
<tr>
<td>E1</td>
<td>C2</td>
<td>20.09115</td>
<td>1.61400</td>
<td>.000</td>
</tr>
<tr>
<td>C1</td>
<td>E1</td>
<td>-19.36633</td>
<td>1.55722</td>
<td>.000</td>
</tr>
<tr>
<td>C1</td>
<td>E2</td>
<td>-18.26621</td>
<td>1.50142</td>
<td>.000</td>
</tr>
<tr>
<td>C2</td>
<td>E2</td>
<td>7.2482</td>
<td>1.63244</td>
<td>1.000</td>
</tr>
<tr>
<td>C1</td>
<td>C1</td>
<td>-19.36633</td>
<td>1.55722</td>
<td>.000</td>
</tr>
<tr>
<td>C1</td>
<td>C2</td>
<td>-18.99104</td>
<td>1.56023</td>
<td>.000</td>
</tr>
<tr>
<td>E2</td>
<td>C1</td>
<td>18.99104</td>
<td>1.56023</td>
<td>.000</td>
</tr>
<tr>
<td>E2</td>
<td>C2</td>
<td>18.26621</td>
<td>1.50142</td>
<td>.000</td>
</tr>
<tr>
<td>C2</td>
<td>E2</td>
<td>-1.10011</td>
<td>1.48135</td>
<td>1.000</td>
</tr>
<tr>
<td>C2</td>
<td>E1</td>
<td>18.26621</td>
<td>1.50142</td>
<td>.000</td>
</tr>
<tr>
<td>C1</td>
<td>E1</td>
<td>-1.10011</td>
<td>1.48135</td>
<td>1.000</td>
</tr>
</tbody>
</table>

* The mean difference is significant at the 0.05 level

The findings of the present study are parallel to the findings of Mei, Kaling, Xinyi, Sing and Khoon (2007), Lydia and Divina (2008) whose studies showed science process skills uplifted learners understanding of science concepts and problem solving abilities. The findings revealed that SPS had a significant effect on students’ achievement in chemistry. However, the current study finding has showed that science process skills influence achievement in mathematics.

Effects ISPS on Student’s Achievement by Gender

This study sought to determine whether there was a gender difference in achievement in mathematics among the students exposed to ISPS and those exposed to CIA. To make the inference whether ISPS instructions played a role in students’ achievement by gender of the scores of MAT on the basis of gender. Information in Table 12 shows the mean cores of posttest obtained by students in MAT by gender in experimental and control groups.

Table 12. Pretest Mean scores and SD on MAT by Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>92</td>
<td>20.76</td>
<td>7.2602</td>
</tr>
<tr>
<td>Female</td>
<td>70</td>
<td>19.19</td>
<td>6.2119</td>
</tr>
</tbody>
</table>

Results in Table 12 show the mean scores obtained by male and female students were 20.76 and 19.19 respectively. To determine whether there was a significant difference in the mean scores before intervention independent t test was performed. Results of the t test are presented Table 13

Table 13: Independent t- test on MAT by Gender

<table>
<thead>
<tr>
<th>Equal Variance Assumed</th>
<th>t</th>
<th>df</th>
<th>Sig (2 tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.455</td>
<td>160</td>
<td>0.148</td>
</tr>
</tbody>
</table>

The results in Table 38 indicate that no significant difference existed in the mean scores of male and female students (t (160) = 0.148 p<0.05). This implied that the level of achievement prior to treatment for the two groups was similar before the onset of ISPS. Analysis of the post test scores obtained by students in groups was done on the basis of gender. Table 14 shows the posttest mean and standard deviation of male and female students to MAT.
Table 14. Mean-scores and SD in MAT by Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>100</td>
<td>56.76</td>
<td>10.08</td>
<td>1.008</td>
</tr>
<tr>
<td>Female</td>
<td>80</td>
<td>54.31</td>
<td>11.58</td>
<td>1.294</td>
</tr>
</tbody>
</table>

The results in Table 14 show that the mean score for males is 56.76 and that of female was 54.31. The boys scored higher than girls. An independent t- test was performed to determine whether this difference was significant. The results are shown in Table 15.

Table 15. Independent t-test on MAT by Gender

<table>
<thead>
<tr>
<th></th>
<th>t</th>
<th>df</th>
<th>Sig (2 tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal Variance Assumed</td>
<td>1.515</td>
<td>178</td>
<td>0.131</td>
</tr>
<tr>
<td>Equal Variance not Assumed</td>
<td>1.492</td>
<td>157.58</td>
<td>0.138</td>
</tr>
</tbody>
</table>

Results in Table 15 show that there was no significant difference in the two means (t (178) = 0.131 p< 0.05). This led to acceptance of the null hypothesis five (H₅) which stated that there is no statistically significant gender difference in mathematics achievement among the students exposed to ISPS. The findings indicate no significant difference between male and female students' achievement in mathematics when exposed to SPS learning mathematics. This suggests integrating Science Process Skills in teaching approaches improves learners’ academic achievement irrespective of gender.

The findings of the present study are consistent with the findings of Zheng (2010) on a cross-cultural comparison of gender and math performance among college students in China and the United States. The findings showed that when common instructional approaches were used, there is no significant difference between male and female students in math performance, but rather significant differences occur on the basis of self-esteem and cultural based stereotypes. The present study has indicated that academic achievement is gender independent. This finding disagrees with the findings of a study by Sarah and Robinson (2013) on Girls’ and Boys’ Mathematics Achievement, Confidence, and Interest along with Experiences at Home and School. The report indicated that the gap between boys’ and girls’ performance in mathematics appeared soon after kindergarten and seemed to widen during elementary and secondary grades. Serap and Meltem (2004) carried out a study on Gender Differences in Academic Performance. The findings reported that smaller numbers of female students manage to enter the university. However, once admitted at university, they excelled in their studies as the same as the male students and at times outperform them. The finding supports the current studies which have revealed that boys and girls are equally competent in mathematics on fair play grounds.

SUMMARY OF THE FINDINGS

The findings of the study showed a statistically significant difference in problem solving abilities in mathematics between the students exposed to ISPS and those exposed to CIA. Results of the study show that experimental groups outperformed control groups in PST. This implied that ISPS is more effective than CIA in improving students’ problem solving abilities in mathematics and science village and science process skills. ISPS enhanced learners’ problem solving abilities in learning mathematics. Students stand to benefit more in learning mathematics when exposed to ISPS than CIA.

The findings of the present study showed a statistical significant difference between the experimental groups and control groups in acquisition of science process skills towards academic achievement in mathematics. Findings of the study have demonstrated that ISPS enhanced interplay of problem solving abilities, favouring academic achievement. When students are exposed to science process skills gains basic concept, skills and knowledge and know how to apply them raises the chances of mental flexibilities in reasoning during learning experiences an essence achievement in mathematics.

The present study findings have revealed that male students equally performed as their female counterparts in science process skills acquisition. There was no statistical significant on academic achievement by gender. A big difference in mean gain existed on experimental groups exposed to the ISPS on PST, CAT MAT tests when compared to control groups exposed to CIA. This suggested that ISPS generally improved learners’ problem solving abilities and individual achievement irrespective of gender more than those exposed to CIA. When science process
skills were integrated in teaching methods students’ curiosity was equally raised independent of gender. However, it is good to appreciate that differences between boys and girls in learning in mathematics may be attributed some other factors like stereotypes and socio-cultural blocks which tend to favour boys and yet girls are equally potentially competent.

CONCLUSION
The students’ exposure to science process skills improved their acquisition of problem solving abilities in learning of mathematics. This implied that could teachers in secondary schools incorporate science process skills in teaching mathematics meaningful learning will be enhanced. This implies that students’ exposure to science process skills will refine their computational skills not only their classrooms but also tackling examination questions and problems of novel situations. Acquisition of science process skills enhanced constructs of cognitive flexibility, recognition and sensitivity in solving problems mathematics during learning experiences. This implies that incorporation of science process skills in teaching methods presets mental frameworks on which critical thinking, logical and analytical reasoning are laid on. Divergence and multisensory viewpoints in learning mathematics is encouraged through brainstorming among secondary school students. This may improve their achievement in mathematics and competencies in science oriented courses at colleges and universities. Integration science process skills in teaching methods enhanced three-way interactions between teacher and learners and from learners to learners with mutual exchange of ideas. This implies that of ISPS formed a strong psychological and pedagogic web on which problem solving abilities interacts to uplift and improve favorable attitudes towards mathematics among learners irrespective of gender. Students’ exposure to science process skills improved achievement in mathematics irrespective of gender hence incorporation of science process skills in teaching methods could mitigate the effects of cultural blocks which negates gender equity towards science oriented subjects like mathematics, chemistry, biology and geography among secondary school students. In nut shell integration of science process skills in teaching methods among secondary schools will result to meaningful learning, high achievement in national examination in preparation of students to colleges and universities. Inadequacy of science oriented professionals, food insecurity, and retarded technological growth will be reversed.

RECOMMENDATIONS
On the basis of the present study findings the following are recommendations.
i) Teachers should adequately utilize ISPS in teaching of mathematics to achieve meaningful learning and improved problem solving abilities among the students. This could be reinforced through Ministry of Education in collaboration with KICD putting up guidelines for mathematics teachers on development of innovative instructional materials.

ii) Universities and Teacher training colleges to design curriculums favouring integration of science process skills during development of instructional materials to enhance innovative pedagogies and teaching approaches which eliminate stereotypes, cultural blocks which may not encourage gender equity.

REFERENCES


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PROPENSITY OF TEACHERS TO THE USE OF TABLET COMPUTERS FOR CLASSROOM INSTRUCTION IN LOWER PRIMARY PUBLIC SCHOOLS IN MERU SOUTH, KENYA

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ABSTRACT
Technology such as use of tablets, laptops, ipads and desktop computers as pedagogical tools in the classroom has increased significantly in recent years all over the world. New technology like the tablet computers offer real value as educational tools due their versatility, portability, and ease-of-use insinuating enormous educational implications that leads to meaningful learning and digital adaptability. The affordances attributed to the tablet computers can only be actualised if teachers have a sound understanding of technology, curriculum and pedagogy. The purpose of this study was to determine the propensity of teachers to the use of tablets computers for classroom instruction in lower primary schools in Meru-south sub-county, Kenya. The study adopted descriptive research design. The teachers who participated in the study were purposefully sampled from public primary schools from Meru-south sub-county in Kenya where a sample of 41 lower primary school teachers was used. The study established that the teachers were not adequately prepared in terms of digital knowledge and skills for tablet computer use for teaching and learning. The findings offer relevant insight to policy-makers and education administrators to prepare teachers to maximize the potential of tablet computer as a teaching and learning tool to facilitate effective instruction that supports meaningful learning. The findings will provide teachers and instructors information relating to key educational and school considerations in the applications of tablet computers for more effective use in the educational context.

Keywords: Tablet Computer, Classroom Instruction, Educational Technology, Lower Primary Schools.

INTRODUCTION
Technology is rapidly changing how educators engage students, deliver content, and manage the traditional classroom (O’Malley, 2013). The use of technology in schools continues to evolve rapidly as new devices and tools become available. The adoption of mobile devices such as iPads and tablets has been a particularly exciting development in recent years. According to Olakanni and Batchelor (2015), there has been a growing interest on use of tablet computer as a tool for enhancing classroom instructions to improve student knowledge and skills at all levels of education. The benefits offered by these technologies, such as their portability, connectivity, accessibility and range of media, present new challenges and opportunities for teaching and learning. As the take up of tablet computer gathers pace in our schools there is a need for advice on the best approaches and apps to help achieve successful learning outcomes. Despite the fact that the integration of technology in the classroom is inevitable and there is great attention in the education innovation, the popularity of tablet computers in instruction is still low.

Technology is beneficial for students’ performance (Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011) due to increased engagement, motivation and enhanced collaboration between students. Technology offers many educational benefits such as the ability to easily adapt curriculum to accommodate different learning styles and abilities, improved learning outcomes and attitudes towards learning. Tablet devices have emerged as valuable pedagogical tools in a wide range of applications and educational contexts (Kucirkova, Messer, Sheehy, Fernandez Panadero, 2014). Specifically, teachers can use tablet computers in the classroom to enhance their differentiated instruction practices that creates student-tailored learning opportunities that provide educational content to students in a multitude of formats. By encouraging students to learn in the way that is most comfortable for them, students can absorb and recall classroom information more readily (Roland, 2017).

Educators are challenged today to search for teaching tools that can be used within the classroom as interactive methodologies that make the educational environment increasingly digital (Prensky, 2012). Tablets are rapidly emerging as a prominent feature of pedagogical practice in schools (Otterborn, 2018) since use of tablet computer has the potential to enhance learning for instance contributing to raised motivation, knowledge acquisition and enquiry-based learning (Major, Hassler & Hennessy, 2017). According to Dias and Victor (2017), tablets keep students engaged, attentive, motivated and allows interaction with the devices. Tablets create an environment that facilitates learners learning process as well as an interactive classroom with real-time feedback (Banister, 2010). Despite the great educational potential of tablet computers for transforming learning, the usage in teaching and learning process is generally not still intensive.

Proceedings of the 6th International Research Conference
When a new technology is introduced into a new educational system, many innovations may be brought about to other elements in the whole system such as the training, software update and corresponding strategies implementation (Long, Liang & Yu, 2013). Tablets computers have significant potential for enhancing learning but as with all technology the most important element remains the teacher and their classroom practice (Major & et al, 2017). Teachers play a critical role in tablet integration because the responsibility for implementation largely happens in the classroom (Bebell & O’Dwyer, 2010) and therefore teachers require sound knowledge of the best pedagogical approaches to use, strong understanding of curriculum and its requirements to facilitate the uptake of new technologies. Teachers are key to the success of implementation of technology in schools. According to Clark and Luckin (2013) integrating innovative technology during classroom practices inevitably demands teachers to acquire new technological and pedagogical skills. Goodwin (2012) also noted that the pedagogical framework in which the teacher situates the technology determines its success and impact on student learning. Thus teachers require a deep and comprehensive understanding about the application of tablet computers in education for effective implementation in classroom.

According to Clark and Luckin (2013) integrating innovative technology during classroom practices inevitably demands teachers to acquire new technological and pedagogical skills. Rikala, Vesisenaho and Mylläri (2013), argued that a continuous focus on pedagogy and professional development is crucial in order to harness the potential of educational technology in Finnish schools. Similarly, the One Child per Laptop (OCPL) project in the developing world has received criticism for only simply giving underprivileged children laptops, but not providing teachers’ training and ongoing support (Warschauer & Ames 2010). Karsenti and Fievez (2013) in a survey of 6,057 students and 302 teachers in Quebec, Canada noted that implementing tablet devices into the classroom is not easy, and requires teacher training. Teachers need to find meaningful ways to integrate the devices into their own practice and to evaluate which of the many thousands of educational applications might be appropriate for their pupils. Thus there is need for sufficient pre-service and in-service training for teachers in order to increase their instructional efficiency with tablet computers.

In Kenya, there was government-supported initiatives to distribute educational tablets computing devices to pupils in class one. Research addressing the teachers’ disposition towards use of tablet computers for teaching and learning is still an unexplored area requiring further in depth studies hence this study investigated the propensity of teachers to use of tablet computers for classroom instruction in lower primary classes in public schools in Meru South sub-county, Kenya.

Statement of the Problem
Teachers need to incorporate modern technology to strengthen their classroom instruction like use of tablet computer that allows greater collaboration and active learning within the classroom rendering class more dynamic and tailored to learners needs. Teachers are expected to integrate technologies such as tablet computer in an innovative way to enhance teaching and learning process even though tablet computer usage is still very much at the initial practical implementation phase. Few studies have examined the teachers proclivity towards use of tablet computers in classroom instruction in Kenya, hence this study aimed to uncover the propensity of teachers to use of tablet computers for classroom instruction in lower primary classes in public schools in Meru South, Kenya.

Purpose of the Study
The purpose of this study was to investigate the propensity of teachers to the use of tablet computers for instructions in lower primary classes in public schools in Meru south sub-county, Kenya.

Objective of the Study
The objective of the study was to explore the propensity of teachers to the use of tablet computers for classroom instruction in lower primary schools in Meru south sub-county, Kenya.

Research Questions
To achieve the objective, the research was guided by the following research questions;
How were the teachers prepared to use the tablet computers in teaching and learning process?
Are the schools equipped with appropriate computer resources?
Is the tablet computer uploaded with relevant content?
What are teachers’ views about use of tablet computer for classroom instruction?
RESEARCH METHODOLOGY
The study used descriptive research design that describes systematically and accurately the facts and characteristics of the population or phenomenon that is being studied (Jackson, 2009). It involves observing, documenting and describing the specific behavior of a subject as it occurs in the environment without influencing it in any way. The phenomenon is observed in a completely natural and unchanged natural environment meaning no variables are manipulated or controlled. Thus the research design was appropriate for the study to create a snapshot of the current state of affairs on the teachers’ use of tablet computers for instruction. The study focused on teachers who teach lower primary classes. The actual sample size was 41 lower primary school teachers that were randomly sampled. A questionnaire was used to collect information. The questionnaire was designed to generate information on accessibility of resources, use of tablets, professional training and opinions of teachers on use of tablet computer for instruction. The questionnaire had three sections where the first section sought demographic information about teachers, section two sought information about availability of resources and section three sought information on teachers views on apps and use of tablet computers. The questionnaire was administered by the researchers assisted by research assistants. To answer the research questions the information from the questionnaire was organized, summarized and then analysed. The descriptive statistics was used to summarize and describe the prevalence of study variables.

RESULTS AND DISCUSSION
Demographic Information
The respondents were lower primary school teachers varied in gender, age and academic qualification. Out of the teachers who participated, 65% constituted female teachers while 35% were male teachers. This implies that in the study locale with regard to lower primary school teachers, there was presence of gender imbalance in favour of female. The result insinuates that teaching is more amenable than other careers to the needs of women thus many women would prefer to be teachers. The findings are consistent with US Bureau of labour population survey that suggested a clear female majority in the teaching profession especially in earlier grades. Loewus (2017) in US survey estimates of public school teachers, pointed out that majority of teachers are women.

With reference to age range of the respondents, 21% of teachers were between 21-30 years, 28% of teachers were between 31-40 years, 36% of teachers of teachers were between 41-50 years and 15% of teachers were between 51-60 years. The results show that many teachers are below 50 years implying that they are active and productive, not preparing for retirement and they could therefore be flexible to integrate the new technology in teaching and learning process. The results are in line with a survey of nearly 2500 American teachers that observed that younger teachers were more likely to share ideas and discuss their use of technology with other teachers (Purcell, Heaps et al. 2013).

About the highest academic qualification, 40% of teachers are holders of primary teacher education certificate, 33% of teachers are holders of diploma while 27% of teachers are holders of degree. The results indicate that the teachers were academically and professionally qualified which is crucial in any educational system. When teachers were asked whether they own smart phone, 98% of the teachers indicated they own while 2% of the teachers said they do not own a smart phone. This implies that the teachers for lower primary schools are techno savvy and may not require an introduction on how to use tablet computer. The teachers have experience with using of technology and can efficiently incorporate use of tablet computers in instruction.

Regarding training on use of tablet computers, 44% of teachers indicated that they were trained while 56% of teachers stated that they were not trained. This implies that majority of teachers were not trained how tablet computers can be used in teaching and learning process yet the teachers need training to effectively integrate technology in instructions. The teachers that were trained indicated that the training was not sufficient because it was mainly on proper management and maintenance of tablets and not on how to incorporate technology as a pedagogical tool. The results resonate with Phu (2015) who pointed out that one of the most decisive factors for successful technology integration into classrooms was teachers’ technology training.

Fernández-Lopez et al (2013) noted that training sessions help teachers to become familiar with tablets for effective use. Schools ought not to assume that teaching staff are ready to operate tablets from the outset (Melhuish & Falloon, 2010), but should actively create adequate opportunities for professional development. Also Goodwin (2012) revealed that teachers need to have a thorough understanding of technology, curriculum and pedagogy prior to implementation to ensure the devices are used to their potential. On any other training the teachers have received,
54% indicated they are trained on computer packages, 2% of the teachers on business related courses and 44% of the teachers indicated they have received training in other courses. Goodwin (2012) recommended that professional learning related to the use of technology integration needs to focus on the teacher’s role and not solely focus on the technology.

**Availability of Resources**

All the teachers affirmed that their schools have a source of power and in particular electricity to charge the tablets and to enable use of laptop and projector. Researcher also found out that in all the schools there is a storage facility for the tablets. Teachers also revealed that in their schools, two laptops, one projector and one Content Access Point are available. This insinuates that the schools are equipped sufficiently with basic requirements for computer technology integration.

The teachers pointed out that the tablets were provided by the government of Kenya as per school but not to individual students and specifically meant for only one stream. In 96% of the schools the students in class one are more than tablets computers available. Only in 4% of the schools that the tablet computers are enough for students in one class of the lower primary school. This means that the tablet to student ratio is neither one-to-one ratio nor one-to-two in most of the schools and so the student engagement and interaction with tablets may be limited due to inadequate provision of tablet computers.

The findings are contrary to what Larkin (2011) proposed that two-to-one laptop use is preferable to one-to-one, achieving a better balance between productivity, student engagement, social activity, and individualised learning. Bjerede and Bondi (2012) pointed out that one-to-one access is an essential factor in increasing student motivation and independence for it allows students personalize their own learning experience, supporting the development of learner autonomy and metacognitive skills. A survey with 169 Finnish teachers in schools using tablets computers showed that the low device-to-student ratio was the main hindrance to carrying out the potential benefits the tablets offered (Rikala, et al. (2013) which could also be the case in the study area.

When teachers were asked whether technical support for use and maintenance of tablet computers in or around the school was available, 9% of teachers affirmed, while 91% said there is no readily available technical support. This hints that there is minimal or no technical support yet the use, maintenance and monitoring networks and digital space that support learning must be an ongoing effort. It is, therefore crucial that technical support be provided to teachers charged with giving instruction using tablets. The results agree with Montrieux et al (2015) who emphasized that policy makers should consider introducing technical and pedagogical support in order to facilitate both teachers’ and students’ understanding of the full potential of innovative technology in education. Ifenthaler and Schweinbenz (2013), in a study of eighteen teachers concluded that most teachers need technical support for the use of tablet computers. Also Oliviera (2014) highlighted that a shortage of technical support and the absence of a tablet policy can prevent staff from using tablets on a regular basis.

**Applications and Use of Tablet Computer**

Regarding the suitability of the applications for the lesson content, 64% of the teachers felt tablet computers are not suitable for lesson content while 36% of the teachers declared that the applications are suitable for the lesson content. All the teachers revealed that tablet computers are not loaded with content developed for the current competency based curriculum that is on use in Kenyan schools currently. This implies that tablet computer is not loaded with appropriate and adequate teaching materials to suit the needs of learners and curriculum requirements for effective instruction. The findings are in line with Ward et al (2013) who stated that utility of a tablet in providing novel lessons is clearly limited by the availability of suitable content.

When teachers were asked how often they use tablet computers per week, 14% of teachers indicated they never use, 8% of teachers stated they use daily while 78% indicated they use tablet computers occasionally. The teachers who indicated that they never or occasionally use expressed the reasons for non-usage such as lack of technological skills due to lack of training, insufficient gadgets, tablet not loaded with content for the current curriculum and also due to insufficient time because of other school activities and programmes. There was 100% consensus with teachers that there is no teachers guide in line with course book on the use of tablet computers. This alludes that teachers rely on the training they underwent, knowledge acquired from other sources, experience from smartphone use or even try and error which reduces their using of tablets. The results concur with Oliviera (2014) who stated that a lack of
relevant training, a shortage of technical support and the absence of a tablet policy can prevent staff from using tablets on a regular basis.

Regarding on whether the teachers can prepare their own materials for students to use on the tablets, 83% of the teachers said they cannot prepare while 17% of teachers indicated they can prepare content. This alludes that the teachers are not adequately equipped with technological and pedagogical knowledge and skills to create their own content that can be used in the tablet computer. The results are consistent with Dunleavy et al (2012) who confirmed that teachers need specific professional development opportunities in order to increase their ability to use ICT for formative learning assessments, individualized instruction, accessing online resources, and for fostering student interaction and collaboration.

**Teachers Views on Applications and Use of Tablet Computer**

With reference to use of tablet computers, the teachers were asked whether use of tablets in teaching is more involving to the teacher compared to the conventional teaching, 54% of the teachers shared that use of tablets in instruction is more involving while 46% argued that use of tablets in teaching is less involving than conventional teaching. This suggests that lack of training may be making teachers find use of tablet computers to be increasing their work. About 86% of teachers asserted that use of tablet computers in teaching-learning process improve instruction while 14% of teachers pointed out that tablet computers do not improve the teaching-learning process. This alludes that with proper training, teachers may use tablet computers more for instructions once they change their attitude.

On whether the tablet computers make learners eager to learn, 95% of teachers confirmed that tablet computers motivate students to learn while 5% noted that tablet computers do not make learners eager to learn. This insinuates that tablet computers stimulate pupils’ interest to learn by engaging the learners and provide a wealth of instructional possibilities to students. This collaborate with Newhouse (2002) who highlighted that Information Communication and Technology can motivate students, increase their self-confidence and self-esteem, stimulate their interest, increase their attainment, allow greater inter-activity and individualization, enhance the pupils’ critical thinking and increase their creativity. These findings also agrees with Rikala & et al, (2013) who indicated that tablets can diversify and enhance teaching and learning in many ways, particularly in supporting learners’ motivation and independent learning, and promoting engaging teaching methods.

When teachers were asked whether the head teachers supported them in the use of tablets, 92% reported that indeed the head teachers support them while 8% of teachers denoted that they do not receive any support from their head teachers. This suggests that majority of teachers are more effective in teaching since the head teacher act as a mediator to integrate technology into education system by playing a key role in guiding, encouraging, providing conditions necessary to enhance use and helping the teachers to use tablet computers in instruction. The results are in line with Osborne and Hennessy (2003) who propounded that it is essential that adequate support be provided to teachers charged with introducing tablets, as the established pedagogy observed in schools does not change simply with the introduction of new technology. Samuel and Zaitun (2006) maintained that the success of integrating information and technology into teaching and learning interaction depends on the support provided by the head teacher of the school. There is need for administrative leadership and commitment to support effective integration of learning technologies as stated by Van’tHooft (2013).

**CONCLUSION**

From this research, it can be observed that majority of teachers were not trained on how to use tablet computers in teaching and learning process that would make their use more effective. The teachers that were trained felt that the training was inadequate since training was on management and maintenance of tablet computers and not on how to incorporate the technology as pedagogical tool. It was found that schools are well equipped in terms of power source, laptops, projectors and Content Access Point. However, the tablet computers are not enough for each pupil in every class. However, the tablet computers are not enough for each pupil in every class. It was also found that technical support was not readily available to the teachers.

There was general feeling by the teachers that the content in the tablet computer is not sufficient and not resonating with the current competence based curriculum. Majority of teachers were also not able to develop digital content to use with the tablets so more training may be required. Many teachers also indicated that use of tablets is more

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involving than conventional teaching methods but most teachers felt that tablet computers make pupils highly motivated to learn.

RECOMMENDATION

For successful integration of tablets in instruction adequate training should be an integral part of professional development for teachers. Teachers need adequate and ongoing introductory and specialized training to acquire digital competence like to master various features and applications on the devices in order to facilitate the adoption of tablet computers and also use tablet technology effectively in the classroom. To manage the process of tablet implementation, teachers need the teachers’ guide to offer guidance and understanding about application skills and use of devices to increase teacher instructional efficiency with tablet computers. The tablet computers need to be uploaded with suitable content such as the new content developed and approved by Kenya Institute of Curriculum Development in Kenya to ensure that all learners are exposed to quality content. Adequate tablet computers need to be availed by the government to implement tablet usage and make digital literacy universally accessible to all learners.

REFERENCES


EFFECT OF COMPUTER ASSISTED TEACHING STRATEGY ON STUDENTS’ ACADEMIC ACHIEVEMENT IN BIOLOGY IN PUBLIC SECONDARY SCHOOLS IN BARINGO, KENYA

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ABSTRACT
Biology is a branch of science studied at secondary school that lays the foundation for careers in medicine, education, agriculture, environment, and biotechnology important in industrial and technological development. Taking into account this significance of biology in the society, students’ academic achievement in biology should be enhanced. The purpose of study was to determine the effect of integration of Computer Assisted Teaching Strategy (CATS) on student academic achievement in Biology. The study employed Solomon Four-Quasi experimental design. The study was conducted in eight extra-county secondary school in Baringo County. Purposive sampling was used to select eight extra-County Secondary schools, which use ICT to integrate CAT in classroom teaching and learning. Stratified random sampling technique was used in selecting sample schools for the study. A sample of 324 biology students participated in the study. The study used Simple random sampling to select experimental and control group. The research instruments used was, Biology Achievement Test with a reliability coefficient was 0.706. The data obtained was analyzed descriptively using frequencies, percentages and inferentially using Analysis of Variance and t-test. Statistical significant values were at α level of 0.05. The findings indicated that integration of CATS enhances students’ achievement in biology. The study concluded that CATS is effective in improving student academic achievement in biology therefore biology teachers should be encourage to incorporate CAT strategy in their teaching.

Keywords: Biology Subject, Computer Assisted Teaching, Strategy, Achievement, Motivation

INTRODUCTION
Biology is one of the branches of science that manages the natural phenomena and help to develop biological knowledge and scientific skills that enhances humanity to appreciate the essence of biodiversity, ecological protection and sustainable utilization of resources (UNESCO, 2007). Biological knowledge plays an important role in most aspect of human life. Its application in genetic engineering has contributed towards meeting the demand of food security, medicine and control of variety of pest and diseases (UNESCO, 2013). Further biological knowledge lays foundation for commercial agriculture the engine for economic growth in Kenya (Government of Kenya, 2003). Research have used biological knowledge to develop high yield, disease resistant and fast maturing food crops and animal to meet the food requirement of ever increasing world population (Burn 2005). Due to this significant role of biological knowledge, therefore there is a concern on the improving academic achievement and motivation in biology in secondary school.

In Kenya, Biology is a key science subject in secondary school. Its achievement has been low when compared to other science subjects over the recent years as indicated by the Kenya National examination council report (2011-2017). Academic achievements in biology are determined by using a standardized test or an achievement test. The low performance in science with biology included is a national concern as articulated in the Session Paper Number 1 of 2005 Ministry of Education, Science and Technology (MOEST, 2005).

According to Waihenya (2002) attributed low achievement to poor teaching methods, lack of mastery of the subject by students, learner’s state of mind towards the subject. Application of ineffective teaching approach by the biology teachers with the teacher centered being dominant as opposed to learner centered, lack of mastery of content by a few teachers and deficient instructing and learning assets. In spite of this achievement in the sciences being low, this has ultimately led to the proposal on the look into pedagogical approach in classroom instruction. Therefore, in an attempt to mitigate this low academic achievement in science subjects, World Bank (2007) suggested in its report that science curriculum has to be taught through the modern modes such as CATS so that learning can be enhanced and more curiosity and enthusiasm created in the learner. Other researchers have called for adoption of constructivist-based teaching methods such as CATS as a way of developing globally connected knowledge societies (Bereiter, 2002; UNESCO, 2007; World Bank, 2008). They argue that students should not be exposed to learning methods that tend towards passive reception of sanctioned information through memorization and recall but need to be exposed to methods that promote gaining skills through active participation such as information gathering, evaluating source quality, collaborating, problem solving, and ultimately knowledge creation. Therefore,
teaching strategy that is a learner-centered approach such as computer assisted teaching strategy that makes learners actively participate in teaching and learning process improves the learner’s motivation to learn.

Computer assisted teaching strategy involve the use of software, drills and simulations in teaching. CATS allow the teacher use computers at different times and spaces depending on the subject matter, the students and the available software and hardware. CAI software integrates features that encourage activities beyond the simple drill-and-practice, such as simulations, graphing and even modeling (Yusuf, 2010). Therefore, utilization of CAT offers chances to the learners and instructors to learn at their speed and consolidate dynamic learning. CAT is outwardly intuitive, since it presents ideas by utilizing movements, shading and sounds making a fascination in the student, this catch the student consideration by giving higher maintenance ability to the students, reinforcing the student's academic achievement and motivation towards the subject. In spite of these constructive outcomes of CAT strategy in enhancing learners achievement and its impact is not clearly understood and in attempt to fill this gap the study investigates the effect computer assisted teaching strategy on student achievement in biology in Baringo County.

**Statement of Problem**

Student academic achievement in biology is determined by KCSE examination. An analysis of the pattern and trends in achievement in biology in KCSE examination clearly indicates that the achievement is below an average score of 50%. Therefore, these calls for appropriate instructional strategy to be used in secondary school for teaching biology and especially on the sub-topic cell division that has remain to be a challenging topic to many candidates in KCSE Biology examination leading to low achievement in biology examination at the national level. This achievement is attributed to many factors that could be due to poor learning environment, lack of innovative teaching strategy such as traditional teaching strategy. That exposes the students to lack of interest in the subject making students to be passive during the teaching and learning process thus low achievement in Biology. Therefore, student centered method such as computer assisted teaching method can be used by the Biology teachers that may help to improve student learning environment which leads to an improved achievement in Biology. However, there is limited on the effect of use of CAT on students’ academic achievement in Biology County. Therefore, a knowledge gap exists that prompts for a study to be carried out in Baringo County to ascertain the effect of CAT on student academic achievement in Biology.

**Study Objectives**

The overall aim of the study was to determine the effect of using computer assisted teaching strategy on student academic achievement in biology in Baringo County.

**METHODOLOGY**

**Research design**

The research design for this study was quasi-experimental research and in particular Solomon Four Non-Equivalent control Group design. This design was employed for the study because the participants selected were intact classes existing in secondary school, therefore not possible to assign individual participants randomly into experimental and control groups. In this study, the experimental and the control group were randomly selected. A pre-test and post-test was administered to the experimental and control groups. This design enabled the researcher to control and measure the main effect of testing. The design is illustrated below:

<table>
<thead>
<tr>
<th>Group I (E1)</th>
<th>O₁</th>
<th>X</th>
<th>O₂</th>
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<tbody>
<tr>
<td>Group II (C1)</td>
<td>O₃</td>
<td>X</td>
<td>O₄</td>
</tr>
<tr>
<td>Group III (E2)</td>
<td>X</td>
<td></td>
<td>O₅</td>
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<tr>
<td>Group IV (C2)</td>
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**Solomon’s Four Non-Equivalent Control Group Design**

O₁ and O₃ are the pre-test while O₂, O₄, O₅ and O₆ are the post-test and X represents the treatment where learners were taught using computer assisted teaching strategy in the sub topic cell division. Group I was experimental group (E1) that received pre-test, treatment, and post-test. Group II control group (C1) that received pre-test followed by control condition then post-test. Group III were the experimental group (E2) that received treatment followed by the post-test. Group IV, the control group (C2) that received a post-test only. C1 and C2 were taught using traditional teaching strategies.
The experimental groups were taught using computer assisted teaching strategy while the control groups were taught using traditional teaching strategy. The strategy groups were further stratified in order to investigate on moderator variable like classroom category and gender participants. Based on classroom category, the experimental group’s participants were classified into boys and girls. However based on gender the participants were classified into boys and girls, in a similar way the participants in the control group were also stratified along classroom category and gender on the participants. The experimental groups were the participants who took part in computer assisted teaching strategy. The group comprises of 8 extra-county public secondary schools which were purposively selected for the study, 4 public secondary schools were randomly selected to participate in the experimental instructional group because the schools had computer for integration of teaching and learning. The schools that took part in the experimental instruction include 2 boys secondary school with participants (n=64) and 2 girls school with participants (n=99) the total number of participants in the experimental instruction group were 163 students. Activities of the experimental group formed the focus of the study. The participants in the experimental group used the computer assisted teaching manual prepared by the researcher to guide in the delivery of the content.

Control group were participants who took part in traditional teaching strategy, and had 4 secondary schools which were randomly selected and assigned as control group, this consist of 2 boys secondary school with participants (n=80) and 2 girls secondary schools with the participants (n=81) and a total of 161 students participants. The control group adopted direct instruction strategy like lecture, demonstrations, and discussion.

Research Instruments
The instrument that was used for collecting data included, Biology Achievement Test (BAT) that was used to evaluate learners’ achievement and Biology Motivation Questionnaires was used to assess learners’ motivation towards Biology.

Biology Achievement Test (BAT)
The Biology Achievement Test was used to assess learners’ mastery of content and to measure student achievement in Biology in the sub-topic cell division. The BAT test consisted of items covered in the sub-topic cell division during the study. The content of the test was mitosis and meiosis cell division. Short answered questions and structured questions on the topic covered consisting of 10 items was used. The items tested knowledge, comprehension, and application of the learned material with the total possible score of 30 marks. The test was used interchangeably; the pretest was reorganized and used as posttest that was administered at the end of the treatment. This pretest was administered to the experimental (E1) and the control group (C1) before the beginning of the lesson and posttest was administered to all groups after the course. The pretest sought to test the student mastery and understanding this was the focus of the study. The test was piloted using secondary school, which had similar characteristics as the sample schools from Baringo sub-county this was used to determine the reliability. The items were scored using a standardized marking scheme and the obtained score were recorded and analyzed.

Data collection
The study was carried in Baringo County, Kenya. Purposive sampling was used to select eight extra-County Secondary schools, which use ICT to integrate CAT in classroom teaching and learning. Form three students were selected because the topic Reproduction (cell division) is taught at this level (KIE, 2012). A stratified random sampling technique was used to select 4 girls and 4 boys secondary school. A total of 145 boys and 179 girls participated in the study. A simple random sampling technique was used to select a particular stream for the study where there was more than one stream in a participating school.

Data was collected using biology achievement test (BAT). The Biology Achievement Test was used to assess learners’ mastery of content and to measure student achievement in Biology in the sub-topic cell division. The BAT test consisted of items covered in the sub-topic cell division during the study. The content of the test was mitosis and meiosis cell division. Short answered questions and structured questions on the topic covered consisting of 10 items was used. The items tested knowledge, comprehension, and application of the learned material with the total possible score of 30 marks. The test was used interchangeably; the pretest was reorganized and used as posttest that was administered at the end of the treatment. This pretest was administered to the experimental (E1) and the control group (C1) before the beginning of the lesson and posttest was administered to all groups after the course. The pretest sought to test the student mastery and understanding this was the focus of the study. The test was piloted using secondary school, which had similar characteristics as the sample schools from Baringo sub-county this was
to determine the reliability. The items were scored using a standardized marking scheme and the obtained score recorded and analyzed.

**Data Analysis**

The data collected was scored, coded, and organized for analysis. Descriptive statistics (mean, standard deviation and percentage) and inferential statistics (ANOVA and t-test) were used to analyze the data and test the research hypotheses. ANOVA was used to analyze the differences in the four means and help to establish whether there is a significant difference among the four groups. While the t-test was used to get the difference between the two means that are the control group and the experimental group. T-test was also used to test for the different groups and between genders of the students. In both ANOVA and t-test it was pre-determined at α=0.05 significance level in order to reject or accept the null hypotheses that postulated equally or non-significant differences between the groups. The data from the study was analyzed with the aid of Statistical Package for Social Sciences (SPSS) version 24.

**RESULTS AND DISCUSSION**

**Effect of Computer Assisted Teaching Strategy on Student’s Academic Achievement**

**Pre-test Results on Student Achievement in Biology**

In order to assess the level of student achievement to learn biology before the exposure to CATS, pre-test mean score on student achievement in BAT was analyzed. The researcher issued biology assessment test (BAT) questions in subtopic cell division in order to ascertain the knowledge of students, comprehensiveness, and application of the learned skill in the topic in answering the questions.

The respondents were first given a pre-test. The respondents were divided into control groups and experimental groups and taught the subtopic cell division using CATS for the experimental groups and traditional method for the control groups. The experimental group one and control group one pretest was administered this was necessary because it enable the researcher to assess the similarity of the groups before administration of the treatment and to assess the effects of the pretest relative to the no pretest. Finally, their mastery of the topic was determined using a post-test. The pretest and posttest results of the group participants were analyzed and presented using descriptive statistics of mean and standard deviation values. The pretests mean score on BAT for experimental and control groups one results were presented in Table 2.

**Table 2. Student Pretest Mean Score on BAT for Experimental group one and control group one**

<table>
<thead>
<tr>
<th>Pretest Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental (E1)</td>
<td>82</td>
<td>5.96</td>
<td>3.760</td>
</tr>
<tr>
<td>Control (C1)</td>
<td>74</td>
<td>11.34</td>
<td>6.779</td>
</tr>
</tbody>
</table>

The results indicated the performance of control group one and experimental group one before the treatment was administered. The results indicate that the pretest mean score of experimental group one was 5.96 with a standard deviation of 3.760. The control group one had a pretest mean score of 11.34 with a standard deviation of 6.779. To test whether the pretest mean score were significantly different, a t-test was used. The results are shown in Table 3.

**Table 3. t-test of Pre-test scores on BAT for experimental group one and control group one**

<table>
<thead>
<tr>
<th>Pre-test group</th>
<th>T</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental (E1)</td>
<td>14.364</td>
<td>81</td>
<td>.121</td>
</tr>
<tr>
<td>Control(C1)</td>
<td>14.296</td>
<td>73</td>
<td>.118</td>
</tr>
</tbody>
</table>

The results presented in table 3 shows no significant difference in the pretest mean scores of control group one (C1) and experimental group one (E1), $t(81) = 14.364, p=0.121 > 0.05$, $(C1),t(73) = 14.296, p=0.118 > 0.05$. The $p (0.121)$ and $p (0.118)$ is greater than 0.05 hence the difference in the pretest mean score is not significant. This means that these groups had comparably close means, thus indicates that learners had similarly comparable characteristics suitable for the study. Therefore the academic achievement in biology prior to the administration of CATS were similar for experimental and control groups. The two groups were equivalent hence suitable for the study. Furthermore, the researcher sought to ascertain the mean difference in student academic achievement BAT by
comparing the pretest mean score and posttest mean score for both experimental and control group one. The student posttest mean scores on BAT are presented in Table 4.

Table 4. Posttest Mean Score on BAT for Experimental group one and Control Group one

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental group</td>
<td>82</td>
<td>15.23</td>
<td>3.325</td>
</tr>
<tr>
<td>Control group</td>
<td>74</td>
<td>11.20</td>
<td>2.321</td>
</tr>
</tbody>
</table>

The results indicated the performance of control and experimental groups after the treatment was administered. The results indicated that the posttest mean score of experimental group was 15.23 with a standard deviation of 3.325. The control group had a posttest mean score of 11.20 with a standard deviation of 2.321. From the findings, it was evident that the mean score of students under experimental group one was higher than that of control group one after the treatment was administered to the experimental students.

Post-test Result on student achievement in Biology

In order to determine the effect of CATS on student academic achievement and analysis of Post-test BAT achievement was carried out. Table 5 shows the post test scores for experimental and control. The results were presented in Table 5.

Table 5. t-test of Posttest Scores on BAT for Experimental group one and Control Group One

<table>
<thead>
<tr>
<th>Group</th>
<th>T</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental group one (E1)</td>
<td>27.129</td>
<td>81</td>
<td>.000</td>
</tr>
<tr>
<td>Control group one (C1)</td>
<td>17.896</td>
<td>73</td>
<td>.000</td>
</tr>
</tbody>
</table>

*denotes significance at α=0.05

The results in table 5 shows a significant difference in posttest mean scores of control group one (C1) and experimental group one (E1). The obtained t-value (E1) t (81) =27.129, (C1) t(73) =17.896 and p=0.000. The p (.000) is <0.05 meaning that the difference in posttest mean scores is significant. This means that there is statistical difference on student academic achievement when taught using CATS since the mean score of students taught using computer assisted teaching strategy perform better than those exposed to traditional method of teaching.

Findings of the present study are consistent with those of Kibos, Ndirangu and Wekesa (2004), on the effect of computer mediated stimulation on biology on student learning outcomes. The study showed that the mean scores of the participants in the treatment group in the treatment group that were exposed to computer-mediated stimulation were significantly higher than those who were exposed not exposed to computers. The results from the study indicate the mean difference between the experimental and the control group were statistically significant in favor of the experimental group therefore the study concluded that the use of computers mediated stimulation programme was effective that traditional teaching method. This findings are in consistent with those of Yusuf and Afolabi (2010); Kevogo, Toili and Mutsotso (2013); Kiboss and Tanui (2013); Orora, Keraro and Wachanga (2014) and Wekesa, D., Wekesa, E. and Amadalo (2013). Their findings concluded that the use of computer assisted learning positively impacts learner’s achievement.

Findings of the study agree with the findings of Serin (2011) on the effect of computer-based instruction on achievement and problem solving skills of science and technology students in Turkey. The results from the study indicated a statistical significant increase in the achievement and problem-solving skills in students in the experimental group that received computer based science and technology instruction. Therefore computer assisted teaching strategy has proven to improve student achievement.

Zupanec (2013) also reported findings similar to the present study. The study investigated the effect of computer-assisted learning in biology teaching in primary school in Serbia. The experimental group that learned biology content (Chordata) using CAL, while the pupils in the control group learned the same content using traditional teaching method. The analysis of the result of the posttest and retest showed that pupils from the CAL group performed significantly better than the control group.
Findings of the study also agree with the findings Pinkal, (2013), on a study conducted in India on use of CAI and its effect in development of instructional Strategy for Biology Teaching. The experimental groups were taught using the CAI while the control groups were taught using conventional method. The results from the study reveal that the experimental group performed better than the control group. Therefore, the study reveals that the use CAI improves academic achievement of students in biology subject compared to conventional strategy. Findings are consistent with Kausar (2008) who conducted evaluated the effect of computer-assisted learning versus classroom lecture for computer science. The study concluded that, the experimental group taught using computer assisted learning performed better than the control group taught using classroom lecture method. Therefore CAL was proved to be very much effective in increasing the evaluation and application skills of students to experimental group, experimental group were motivated and ready to learn each day of experimental duration of CAL treatments than students of classroom lecture treatments.

Mahmood (2004) also reported similar findings on a study conducted on CAL and traditional method of instruction, the study examined the effect of computer-assisted learning on student achievement in general science as compared to traditional method of instruction. The result revealed that the experimental group outperformed the control group in all achievement areas that is overall, by levels of cognitive domain and by type of content and students had interest on CAL program and benefited from it.

Etukudo (2003) carried out another study agreeing with the findings of this study, in an investigation on impacts of computer-assisted learning (CAL) on Nigerian secondary school learner’s execution in Mathematics. The results from the study reveals that experimental group that learned mathematics content using CAL performed better than the control group that were taught using the traditional techniques of teaching. The experimental group posted a higher mean score than the control group this results indicated the mean difference between the experimental and control group. Therefore the results demonstrated that performance of learners presented to CAL were superior to their partners presented to the traditional teaching techniques.

Findings similar to the present study, was also reported by Owusu Monney and Appiah, (2010) on an investigation on the effect of computer assisted instruction in performance of senior high school biology students in Ghana. The experimental group learned science concept cell cycle by CAI. The control groups were taught the same concept by conventional approach; the result indicated that students that were instructed by conventional approach performed better on posttest than those instructed by CAI. However, the performance of lower achievers within the experimental group improved after being instructed using CAI.

The finding of the study corroborates that of Akçay et al. (2006) who assessed the effect of CAL on achievement and attitude of college students in analytical chemistry. The study found out that achievement of experimental groups was significantly higher than the control group. Similiarly, Garanga et al. (2012), Dasdemir et al. (2008), Hüllegebreal (2012), Frailich et al. (2005) and Nduati (2015) showed that when CAL is used to teach acids and bases, electrochemistry and carbon and its compounds respectively the post-test scores were statistically and significantly different in favour of experimental group. This indicates that integration of CAL enhances students’ understanding of chemistry concepts thus enabling students exposed to the teaching method to perform better It also agrees with Ozmen (2008) who postulates that teaching-learning of topics in chemistry related to chemical bonding can be improved by the use of computer-assisted teaching materials.

The findings agree with Nduati (2015), on the effect of CAL on secondary school student achievement in chemistry. They indicate when CAL is used to teach acids and bases, electrochemistry and carbon and its compounds respectively. The post-test scores were statistically and significantly different in favour of experimental group indicating that integration of CAL enhances students’ understanding of chemistry concepts thus enabling students exposed to the teaching method to perform better than those taught using conventional methods. These results agree with observations of Okere (2014), Jesse, Twoili and Mandu (2014).

**Effect of Computer Assisted Teaching Strategy on Student’s Academic Achievement Based on Gender**

Biology achievement test was used to determine the performance of students based gender when exposed to CATS method of teaching. The researcher compared mean score of student’s performance by gender before and after administering the treatment to determine the significant difference in student achievement in Biology based on gender when taught using computer assisted teaching strategy Baringo County. The researcher administered a BAT pre-test to experimental and control groups involved in the study. The aim of the pretest was to ascertain whether
the students selected to participate in this study had comparable characteristics before intervention. The findings from the analysis of pretest mean scores were presented in the Table 6.

### Table 6. Pretest Mean Score Obtained by Students in BAT by Gender

<table>
<thead>
<tr>
<th>Group</th>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Pretest</td>
<td>Male</td>
<td>44</td>
<td>7.87</td>
<td>2.001</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>38</td>
<td>6.43</td>
<td>1.861</td>
</tr>
<tr>
<td>Control Pretest</td>
<td>Male</td>
<td>36</td>
<td>3.81</td>
<td>1.112</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>38</td>
<td>4.48</td>
<td>1.231</td>
</tr>
</tbody>
</table>

The results indicated the pretest mean score of biology based on gender for control and experimental group one category. Experimental group one (E1) the mean score for boys was 7.87 with a standard deviation of 2.001 and that of girls was 6.243 with a standard deviation of 1.861. On the other hand, the pretest mean score of biology per gender on control group one (C1) pointed out that boys had a mean score of 3.81 with a standard deviation of 1.112. Girls had a mean score of 4.48 with a standard deviation of 1.231. The researcher also sought to compare the experimental and control group posttest mean scores results of students so as to ascertain the effect of the CAT strategy of teaching compared to the performance of students based on gender. The findings from the analysis were presented in Table 7.

The result from Table 7 indicated the experimental and control group posttest mean score of biology based on gender. Experimental group (E1 and E2) the mean score of boys was 5.81 with a standard deviation of 1.93 and that of girls was 9.00 with a standard deviation of 2.99. On the other hand, the posttest mean score of biology based on gender for control group (C1 and C2) pointed out that boys had a mean score of 5.23 with a standard deviation of 3.59. Girls had a mean score of 6.16 with a standard deviation of 3.64.

### Table 7. Posttest Mean Score Obtained by Students in BAT by Gender

<table>
<thead>
<tr>
<th>Group</th>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Posttest</td>
<td>Male</td>
<td>64</td>
<td>5.81</td>
<td>1.93</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>99</td>
<td>9.00</td>
<td>2.99</td>
</tr>
<tr>
<td>Control Posttest</td>
<td>Male</td>
<td>80</td>
<td>5.23</td>
<td>3.59</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>81</td>
<td>6.16</td>
<td>3.64</td>
</tr>
</tbody>
</table>

Based on the findings, there was a significant difference in performance based on gender. The mean score of boys in the experimental group was 5.81 higher than that of boys in the control group, which was 5.23. On the other hand, the mean score of girls under experimental group was 9.00 higher than that of girls under control whose mean score was 6.16. This implied that those students exposed to a better method of instruction perform better than those exposed to traditional method of teaching. However, this requires a substantive justification. Therefore, in order to qualify or disqualify the stated hypothesis that there is no statistical significant difference in student academic achievement in Biology based on gender when taught using computer assisted teaching strategy in Baringo County, a t-test was carried out. The results of analysis are presented in the Table 8.

### Table 8. t-test Results of Posttest Mean Score Obtained by Students by Gender exposed to CATS

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean Difference</th>
<th>SD</th>
<th>t-value</th>
<th>Df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>163</td>
<td>14.81</td>
<td>6.016</td>
<td>1.531*</td>
<td>161</td>
<td>.000</td>
</tr>
<tr>
<td>Females</td>
<td>161</td>
<td>11.39</td>
<td>4.429</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*denotes the smallest value of α=0.05

The Table 8 indicated the significance test of the mean difference of mean score of students exposed to computer assisted teaching strategy (CATS) and traditional method of teaching. The posttests mean score for boys is 14.81 while for girls is 11.39. The findings indicated that the t-value = 1.531, p<0.05 which is an indicative of statistically significant difference in the achievement in biology subject between boys and girls when exposed to Computer Assisted Teaching Strategy. Therefore the study null hypothesis was accepted, which states that there is no statistical significant difference in student academic achievement in biology based on gender when taught using computer assisted teaching strategy.
Findings of the present study also concur with the findings of Gambari (2014), on a study on effect of computer animations and geometrical instructional model on mathematics achievement and retention among the junior secondary school students in Minna, Nigeria. The study examined the influence of gender on achievement of students taught geometry with computer animation packages and geometry instructional model respectively. The findings from the study showed that there was no gender effect on the achievement of males and females students taught geometry using computer animations and geometry instructional model. Therefore, this implies that irrespective of the instructional method, male and females students benefit equally.

The findings of the present study contradict the findings by Olumide (2013), on a study on computer simulation and packages and gender predictors of student achievement in biology. The main objective of the study was to determine the student academic achievement in biology when exposed to computer simulation packages in teaching of genetics in secondary school. The study reported a significant effect on gender on student academic achievement in biology when taught using computer assisted teaching strategy. Male students attained significantly higher scores in biology than females after being taught genetic using computers simulations.

In contrast to the findings of the study, the findings of Kiboss, Ndirangu and Wekesa (2004) on effect of computer mediated simulation program in school Biology on pupils learning outcomes in cell theory. The study findings showed no relationship between the participant’s gender and the learning outcomes. This finding also concurs with those of Chinywe and Chinyere (2010) who reported that there was no gender effect on academic achievement in basic ecological concept in biology.

CONCLUSION
Results of the study indicated that the CATS strategy is beneficial since it improves students’ academic achievement as compared to the traditional teaching strategy. Therefore, CATS can be used to supplement the traditional teaching strategy since it produces higher academic achievement than the use of traditional teaching strategy alone and students learn the instructional content faster and can retain what was learned better than the traditional teaching strategy. Therefore, there is a difference in achievement in biology between the student exposed to CATS and those exposed to traditional teaching strategy. Findings of the study indicated that CAT strategy enhances student academic achievement in biology. Therefore, when better method of instruction is applied, students’ performance changes in the positive as well.

RECOMMENDATION
Based on the findings of the study, the following recommendations were made: Biology teachers should be encouraged to incorporate the use of CAT strategy in teaching biology in order to enhance teaching biology and improving achievement in biology. If biology teacher adopt the use of CAT strategy in their teaching this may improve performance in biology in KCSE. Biology teachers should embrace the use of CAT strategy as a way of motivating students in order to have interest in the subject and improve academic achievement in biology.

REFERENCES


*****
ENVIRONMENTAL DYNAMISMS AND ENTREPRENEURSHIP EDUCATION

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ABSTRACT
This paper focuses on environmental dynamisms and entrepreneurship education in inculcating entrepreneurial propensity among university students in Kenya. Studies have shown that environmental dynamism moderates entrepreneurship education and entrepreneurial propensity. Universities can benefit from adapting to environmental dynamisms in their quest to teach entrepreneurship and create employment for entrepreneurship grandaunts. Globalization, market changes and technology leads to market imperfections leading to the formation of entrepreneurial opportunities. Entrepreneurial dynamisms lead to entrepreneurial propensity facilitating a change in attitude and resulting to a behavioural change towards entrepreneurship. Environmental dynamisms and environmental heterogeneity are significant predictors of entrepreneurial orientation and has a positive effect on entrepreneurial propensity. Environmental determinants affect risk taking and innovativeness which are considered as basic dimensions of entrepreneurial propensity. Environmental dynamism has a positive effect on firm performance. Economic evolution that is associated with creative destruction dominates the slow evolutionary dynamics of the ecosystem which consequently weakens its resilience. Knowledge base of the economic order is ever changing rapidly. Environmental dynamisms capabilities influence how new ventures are created and shape its resource position and capabilities which affect the new business performance. Environmental dynamics has a great effect on international firm performance. Environmental dynamisms are helpful to leverage entrepreneurial resources to benefit start-up businesses. An entrepreneurial ecosystem basically comprises of six domains. The domains of an entrepreneurial ecosystem includes a conducive culture, enabling policies and leadership, availability of finance, quality human capital, venture markets that are friendly and a range of institutional support. The above domains have elements which interact in a highly complicated and idiosyncratic ways. Each ecosystem emerges under a unique set of conditions within which the ecosystems operates. An entrepreneurial ecosystem can be industry specific. It may evolve from a single industry to include other industries. They are also graphically bounded, yet again cannot be confined to one specific geographical location. Entrepreneurial ecosystems are also not related to one particular city.

Definition of terms:
Environmental dynamisms: Environmental dynamisms describe the rate and unpredictability of changes in a firm’s external environment (Dess & Beard 1984).
Entrepreneurial Ecosystem: Is a set of interconnected entrepreneurial actors either existing or potential. They include entrepreneurial organization such as firms, financing institutions, universities, public sector agencies and also entrepreneurial process such as start-up enterprises, firms that highly connect either formally or informally, those that govern the performance within the local entrepreneurial environment (Rosted, 2012).
Propensity: Personal disposition to act on ones decisions. (Bateman & Crant, 1993; Krueger, 1993).
Entrepreneurship Education: Entrepreneurship education refers to specialized knowledge that inculcates in learners the traits of risk-taking, innovation, arbitrage and co-ordination of factors of production for the purpose of creating new products or services for new existing users within human communities. It is the process of providing individuals with the ability to recognize commercial opportunities and the knowledge, skills and attitudes to act on them (Mauchil et al., 2011: 1307).
Entrepreneurship: It is the dynamic process of creating incremental wealth. This wealth is created by individual who assume the major risks in terms of equity, time or career commitment of providing value for some products or services. The products or services may or may not be new or unique but value must somehow be infused by the entrepreneur by allocating the necessary resources and skills (Ronstadt 1984: 28).
Entrepreneur: Is an individual who exploits market opportunities through technical or organizational innovation (Frank H. Knight 1921).

INTRODUCTION
It is important that young people are integrated in the labour market upon graduation so that the many negative consequence of graduates’ unemployment is reduced as much as possible. Young people in Kenya account for more than 35 % of the total national population, of which 67% are the country’s unemployed workforce (Otieno, 2016). 1-2 graduates are still unemployed and only 1 in every 5 youth with university degrees are self employed. Both
public and private universities in Kenya churned out about 50,000 graduates every year. This number continues to pile into the number of the youths in Kenya who are unemployed estimated to be approximately 2.3 million (RoK, 2016). The introduction of entrepreneurship education in Kenya in 2005 was to address the issue of unemployment. The Government of Kenya viewed entrepreneurship education as a tool that can be used to address the unemployment problem, nevertheless, the problem seems to be escalating (Otieno, 2016). This results to the many problems that come as a result of unemployment such as, increased poverty rates, deskillling, social exclusion, and lack of motivation as well as mental health problems. It is due to lack of employment fresh graduates often finding themselves trapped in a vicious cycle. Fresh Graduates have not had an opportunity to get experience which is mainly sought by many employers which often prevents them from getting employed. Not being employed causes cultural and social isolation. It is as a result of feeling isolated that the youths in Kenya become prone to joining illegal groups that have become a big problem in Kenya. Studies have revealed that youth unemployment is also associated with an increase in drug and alcohol abuse, high level in crime, rape cases as well as early pregnancies which all can be attributed to unemployment.

Environmental Dynamism

Environmental dynamism is the frequent changes that occur in the environment. Wijbenga and Van Witteloostuign (2007), it is the rate at which the preference of customers and the services of organisations change over time. An act of entrepreneurship can ameliorate a constraint rather than being limited by it Rammel,( 2003). One of the ways in which this can be attained is by shifting resources, substituting resources. This would include adopting new technologies changing business models in order to bear on the problems. It may also include coming up with new forms of contracts in organization Rammel, (2003). Environmental constraint can be a function of an incentive within which entrepreneurial agents can see business opportunities.

A study by Zapalska (2003) revealed that various environmental factors affected entrepreneurs of New Zealand. Ullah (2011) in his study he emphasized that both environmental dynamisms and entrepreneurial heterogeneity are significant predictors of entrepreneurial orientation and that it has a positive effect on entrepreneurial propensity. Jalali (2012), in his study, he found that environmental determinants affected risk taking and innovativeness which are considered as basic dimensions of entrepreneurial propensity. Gul (2011) affirms that environmental dynamism has a positive effect on firm performance. Economic evolution that is associated with creative destruction dominates the slow evolutionary dynamics of the ecosystem which consequently weakens its resilience (Gual and Norgaard 2010). Metcalfe (1998) confirms that the knowledge base of the economic order is ever changing rapidly.

Environmental dynamisms capabilities influence how new ventures are created and shape its resource position and capabilities which affect the new business performance (Zott 2003). Jantunen (2005) analyzed the relationship between entrepreneurial propensity and internationalized performance and found that environmental dynamics has a great effect on international firm performance (Jantunen, 2005). Environmental dynamisms are helpful to leverage entrepreneurial resources to benefit start-up businesses (Wu, 2007). A study by Teece (2007) revealed that new ventures rely on environmental sensing capabilities and response capabilities so that they may dynamically adapt to a new complicated environment. New ventures achieve knowledge from the environment, configure it and integrate its operational capabilities at the end of it they internally change and effectively respond to new market demand and consequently realize the dynamic match between internal resources and external environment.

Entrepreneurship Education

The need for a person anticipating to become an entrepreneur in future as a result of skills acquisition cannot be over emphasized (Ibrahim & Lucky, 2014). In general, entrepreneurship has become a major concern to both scholars and policy makers. This is due to the understanding of the significant role it plays in economic and social growth (Brsncu, 2015). Entrepreneurship education has been considered as the avenue responsible in driving innovation, creates employment and is also essential for economic transformation and advancement (Hathaway & Litan, 2014). Many governments have considered entrepreneurship as a panacea that facilitates economic growth and especially in Counties that are still developing (Thornton, 2011).

Kenya being a developing Country has developed policies that encourage self-reliance after students graduate from the universities; consequently, it has made entrepreneurship studies compulsory to students, even those not taking business courses (Akambi, 2013). The possibility of entrepreneurially trained students to become entrepreneurs in future has continuously been a challenge to the government and to the scholars as well (Abidin & Bakar, 2005; Lucky & Maina, 2011).
Many students still have their eyes on white collar jobs and are still adamant on taking entrepreneurship as a career option despite its numerous advantages (Akambi, 2013). This situation has lead to increased rate of unemployment and an increase in poverty rate (Olotu, 2015). It has become evident that entrepreneurship education cannot transform them to become venture creators but also the propensity to become enterprising (Taatila & Down, 2012).

Entrepreneurship awareness has in the recent past touched almost every country in the world. This has been as a result of the increasing global competition that is based on creativity and innovation (Kelly, 2012). Past studies reveal the important role of entrepreneurship education with regard to creation of successful entrepreneurs particularly in Africa (Izedomni & okafor, 2010, Njoroge & Gatungu, 2013). Increased interest in entrepreneurship can as well be attributed to the changing structure of the western economy, the trend to downsize large companies, changing business patterns and the developing market economies such as China, India as well as Eastern Europe (Kelley, 2012). Ability to predict entrepreneurial characteristics draws attention to the significant role that entrepreneurship training and development plays in mentorship and grooming processes (Ibrahim & Ellis, 2002). It can be concluded that the relative importance of education in enhancing entrepreneurial traits is very high. This can be supported by the fact that many associations allocate a great deal of resources to educate their members through external and internal education opportunities (Chell, 2014).

Entrepreneurship has been considered as important force that boosts economic growth and creating Jobs (Haislip, 2011). There are a number of events which focus on entrepreneurship, for instance, the global entrepreneurship week which is celebrated around the world. The aim being to expose the benefits of entrepreneurship to people and encourages people to explore their business ideas and new ventures. Start up weekend is a non-profit organization with a global presence in over 100 countries which aims at promoting entrepreneurship networking in different parts of the world. During that time, a 54 hour weekend is organized whereby people with different backgrounds come together as teams and work throughout the weekend on developing and exchanging business idea (Schramm, 2012).

Many awards are frequently given to successful entrepreneurs, for instance the earnest and young entrepreneurs of the year awards which reach 50 countries worldwide. The global award for entrepreneurship research which was established in 1996 is also another very important event (Henrekson & Lundstrom, 2010). Since entrepreneurship is relevance to economic growth, social value as well as job creation it means more knowledge about entrepreneurship can therefore speed up the development of entrepreneurial activity for individual firms as well as the societies as a whole (Lohreke, 2010). The entrepreneurship concept is not limited to creating personal or shareholders value with private business; it can also be about creating value for customers’ wealth, shareholders wealth as well as creating benefits for other stakeholders and the society at large (Hitt, 2011). On the other hand, social entrepreneurship which is a type of entrepreneurship aims at solving societal and consequently creating social value (Austin, 2006). It is due to the realization of the importance in contributing to economic growth that entrepreneurship education has become a popular topic in various universities and consequently a substantial increase in the number of courses offered.

**Experiential Learning Theory**

Learning is an integral part of entrepreneurial process. It is the process though which human and social aspects holds much importance in economic factors Roe, (2006). Shane (2001), states that entrepreneurial activities change from time to time. The reason behind these changes is to respond to the venture requirement. The process is regarded as dynamic and complex and as a result, it becomes difficult to predict the behaviour that an entrepreneur may adapt in order to deal with the changes that are prevailing. Nevertheless, it’s possible to estimate the course of the entrepreneurial activities basing it on their behaviour in regard to their past experiences. An entrepreneur assumes different roles during the business process Gartners, (1988). Each role requires a unique set of skills whose possession would translate to a unique learning exercise Gartners, (1988).

This theory stipulates that from the time a business opportunity is recognized by an entrepreneur, to the time he/she is involved in the actual creation of an enterprise, the He/She is involved in many learning cycles which in the process adds to his/her experience. The experiential learning theory widely explains how people acquire knowledge which is translated into a behaviour which is later applied in the process of recognizing and acting on opportunities that come along their way as they organize, start and manage new ventures (Carswell, 2000). Much of the learning that takes place within an entrepreneurial context is experiential in nature Sullivan, (2000).

The cognitive aspect has dominated experiential entrepreneurial theory (Minti & Bygrave, 2001). The cognitive theorists consider learning as taking place in a vacuum. It is considered as in isolation from external factors and overlooks the role played by personal experiences. This study however considered beyond the cognitive aspect.
Personal experience is believed to influence an individual learning giving rise to a stream of experiences eventually contributing to the individuals’ career choice (Cope, 2005). Past studies reveal three major sources of learning (Azoulay, 2001). They include learning by repetition of efficient practices as well as learning by doing (Bazerman, 2001). It also includes memorizing new information which is as a result of incorrect knowledge and practices based on negative feedback Bazerman,( 2001). It’s because of the relationship between experiential learning and how it contributes in starting a venture that renders this theory relevant to the study.

**Global Perspective of Entrepreneurship Education**

It is due to the realization of the importance of entrepreneurship when it comes to its contribution to economic growth that entrepreneurship education has become an area of interest. This can be supported by the substantial increase in the number of courses that are offered in the institutions of higher learning (Kuratko, 2007). Over the past 20 years, 2000 courses have been offered in the 1500 schools in the United States (Kuratko, 2007). In China for instance, the universities have given a lot of attention to entrepreneurship education. The central education for China decided to require universities to provide entrepreneurship courses such as small business management, new venture creation, industry management and corporation management (Weber, 2014). The government of China hopes that such a progress would address the unemployment problem that the county is currently facing (Weber, 2014). Middle East countries have also recognized the role that entrepreneurship education plays and as a result has established incubators and entrepreneurship centres that are vital in motivating students into entrepreneurship (Weber, 2012). In Nigeria, developing entrepreneurial skills among its citizen is an objective in its 2020 vision (National Implementation plan) NIP, (2010). In Nigeria, entrepreneurship education is taught as part of the prerequisite for graduation. The aim of adopting entrepreneurship education was to equip graduates to become self-reliant to achieve faster economic development in the country (Effiong & Ele, 2012). Such a background is an indication that entrepreneurship plays a big role, not only to the individual undertaking it, but to the society as well as to the country as a whole.

**Kenyan Perspective of Entrepreneurship Education**

Since 1963, the Kenyan Government has been addressing the many challenges facing the education sector. This has been addressed through formation of commissions, committees and taskforces (Ominde Report 1964; Sessional paper No: 10 of 1965 and Mackay Report, 1981). The formed commissions and committees was to reform the education system that was inherited from the colonial Government to address its problem from its indigenous. There has been transformation of higher education and training in Kenya in the recent past (Kinyanjui Report, 2006; Some 2012) notwithstanding the national strategy for university education in Kenya.

Currently, there are 30 public universities in Kenya having increased from 23 in 2015 (Economic Survey, 2017). Public universities have 286,840 male and 192,472 female, while private universities has 43,547 male students and 41,645 female giving a grand total of 564, 507 (Economic Survey, 2017). Kenya is traditionally known for educating students to get employment in the public sector and the established Kenyan firms. Consequently, there has been less focus on enabling university graduates to focus on becoming entrepreneurs in future. With rapid change of economic and social conditions in Kenya, it is becoming increasing evident that entrepreneurship is the gap between the current and desired levels of economic growth.

In tandem with increased numbers of university grandaunts pouring into the job market every year and in cognizance of the critical role of entrepreneurship in creating job opportunities for the graduates, entrepreneurship programmes have become a function of the universities. Many universities have included entrepreneurship courses in their education curriculum spanning across several fields of specialization. Entrepreneurship courses are developed to encourage entrepreneurial behaviour, understanding the students’ propensity to choose self-employment as a career choice. The critical question has been not just ‘how to learn’ but also ‘how to teach’ entrepreneurship (Fayolle & Khandit, 2006) and this has, till now a continues quest in research. The International labour report (ILO) of 1972 created awareness on the need to focus more on entrepreneurship. The findings indicated that Kenyans lacked an entrepreneurial culture and those who operated businesses, their business were informal and petty trading, International Labour Organization (ILO), 1972). The Government development several development plans that aimed at inculcating an entrepreneurial culture among Kenyans which ran from 1979-1998 development plan (Gok, 1999). In 2005, a sessional paper was developed. Students in the institutions of higher learning should take a unit in entrepreneurship (sessional paper, 2005).
The importance of improving education level of Kenyans within the context of poverty reduction and economic growth is something that the Kenyan Government recognizes very well (RoK, 2005). The Government recognizes that unemployment is a major problem facing Kenya today (RoK, 2006). Creating an entrepreneurial activity and growth in Kenya and enterprise growth can be attained by creating an entrepreneurial culture among the Kenyan university students (Nelson & Mburungu, 2002). This is specifically important as focusing the students as soon as they leave the university may provide a long lasting solution to the problem of unemployment. University students are trained to be employment seekers as opposed to job creators. In spite of this puzzle entrepreneurship studies have paid little attention to entrepreneurial propensity, beliefs and values of entrepreneurship. Facilitating entrepreneurship interest among students in Kenyan universities is one of the ways to address youth unemployment (Maina, 2006). Despite the career guidance through entrepreneurial courses for undergraduates, some of them are taking longer time to secure a job after graduation (Maina, 2006).

**Under-graduates students in Kenyan Universities**

Employability of university graduates as well as their ability to start new ventures to enable them employ other Kenyans and at the same time contribute to the Countries economic well being are quite important to the mission of the university education system in Kenya. There is sufficient support that reveals that university students can be used as appropriate subjects in research on entrepreneurial propensity and behaviour (Khera & Benson, 1970, Krueger, Rally and Carsrud, 2000).

**Teaching Methods**

Popular teaching methods in entrepreneurship education are creation of business plan, case studies and lectures (Solomon, 2002). Many ways of delivering entrepreneurship education depends on the main objectives of the education (Hytti & O’ Gorman, 2004). If the objective of education is to increase the understanding of what entrepreneurship is all about, the effective way to accomplish that objective is the provision of information through public channels for example media, seminars as well as lectures sessions. The methods are effective since they will deliver message to a group of people within a short time period. If the objective on the other hand would be to equip individuals with entrepreneurial abilities, the preferred way would be to provide education in a form of training whereby the individuals are directly involved in the entrepreneurial process as it happens in an industrial training (Hytti& O’ Gorman, 2004). If the objective was preparing students to act as entrepreneurs, appropriate technique would be doing experiments in a controlled area (Ahamed , 2004).

Entrepreneurship teaching has been categorized into two “traditional methods”, referred to as normal methods and “innovative methods’ (action based method). The two methods have as well been referred to as either passive or active methods of teaching (Mwaslwa, 2010). The active method requires that the instructor facilitates learning and not to control and apply methods that would otherwise enable the students to have a self discovery during the learning session. In teaching entrepreneurship, the most commonly used methods are lecture methods, case study and group discussion method. The same methods are also applied in teaching other business courses. They are passive and less effective in helping refer an entrepreneurial intention among the learners (Bennett, 2006). Fiet (2000), states that some instructors who rely on these methods do so because they are easier to accomplish and require less investment. Other methods applicable in teaching entrepreneurship include films and vedio, guest speakers, role model, preparation of a business plan, project works, games as well as competition, setting small ventures, workshops, presentations as well as study visits. These methods are active and more appropriate in inculcating an entrepreneurial propensity among students (Mwasalwiba, 2010).

**CONCLUSION AND RECOMMENDATION**

In a global economy plagued by high levels of unemployment nothing would be better than helping students launch their own businesses by conducting market research, obtaining finance and creating viable businesses. The students would practically learn in the process and expand their practical knowledge. Universities can come up make entrepreneurship courses more engaging and make money by providing consulting services to small businesses and non-profit agencies. Conceptually entrepreneurship lecturer may lead the consulting team of students by formulating operational priorities and guide students throughout to consulting engagement. This scenario offers a win-win for all parties involved. Students learn practical stuff on how to cope with businesses and non-profit agencies pay affordable rates for high quality consulting services.

There is need to examine entrepreneurship education programme in Kenya to assess its effectiveness in providing a long-term solution to the problem of job creation in Kenya. The curriculum should be able to answer how relevant is
entrepreneurship education programme on employment creation? What is the place of entrepreneurship in science, technology and innovation? Such a curriculum would be on the road to facilitating the attainment of vision 2030 besides propelling the graduates towards the attainment of employment creation as opposed to job seeking in Kenya. Teaching Entrepreneurship education in school should start as early as primary school level where students are introduced to entrepreneurship and the mindset of white collar job is challenged. At the primary school level, a saving and investing culture when encouraged. It becomes critical in enhancing entrepreneurial spirit. One of the characteristics of true entrepreneurship is that it uses methods that encourage the exercise of judgement and critical faculties by the learner.

Technology has asserted its supremacy in today’s global economy. Higher learning institutions can jumpstart their students’ career by incorporating more technology topic in curricula. The idea is to teach strategic ways companies and entrepreneurs are using technology to innovate, communicate, advertise and make money. Universities can come up with partnership agreement with prominent businesses whereby universities send their students to work for them temporarily as internship. Entrepreneurship is an innovative way to foster practical knowledge and allow young professionals to rub elbows with established and experienced entrepreneurs this kind of a programme facilitates pairing of successful entrepreneurs and start up founders who serve as mentors and consequently offers to the students’ real world perspective of business and entrepreneurship.

REFERENCES


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HOME BASED CHALLENGES FACED IN MANAGEMENT OF PUPILS DISCIPLINE IN PUBLIC PRIMARY SCHOOLS OF IMENTI SOUTH, SUB COUNTY, MERU COUNTY KENYA

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ABSTRACT
Management is working with available resources through individuals for the purpose of achieving the required goal of an organization. Management is acknowledged to be essential for creating a peaceful school environment thus leading to smooth running of the school activities. Management of pupils discipline in primary school remains a concern to the school administrations and other stakeholders because without discipline the school activities may not run smoothly hence affecting teaching and learning. There is a growing concern from educators and other stakeholders that the poor results in Imenti South Sub County could be attributed to discipline. The purpose of this study was to determine the home based challenges in management of pupils discipline in public primary schools of Imenti South Sub County. The objectives of the study are home based challenges in management of pupils discipline in public primary schools of Imenti South Sub County. The study adapted descriptive survey research design. The study was conducted in public primary schools in Imenti South Sub County. The target population was 1,291 subjects comprising of 1,288 teachers and 3 Curriculum Supporting Officers. A sample of 303 respondents was selected. Data was collected using questionnaires and interview schedules. Reliability was tested through Cronbach's alpha. Data was analyzed using Statistical Package for Social Science (SPSS) version 21. Quantitative data was analyzed by use of descriptive statistics of frequencies and percentages. The study revealed that unfriendly home environment, lack of provision of basic needs and parents use of alcohol posed a challenge in management of pupils discipline. Thus parents should be sensitized on how to create positive environment. This study will help in realizing the priority areas of challenges and address such challenges for effective management of pupils discipline.

Keywords: Management of Discipline, home based challenges, home environment, parental involvement, parental education and parenting styles.

INTRODUCTION
Background of the Study
Management of discipline in the school context involves the skillful control and guidance of pupils in order to achieve the school’s desired outcomes (MOE & HRD, 1999). Management of discipline also involves the management of learners’ behavior within and outside the classroom (Luiselli, Putnam, Handler & Feinberg, 2005). Effective management of discipline is about developing proactive ways to prevent problems from occurring while creating a positive learning environment (Burden, 2016). This implies that for any school to have smooth running of its activities discipline should be maintained since it ensure no disruptions in the learning process. In United Kingdom every school has a behavior policy which lists the rules of conduct for pupils before and after school as well as during the school day. Public schools in United Kingdom often rely heavily on the maintenance of discipline by older boys (Driessen, Cameron, Thornton, Lai & Barnett, 2014). Detention is also one of the most common punishments in schools in the United Kingdom, Ireland, Singapore, Canada, Australia, New Zealand, and South Africa among other countries.

The South African schools Act Number 84 of 1996 Section 8 highlights that the management of discipline calls on teachers to make children feel emotionally comfortable and physically safe so that learners can develop self-discipline and accountability in their actions (Naong, 2007). In Tanzania, discipline is valued since it is seen as a way of maintaining order. One of the goal and responsibility in the school is management of pupils’ discipline. The teacher goal is to ensure discipline is maintained and the school activities run without interference (Semali & Vumilia, 2016). In Kenya, primary schools are managed by Board of Management on behalf of the patron and the minister. The head teacher is responsible for the day-to-day management of the school, including guidance and direction of teachers and other staff (Sekiziyivu, 2013).

In primary school in Kenya the head teacher’s management of discipline skills are therefore very essential because the general school and classroom discipline is dependent upon him or her (Okumbe, 1998). The head teacher plays an important role in managing discipline in that he monitors and maintains the behavior policy and classroom activity, being felt around the school in all the activities happening and dealing with staff which are all part of the
management functions (Darling-Hammon& Lieberman, 2013). The head teacher also oversee the evaluation of pupils, promotes welfare of pupils and staff, overall organizer and supervisor of all school activities and responsible for improving and maintaining the school standards (Jelly, Fuller & Byers, 2013).

Mukiri (2014) in a study on pupils discipline in Nairobi found out that in traditional society the question of children discipline was a joint effort for all members of society. That has changed since most children go to school from a very early age and therefore spend most of their time away from their parent. The parents are also busy making money thus the issue of discipline is mostly left to the teachers. Magana, (2009) in a study also observed that children were left and cared for by househelps who cannot instil discipline in the children. This implies that parents don't control the behavior of their children therefore children can learn undesirable behaviour and continue to practice them since no one is controlling them. Mihindou, (2011) noted that when children walk into the school they bring with them ambitions, pressure, expectations, physical and mental strengths and weakness, sometimes abuse, insecurities, stress and other problems. Lowry (2015) observed that problems like poverty, separation and divorce, stress, lack of basic needs among others will manifests themselves in the behavior of pupils in schools. Such problems pose a challenge in management of discipline.

Ngari (2014) in a study found out that prolonged conflict and hostility between parents and guardians may have a negative impact on children. Marital psychological abuse is a risk factor to children’s socio-emotional and behavior which may be taken to school. (Karuke, 2012) also found out that negative family environment contributes to behavior problem in children. This is because the family is the basic unit in which children learn values that guide their behavior throughout their lives. Pupils whose schools are located in areas with criminal activities may display the same in schools thus posing a challenge in management of pupils discipline in schools (Ngari, 2014). Poverty in the home can also tempt children to acquire vices such as stealing as they try to cope with life challenges (Magana, 2009). These children may bring such vices to school thus posing a challenge in management of pupils discipline in schools. When parents fail to meet learner's basic needs as stipulated by Maslow's hierarchy of needs (1970) the children are not motivated to learn and may result to abusive behaviour since their needs are not satisfied to the required extent (Kagema and Kagoiya, 2018). This implies that lack of basic needs may lead children to develop undesirable behaviour as they try to meet the needs. It is for this reason the researcher sought to establish the home based challenges faced in management of pupils discipline in public primary schools of Imenti South, Meru County, Kenya.

**Statement of the Problem**
Management of discipline involves the management of learners’ behavior within and outside classroom. Management of discipline is important because it ensures the learners display acceptable behavior and follow set rule and regulations, this helps to create a positive learning environment and smooth running of school activities. Management of pupils’ discipline has continued to face challenges due to emerging issues like drug abuse by pupils since research shows that the drug abuse age has gone down to 10 years, other pupils indiscipline behaviours include; fighting, bullying, lateness, absenteeism and drug trafficking. Observation by stakeholders on emerging cases and causes of indiscipline is that the emerging cases of indiscipline bring with them new challenges in management of pupils’ discipline. It is for this reason the researcher sought to establish the home based challenges faced in management of pupils discipline in public primary schools of Imenti South, Meru County, Kenya.

**Objectives of the study**
To investigate home based challenges in management of pupils discipline in public primary schools of Imenti South.

**Research Questions**
What are the home based challenges in management of pupils discipline in public primary schools of Imenti South

**Significance of the Study**
The findings of this study can be used by the curriculum developers, policy makers, school administrators, teachers, parents and researchers when dealing with matters of discipline. The findings of this study can help the curriculum developers to design policies that will cater for the challenges faced in management of pupils’ discipline so that the school managers can manage pupils’ discipline well irrespective of the challenges faced. The findings will act as a guide to school administrators, teachers and parents on their role in managing pupils’ discipline. The policy makers will also use the findings to come up with intervention measures in order to eliminate the challenges faced in management of pupils’ discipline. The study will also provide a base on which other research might be carried on.
Scope of the Study
The study was conducted in public primary schools of Imenti South Sub-County, Meru County, Kenya. The respondents were the head teachers, deputy head teachers, teachers and Curriculum Supporting Officer. The study addresses home based challenges faced in management of discipline in public primary schools. The study focused on home based challenges faced in management of pupils’ discipline in public primary schools of Imenti South.

LITERATURE REVIEW
Management of Pupils’ Discipline in Public Schools
Discipline is a system of training of mind and character so that the individual is guided to make reasonable decisions in a responsible manner. Discipline should lead to obedience, self-control and the development of an attitude of cooperation and being accountable for one’s behavior and action (MOE & HRD, 1999). Discipline is widely acknowledged to be essential for creating a peaceful school climate thus leading to sound academic performance. It is a basic requirement of successful teaching and learning in schools and necessary for effective school management and accomplishment of its goals (Odoyo, Odwar & Kabuka, 2016). Discipline is the administrative action taken by education managers to encourage employees to follow the standards, rules and organizational expectations (Okumbe, 1999). Ouma, Simatwa and Semen (2013) maintain that discipline is an important component of human behavior that without it an institution cannot function well towards the achievement of its goals. It is one of the main Management of discipline involves the skillful control and guidance of pupils in order to achieve the school’s desired outcomes (MoE & HRD, 1999). Management of discipline also involves the management of learners’ behaviour within and outside the classroom (Adam, 2003). Effective management of discipline is about developing proactive ways to prevent problems from occurring while creating a positive learning environment (Gretty, 2009). attributes of effective school, (Agbenyega, 2006).

Home Based Challenges
Home is important because it provides the first context for learning; language and mental skills, emotional and moral values as well as gender identity of a given culture (Mumbi, 2002). At home the parents are models and symbols of truth to be imitated by their children. The parents behavior and home environment, influences a child’s behavior and response to formal school system because parents are the initial teachers. From parents children learn social skills and respect for authority among others, (Sifuna et al, 2006). According to Olaian, Mohammed and Ajibora (2013) parents are very important in creating a healthy learning environment and lack of parental involvement is the major cause of disciplinary problems. A home characterized by quarrels and disagreements may have a negative effect on the child. Parents in such a relationship tend to direct negative behavior at their children who have a high chance of developing anti-social behaviours (Mumbi, 2002). Parental neglect has also been identified as a factor associated with increased pupils’ strikes and protests, (Murage, 2014). Permissive home environments contribute to learner misbehaviour (Kagema et al., 2018). This is because if parent spend little time with their children they are not able to monitor the behavior of their children hence the children may result in undesirable behaviour.

Most of the pupils’ misbehavior is rooted in a dysfunctional home life. When a pupil’s family struggles with extreme poverty characterized by poor living conditions, lack of basic necessities, small or congested shelter may affect the way children relate to life (Ong’era, 2007). Pupils growing up in such conditions may develop behavior difficulties like aggression, extreme fear and lack of confidence in self (Ong’era, 2007). When parents fail to meet learner’s basic needs as stipulated by Maslow’s hierarchy of needs (1970) it may impact on the learners negatively since they are not motivated to learn and as a result may be involved in abusive behaviors like stealing, child labour, prostitution, hawking among others (Kagema et al, 2018).

According to Ong’era, (2007), children become emotionally unsettled when there are family problems such as parental divorce. Broken families, disorganized homes with unstable relationships in the family may result into stress and eventually yield to behavior difficulties such as depression and aggression (Ong’era, 2007). Parents have a responsibility of instilling discipline in their children through guidance and counseling in the process of socializing children at the family level because good behavior is founded on positive parenting (Kilonzo, 2013). Failure of parents to communicate standards of behaviour or societal expectations to their children may lead learners in disruptive behavior since the children are not aware of what is expected of them (Magana, 2009). This implies that if parents fail in their duty to mould the behavior of their children then they are likely to bring these behavior problems with them when they come to school and this may pose a challenge to management of discipline.
Ouma (2013) in a study observed that boys in primary school were using alcohol and went to school drunk since alcohol was brewed in their homes. The parents did not control their children when at home hence children developed habits which made them truants and disobedient. Other parents did not provide their children with basic needs thus forcing them to steal while other pupils were coming to school late since they were being engaged in domestic chores in the morning and others had to attend to their sick parent who were already infected by HIV/AIDS before attending school (Ouma et al., 2013).

Mukiri (2014) in a study on pupils discipline in Nairobi found out that in traditional society the question of children discipline was a joint effort for all members of society. That has changed since most children go to school from a very early age and therefore spend most of their time away from their parent. The parents are also busy making money thus the issue of discipline is mostly left to the teachers. Mihindou, (2011) noted that when children walk into the school they bring with them ambitions, pressure, expectations, physical and mental strengths and weakness, sometimes abuse, insecurities, stress and other problems.

Lowry (2015) observed that problems like poverty, separation and divorce, stress, lack of basic needs among others will manifests themselves in the behavior of pupils in schools. This implies that these problems may affect the children negatively thus they end up posing a challenge in management of discipline. The studies that have been carried out on discipline many have focused on school environment as the only determinants of pupils discipline. These studies include (Okumbe, 2007; Ong’e-ra, 2007 & Njuguna, 2015) therefore, this study will seek to address other factors such as home based challenges and cultural based challenges faced in management of discipline.

Theoretical Framework
This study was guided by the Path-Goal theory propounded by House (1974). The theory is based on the leader-follower concept. The path-goal theory is a process in which leaders select specific behaviours that suit their followers' needs and the working environment so that they may best guide the followers through their path daily activities. In the process, the leader may assume different types of behavior or different leadership styles which include directive, supportive, participative and achievement (House, 1996). The leader may clarify the path by directive where he or she informs the followers on what is expected of them in terms of how to perform a task and scheduling and coordinating the work. This way the follower is well informed of what is expected of him or her. At home the parents are the leaders to be followed and be imitated by their children.

The parents should therefore display values and behaviour which will motivate children in doing the right thing. Parent can achieve this by removing unpleasant situation in the environment of the children. For instance they can avoid quarrels and fights in the presence of their children. They should also remove and discourage disrespect and disobedience through simple punishment and correcting their children when they do wrong. If the parents fail in this it may lead to indiscipline of their children. The children may carry the problem at school thus posing a challenge to discipline management.

Conceptual Framework
Conceptual Framework refers to a hypothesized model of pointing out the theoretical approach under the study plus the relationship connecting the dependent and independent variables to be tested in the study (Mugenda & Mugenda, 2003).

Independent variable | Intervening variable | Dependent variable
The independent variable is a variable that a researcher can manipulate so as to determine its effect on another variable. Challenges were the independent variables which included; home based factors. Management of pupils discipline was the dependent variable which attempt to indicate the total influence arising from the effects of the independent variable. These included; time management, respect towards authority, obedience and participation in school activities. The intervening variables, which may influence a study without the researcher being aware of, include; pupils’ personality and pupils’ age. The independent variables were manipulated by the researcher that determined their influence on the dependent variables. The independent variable influences dependent variables to change either way (positively or negatively).

**METHODOLOGY**

**Research Design**

The study adopted descriptive survey design. Descriptive survey design seeks to obtain information that describes existing phenomena by asking individuals about their perceptions (Mugenda&Mugenda, 2003). It also determines and reports things the way they are.

**Population of the Study**

The target population was 1,291 comprising of teachers and Curriculum Supporting Officers (CSOs) in Imenti South Sub-County.

**Sampling Procedures and Sample Size**

The researcher used simple random sampling to select teachers from the selected schools to participate in the study since it ensures that each member in the population under study has an equal chance of being picked (Mugenda&Mugenda, 2003). Purposive sampling was used to select the deputy head teachers head teachers and the CSOs. Head teachers and deputy head teachers were purposively selected for the study because they are the immediate managers of discipline in a school and bearers of records of discipline of pupils which were used by the researcher to get accurate data for the study. The sampling procedure ensured that the researcher got 20 head teachers, 20 deputy head teachers, 260 teachers and 3 CSOs as a sample size of the study. The sample size is shown in Table 1.

<table>
<thead>
<tr>
<th>Category</th>
<th>Target population</th>
<th>sample procedure</th>
<th>Population</th>
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<tr>
<td>Head Teachers</td>
<td>122</td>
<td>Purposive</td>
<td>20</td>
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<tr>
<td>Deputy Head Teachers</td>
<td>122</td>
<td>Purposive</td>
<td>20</td>
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<tr>
<td>Teachers</td>
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<td>Simple random</td>
<td>260</td>
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<td>Total</td>
<td>1,291</td>
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<td>303</td>
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</table>

**Data collection and data collection instruments**

Data was collected using questionnaires which was given to the respondents and collected later. The questionnaire had both open and closed ended questions. Interview schedules were also used.
Piloting
Wierma (1995) notes that piloting helps to identify ambiguities and irrelevant items. Piloting was conducted in the neighboring sub-county Imenti central. A piloting sample is made up of 10% of the sample size (Maina, 2013). For this study the pilot sample was 30 respondents and piloting was carried out in Imenti Central Sub-County, because they have similar characteristics. 2 head teacher, 2 deputy head teachers, 25 teachers and 1 CSO were involved.

Validity
Validity is the degree to which results obtained from the analysis of the data actually represent the phenomenon under study (Mugenda&Mugenda, 2003). The researcher ensured that the research objectives were adequately covered in the questionnaires to enhance content validity. Content validity refers to whether an instrument provides adequate coverage of a topic.

Reliability
According to Mugenda and Mugenda (2003) reliability is the measure of the degree to which a research instrument yields consistent results after repeated trials. A reliable instrument is one that produces consistent results when used more than once to collect data from the sample randomly drawn from the sample population (Orodho, 2009). Cronbach’s Coefficient Alpha was applied to access reliability. A reliability coefficient of at least 0.7 is acceptable for use. All the constructs had a Cronbach’s Alpha value above 0.6 which indicated adequate convergence or internal consistency.

Data Collection Procedure
The researcher obtained an introduction letter from Chuka University which facilitated acquisition of research permit from the National Commission for Science, Technology and Innovation (NACOSTI). The permit was presented to the Sub-County Director of Education (SCDOE), Imenti South Sub-county. The researcher then visited the selected schools and personally sought permission from the administration after which the researcher administered the questionnaires to all respondents; to be filled before collecting them back for data analysis. The questionnaires were distributed to the head teacher, deputy head teacher and teachers during break to avoid disruption of classes. The researcher took four weeks in data collection.

Ethical Issues
According to Orodho (2004) research is guided by rules and regulations which reduce conflicts and misunderstanding among researchers. Confidentiality for the collected data was adhered to.

Data Analysis
According to Orodho (2009) data analysis is the process of systematically searching and arranging field notes and data from the field with the aim of increasing one’s own understanding of that data and enabling the researcher to present them to others. Questionnaires were checked to remove incomplete items and multiple entries. Data collected was coded by assigning a number to each answer in the question. Coded data was then transferred to a computer sheet prepared using Statistical Package for Social Science (SPSS) version 21 for the purpose of analysis. SPSS is the most commonly used computer programme in educational research and is able to handle large amounts of data and its wide spectrum of statistical procedures purposefully designed for social sciences making it efficient.

The researcher yielded both qualitative and quantitative data. Descriptive statistics were used to analyze quantitative data which was obtained by use of frequency counts and percentages. Qualitative data was obtained from open ended questions which were organized into themes and were reported thematically in line with the objectives of the study. The results of data analysis were presented using frequency distribution tables.

RESULTS AND DISCUSSION
Response Rate
Response rate refers to the number of questionnaires sent to the field divided by the number of questionnaires completed and returned. A total of 303 questionnaires were distributed and delivered to the respondents but only 293 questionnaires were filled and returned. This represented 96% response rate which is quite suitable to make a finale for the study. According to Mugenda and Mugenda (2003), a response rate of 50% and above is considered adequate for reporting and analysis, 60% good and 70% and above response rate is very good for data analysis and reporting. Table 2 provides an illustration of the response rate by subsector.
Table 2. Response Rate

<table>
<thead>
<tr>
<th>Category</th>
<th>Target sample</th>
<th>Number that responded</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSOs</td>
<td>3</td>
<td>1</td>
<td>33.33</td>
</tr>
<tr>
<td>Head Teachers</td>
<td>20</td>
<td>18</td>
<td>90</td>
</tr>
<tr>
<td>Deputy Head Teachers</td>
<td>20</td>
<td>18</td>
<td>90</td>
</tr>
<tr>
<td>Teachers</td>
<td>260</td>
<td>256</td>
<td>98.46</td>
</tr>
<tr>
<td>Total</td>
<td>303</td>
<td>293</td>
<td>96.69</td>
</tr>
</tbody>
</table>

In Table 2 results indicate that 33.33% of CSOs responded to the interview schedule this is because, the CSOs have to go to the field to monitor primary schools and attend meetings, this made it difficult to find all the CSOs present in the office hence the 33.33% response rate. The response rate for headteachers, deputies and teachers was high with 90%, 90% and 98.46% respectively. Generally the overall response was 96.69%.

Home Based Challenges and Management of Pupils Discipline

The parents behavior and home environment, influences a child’s behavior and response to formal school system because parents are the initial teachers. From parents children learn social skills and respect for authority among others. Homes that these children grown in do influence children and their discipline and behavioral characteristics, and also influences the way they are treated by their parents. It is for this reason that this research aimed at finding out the influence of Home Based Challenges and Management of Pupils Discipline. A minority (2.7%) of the respondents said that parents do not use alcohol and this therefore did not compromise the pupils discipline. 21.6% replied that there was small extent of parents who use alcohol hence influencing the discipline of the pupils. However 7.9% of the respondents remained neutral about this matter. It was also found out that a majority of 36.0% of the respondents said that parents used alcohol in a great extent therefore leading to the influence of the pupils discipline in a great extent while 31.8% of the respondents said that there is a very great extent of parents who use alcohol and therefore this influenced the discipline of the pupils. A minority of 3.4% said that home environment never influenced pupils discipline in any extent while 24.3% agreed home environment influenced pupils discipline in a small extent.14.0% remained neutral about this matter while a majority of 36.3% agreed that home environment influenced pupils discipline in a great extent.

Table 4. Home Based Challenges and Management of Pupils Discipline

<table>
<thead>
<tr>
<th>Item</th>
<th>NE</th>
<th>SE</th>
<th>N</th>
<th>G</th>
<th>GE</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents use of alcohol</td>
<td>2.7</td>
<td>21.6</td>
<td>7.9</td>
<td>36.0</td>
<td>31.8</td>
<td>3.72</td>
</tr>
<tr>
<td>Home Environment</td>
<td>3.4</td>
<td>24.3</td>
<td>14.0</td>
<td>36.3</td>
<td>21.9</td>
<td>3.48</td>
</tr>
<tr>
<td>Parenting style</td>
<td>3.4</td>
<td>20.5</td>
<td>17.8</td>
<td>32.2</td>
<td>26.0</td>
<td>3.56</td>
</tr>
<tr>
<td>Parents as models and symbols to be imitated</td>
<td>4.8</td>
<td>26.0</td>
<td>14.7</td>
<td>34.9</td>
<td>19.5</td>
<td>3.38</td>
</tr>
<tr>
<td>Individualization and change in family structure</td>
<td>8.9</td>
<td>27.4</td>
<td>26.0</td>
<td>21.9</td>
<td>15.8</td>
<td>3.08</td>
</tr>
<tr>
<td>Parental divorce and separation</td>
<td>5.8</td>
<td>24.3</td>
<td>8.9</td>
<td>28.4</td>
<td>32.5</td>
<td>3.57</td>
</tr>
<tr>
<td>Provision of basic necessities</td>
<td>6.8</td>
<td>26.7</td>
<td>15.1</td>
<td>36.3</td>
<td>15.1</td>
<td>3.26</td>
</tr>
<tr>
<td>Motivation</td>
<td>9.6</td>
<td>31.8</td>
<td>16.4</td>
<td>31.8</td>
<td>10.3</td>
<td>3.01</td>
</tr>
<tr>
<td>Payment of School levies</td>
<td>11.6</td>
<td>22.6</td>
<td>22.3</td>
<td>29.5</td>
<td>14.0</td>
<td>3.11</td>
</tr>
<tr>
<td>Guidance and counseling</td>
<td>5.1</td>
<td>30.5</td>
<td>22.3</td>
<td>26.4</td>
<td>15.8</td>
<td>3.17</td>
</tr>
<tr>
<td>Average</td>
<td>6.2</td>
<td>25.5</td>
<td>16.5</td>
<td>31.3</td>
<td>20.2</td>
<td>3.33</td>
</tr>
</tbody>
</table>

A total of 21.9% said home environment influenced the discipline of the pupils in a very great extent. This is in line with Mumbi (2002) that a home characterized by quarrels and disagreements may have a negative effect on the children. Kagemeta et al. (2018) said permissive home environments contribute to learners misbehaviour. A minority of 3.4% said that parenting style never influenced pupils discipline in any extent while 20.5% said parenting style influenced the discipline of the pupils in a small extent. Further results indicated that 17.8% remained neutral concerning the style of parenting while a majority 32.2% said parenting style in a great extent influenced the discipline of the pupils while 26.0% said that parenting style influenced the discipline of the pupils in a very great extent. This is in line with Ngari (2014) in a study found out that prolonged conflict and hostility between parents and guardians may have a negative impact on children A minority of 4.8% said that parental models and symbols never influenced pupils discipline in any extent.26.0% of the respondents said that parental models and symbols influenced pupils discipline in a small extent.14.7% decided to be neutral about this matter while a majority of 34.9% agreed parental models and symbols influenced pupils discipline in a great extent.19.9% said parental models and symbols greatly influenced pupils discipline.
A minority of 8.9% said that Individualization and change in family structure never affected the discipline of the pupils in any extent. Majority (27.4%) said that Individualization and change in family structure influenced the discipline of the pupils in a small extent. 26.0% decided to be neutral about this matter while 21.9% and 15.8% said Individualization and change in family structure influenced pupils discipline in a great and very great extent respectively. The results indicated that a minority of 5.8% of the respondents said parental divorce and separation never influenced pupil’s discipline. 24.3% of the respondents replied that influenced pupil’s discipline in a small extent while 8.9% of the respondents remained neutral about this matter as majority (32.5%) said Parental divorce and separation influenced pupil’s discipline in a great extent. Only 3.57% said that Parental divorce and separation influenced pupils discipline in a very great extent. This is in line with Ong’era (2007) that children become emotionally unsettled when there are family problems such as parental divorce.

A minority of 6.8% of the respondents said that Provision of basic necessities never influenced the pupil’s discipline in any extent while 26.7% of the respondents said Provision of basic necessities influenced pupils discipline in a small extent. The majority (36.3%) said Provision of basic necessities influenced pupils discipline in a great extent while 15.1% said that Provision of basic necessities influenced pupils discipline in a very great extent. This supports Murage (2014) who observed that parental neglect is associated with increased pupils strikes and protests. The findings are further supported by Kagema et al (2018) that when parents fail to meet learners basic needs as stipulated by Maslows hierarchy of needs (1970) may impact on learners negatively. It also agreed with Lowry (2015) observed that problems like poverty, separation and divorce, stress, lack of basic needs among others will manifests themselves in the behavior of pupils in schools.

A minority 9.6% hinted out that Motivation never influenced the pupils discipline in any extent. Majority (31.8%) said that Motivation influenced discipline of the pupils in a small and great extent too. 16.4% of the respondents were neutral about this matter while 10.3% of the respondents said that motivation influenced pupils discipline in a very great extent. A minority (11.6%) of the respondents said that payment of school levies never influenced pupils discipline in any extent while 22.6% said that Payment of School levies influenced pupils discipline in a small extent. 22.3% of the respondents were neutral. Majority 29.5% said that Payment of School levies influenced pupils discipline in a great extent while 14.0% said Payment of School levies influenced pupils discipline in a very great extent. 5.1% said Guidance and counseling never affected the pupil’s discipline in any extent. Majority (30.5%) said that Guidance and counseling influenced pupil’s discipline in a small extent. 22.3% decided to be neutral about this matter while 26.4% said that Guidance and counseling influenced pupil’s discipline in a great extent as 15.8% said Guidance and counseling greatly influenced pupil’s discipline.

The results indicate majority of the respondents (31.3%) felt that that home based challenges influences the management of pupils discipline in primary school pupils to a great extent and 25. 5% indicated that home based challenges influences the management of pupils discipline in primary school pupils in a small extent. Further 6.21% of the respondents indicated that home based challenges never influenced management of pupils discipline and 20.2% indicated home based challenges largely influenced management of pupils discipline.

Results indicated majority of respondents said that home based challenges were as a result of polygamous families which lead to quarrelling and abusive words among the adults and eventually leading to alcoholism due to economic pressures which later translates into the mind of the pupils as a copied character. Results also showed that a minority said that neighbour’s characters influenced the discipline of the pupils in a small extent. It was also found out that majority 90% of the respondents said that to solve these home based challenges then pupils should be guided and taught to check on the friendship relations and effort to stop brewing of local liquor should be put in place. A minority said that parents workshops should be organized on termly bases.

The results also shows that a majority of respondents with a mean of 3.72 felt that parents use of alcohol was a home based challenge. Respondents who recorded a mean of 3.57 reported that parental divorce and separation was a home based challenge. On parenting styles respondents with a mean of 3.56 agreed that it was a home based challenge. Respondents who recorded a mean of 3.48 reported that home environment was a home based challenge. This is in line with Kagema et al. (2018) observed that permissive home environment contribute to learner misbehaviour. On parents as models and symbols to be imitated respondents with a mean of 3.38 reported that some parents were failing in their duty as models thus becoming a home based challenge. Respondents who recorded a mean of 3.26 reported that provision of basic necessities was among home based challenges. On guidance and counseling respondents with a mean of 3.17 reported that it was a home based challenge. 3.11 said
payment of school levies was a home based challenge. Another group of respondents with a mean of 3.08 reported that individualization and change in family structure was a home based challenge. Respondents who recorded a mean of 3.01 reported motivation as a home based challenge.

### Table 5. Strategies that can be employed to overcome home based challenges

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Frequency</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminars to educates parents on ways of instilling discipline</td>
<td>105</td>
<td>35.96</td>
</tr>
<tr>
<td>Parents participation in disciplining pupils at home</td>
<td>62</td>
<td>21.23</td>
</tr>
<tr>
<td>Parents to take up their responsibility</td>
<td>125</td>
<td>42.81</td>
</tr>
</tbody>
</table>

Table 5 shows that a majority 42.81% of the respondents said parents should take up their responsibility in order to overcome home based challenges, 35.96% indicated that conducting seminars to train parents on ways of instilling discipline would overcome home based challenges while minority 21.23% of the respondents said that parents should participate in disciplining pupils at home so as to overcome home based challenges.

### SUMMARY

The purpose of this study was to establish the challenges in management of pupils discipline in public primary schools of Imenti South Sub County, Meru County, Kenya. The objectives that guided the study included: to investigate the home based challenges in management of pupils discipline in public primary schools of Imenti South Sub-County. The study findings on the home based challenges in management of pupils discipline revealed that home environment in which the child was reared, lack of provision of basic necessities to learners, parent use of alcohol, parents as models and symbols to be imitated by learners and parenting styles used led to challenges in management of pupils discipline in a great extent.

### CONCLUSIONS

The findings of this study were based in reference to the specific objectives. The home based challenges faced were caused by unfriendly home environment in which the child was reared; lack of provision of basic necessities to learners, parent use of alcohol, failure of parents in their role as models and symbols to be imitated by learners and poor parenting styles making it difficult for the children to acquire moral values which then influences their behavior thus leading to challenges in management of pupils discipline in a great extent. The home environment that the pupils grow in is very important in molding a disciplined pupil. Lack of a positive home environment is a major cause of disciplinary problems.

### RECOMMENDATIONS

Based on the findings of the study, the researcher recommends the following: Active engagement of parents in maintaining pupils discipline by the school management so that they can help teachers to curb some behaviours in pupils. The parents should also be educated on their parental role to minimize cases of home based challenges in management of pupils discipline. From the findings of the study, the following areas were suggested for further research: Impact of guidance and counseling in enhancing management of discipline in public primary schools of Meru County. Impact of parent enlightenment in enhancing management of discipline in public primary schools of Meru County.

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ROLE OF CAREER GUIDANCE AND COUNSELING ON CAREER AWARENESS LEVEL OF SECONDARY SCHOOL STUDENTS IN MERU SOUTH DISTRICT-KENYA

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ABSTRACT
The aim of career guidance is to provide occupational needs of the students in preparation for integration into the world of work. This study was carried out to establish the role of career guidance and counseling programmes on career awareness level of students in secondary schools. The study used expost facto design and was carried out in secondary schools in Meru South District. The district has 40 schools which have 2766 form four students and 40 guidance and counseling teachers. A sample of form four students and another sample of guidance and counseling teachers were selected. The data was collected using self-scoring questionnaires; one for the students and the other one for guidance and counseling teachers. The data was analyzed using frequency percentages, rank sum test and chi-square methods. It was presented using tables, pie charts and bar graphs. The data was analyzed using the computer based Statistical Packages for Social Sciences (SPSS) Version 16.0. The study established that there was a significant relationship between career guidance and counseling and career awareness level of secondary school students of Meru South District. The findings show that there are insufficient career counselors in Meru South district, inadequate availability of counseling facilities and that majority of teacher counselors were not trained in guidance and counseling. The results of the study were used to highlight the needs of career guidance and counseling and to recommend improvements in secondary schools.

Keywords: Career, Career counseling, Guidance counselor, Vocational guidance

INTRODUCTION
The world of work today is rapidly changing and anyone entering into it needs to have a career understanding through awareness, exploration and education mainly with regard to Information Communication Technology (ICT). In Kenya today, it is possible and common to see an individual employed in an area that is neither in line with his or her professional training nor with his or her career interests. This is mainly because people go for what is available rather than what is in line with their personal interests, values, abilities and skills. Career attitudes include career interests, preferences and aspirations while career behaviors include choice of study subjects and career choices among others. The Ministry of Education Science and Technology (MOEST) directed all secondary schools to establish guidance and counseling programmes to cater for all developmental needs of students. This situation reflects a need to harmonize individual’s natural abilities and interests with their education and training in line with changing needs of the job market. This can be achieved through career guidance and vocational counseling. The MOEST defined vocational career guidance as the process of assisting an individual who possesses certain attributes, abilities and possibilities to select from many occupations one that is suitable to himself/herself and then to assist him or her prepare for it, enter and progress in it (MOE,2009). The school guidance counselor is the person to whom students go to seek help whenever they have difficulties in learning, career decision and life adjustment.

The school guidance counselor, according to MOE (2009) is charged with the following specific roles:
1. Keeping cumulative records of each student’s academic performances to analyse evaluate them for the purpose of understanding the student’s academic strengths and weaknesses;
2. Dealing with each student’s social and personal problems which may hinder or jeopardize the student’s academic progress;
3. Providing information services that include full range of educational occupational information and
4. Orientation of students to the school.

Considering the third role above, the guidance and counseling programme in secondary school has the responsibility of providing the career needs of students. Rao (1990) states that one of the major aims of education is to develop explicitly the life goals of students, which are desired and valuable. One of such life goals is the choice of an occupational career. The chosen career or occupation should be in harmony with the student’s interest, abilities and also fulfill one’s basic needs. Super (1990) and Roe (1996) agree that choosing a career is equivalent to choosing a way of life. Career planning and decision making normally does not involve one decision but a multiple of decisions which normally extend over a period of several years (Patterson & Creed, 2001). Thus students must have ready access to dependable sources of occupational information for exploration in the world of work. Gibson & Mitchell
(2003) define career development as that aspect of one’s total development that emphasizes learning about, preparation for, entry into and progression in the world of work. Career development can be referred to as the systematic sequence of acquisition of attitudes and behaviour associated with work related experiences which acknowledges the individuals entire lifespan (White, Cooper & Cox, 1992). The developmental approach to career growth was fully expressed in the work of Super (1957) and led to development of Super’s theory of life and career development. The theory outlines five stages of career development as: Growth (Birth to 14 years), Exploration (15 to 24 years), Establishment (25 to 44years), Maintenance (45 to 60 years) and Decline 65 years onwards.

Super (1996) describes the growth stage as characterized by identification with members of the family and school and an increasing awareness of interest and abilities. It contains the sub-stages of fantasy, interest and capacity. The exploration stage is characterized by increasing exploration of self in relation to work when tentative choices are made and implemented in mid-teens in preparation for transition stage of work entry and professional training. The establishment stage is the period during which an individual begins to feel established in a given field and can be separated into two sub-stages: trial and stabilization stage. During maintenance stage, little ground is often made in career development.

Finally, the decline stage coinciding with retirement from work is seen as time of deceleration but with a chance to take on new roles and activities. Using Super’s career development theory, the majority of students in Kenyan secondary schools can be considered to fall under exploration stage. Guidance and counseling has been established in secondary schools as per the recommendation of MOEST for the purpose of determining and providing for developmental needs of students. This would enable students to accomplish successfully the career developmental tasks expected of their stage of career development. These career developmental tasks include choice of subjects, knowledge of one’s own interests, abilities, values, attributes, listing of alternatives, preferred life-roles, tentative career choices and educational programme for exploration among others. It is against this background that this study attempted to establish the role of career guidance and counseling on career awareness level of secondary school students.

Objectives of the Study

1. To find out the role of career guidance and counseling programmes on career awareness level of secondary school students in Meru South district.
2. To establish the relationship between career information resources and availability of career counselors among secondary school students in Meru South district.

Theoretical Framework

Super’s theorizing model of life and career development has been adopted to form the theoretical framework of this study. Ospow & Fitzgerald (1996) critiquing on the model pointed out that the theory has a conceptual model and provided a convenient framework for research owing to its explicitness, its fairly high degree of empirical support and its substantially large number of applications to human affairs. The major weakness of this theory is the lack of integration of how the aspect of self-concept differentiation relates to developmental tasks or stages. However, of all the available models, Super holds the greatest promise of providing an ideal standard for the process involved in career development. The application of Super’s theory of education assessment and counseling is a major practical action of the theory.

According to Super’s theory of career development the age span for exploration stage is between 15 years and 24 years. The majority of secondary school students in Kenya is within this age bracket and can be considered to be in the exploration stage of career development. In this study the career developmental tasks as conceptualized by Super will be used to measure career maturity of the secondary school students. The individual career development will be measured in terms of his/her mastery of career tasks appropriate to his or her age level and lifestyle. For example, among the career developmental tasks of a secondary school student who falls under exploration stage include: education decisions on choice of study subjects, career interests, tentative career choice and choice of degree programmes of study. The achievement of career development will essentially be a compromise between the achievement of developmental tasks and factors affecting career development. In this study, students’ career awareness will also be measured by students’ knowledge of career choice and factors affecting the choice and planning specificity of planning and preparation for the preferred career and use of resources in obtaining occupational information.
METHODOLOGY

Research Design

The researcher used ex-post-facto research design. Kothari (1990) describes ex-post facto studies as attempts by researchers to discover causes even when they cannot control variables. This type of research is a systematic empirical enquiry in which the scientist does not have direct control of independent variables because their manifestations have already occurred or because they are inherently not manipulatable. The study targeted four students and guidance and counseling teachers in Meru South District. The district has 40 secondary schools. The researcher developed two questionnaires which were used to meet the objectives of this study.

The first questionnaire was administered to the student sample of form four students. The questionnaire provided information on bio-data, status and role of career guidance and counseling, career awareness, career planning and the students' perception of the role of career guidance and counseling. The raw data was classified according to categories of respondents and coded based on the objectives of the study. Each of the four objectives was analyzed using descriptive statistics of frequencies and percentages. Inferential statistics of chi-square were used to test the three hypotheses. Kathuri & Pals (1993) show how the statistics are calculated. The raw data was classified according to categories of respondents and coded based on the objectives of the study. Each of the four objectives was analyzed using descriptive statistics of frequencies and percentages. Inferential statistics of chi-square were used to test the three hypotheses.

RESULTS AND DISCUSSION

Analysis of Teachers’ Questionnaires

The study sought to determine the gender distribution of respondents. Majority (76.7%) of the respondents were females while 23.3% were males. This is indicative of gender bias in the allocation of career guidance and counseling positions. The respondents were requested to provide information about their age. The findings are presented in Table 1.

Table 1: Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 - 29 years</td>
<td>7</td>
<td>23.3</td>
</tr>
<tr>
<td>30 - 39 years</td>
<td>7</td>
<td>23.3</td>
</tr>
<tr>
<td>40 - 49 years</td>
<td>15</td>
<td>50.0</td>
</tr>
<tr>
<td>Above 50 years</td>
<td>1</td>
<td>3.3</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Professional Qualification

According to Table 1, the majority (50.0%) of respondents was aged between 40 – 49 years, 23.3% were aged between 20-29 years, and another 23.3% were aged 30 – 39 years old while those above 50 years of age made up 3.3%. Career guidance and counseling is like any form of counseling. The counselor should be of age so that he/she can be able to guide and counsel out of experience apart from training. The respondents were further requested to provide information about the highest professional qualification attained. The results are tabulated in Table 2. The vast majority (46.7%) of the teachers had qualified up to B Ed level, 30.0% up to Dip Ed and 10.0% up to M.Ed. This is an indication that majority of teachers were well qualified and therefore were in a good position to fill in the positions of career counselors.

Table 2: Professional qualification

<table>
<thead>
<tr>
<th>Professional Qualification</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.E.D</td>
<td>14</td>
<td>46.7</td>
</tr>
<tr>
<td>PDGE</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>DIP.ED</td>
<td>9</td>
<td>30.0</td>
</tr>
<tr>
<td>MED</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>Untrained</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Role of Career Guidance and Counseling Programmes on Career Awareness Level

Table 3 shows the level of career awareness amongst the respondents measured using different indicators. Respondents mainly strongly agreed (WA=4.13) they understood the definition of career. From the table, the respondents mainly agreed (WA = 3.83) that they were aware of information about the various careers available in the country. It was established that majority of the respondents agreed (WA = 3.06) that they were aware of the training requirements for various careers. The respondents further agreed (WA = 2.92) that they were aware of how jobs are related to each other. From the table, we can establish that respondents agreed (WA = 3.59) that they have the abilities in terms of career involvement. This is an indication that the majority of the respondents were well versed as far as the counselling program is concerned.

Table 3: Career Awareness

<table>
<thead>
<tr>
<th>Awareness</th>
<th>Student’s response, N = 370</th>
<th>WA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SA</td>
<td>A</td>
</tr>
<tr>
<td>Definition of career.</td>
<td>144</td>
<td>38.9</td>
</tr>
<tr>
<td>Various careers available in the country.</td>
<td>99</td>
<td>26.8</td>
</tr>
<tr>
<td>Training requirements for various careers.</td>
<td>24</td>
<td>6.5</td>
</tr>
<tr>
<td>Various jobs related to each other.</td>
<td>16</td>
<td>4.3</td>
</tr>
<tr>
<td>Abilities in terms of career involvement.</td>
<td>103</td>
<td>27.8</td>
</tr>
<tr>
<td>Career interests.</td>
<td>158</td>
<td>42.7</td>
</tr>
<tr>
<td>Career that would lead to optimum satisfaction.</td>
<td>139</td>
<td>37.6</td>
</tr>
<tr>
<td>Experience in career choices.</td>
<td>50</td>
<td>13.5</td>
</tr>
<tr>
<td>Career environment in which they would work best.</td>
<td>87</td>
<td>23.6</td>
</tr>
<tr>
<td>Career capabilities and limitations.</td>
<td>60</td>
<td>16.2</td>
</tr>
</tbody>
</table>

Hypothesis Testing

The study had three hypotheses. In subsequent sections are the findings of the hypothesis testing. The first hypothesis was there was no significant relationship between guidance and counseling programmes and career awareness level of secondary school students in Meru South District. Table 4 summarizes the Chi square tests.

Table 4: Chi Square test (Awareness level)

<table>
<thead>
<tr>
<th>Awareness</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Various careers available in the country.</td>
<td>Chi Square</td>
<td>12.217</td>
<td>4</td>
</tr>
<tr>
<td>Training requirements for various careers.</td>
<td>Chi Square</td>
<td>25.195</td>
<td>4</td>
</tr>
<tr>
<td>Various jobs related to each other.</td>
<td>Chi Square</td>
<td>13.898</td>
<td>4</td>
</tr>
<tr>
<td>Career interests.</td>
<td>Chi Square</td>
<td>10.583</td>
<td>4</td>
</tr>
<tr>
<td>Career that would lead to optimum satisfaction.</td>
<td>Chi Square</td>
<td>24.168</td>
<td>4</td>
</tr>
<tr>
<td>Experience in career choices.</td>
<td>Chi Square</td>
<td>37.899</td>
<td>4</td>
</tr>
<tr>
<td>Career environment in which they work best.</td>
<td>Chi Square</td>
<td>19.021</td>
<td>4</td>
</tr>
</tbody>
</table>

Chi square computation revealed that there was a statistically significant relationship between career guidance and counseling programmes in school and various careers available in the country p=0.016<0.05; training requirements for various careers p=0.000<0.05; various jobs related to each other p=0.008<0.05; career interests p=0.032<0.05; career that would lead to optimum satisfaction p=0.000<0.05; experience in career choices p=0.000<0.05; career environment in which they work best p=0.001<0.05. In conclusion, there was a significant relationship between career guidance and counseling programs in school and career awareness level of secondary school students and therefore we reject the null hypothesis that there was no significant relationship between career guidance and counseling programs in school and career awareness level of secondary school students. The second hypothesis was: there is no significant relationship between career information resources and availability of career counselors. Findings are presented in Table 5. The Chi-Square computation revealed that there was no statistically significant relationship between availability of career counselors and career information resources p=0.064>0.05. Therefore, it
could be we accepted that the null hypothesis that there is no significant relationship between availability of career counselors and career information resources.

Table 5: Chi Square test (Career information resources)

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>3.438(b)</td>
<td>1</td>
<td>.064</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity Correction(a)</td>
<td>2.877</td>
<td>1</td>
<td>.090</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>3.430</td>
<td>1</td>
<td>.064</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher’s Exact Test</td>
<td></td>
<td></td>
<td></td>
<td>.081</td>
<td>.045</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>3.429</td>
<td>1</td>
<td>.064</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>370</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SUMMARY**

Career guidance and counseling services play an integral part in the overall student services department of any elementary or secondary school. The aim of career guidance and counseling programs in schools is to help students to make systematic judgments of the relative effectiveness with which goals are attained in relation to specified standards.

**CONCLUSIONS**

The study established that:
1. Majority (70%) of the teacher-counselors were not trained in guidance and counseling therefore, they did not offer professional career guidance and counseling services. P=0.016<0.05
2. There was a significant relationship between career guidance and counseling programmes in school and career awareness level of secondary school students.
3. There was no statistically significant relationship between availability of career counselors and career information resources p = 0.064 > 0.05.
4. There was insufficient career counselors in schools in Meru South District; inadequate availability of counseling facilities; and that the qualification of career guidance and counseling personnel has impact on career awareness levels of secondary school students.

**RECOMMENDATIONS**

This study recommends to the provision of professional guidance and counseling in secondary schools in Kenya that:
1. All secondary schools should have teacher career counselors appointed on the basis of their qualifications and interest in the area.
2. The Ministry of Education should reduce the school academic workload for career teacher counselors so as to give them an ample time to cater for the ever increasing counseling needs of the students.
3. The school administration should set specific times of the day when students are supposed to attend counseling sessions and also increase the frequency from the current once per month to a daily affair so that students can access these services more easily.

**REFERENCES**


*****
EFFECTIVENESS OF PRIMARY PREVENTIVE COUNSELLING IN ADDRESSING PROBLEM BEHAVIOURS OF STUDENTS IN SECONDARY SCHOOL OF IGEMBE SOUTH SUB-COUNTY, MERU COUNTY, KENYA

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ABSTRACT
Addressing students’ behaviour problems has become a major challenge in secondary schools in Kenya. This could partly be attributed to inadequate counselling approaches. The purpose of this study was to establish the effectiveness of primary preventive counselling interventions in addressing behaviour problems of secondary school students in Igembe South Sub-County. Descriptive survey research design was used. The study involved 42 public secondary schools with a total enrolment of 8,017 students. Accessible population was 1,974 Form Three students from which a sample of 317 was drawn using simple random sampling. Further, 15 Teacher Counsellors and 15 Deputy Principals from the selected schools were purposively sampled to participate in the study. Data was collected using three different questionnaires designed for respective respondents. Expert judgement from the university supervisors was used in determining the content, construct and face validities. A pilot study was conducted in three sampled secondary schools in Igembe North Sub-County which had similar conditions. Cronbach alpha coefficient was used to estimate the reliability of the instrument and a reliability coefficient of 0.857 obtained was appropriate for the study. Analysis involved use of frequencies, percentages and means. The findings established that primary preventive counselling was effective in addressing common problem behaviors of secondary school students. It is recommended that teacher counsellors should be empowered through training and by setting a favourable counselling environment in all the secondary schools to efficiently identify antecedents and symptoms of problem behaviors, adequately address and prevent secondary school students’ problem behaviors. The findings are important in helping students develop positive and acceptable behaviors and also form part of relevant data to scholars for future researches on primary preventive counselling in addressing students’ problem behaviors in secondary schools in Kenya.

Keywords: Preventive counselling, Secondary prevention, Behaviour problems, Mental health

INTRODUCTION
Guidance and counselling is a broad term that generally describes the approaches used to help solve and alleviate the problems affecting the individual’s physical, emotional and mental wellbeing to bring about behaviour change and transformation of the individual or group (Mutie & Ndambuki, 2004; Wango, 2006). Conventional counsellors mainly offer corrective and rehabilitative solutions rather than preventing the problems behaviours and their consequences to the individuals or society only focus on anticipation and avoidance of human psychosocial conflicts and problems (Mutie & Ndambuki, 2004; Wango, 2006). It uses different theoretical approaches, strategies and interventions at each level targeting individuals, groups and populations depending on the behavioural or psychological wellbeing. Preventive Counselling on the other hand is mainly concerned with identifying, Addressing and reducing problem behaviours that are not acceptable by the societal standards, norms, morals, values, and ethics. Such behaviours could be detrimental to the individual or society’s wellbeing (Caplan, 1964, Hage & Romano 2001). Much prevention intervention focussed on enhancing human functioning and reducing psychological distress (Catalano, Berglund, Ryan & Hawkins, 2002). It promotes health and wellbeing of the individuals, community and the nation; reduces the cost of mental health care and controls occurrence of problem behaviours (Satcher, 2000; Tolan & Dodge 2005; World Health Organization, 2008). Bull, (2011) said infusing and applying the modern technological development helps to further the benefits and effectiveness of preventive counselling interventions on problem behaviours.

Scholars like Stone & Archer, (1990); Hage & Romano, (2000); Maintin & Thomas, (2000) literally viewed prevention as the act of stopping something from happening. According to Caplan (1964) preventive counselling has primary; secondary and tertiary prevention approaches. The approaches aim to control reduce or stop the problem behaviours from actually occurring as opposed to conventional guidance and counselling approaches that are only applied to remedy or treat problems that have already occurred. When problem behaviours like absenteeism, truancy, drugs and alcohol abuse, adolescent sex and teenage pregnancies, violence and arson happen, they greatly affect the students and the parents indirectly (Njoroge, 2005; Kyalo, 2010).
Primary Prevention that was viewed by Felner & Silverman (2000) as real preventive intervention focuses on preventing a problem from occurring and designed to reduce the incidences, prevalence and impact of the problem behaviours to promote health, social, moral and physical well-being of the individual or society (Cowen, 1996). Primary prevention approach also seems to have some remediation and rehabilitative interventions depending on the problem behaviour or disorder in question (Schwartz & Waldo, 2003; Schwartz, Griffin & Russell, 2006). For effective intervention, Primary prevention should be applied at early stages in life since the children and adolescents are mainly at higher risk of problem behaviours like drugs and substances abuse, violence, teenage sex and pregnancies, sexually transmitted infections and other forms of deviancy (Weisberg et al., 2003).

Early preventive interventions should focus on reducing the risks and causes of problem behaviours or psychological dysfunctions and promote positive behaviour development in individuals and society wellness. (Conyne, (2004); Durlak et al., 2010). Catalano et al., (2002) had the opinion that primary prevention promotes health and wellbeing of the individuals, community and the nation by reduces the cost of mental health care and controls occurrence of problem behaviours. This was supported by Satcher, 2000; Tolan & Dodge 2005; World Health Organization, 2008 that stressed the importance of prevention in Addressing the problem behaviours in the individuals or society over a certain period by Addressing their antecedents before they result to behaviour problems.

The Universal Prevention intervention can contemporarily be applied in preventing common students’ problem behaviours by setting out the requirement for the acceptable behaviour. Universal Prevention is used to address all students during assembly days. This is by putting in place a participatory school-wide plan that involves the students clearly stating and defining the behavioural expectation in or outside the school. It requires all the students to meet the behavioural expectations impartially and reinforcing when the set out behavioural expectations are met by the students. The intervention should focus on immediate and consistent response to the inappropriate behaviours shown by the students ensuring follow-up and data collection for appropriate decision making (Schwartz & Waldo, 2003).

This is crucial level in which much behaviour expectations can be achieved by putting in place interventions in a school wide program that involves all staff, students, parents, community and the environment (Sharon et al., 2002). Most of the physical problem behaviours are caused by both external and internal factors that relate to the family background, classroom and school environment, interrelationship with peers and teachers, communication breakdown, culture and societal norms and ethics, the genetic, physiological and morphological changes in an individual (Rizzo & Kim, 2005; Price & Anderson, 2007; Yee, Fox & Bailenson, 2009).

Most of the problem behaviours expressed by the students have their origins at homes, hence students from families deranged with poverty, domestic violence, conflicts, separation or divorce and autocratic parenting may depict such behaviours at school (Show, 2000; Solomon, 2005). The physical problem behaviours need to be prevented or reduced early enough before they negatively impact on the students’ way of life, conduct and academic performance. The primary interventions should focus on all the students in a classroom or non-classroom activities as it targets to improve the school environment, student communications, interpersonal relationships and discipline in the school. It will also reduce the referrals on behavioural problems, save time wasted in instructions, counselling and handling the problem behaviour cases (Watson & Griffin, 2009).

Externalising behaviours that can be controlled at this level are expressed in emotions, feelings, and aggression (Njoroge, 2005; Muchiri, 2008). Teaching and inculcating good moral such as honesty, trustworthy, obedience, uprightness, faithfulness and sincerity associated with the acceptable school rules, ethics, norms and values can promote acceptable behaviours at the same time discouraging the antisocial behaviours in students (Greenberg, 2002; Trevino, 2006). Students can easily learn the morally acceptable acts, good moral decision-making skills, moral judgement and good moral behaviours (Bernardi et al., 2004; Muchiri, 2008). This can promote acceptable social behaviours, social interactions and practices (socialization) such as giving gifts, helping others, sharing notes and group working impacts students’ intentions, emotions, feelings, and actions. It also influences their thoughts and attitudes towards others enhancing good social behaviours (Kochanska & Aksan, 2006; Poulou, 2005; Adler, 2002). The conventional Counselling approaches currently applied in schools are ineffective since they greatly focused on post-crisis interventions (crisis counselling) and remediation ignoring the pre-crisis (Preventive counselling) that is concerned with identifying, Addressing and preventing the students’ problem behaviour (Wambui, 2005; Samatwa, 2007: UNESCO, 2012). It is for this reason that the researcher sought to establish the effectiveness of preventive counselling in addressing the problem behaviours of secondary school students in Igembe South Sub-County.
Objectives
The objective of the study was to determine the effectiveness of primary preventive counselling in Addressing problem behaviours of students in secondary school of Igembe South Sub-County, Kenya.

METHODOLOGY
The study targeted individual students at various levels of problem behaviour development through primary, secondary and tertiary preventive counselling interventions. The study adapted a descriptive survey research design and involved 42 public secondary schools with a total enrolment of 8,017 students. Accessible population of the study was 1,974 form three students from which a sample of 317 respondents was drawn to participate in the study through simple random sampling. Further 15 teacher counsellors and 15 deputy principals from the selected schools were purposively sampled to participate in the study. The study had a total sample of 347 respondents. Data was collected using questionnaires. To ensure validity of the instruments, the researcher sort expert judgement and opinion from the university supervisors in determining the content, construct and face validities in addition to searching relevant literature.

To test the reliability of the instruments a pilot study was conducted in three sampled secondary schools in Igembe North Sub-County which had similar conditions. Cronbach’s alpha coefficient method was used to estimate the internal consistency and reliability of the instruments. The reliability coefficients of 0.903, 0.875 and 0.794 were obtained for the students, teacher counsellors and deputy principals respectively. An average reliability coefficient of alpha scale of 0.857 was arrived at indicating that the instruments used were reliable. Data collected was analysed using the Statistical Package for Social Sciences (SPSS) version 20.0 and presented using frequency tables, percentages, charts and graphs. Qualitative analysis was done by determining the effectiveness of primary preventive counselling from the information collected through questionnaires. The results of the analysed data were presented in frequencies, percentages and means.

RESULTS
The study aimed at testing how effective is Primary Preventive Counselling in addressing problem behaviours of secondary school students in Igembe South Sub-County. The information was obtained from 317 form three students, 15 teacher counsellors and 15 deputy principals whose analysed data produced the following results.

Demographic Characteristics of the Respondents
The students represented 91.36%, teacher counsellors 4.42% and the deputy principals 4.42%. Of the students 58.99% were girls and majority (75%) were aged between 18-20 years, 16.14% between 12-17years and 7.25 % between 21-24years. Majority of the teacher counsellors were females (73.33%) and males (26.67%) with most them aged between 25-32years (60.0%) while 40.0% between 33 to above 37 years. 60.0% of the teacher counsellors were degree holders, 26.67% diploma holders and 13.33% undergraduates. Trained teacher counsellors were 26.67% while the untrained ones were 73.33%. The deputy principals were 80.0% males and 20.0% females with majority (60.0%) aged between 25-36 and 40.0 % aged 37 years and above.

Responses on effectiveness of Primary Preventive Counselling
The researchers sought information from the respondents to establish the effectiveness of primary preventive counselling in addressing problem behaviors of secondary school students. The questionnaires had seven itemized statements specifically designed to obtain required information on the effectiveness of primary preventive counselling. A five-point Likert scale rated between 1 and 5 with 5=Very Effective; 4=Effective; 3=Unsure; 2=Less Effective and 1=Ineffective was used. The findings were presented in form of frequencies and percentages with 1.0-19.9% meaning it is ineffective, 20.0-39.9% less effective, 40.0-59.9 average, 60.0-79.9 effective and 80.0-100% very effective for the statements related to primary preventive counselling in addressing the students’ problem behaviors. Findings of students’ responses on the effectiveness of primary preventive counselling in addressing the students’ problem behaviors are presented in Table 1.

The findings in Table 1, the students agreed that primary preventive counselling was very effective with 91.0% and only 09.0% showing that the approach was ineffective. The approach was effective in enlightened students on dangers of drug abuse with 93.4%, risks on STIs with 93.2%, motivated them towards good and acceptable behaviors with 95.8% and uplifting their self-esteem 77.7%. Griffin, (1994); Chepkonga, (2009) and Muinde, (2015) in their studies in their studies found that counselling was effectiveness in inculcating appropriate behaviors in
students. Findings of the teacher counsellors’ responses on the effectiveness of primary preventive counselling in addressing problem behaviors in secondary school students are shown in Table 2.

The findings from teacher counsellors in Table 2 showed that the primary preventive counselling was effective with 76.2% and only 23.8% indicating it was less effective. They indicated that the approach was effective in promoting good behavior in students with 93.4% and in educating students on dangers of STIs (86.7%). It was effective also in enlightening students on dangers of drug abuse with 73.3%; in uplifting students’ self-esteem with 73.4% and in improving interactions between students and teachers with 66.6%. Studies by Kenani (2011); Kyriacou (2001) and Goldstein (1995) support the findings on improved interaction among students and teachers and its positive impact on students’ behaviors. Living in harmony with other students and teachers makes the students feel cared for, raises their self-esteem and attachment to their school.

The researcher sought information from deputy principals on effectiveness of primary preventive counselling and the findings are as shown Table 3.

<table>
<thead>
<tr>
<th>Responses</th>
<th>VE</th>
<th>E</th>
<th>U</th>
<th>LE</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>In enlightening students on dangers of drug abuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Promoting good behaviors in students</td>
<td>116</td>
<td>37.4</td>
<td>173</td>
<td>55.8</td>
<td>9</td>
</tr>
<tr>
<td>Uplifting students’ self-esteem in school</td>
<td>235</td>
<td>75.8</td>
<td>62</td>
<td>20.0</td>
<td>6</td>
</tr>
<tr>
<td>Teaching students’ importance of dialogue in presenting their needs in school</td>
<td>203</td>
<td>65.5</td>
<td>73</td>
<td>23.5</td>
<td>18</td>
</tr>
<tr>
<td>Improving interaction among students and teachers</td>
<td>170</td>
<td>54.8</td>
<td>101</td>
<td>32.6</td>
<td>17</td>
</tr>
<tr>
<td>In educating students on the risks of teenage sex and STIs</td>
<td>229</td>
<td>73.9</td>
<td>51</td>
<td>16.5</td>
<td>8</td>
</tr>
<tr>
<td>In cautioning students on the use of sexually explicit materials and clothes</td>
<td>212</td>
<td>68.4</td>
<td>79</td>
<td>25.5</td>
<td>5</td>
</tr>
<tr>
<td>In teaching students’ importance of dialogue in presenting needs in school</td>
<td>212</td>
<td>68.4</td>
<td>79</td>
<td>25.5</td>
<td>5</td>
</tr>
<tr>
<td>Average Mean</td>
<td>184.4</td>
<td>59.5</td>
<td>97.7</td>
<td>31.5</td>
<td>10.7</td>
</tr>
</tbody>
</table>

Table 1. Students’ Responses on the Effectiveness of Primary Preventive Counselling in Addressing Students Problem Behaviors

<table>
<thead>
<tr>
<th>Responses</th>
<th>VE</th>
<th>E</th>
<th>U</th>
<th>LE</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enlightening students on dangers of drug abuse</td>
<td>6</td>
<td>40.0</td>
<td>5</td>
<td>33.3</td>
<td>1</td>
</tr>
<tr>
<td>Promoting good behaviors in students</td>
<td>8</td>
<td>53.4</td>
<td>6</td>
<td>40.0</td>
<td>0</td>
</tr>
<tr>
<td>In uplifting self-esteem in school</td>
<td>7</td>
<td>46.7</td>
<td>4</td>
<td>26.7</td>
<td>2</td>
</tr>
<tr>
<td>In teaching students’ importance of dialogue in presenting needs in school</td>
<td>7</td>
<td>46.7</td>
<td>5</td>
<td>33.3</td>
<td>1</td>
</tr>
<tr>
<td>In improving students &amp; teachers interaction</td>
<td>5</td>
<td>33.3</td>
<td>5</td>
<td>33.3</td>
<td>2</td>
</tr>
<tr>
<td>In educating students on the risks of teenage sex and STIs</td>
<td>6</td>
<td>40.0</td>
<td>7</td>
<td>46.7</td>
<td>0</td>
</tr>
<tr>
<td>In cautioning students on the use of sexually explicit materials and clothes</td>
<td>4</td>
<td>26.7</td>
<td>5</td>
<td>33.3</td>
<td>2</td>
</tr>
<tr>
<td>Average Mean</td>
<td>6.1</td>
<td>41.0</td>
<td>5.2</td>
<td>35.2</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Table 2. Teacher Counsellors’ Responses on the Effectiveness of Primary Preventive Counselling in Addressing Problem Behaviors in Secondary School Students
In the findings in Table 3 the deputy principals indicated that primary preventive counselling was effective with an average rating of 70.5% and 29.5% had said it was less effective. In their opinion, the approach was effective in teaching students the importance of interaction among them and teachers at a rating of 77.0% and of dialogue in presenting their issues at 69.3%. The approach was effective also in educating and cautioning the students on risks and consequences of problem behaviors such as drug abuse at 69.3%; exposure to explicit sexual materials and dressing at 69.3%; teenage sex, pregnancies and STIs at 61.6%. The students moral behaviors are greatly influenced either negatively or positively by the exposure to social media, internet, radio and television. They encounter personalities and information they associate with and copy the styles they observe as Mahega, (2014) explained in her study done in Tanzania. In her study done in Kitui secondary school, Muinde R., (2015) revealed that uncensored internet and social media use exposes the students to inaccurate information and inappropriate role models that greatly influences their moral behaviors.

**Table 24. Deputy Principals’ Responses on the Effectiveness of Primary Preventive Counselling in Addressing Students Problem Behaviors**

<table>
<thead>
<tr>
<th>Respondents ratings</th>
<th>VE</th>
<th>E</th>
<th>U</th>
<th>LE</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>In enlightening students on dangers of drug abuse</td>
<td>5</td>
<td>38.5</td>
<td>4</td>
<td>30.8</td>
<td>2</td>
</tr>
<tr>
<td>In promoting good behaviors in students</td>
<td>8</td>
<td>61.5</td>
<td>1</td>
<td>07.7</td>
<td>1</td>
</tr>
<tr>
<td>In uplifting students’ self-esteem in school</td>
<td>6</td>
<td>46.2</td>
<td>4</td>
<td>30.8</td>
<td>1</td>
</tr>
<tr>
<td>In teaching students’ importance of dialogue in presenting their needs in school</td>
<td>4</td>
<td>30.8</td>
<td>5</td>
<td>38.5</td>
<td>2</td>
</tr>
<tr>
<td>In improving interaction among students and teachers</td>
<td>4</td>
<td>30.8</td>
<td>6</td>
<td>46.2</td>
<td>1</td>
</tr>
<tr>
<td>In educating students on the risks of teenage sex and STIs</td>
<td>3</td>
<td>23.1</td>
<td>5</td>
<td>38.5</td>
<td>2</td>
</tr>
<tr>
<td>In cautioning students on the use of sexually explicit materials and clothes</td>
<td>3</td>
<td>23.1</td>
<td>6</td>
<td>46.2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Average mean</strong></td>
<td>4.7</td>
<td>36.4</td>
<td>4.4</td>
<td>34.1</td>
<td>1.4</td>
</tr>
</tbody>
</table>

The students had the view that primary preventive counselling was very effective in addressing most of their problem behaviors with the average ranking of 91.0% while the teacher counsellors and deputy principals concurred that primary preventive counselling was effective with the rating of 76.2% and 67.0% respectively. When 33.0% of the deputy principals indicated the approach was less effective 09.0% of the students and 26.7% of the teacher counsellors showed that the approach was ineffective in addressing most of the common problem behaviors in secondary school students. But while the students and teacher counsellors said that primary preventive counselling was effective in teaching students the importance of dialogue and educating them on the risks of teenage sex and STIs, to the deputy principals the approach was just average in addressing the issues. The finding are supported by the studies by Ndwiga (2007), Kenani (2011) and Karega (2012) in which they found out that guidance and counselling helps students to acquire the right values and attitudes that will make them attain a sense of self-identity and self-esteem that can guide their behavior and form their character.

**DISCUSSION**

Primary preventive counselling was effective in addressing the common problem behaviours in secondary school students. Students had acquired the right values and attitudes that helped them develop a sense of identity that guided their behaviour and formed their character. The students were constantly cautioned on dangers of involving themselves in problem behaviours such as drug abuse, violent and antisocial behaviour, teenage sex and exposure to explicit sexual materials. This is in concurrence with what Griffin (1994), Chepkonga (2009) and Muinde (2015) had found in their studies on importance of guidance and counselling in influencing students behaviours. It showed that the students, teacher counsellors and deputy principals agreed that primary preventive counselling inculcated and promoted appropriate and acceptable behaviours in secondary school students. The studies by Kenani (2011);
Kyriacou (2001) and Goldstein (1995) supported the idea that improved interaction among students and teachers promoted positive behaviours in students hence addressing the problem behaviours in them. In their studies Ndiga (2007), Kenani (2011) and Karega (2012) supported the findings that guidance and counselling helps students to acquire the right values and attitudes. These will make them attain a sense of self-identity and self-esteem that can guide their behaviour and form their character. Living in harmony with the teachers and other students makes students feel cared for, raises their self-esteem and their attachment to their school. This created a healthy environment for development and maintenance of good behaviours as well as positive behaviour changes in secondary school students.

CONCLUSION
The purpose of this study was to determine effectiveness of primary preventive counselling in Addressing students' problem behaviours Vis a Vis conventional guidance and counselling. This study established that primary preventive counselling impacted greatly on the students' appropriate behaviour development. Primary preventive counselling was found to be effective in promoting dialogue; enlightened and motivated students towards appropriate behaviours; inculcated good behaviours in them in order to lead well-adjusted lives. It also cautioned student on the dangers and consequences of the common problem behaviours, helped them develop high self-esteem and good social interaction amongst themselves and with their teachers. It has also helped them acquire the right attitudes that will help them acquire a sense of self-identity, values and beliefs that can guide their behaviour and form their character.

RECOMMENDATIONS
Proper comprehensive curriculum should be in place to equip the teacher counsellors with adequate professional knowledge in guidance and counselling. All the schools should have trained teacher counsellors with specific duties and responsibilities in guidance and counselling to meet the students’ needs especially through primary preventive counselling to control the students’ problem behaviours. The school administrators, teachers and parents should be enlightened on factors that lead to problem behaviours in students in order to enable them execute their different role effectively and help in making the students appreciate their influence on their behaviour development.

REFERENCES
GROUPTHINK AND ITS IMPACT ON ACADEMIC COUNSELING AMONG SECONDARY SCHOOL STUDENTS

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ABSTRACT
Academic counseling is an essential part of the school curriculum since it plays an important role in the overall academic performance of secondary school students. Academic counseling assists students in planning effective study and revision programs, choosing subjects, reducing test anxiety, providing information on higher education and helping learners in all aspects related to the pursuit of education. Despite emphasis of academic counseling in secondary schools, there is still underutilization of academic counseling by students. However, there may be little understanding of the impact that groupthink has on academic counseling. The purpose of this study was to determine the impact of groupthink on academic counseling among secondary school students in Tharaka- Nithi County, Kenya. The study employed descriptive survey design since the variables of the study were studied as they existed in the field. The target population of this study was 148 teacher counselors from the 142 schools in the county. Purposive random sampling technique was used to select 108 teacher counselors who were involved in the study. Data was collected through an interview schedule for the teacher counselors. Qualitative data analysis involved giving meaning to the information collected by organizing the data and creating a summary. The information was used to determine the impact that groupthink has on academic counseling. The findings indicated that agreement of all group members caused members to either seek or not seek academic counseling which implicated that groupthink has an impact on academic counseling. It was concluded that students unanimously agree or disagree in seeking or not seeking academic counseling. It was recommended for teacher counselors to intensify academic counseling programs by organizing sessions for various groups among students, and helping them to deal with groupthink in a positive manner so that group members can seek academic counseling freely.

Keywords: Groupthink, Impact, Academic counseling, Group, Cohesive, Academic performance

INTRODUCTION
Academic counseling traces its beginnings to the earliest of American colleges including Harvard University where the academic counselors helped students determine what courses they needed to study in order to graduate (Gillispie, 2003). According to Kasomo (2009), African countries vary in how academic counseling services are provided based on economic funding for schools and counseling programs. Parham (2002) points out that some countries in Africa that have no formal academic counseling programs use classroom teachers to conduct academic counseling with a primary emphasis on career development. In Nigeria and Botswana, academic counseling is provided by academic counseling specialists (Oyaziwo, 2006). In other countries like Zambia, academic counseling is provided by classroom teachers who either have such duties added to their typical teaching load or teach only a limited load that also include school counseling activities (Borgil, 2001). In Kenya, academic counseling in secondary schools has been strengthened which serves as a catalyst to academic improvement (Ndondo, 2004).

Stone and Dahir (2006) point out that a teacher counselor uses cumulative records to counsel each student realistically on selection of subjects of study, and ensure the academic content and subjects taught to students are based on their interests, abilities and aptitude. Chibber (2005) explains that a teacher counselor carries out academic analyses or diagnoses of areas of learning difficulty and uses the diagnostic to design strategies for overcoming these learning difficulties. Dimmit, Careu and Hattch (2007) provide diagnostic measures that include continuous and careful observation of students’ academic behavior. Academic behavior such as interaction of students with the teacher during instruction, interest shown for involvement in the teaching learning activity and performance in tests and assignments may be observed. The teacher counselor also identifies special learners including gifted, creative, slow and under-achievers, and comes up with appropriate approaches for each category to help students overcome academic challenges (Gibbon & Mitchell, 2003). For instance, a teacher counselor may come up with accelerated academic program for gifted learners by allowing such learners to complete the prescribed course of study in a shorter period than normally taken by the rest of the learners of the same class.

Many students may find the demands of coursework overwhelming and thus require academic counseling. Academic counseling synthesizes and contextualizes educational experiences within the framework of students’ aspirations, abilities and lives to extend learning beyond classroom boundaries and timeframes (Pandey, 2005). A
study by Kimathi (2002) which investigated the perception of teacher counselor role in the implementation of secondary school curriculum in Kenya established that academic counseling has contributed to effective student learning and high academic performance. Therefore, learning institutions may need to provide adequate and appropriate academic counseling for quality education to students in order to contribute to academic development and attain academic goals. However, undesirable groupthink may sometimes hinder students from seeking academic counseling. Absence of academic counseling cause low academic performance that generates feelings of worthlessness and helplessness among students (Johnson, 2010). Low academic performance predicts problems such as school dropout, truancy and low self-esteem, and undermines the meaning of academic work to such learners (Chibber, 2005). Groupthink may also determine students’ utilization of academic counseling programs. According to Sdorow (2005), groupthink places unanimity ahead of critical thinking. In this regard, students may unanimously agree to seek or not seek academic counseling.

A study by Nyutu (2007) on development of student counseling scale reveals that the need for academic counseling is now more critical than ever as students face more academic stress in their pursuit for academic excellence. However, a study by Wanjiru (2003) on assessment of organization and implementation of guidance and counseling programs in Kenyan secondary schools showed that poor utilization of academic counseling led to students' academic problems going unaddressed and therefore negatively affecting academic performance. Wambu and Fisher (2016) carried out an analysis on historical development, current status and future prospects of school guidance and counseling in Kenya. This analysis revealed that the attribution of counseling to discipline, lack of standardized training curriculums, ethical standards and counseling models have contributed to underutilization of counseling services by students. Academic counseling may be influenced by groupthink among secondary school students. According to Sdorow (2005), groupthink places unanimity ahead of critical thinking. In this regard, students may unanimously agree to seek or not seek academic counseling.

Students have a responsibility to make decisions such as coming up with an academic plan to guide them in improving their academic performance. Academic counseling is therefore paramount in helping students better their schoolwork. Groupthink influences many dimensions of people’s lives such as in jobs and politics. Individuals in a group interact with each other with respect to common interests and goals (Aranson, 2010). Groups can facilitate the achievement of these goals and interests. For instance, students who make up a group of a football team may all have an interest in football game while students belonging to a religious group are likely to have an interest in spirituality. Such interests in the various activities in a school may be influenced by groupthink. Thus, acts of students in seeking or not seeking academic counseling are also likely to be determined by groupthink. New students like the Form One class and students on school transfer may be easily influenced by groupthink to agree to a group’s position of either seeking or not seeking academic counseling.

Groupthink results from deterioration of mental efficiency, reality testing and moral judgment in a group that results from an excessive desire to consensus (Weiten, 2001). The findings of a study on groupthink by Janis in 1982 revealed that groupthink among the subjects emerged when maintaining a pleasant social atmosphere was more important to them than making the best decision. The decision making process occurs in small, cohesive groups that places unanimity ahead of critical thinking and aims at pre-mature consensus (Sdorow, 2005). According to Safire (2004), group members try to minimize conflict and reach a consensus decision without critical evaluation of alternative viewpoints by actively suppressing dissenting viewpoints and by violating themselves from outside influences. Packer (2009) asserts that groupthink requires individuals to avoid raising controversial issues or alternative solutions, which leads to loss of individual creativity, uniqueness and independent thinking.

Groupthink is also likely when a group works in relative isolation, when the group’s power structure is dominated by a strong, directive leader, and when the group is under stress to make a major decision (Wingfield, 2003). Groups with directive leaders consider fewer alternatives than groups with leaders who encourage members to participate, especially if the leader expresses their opinions early in the deliberation (Sdorow & Rickabaugh, 2002). Groupthink symptoms can produce a failure to discuss contrary information and alternative possibilities by producing defective decisions when a leader promotes an idea (Stark, 2004). Agreement arrived at on whether group members should seek or not seek academic counseling may arise, for instance, when directive leaders of groups express their points of view on academic counseling early in the discussion. This is likely to switch on group members to follow their leader’s opinions about seeking or not seeking academic counseling. Antecedent factors such as group cohesiveness, faulty group structure and situational context such as community panic play into the likelihood of whether or not groupthink impacts on the decision making process (Taylor, 2006). Although a high level of cohesiveness would
Individuals are strongly attracted to a group and badly want to be accepted by group members, and are more likely to allow group members to influence their thinking and actions (Huffman, 2002). Groups faced by a threatening situational context may value speed of decision making over accuracy (Safire, 2004). For example, mass failure of a class in a continuous assessment test may trigger the class towards urgent sought of academic counseling. Ferrante (2003) observes that during times of stress, group members become more dependent on the reassuring support of others, which increase the group’s influence on individual members. Structural and procedural faults such as a lack of systematic procedures for making and reviewing decisions and the isolation of the group from others contribute to groupthink (Gray, 2002). A strong, directive leader who lets group members know what their inclinations are regarding the group’s final decision also contribute to groupthink (Henslin, 2004). Symptoms of groupthink overestimate ones in-group in which group members develop an illusion of invulnerability and an unquestioned belief in the in group’s own morality (Stark, 2004). For instance, a school may molest members who seek academic counseling if the position of the school detests academic counseling. Groupthink symptoms also bring out close-mindedness where group members rationalize the correctness of their decisions and develop a stereotype of their opponents (Giddens, et al., 2003).

Groupthink symptom is also notable from increased group conformity pressure (Stark, 2004). From this symptom, group members reject those who raise doubts about the group’s assumptions and decisions, and they censor their own misgivings (Weiten, 2001). With all this group conformity pressure, members develop an illusion that everyone is in agreement, which serves to confirm the group’s ill-chosen decisions (Wade & Tavris, 2005). Groupthink is also likely to arise when there is strong premium on loyalty and when there is not a lot of intellectual range of diversity within a decision-making body (Wingfield, 2003). Students’ groups that are highly cohesive are likely to develop unanimous decisions to seek or not seek academic counseling. Gall (2006) observes that the process of groupthink begins with group members feeling a strong sense of cohesiveness and relative isolation from the judgments of qualified outsiders. Even moral judgments must be put aside, for a group is convinced that its welfare depends on a single course of action (Watkins, 2009). A study carried out by Kagwanja (2009) established the cause of the national post-election violence in Kenya in 2008 and the researcher concluded that groupthink led to mass looting, displacement and killings by the victims’ opponents. Students may unanimously agree to seek or not seek academic counseling in order to maintain cohesion in their groups. Such unanimity may positively or negatively impact on academic counseling.

Concurrence seeking becomes so dominant in a cohesive in-group that it tends to override realistic appraisal of alternative courses of action (Gray, 2002). As a result, members of a group develop a tendency to suppress dissent that lead to the problem of getting the best ideas and efforts of their members. Ferrante (2003) observes that groupthink frequently embarrass potential dissenters into conforming and can produce a shift in perceptions so that alternative possibilities are ruled out without being seriously considered. Any member who dissent is negatively criticized, thus the safe alternative is for such a member to agree to the other members’ points of view (Sdorow, 2005). Some students within their groups may hold conflicting beliefs against the majority’s stand to either seek or not seek academic counseling. However, due to these groups being cohesive, students may tend to sway towards unanimity so that they can conform to either seeking or not seeking academic counseling. Groupthink does not produce very effective decision making; in most cases since it leads to major blunders that may look incomprehensible (Weiten, 2001). A military study by Johnson (2001) on effects of groupthink on tactical decision-making revealed that groupthink in most cases contribute to poor decision outcomes. However, groupthink phenomenon does not always produce negative outcomes though it may lead to overconfidence and a disregard for the risks that the group is taking (Henslin, 2004). A unanimous agreement by group members to seek academic counseling would produce a positive outcome. Thus, students’ groups which unanimously agree that academic counseling is necessary, are likely to seek academic help when need arises.

When groups are strongly cohesive, they generally share a strong desire for agreement to see themselves as one (Henslin, 2004). Strong cohesiveness can impair group decisions in another way; that the close feelings of togetherness that often arises within such groups can create feelings of euphoria and an illusion of invulnerability (Feldman, 2011). Brown (2000) said the danger of groupthink is greater when groups are highly cohesive. However, group cohesiveness can facilitate group productivity and help achieve great things. Weiten (2001) maintains that
close-knit groups sometimes come to believe that they will always be successful, no matter what the odds. Desire for agreement in groups may lead members to ignore important information or points of view held by outsiders (Plotnik, 2005). The desire for students to agree to seek academic counseling causes these students to develop desirable opinions about academic counseling if unanimity is pegged on seeking this help. Groupthink need not be ignored as a factor that can impact on academic counseling.

Groupthink promote incomplete gathering of information and as a result, group members search for information which is biased in favor of facts and opinions that support their decision (Gray, 2002). Sound decision making depends on group members combining their information effectively (Feldman, 2011). However, when groups discuss issues, members have an interestingly tendency to focus mainly on the information that the members already share as opposed to encourage offers of information unique to individual members (Galvin, 2004). Individual members among students’ groups may be denied a chance to present their opinions and beliefs about seeking or not seeking academic counseling, if these opinions and beliefs differ from those of most of the members. Therefore, these students’ stand on academic counseling is influenced by the unanimous position of this majority. This unanimity can also be influenced by gender of group members. Women are socialized to be more caring about the desires of other people than men hence they tend to unanimously agree more with opinions of others than males without considering other options (Markus, 2003).

Groupthink often makes members to feel a strong compulsion to avoid disrupting the group’s unity and the positive feelings it creates (Huffman, 2002). As a result, members of the group tend to convince themselves that anyone who remains silent during policy talks must be in complete accord with the rest of the group; an assumption referred to as illusion of unanimity (Santrock, 2005). Once this illusion of unanimity has been established, it tends to stifle divergent thinking. Students’ groups may agree unanimously if members should seek or not seek academic counseling. A key factor in determining whether a member will fall victim to groupthink has to do with the group’s norm (Wade & Tavris, 2005). Norms of a cohesive group can favor consensus which can lead to groupthink or critical analysis, which prevents this consensus (Gray, 2002). Some groups demand consensus; they want all members to dress, think and behave the same way while others not only tolerate but value non-conformity, setting norms and exceptions for critical thinking and independent actions (Wingfield, 2003). Groups in secondary schools may determine members’ opinions on academic counseling by expecting all of the members to either seek or not seek academic counseling.

Objective of the Study
To determine the impact of groupthink on academic counseling among secondary school students in Tharaka-Nithi.

Research Question of the Study
What is the impact of groupthink on academic counseling among secondary school students?

METHODOLOGY
Descriptive survey research design was adapted for this study. This research design was appropriate for this study because the variables of interest of the study were studied as they existed in the natural setting. In this study, groupthink was already in existence among students and could not be manipulated, thus, the study findings were reported as they existed in the field. The population of the study was 148 teacher counselors from 142 secondary schools in Tharaka-Nithi County. Purposive random sampling technique was used to obtain a sample of 108 teacher counselors from the study population. This technique was used because it allowed the researcher to select teachers with the required characteristics of the study.

An interview schedule was developed to provide necessary qualitative data based on the objective of the study. Interview schedules give the right balance between maintaining control of the interviewee and space to redefine the topic and hence generate novel insights (Willing, 2001). All possible effort was made by the researcher to establish rapport with the teacher counselors; an action that motivated the respondents to communicate freely. The researcher interviewed teacher counselors to determine the impact of groupthink on academic counseling among secondary school students. The researcher ensured that the interview schedule used in data collection was relevant to the purpose to which the research was put. Opinions of experts in the related field of study were sought for validation of the research instrument. The researcher sought permission to carry out the study from head teachers of the teacher counselors who were sampled for the study.
RESULTS AND DISCUSSION
Research findings from the teacher counselors’ interview schedule revealed that groupthink influenced secondary school students in seeking or not seeking academic counseling. Students’ need to maintain friendships and create peace made them to unanimously agree on seeking or not seeking academic counseling. Students rarely questioned the validity of proposed unanimous agreements by group members since they feared rejection from their groups for disagreeing with the opinions of members. The respondents revealed that unanimity in students’ groups was so strong that that all members were expected to seek or not seek academic counseling.

Results of the study indicated that even when some group members remained silent during discussions about seeking or not seeking academic counseling, all group members were expected to agree to the agreements of those who presented their opinions. Further results of the study suggested that in most of the groups, all members thought, decided, and acted in a similar manner on matters of seeking or not seeking academic counseling. Information from the interview schedule showed that all group members concentrated on the position of seeking or not seeking academic counseling that the members held initially rather than putting into consideration of alternatives. It was noted from the respondents that group members who sought academic counseling posted improvement in their academic performance. The study findings indicated that groupthink is a key factor that determines whether students seek or do not seek academic counseling.

CONCLUSION AND RECOMMENDATIONS
Based on the conclusions of this study, groupthink that is directed towards not seeking academic counseling is devastating because it inhibits all group members from seeking academic counseling. Such kind of groupthink negatively influences academic improvement. However, groupthink directed towards seeking academic counseling is helpful since all members of a group access academic counseling: hence create room for academic improvement. Undesirable groupthink hinders students from leaping academic improvement because they fail to seek academic counseling. It was recommended for teacher counselors to intensify academic counseling programs by organizing sessions for various groups among students. Group members may be helped to deal with groupthink positively so that they can seek academic counseling freely. Teacher counselors need to design academic counseling programs aimed at facilitating students’ positive attitude towards academic counseling. This may be accomplished through teacher counselors engaging students in open talks on groupthink and its influence on academic counseling.

REFERENCES


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TUTORS’ LESSON PREPARATION IN THE IMPLEMENTATION OF INTEGRATED LITERATURE AT PUBLIC PRIMARY TEACHER TRAINING COLLEGES IN KENYA

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ABSTRACT
Preparation of lessons is an inevitable first step in a school teaching activity because it gives the teacher an opportunity to formulate lesson objectives. Subsequently, the teacher selects the content and determines the learning activities which will lead to the achievement of these objectives. In Kenya, English is taught as a second language. English is both a compulsory subject in primary and secondary schools and a language of instruction for all the other school subjects except Kiswahili at all levels of education in Kenya. It is therefore a prestigious language and students’ prowess in it is highly valued. For this reason, effectiveness on how it is taught is critical both for teachers and policy makers. Literature is used in English language classrooms as a resource for availing students with contextual backgrounds for studying English language. This also explains why it was introduced in Kenyan primary teacher training colleges in 2006 and integrated in English subject. Whereas many scholars in Kenya have researched on the other factors influencing students’ performance in English, very little has been mentioned about the influence of preparation of literature lessons particularly in teacher training colleges. The purpose of this study is therefore an attempt to fill this gap by investigating the tutor preparation of literature lessons at public Primary Teacher Training Colleges (PTTCs) in Kenya. Data for the study was collected by administration of questionnaires to teachers’ colleges tutors teaching literature, interview of English subject heads and observation of literature lessons. Analysis of data was done using descriptive statistics of frequency and percentage and presented in text. The study concluded that failure by college tutors teaching literature to prepare literature lessons well and prior to teaching bedevils integrated literature implementation. The study recommends regular in-service training of teachers’ colleges tutors teaching literature to enlighten them on the learning objectives of literature and equip them with the necessary knowledge and skills necessary in the preparation of literature lessons. Furthermore, the study recommends vibrancy and tutor-administrator collaboration in the monitoring of literature implementation in public PTTCs in Kenya.

Keywords: Curriculum Implementation, Lesson Preparation, Literature, Teacher Training Colleges, Tutors,

INTRODUCTION
Lesson preparation is an indispensable step in the implementation of curriculum because apart from affording the teacher an opportunity to carefully explore, examine and internalise what to teach, it is an informative procedure in lesson-time allocation, collection and preparation of teaching materials and instruments as well as determination of teaching methodologies. In other words, lesson preparation is the lesson management map to the teacher on what to teach, how to teach and the objectives to achieve. Instructional plans also play a central role in creating effective learning environments (Clark & Dunn, 1991; Reiser & Dick, 1996; Shauelson, 1983 cited in Koszalka et al., 1999). A successful formal teaching and learning process requires proper selection and arrangement of the teaching items and materials.

The success or failure of any lesson depends on lesson preparation. The duration and effort a teacher employs in exploring, internalising, comparing, relating and critiquing the content to present to the learners has a great effect on achievement of lesson objectives. Brown et. al. (1994) stated that no matter how kind, amiable and well-meaning a teacher may be, he or she cannot possibly succeed unless he/she has a thorough knowledge of the subject matter he/she is teaching and a good general knowledge. Teacher mastery of the instructional content is the basis on which good lesson planning is founded. Because rational method of planning requires teachers to set goals, formulate alternatives, predict outcomes, and evaluate the effectiveness of reaching those goals (Lenski & Caskey 2009), thorough knowledge and understanding of what to teach in an invaluable asset to the teacher.

A teacher is a learner throughout his/her career as teaching involves an analysis of the teaching content, learning environment, learner behaviour and applicable strategies in overcoming the challenges encountered. Teacher lesson preparation is an unmissable opportunity for effective teaching because as Lee and Yatahashi (2011) claim, teachers’ preparation in lesson plan is helpful in determining the teaching goal, considering the existing resources, and designing the learning activities. Fernandez and Yo-shida (2004) add that in lesson planning, the basic problems encountered by students in their daily lives can be used as stimulators for students to achieve the learning goals.
Rosenshine et al. (1995) indicated that planning should be the first thing a teacher should do when beginning to teach and meeting a group to teach for the first time, which is also an indicator to achieve educational goals.

Marzano et al., (2003) assert that the teacher is probably the single most important factor affecting student achievement. This is because teachers decide the form and content of their instruction, such as how much presenting, questioning, and discussing to do; how much material to cover in the allotted time; and how in-depth to make their instruction. But the recurrent question has been, what constitutes an effective teacher. For researchers have attempted to answer this question without much success given the various abilities of learners, learning environment and the quality and quantity of learning resources which teachers have to grapple with. Wong (2009) emphasises on lesson preparation as a definite path towards teaching effectiveness. He defines an effective teacher as one who has positive expectations for student success which should be reflected in the lesson plan, knows how to design lessons for student mastery as evident in the lesson plan and an extremely good classroom manager; which is possible via good time management during class time and that is possible only by effective implementation of a good lesson plan.

Lesson plans are effective tools in classroom management as they ensure students are deeply engaged with their work, students know what is expected, there is little wasted time and the climate in the classroom is work-oriented, but relaxed and pleasant. An effective classroom situation demands that the teacher be a monitor and an advisor as opposed to the director of learning. Quist (2000) observes that one of the problems in pupil's learning is teachers, lack of awareness of the barriers to effective teaching. Borich (2007) states that as a combination of lesson objective designing, teaching, modelling, checking for understanding, re-teaching and teacher’s self-reflection, lesson plan is a crucial element in the process of meeting national content standards and optimizing the outcome of classroom teaching and learning. This kind of classroom management is congruent with curriculum objective which wants the students to search for, analyse and critique, and practice every step until they could lean by themselves.

Learner Diversity and Lesson Preparation

Learner difference and diversity have bogged the minds of educators over years with a challenge to modify instruction, learning environment, learning opportunities and access to learning resources so that learning is equitably provided. As suggested by Jackson and Davis (2000) school teachers have to know their students well—who they are and how they learn best—and use this information when planning instruction and assessing student performance. Whole class teaching is highly ineffective especially when working with heterogeneous students whose diversity hinge on intellectual ability, family backgrounds, pre-school orientations and gender. Diverse backgrounds of learners influence their grasp of instructional concepts hence the need to anticipate them during the planning of lessons. Differentiated instruction is aimed at leaving no student out in teaching and it is based on the idea that each student has potential and it can be exploited optimally by availing the right learning environment devoid of fear, embarrassment and discrimination. Rick Wormelli (2007) explains that teachers need to give every student a fighting chance to be not just competent but excellent, while finding meaning in the learning as well. Tomlinson and Eidson (2003) refer to the “dual goals of honouring each student’s learning needs and maximizing each student’s learning capacity”. To successfully differentiate instruction, novice teachers are now being instructed how to employ a variety of grouping options, materials, assessment tools, and use classroom space in a flexible manner (Okun, 2012).

Provision of limited learning opportunities by teachers which mostly favour extremely talented students at the expense of less talented ones has been widely blamed for lack of equity in the classrooms. As educators attempting to differentiate instruction, we should all recognize the importance of incorporating opportunities for student choice (Okun, 2012). The advocates of contemporary practices in learning and teaching are strongly opposed to whole class teaching based on the premise that, however homogenous a group of students may appear to be, they have diverse learning needs which ought to be addressed in planning, implementation and assessment of learning. This resonates with Florian and Black Hawkins’ (2011) principles of inclusive pedagogy which advocates for creation of learning opportunities that are sufficiently made available for everyone; extending what is ordinarily available for all learners rather than using teaching and learning strategies that are suitable for most alongside something ‘additional’ or ‘different’ for some who experience difficulties; and focusing on what is to be taught (and how) rather than who is to learn it”.

The characteristic feature of whole class teaching is that everybody is taught the same thing at the same time and at the same speed. The teacher’s heavy workload and expansive syllabus may drive teachers to the practice of whole
Gender parity is so important an issue in provision of education opportunities that educators have to consider and prepare for it from the onset. Societal traditional perceptions and expectations on male and female trickle down to differentiated provision of education opportunities between men and women. Subject teacher’s awareness of this differentiation and prior plan for it in preparation for teaching will go a long way in bringing equity in the lessons so that male and female students are provided with equal lesson participation platforms. Gender refers to being male or female. Within the gender groups the people are influenced by societal expectations of how people should behave. In Kenya, the traditional implications of being feminine and masculine are that a feminine should be delicate, shy, motherly, home keeper, quiet and a good listener (Egunza, 2014). Masculine characteristics are seen as being strong, powerful, dominant, courageous and decision makers (Egunza, 2014).

This gender disparity is reflected in the classrooms with girls not readily willing to express their opinions and ask questions during the lessons. in the classrooms, boys will always take the lead and dominate all the class sessions with an attitude of superiority especially in mathematics and sciences. Even boys can intimidate and bully the clever girls. The boys will do most of the talking thus dominating class discussions while girls who are keener to write are doing the listening. An effective teacher should plan, analyse and address this scenario in order to create an enabling learning environment for both. Girls need more time and more patience from the teacher so that their confidence can be built. They especially need confidence developed in subjects considered to be for males such as mathematics and sciences. Similarly, boys may need more time in English comprehension. Teachers can give remedial teaching to both who are weak in certain subjects. An attractive environment in school where boys and girls interact during games debates, study visits and in textbooks where women are drawn to represent doctors, engineers and technicians need to be emphasised. The teacher can praise both girls and boys, give tasks for example cleaning to boys and group them to give the girls support and confidence.

Collaborative Lesson Preparation
Collaboration means “working communally with the aim of learning from each other”. There is a possibility of perfection if teachers plan their lessons communally especially if they are teaching the same level students. As they engage in discussions with colleagues, teachers exploit the repertoire of shared experiences developing their professionalism and bolstering their confidence to take charge of learning activities in their classrooms in a more knowledgeable manner. The benefits of collaborative nature in lesson preparation are immense one of which is a provision of a benchmarking process that teachers can use to gauge their own skills. Collaboration includes continuing interactions about effective teaching methods plus observations of one another’s classrooms (Stigler & Hiebert, 1999). This approach helps teachers to form communities of practice around planning and teaching. In these communities, teachers construct, organize, share, and refine their knowledge of the lesson. It also provides an avenue for teachers with common interests to interact with other professionals with similar interests to solve problems and improve practice. Collaboration also involves Lesson Study, a teacher teaches a lesson as colleagues observe and take note of teacher’s approach and learners’ response. Teachers using Lesson Study work as a team, either by grade level, subject area, or as an interdisciplinary group, to examine an instructional problem and determine how to apply the solution to current teaching goals. As teachers participate in Lesson Study groups, they actively discuss instructional interventions and share knowledge about how students will respond. Culminating from those discussions, teachers produce a lesson plan that is the result of collective wisdom and experience.
Desire for self-evaluation with view to improving one’s teaching practices is an invaluable ingredient and ought to be the driving force towards effective collaboration among teachers. Friend (2000) points out that teachers themselves perceive collaboration as difficult and abhor the fact that little attention is paid to collaboration during their professional preparation. Teachers are normally prepared to be lone rangers in thought and practice and this explains why they normally flounder whenever they are asked to demonstrate their skills in the classroom (Friend, 2000). Teachers need specific training and practice in knowing “how to work, communicate, and collaborate with colleagues” (McCormick, Noonan, Ogata, & Heck, 2001) Teachers may not have learned this, because the most common practice for teachers is to work in relative isolation (McManus & Kauffman, 1991), and they are used to making decisions alone (Janney, Snell, Beers, & Raynes, 1995). According to Brownell, Yeager, Rennells, and Riley (1997), collaboration among school professionals can be developed and sustained, and positive outcomes are shown both for students and for teachers.

The review determined that there are five fundamental characteristics of effective teacher-teacher collaboration:

• A shared vision for student learning and teaching,
• Common commitment to collaboration,
• Communities of care,
• Frequent, extended, positive interactions between school faculty and leaders, and
• Administrative leadership and power sharing. From the foregoing, the benefits of teacher collaboration cannot be gain said. For collaboration to be meaningful, it must begin at the first step and this is planning of the lesson. At this stage, it is advantageous for the teacher has an opportunity to consult and involve colleagues in the planning of the subject matter, methodologies, learning activities and time allocation for each session for the benefit of the learners. Teachers who plan their lessons in a collaborative manner seek to satisfy the intellectual needs of their students and have no problem in accounting for their instructional time.

Statement of the Problem
Teacher preparedness is a vital step in the implementation of any curriculum as it gives the teacher an opportunity to reflect on the subject matter, collect additional information to fill the existing gaps, anticipate classroom challenges and strategize on the effective delivery methodologies. English is a very important subject in Kenyan education system because apart from being a social, business and educational language, it is used as the medium of instruction for all the other subjects from early childhood education to tertiary level of education except Kiswahili. To inculcate English language skills to learners, teachers ought to be not only qualified but also dutiful in preparation of lessons in order to have ample time for creativity required in the teaching of language. The Government of Kenya (GoK) through Teachers Service Commission (TSC) in collaboration with Inspectorate Depapartment of the Ministry of Education Science and Technology (MoEST) – State Department of Basic Education reminds teachers that they ought to dutifully prepare their lessons before teaching. Literature is not taught as a separate subject in Primary Teacher Training Colleges (PTTCs) in Kenya. Rather it is integrated into Primary Teacher Education (PTE) English curriculum to facilitate Communicative Language Teaching (CLT) of English. Towards this achievement, preparation of lessons by teacher trainer is critical. Whereas massive research has been done on the levels of teacher lesson preparation at primary and secondary schools in Kenya, little is mentioned about tutors in public PTTCs on this vital professional responsibility, hence the essence of this study.

Objectives of the Study

i. Determine tutors’ preparation of professional documents like schemes of work, lesson plans and records of work
ii. Investigate whether tutors’ read literary texts prior to the lessons
iii. Examine the challenges affecting tutors’ preparation of literature lessons

RESEARCH METHODOLOGY
The research design adopted for this study was evaluation study design. This design is used in research when the aim is to determine whether the program achieved the goals. Data was analysed using quantitative and qualitative techniques. Purposive and random sampling techniques were used to select respondents. Using Proportionate Stratified Random sampling technique, the study randomly sampled 16 teacher training colleges for study which provided 16 Heads of Subject - English and 52 teacher trainers teaching Literature. Questionnaires, interview schedules and lesson observation schedules were used to collect data from the target participants. A questionnaire was preferred for teacher trainers teaching Literature because it can be used to collect data simultaneously from several respondents within a short period of time. It also gave the respondents ample time to consider the questions
and give accurate responses. An interview schedule was used for heads of subject English to afford the researcher an opportunity to probe more information from the respondents regarding the topic under study. Data was analysed and presented using descriptive statistics of percentages.

**STUDY FINDINGS**

The study found that all the 52 tutors who participated in the study had their schemes of work prepared by their Heads of Subject (HoSs) English. Schemes of work comprise of the subject topics and sub-topics to be taught in the term, the objectives to be achieved, class learning activities to lead to the achievement of the set objectives as well as the learning and teaching resources to be deployed. Asked why they preferred to scheme lessons for tutors as opposed to the latter scheming their own lessons, majority of HoSs English said that individual scheming was unnecessary as the same content was being taught in the term by all tutors. They also said the practice saved time and helped avert confrontation with their slow or reluctant colleagues in preparing professional documents. Teachers ought to personally prepare their lessons because rational method of planning requires teachers to set their own goals, formulate alternatives, predict outcomes, and evaluate the effectiveness of reaching those goals (Lenski & Caskey 2009). Having someone else come up with the subject matter to teach at what time, the class activities to utilize and the learning resources to deploy is off hand practise by teachers and only lead to ineffectiveness in curriculum implementation.

As to whether or not HoSs English checked their colleagues’ designing and documentation of lesson plans as well as filing of work records, it was found that they had no definite way of ascertaining these practices. They majorly relied on the good will of their colleagues and hoped that the latter’s affirmative responses during subject meetings on whether they designed, documented and filed their work records were actually true. Having their lessons schemed by someone else and negligence of record keeping is a professional malpractice by tutors in teachers’ colleges. Best practices the world over demand that teachers design, organise, implement and evaluate their own lessons because teaching is essentially a personal endeavour. To bring about the envisaged outcomes from the learners, teachers should have a personal grip of their own lessons from preparation to evaluation so that they can be at a position to relate the levels of learning in their classrooms with the subject matter and the methodologies they deploy. This holistic personal experience will influence their future decisions on remedial teaching and the teaching of related subject matter.

The reading of literary texts by tutors prior to literature lessons at public PTTCs in Kenya was found to be haphazard. Of the 52 tutors surveyed, 24 (46.2%) submitted that they don’t read lesson areas of literary texts such as poems, novels, plays and short stories before going for the lessons. They said that they would rather read them with the students in their classrooms. However, of the same tutors, 37 (71.2%) said that reading literary texts with students in the classroom is a slow process, tedious and boring. They said that as much as they would like to read these texts with students, time allocated for each lesson was too little compared to the content to be covered before the students are presented for national examination. Majority of HoSs English revealed that many of the tutors preferred to assign students reading areas especially for voluminous texts like novels. Such tutors then assume the role of a lecturer during the lesson and expose the literary material they hope (just hope) that students read on their own. This distorts the role of literature in an English as Second Language (ESL) classroom, the Kenyan case.

The advantage of literature in an ESL context is to provide contextual grounds upon which various concepts of language can be learnt. Research has shown that mere definition of words using the dictionary does not enable students to fully understand words and knowledgeably transfer them to their speech and writing (Rhoder & Huerster, 2002). This is where teacher’s intervention becomes crucial. The voice of the teacher when reading any educational material is very important especially when that material is presented in a figurative form. Literature especially poems are termed as complex because they are presented in a language which requires piecing together various concepts in the text to understand the subject matter and the poet’s storyline. Prowess in this ability requires wide experience with literature and that is where the teacher comes in. Failure to read and analyse literary texts prior to using them to teach the students or worse, leaving students on their own to read them is complex as it is frustrating.

Tutors and HoSs English at public PTTCs in Kenya identified challenges which affect their preparation of literature lessons. Inadequate training of tutors on literature implementation topped with 63.6% of tutors identifying it as a literature lessons’ preparation challenge. Insufficient literature resource books (54.5%) followed with tutors’ non-commitment to planning (45.5%) coming third. Training of teachers refreshes and broadens their knowledge on the subject matter and effectively sophisticates all their professional practices including lessons preparation. According
to Rice (2003) training empowers teachers to bridge the gap between the learner’s world and the curriculum making the latter relevant and reliable in solving the problems faced by the learner. In the same vein, availability of learning resources can be a determining factor on how far the teacher can go in lesson preparation. Further, no other factor can work wonders in teacher lesson preparation like personal commitment. It enables teachers to find meaning of work even in the most difficult situations and effectively overcome the many challenges associated with teaching.

CONCLUSION

It can be concluded that tutor preparation of professional records necessary for implementing integrated literature at public PTTCs in Kenya is piecemeal. Tutors’ ought to take personal responsibility on their lessons from preparation to evaluation. Tutors prior reading of literary texts as well as reading them with students in class was found to be lacking which greatly distorts the worth of literature in Kenyan English classrooms. Further it complicates literature for students hence demotivating them. Inadequate on-the-job training for tutors, insufficient learning materials as well as non – commitment of tutors in the preparation of literature lessons jeopardizes the teaching of integrated literature from the onset. Tutors greatly feel under equipped and non-commitment reduces them to mechanical implementers of curriculum. To achieve the intended goals in the teaching of integrated literature in Kenyan public PTTCs, these problems must be adequately addressed.

REFERENCES


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ABSTRACT
The Government of Kenya (GoK) introduced free day secondary education in 2008 to increase students transition from primary to secondary school. In this mode, the government gives capitation which covers tuition, learning and teaching materials and pays school support staff. The parents in turn were required to buy school uniforms for their children, provide them with lunch and personal school as well as ensure and monitor their children’s attendance to school. The latter charges parents with a responsibility in their children’s education. Parental support which is mostly dictated by the parent’s income is key for students to benefit from this Government initiative. The aim of this study was to find out the effects of parental income and support on students’ participation in free day secondary education at public day secondary schools in Imenti North sub-county, Kenya. The target population for the study was students and head teachers at the sub-county’s public day secondary schools. A total of 220 students (113 boys and 107 girls) participated in the study. The researcher visited 11 public day secondary schools in the sub-county from which all the head teachers were included in the study. Questionnaires were used to collect data for the study. A questionnaire for head teachers and another for students were applied. Descriptive statistics were used to analyse data and the findings were presented in percentages and text. It was found that 85.00% of students at public day secondary schools in Imenti North sub-county, Kenya had challenging home environment, quite unfavourable for academic activities. Students were found to seriously lack separate rooms at home from where they could conduct their studies with 72.00% of respondents reporting to suffer the challenge. Also from these homes, 75.00% of the respondent students said they relied on kerosene lamps (mainly tin lamps) to light their rooms which posed health challenges because of straining their eyes due to dim light and smoke emitted. They also pointed out that they could not study for as long as they wanted because they had to save kerosene given the prevalent family poverty. The study also found that 63.64% of the parents at public day secondary schools in Imenti North sub-county were single mothers 75.50% of which struggled financially to sustain their children in school. It was established that 90.00% of parents in these schools had no decent income. They were mainly peasants and subsistence farmers with a monthly income Ksh 3, 000.00 (US Dollars 30). Parental low income dictated frail support for their children’s educational material needs with 54.55% of participating head teachers reporting that less than 50.00% of parents in their schools honoured their financial obligations on their children’s education. In addition to non-payment of school fees, parents were also found to falter in support of their children with educational materials not provided by the government. In 73.50% of the classrooms visited, students were found to lack either pens, mathematical instruments, dictionaries and revision books. This resulted to heavy borrowing from their classmates and learning time wastage when they were asked to go home and buy. The study concludes that home conditions were un conducive for academic activities, parents had very low income to fully and consistently support education for their children and students lacked the necessary support educational materials to participate and fully benefit from free day secondary education offered by the Government. In addition to non-payment of school fees, parents were also found to falter in support of their children with educational materials not provided by the government. In 73.50% of the classrooms visited, students were found to lack either pens, mathematical instruments, dictionaries and revision books. This resulted to heavy borrowing from their classmates and learning time wastage when they were asked to go home and buy. 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affects the grade of the children and their ability to progress to a higher level. Her analysis further shows that the influence of parental income on child’s education is differentiated in gender and age. An increase in parental income influences more of the male child than the female and also family income is more important at adolescence compared to childhood. Mensah and Kierman (2010) found that primary school children in England between 2005 and 2006 in families experiencing low socioeconomic status had lower development in communication, language, literacy and mathematics. Poor family environment indicates poorer educational outcome of children. When families have high income, they can afford to buy extra textbooks, stationery, provide extra tutoring to improve children’s academic performance and hence ensure their children attain higher levels of education (Willingham, 2012). On the contrary, a low income resourced family may be constrained in even meeting the basic necessities in life, hence cannot adequately support children with educational resources (Donkor, 2010). According to Becker and Tomes (1986), parents of high socioeconomic status (SES) may have access to credit facilities while that of the low SES parents may not thereby limiting their ability to provide basic or supplementary resource for their children’s education. There is a direct link between child’s educational attainment and resources invested in them. Haveman and Wolfe (1995) said the investment theory shows that children are bound to attain higher education on the average compared to their parents in accordance with the weight of resources invested in them.

Parents moral support to their children requires a booster of resources for the achievement of better educational outcomes. Financially stable parents are more likely to invest heavily in their children’s education and morally support their children in a bid to account for their life in school. Internationally, UNESCO (2006) and the World Bank (2009) found a strong positive correlation between literacy and poverty. There exists evidence that family poverty is closely associated with family instability, unemployment, and alcoholism, which can potentially impair children’s educational attainment (Lauder, Brown, Dillabough, & Halsey, 2006). The attendant effects of family poverty spells doom for child’s education especially in slums and remote villages where the poor are lumped together. For a school going child in these neighbourhoods, it is a double tragedy as threat to their education does not only emanate from their own families but also their neighbours. School non-attendance and dropout rates are more prevalent in slums and remote villages. The fate for a child from a poverty-stricken family is compounded by little or no education at all for their parents. Inspired by the notion that parents’ education has a direct effect on family income (Feinstein, et al., 2008), it can be hypothesised that parents’ education levels and family income combine to influence children’s school achievement.

Owing to increased wages, educated parents with higher incomes are able to provide for their children’s education, and thereby increase their children’s chances of successful school attainment (Brown and Iyengar, 2008). Evidence shows that low income children lag behind in cognitive development and lie one year behind in vocabulary when they enter school, with long-term attainment consequences. Such early gaps may affect the attitudes of children from low income households towards education (Waldigèl & Washbrook, 2010, Lauder, et al., 2006). Family income has also been found to have a bearing on child’s readiness to take advantage of learning opportunities. Eden (2013 in Ward (2013) and Blanden and Gregg (2004) found evidence that poverty, in terms of family resources, has a powerful influence on children’s ability to respond to educational opportunities. Poverty unequivocally robs the child of the right educational instruments, attitude, environment and morale, which are the principle elements of success in school. Eden (2013) postulates that poverty, in terms of low family income affects children in several ways such as the absence of learning habits and experiences at home, lack of access to computers, lack of a sense of self-esteem through appropriate interactions with parents, poor housing, an unhealthy diet, possible mental health issues within the family, domestic violence and stress associated with low pay or unemployment. These all make it potentially difficult for children to see themselves as able achievers (Gottfried & Gottfried, 1989).

The parents’ closeness with their children is determined by the economic pressures exerted upon them. Blanden and Gregg (2004) found that parents who are stressed about money and employment, working unsocial hours in more than one job, are likely to have less time to provide their children with an environment conducive for good educational outcomes. From these reviews it is widely recognised that if pupils are to maximise their potential from schooling, they will need the full support of their parents (Desforges & Abouchaar, 2003; Feinstein, et al., 2008; Brown & Iyengar, 2008; UNESCO, 2005). The impact of parental income on their children’s education is expected to tarry in the family beyond children’s generation. This is because children’s lack of good education owing to family poverty means that the effects will trickle to their own children whose education will likewise be dogged by lack of proper support and guidance. The lack of literacy owing to poverty is negatively linked to reduced parental educational support to their children (Nyamugasira, Angura, & Robinson 2005).
Objectives of the Study
a. To determine the effects home academic conditions on students’ participation in free day secondary education at public day secondary schools in Imeni North sub-county, Kenya
b. To establish the income levels for parents with children at public day secondary schools in Imeni North sub-county, Kenya
c. To examine the influence of availability of learning material on students’ participation in free day secondary education at public day secondary schools in Imeni North sub-county, Kenya

RESEARCH METHODOLOGY
Descriptive research design was used for this study. This design was appropriate for this study in that it enabled obtaining of information concerning the current socioeconomic status of parents with students at public day secondary schools in Imeni north sub-county, Kenya and describe this status with respect to educational needs of their students. The target population for this study was students and school head teachers of public day secondary schools in the sub-county. Form 3 (grade 11) students were sampled to represent the students in the study owing to their experience in day secondary schools on what is required for them to achieve academically. From a total of 22 public day secondary schools in the sub-county, 11(50%) were randomly selected to participate in the study. This gave rise to 440 Form 3 students from which 220 (50%), 113(51.36%) boys and 107(48.64%) girls were randomly picked to take part in the study. All the head teachers in the schools visited were included in the study. The study used questionnaires to collect data. This instrument was preferred because it allows simultaneous collection of data on a large population. Additionally, study participants were at a position to provide accurate information because they could read the questions and respond to them at a personal level. The findings of the study were analysed using descriptive statistics and presented in percentages and text.

STUDY FINDINGS
The ages of students who participated in this study had an impetus to the study. Majority of them, 86.00% were above 18 years. Ideally, students who enrol at grade 1 in Kenyan system of education at the government’s recommended age of 6 years, are aged 17 years at grade 11. The respondents attributed this overage to delay in joining Form 1 (grade 9) the first year in secondary school after completing primary education. Of those who had these delays, 30.00% cited family poverty as a causal factor. They said that the requirements for their enrolment in Form 1, such as school uniform, textbooks, stationery, meal fees which were quite a burden to their already impoverished families, made them delay enrolment or forgot about secondary education until the arrival of miraculous aid from sponsors. Some said that they were in school courtesy of benefactors whose aid came after they had stayed at home for as long as 3 years after their primary school education. They said that poverty in their families could not allow them to prioritise education. The study also found that almost half of respondent students, (48%) had transferred from one school to another during their secondary education. Majority of the transfers (47%), the respondents said were occasioned by lack of school fees, as compared to 16% who transferred because of unfavourable climate and 10% who transferred in pursuit of a better school in academic performance. Further search revealed that of those who transferred because of school fees, 50% resorted to schools near their homes so that they could cut off transport expenses to and from school.

The majority of respondent students 72.91% strongly agreed that the key areas affecting their education where they would need immediate intervention of their parents and guardians were: conducive study rooms at home, lighting in these rooms, food at home and payment of school fees. From the sample, 72.00% of students said that they did not have separate rooms at home from where they could do their homework. Majority of them said that they lived in congested family houses where they were made to share rooms with their siblings or cousins (for those staying with relatives) many of whom were not students. This made such rooms noisy and conducive for studies as sometimes their kin played loud music, entertained friends for lengthy periods going even up to midnight or simply they were hostile with reading taking place in their rooms. Many of the students who participated in this study blamed family poverty for not having their separate study rooms at home. The study found that in addition to lack of quiet and comfortable homework rooms at home, there was a nagging problem of lighting. It was established that 75.00% of the respondent students in this study relied on kerosene lamps (mainly tin lamps) for lighting of their rooms while doing homework. Only a quarter of the respondents 25% had electricity at home. Those relying on kerosene lamps said, they faced unending problems because their parents and guardians were not at a financial position to keep a steady supply.
Additionally, they complained that with kerosene lamps they could not read for as long as they wanted with 65% saying that they were made to put them off early to save kerosene, 20% complained they did not provide enough light so they strained their eyes and 15.00% said that smoke emitting from smoke was sickening. Even those with electricity at home said, they could go for weeks with power off owing to non-payment of previous consumption bills. When there was a blackout, they said they just called it a day in home studies because they had no alternative lighting. Availability of separate rooms and lighting had great impact on the students’ study habits. The head teachers decried an alarming failure of students to complete teachers’ assignments. They also noted with concern that generally only a quarter of their students carried study books home meaning they did not read at home. Students said lack of study friendly rooms at home, absence of lighting systems as well as unsupportive parents and guardians were the major contributors to their non-readership behaviour at home.

The majority of parents in charge of students in public day secondary schools in the sub-county (63.64%), were found to be single mothers, 20.14% grandparents and 6.22 guardians (relatives and benefactors). Parenting has an impact on financing children education because two parents are at a better position to provide what is required by their children in school. Provision to the needs of students made them more stable, confident and focused in school and this end can be more achieved by two parents as compared to one. Responses from head teachers revealed that students with both parents demonstrated comparatively better characteristics in school. They noted that 63.64% of the highly disciplined students in school were under the care of both mother and father, just like 70.00% of those who attended school daily, 70.00% of those who demonstrated confidence in studies and 88.89% of those who posted steady improvement in academic performance.

Single mothers and grandparents struggled to provide to the students as a number of them did not have a permanent abode. It was also found that 90.00% of these mothers, grandparents and guardians were peasants and subsistence farmers. With a monthly income of approximately 3000 Kenya shillings, these parents were not in a position to comfortably and fully provide to the educational needs of their children. Justifiably, the most nagging need they itched to satisfy was hunger and whatever remained was so little to satisfy what was required at school. It was found that although most of the parents in day secondary schools in the sub-county were aware about free day secondary education provided by the government (with parents required to meet only the cost of students’ uniform, a few learning materials and meals), poverty was a heavy burden on them and financing education was lowly prioritised. Head teachers blamed family poverty for parents’ failure of to meet their financial obligations in school. Poverty was blamed for 54.55% students’ failure in academic performance, non-prioritising of education 18.18% and carefree attitude 9.09%. From these results, it is evident that parents’ failure to provide to their children in school did not emanate from naivety or disinterest, but poverty. Some parents resorted to begging even from strangers to make desperate efforts to salvage learning opportunities for their children. The study also found a correlation between parents’ material support for their children’s education and concern about their performance in school. It was found that 90.00% of the parents who were consistent in supporting their children education materially were concerned about their discipline in school, 63.64% questioned their academic performance and 70.00% inquired about their school attendance. All head teachers surveyed were unanimous that parental involvement in their children’s education was crucial as it buttressed teachers’ efforts in call for discipline and academic performance in school.

This study also sought to establish the influence of parental educational materials support of their children at day secondary schools in Imeni North sub-county Kenya. From the study, 65.00% of the respondent students said that they lacked school fees (mainly lunch money). The head teachers 54.55% revealed that less than 50.00% of parents in their schools meet their financial obligations in school. Only 36.36% of the school head teachers claimed that 50.00% of parents in their schools pay for their children’s education promptly with a paltry 09.09% registering above 50.00% compliance. The respondent students submitted that their parents’ failure to pay school fees in time seriously hampered their progress in school because most of the time they would be sent home where some could take weeks before getting back to school. They complained that the dent visited upon their education by absenteeism was quite devastating. Many of them noted that they lagged behind in subjects which required step by step with teacher’s instructions, namely, languages, mathematics and sciences. With some teachers being overwhelmed with work, rigid and inconsiderate, these students observed that when they came back to school after missing out for days or weeks, they were not given any differentiated instructions on the topics covered in their absence. They therefore lagged behind for weeks and because topics in each syllabus are inter-related, their shoddy coverage of one topic led to their poor performance in the whole term or year. A close examination of students’ performance revealed that students’ presence in school was directly proportional to their performance in languages, mathematics and sciences. From this study, 86.72% of the students who were frequently absent from school had below average performance.
(grade c-), a mean score of less 50% in languages, mathematics and sciences throughout the year. This could partly explain why boarding secondary schools did better than day secondary schools. The difference comes in the fact that, whereas day secondary schools ended their teaching at 4.00pm to allow time for co-curricular activities and journey back home because many came from far and started lessons at 8.00am to allow all students arrival in school, their boarding secondary school counterparts had extended evening and dawn classes to compensate for the lost learning time.

Apart from school fees, it was found 73.54% of students in day secondary schools in the sub-county had insufficient learning support materials like pens, mathematical instruments, dictionaries, revision books and had no access to extensive reading materials like newspaper articles and magazines. They mainly relied on conventional textbooks and exercise books provided by the government. In 20.00% of the classrooms visited, 60.00% of students lacked either pens, pencils, mathematical instruments, dictionaries, revision books and personal workbooks. Asked why they lacked such things like pens yet they were very cheap, going for as low as 10.00 Kenya Shillings (US Dollars 0.1), the students gave such reasons like the ones they buy are very cheap hence they could not last for long before they developed faults, parents do not buy for them and yet others said, they do not tell their parents about their school needs because they know they would not get any support. Lack of these items demoralised many students and denied them confidence in the classroom.

The students said that 85.00% of teachers send them out during their lessons on realising that they lacked the necessary learning materials, 10.00% allowed them to share and 5.00% ignored them. Those sent out confessed that the treatment remains and can go on for weeks if they do not make efforts to acquire the learning items demanded by the teacher. During these weeks they noted a lot is covered in the syllabus without their participation. The head teachers reported that the reason they allowed students to share whatever few materials they had was that sending them home could mean weeks of absence from school and still report back without the said items. However, 86.00% of the students who had shared learning materials with their classmates opined that the practice resulted to a lot of time wastage and distraction from learning. It also resulted to inequality in learning acquisition because the student whose parent had struggled against odds to purchase the items suffered the same way as those of whom had not.

CONCLUSION
The study concludes that home conditions for most of the students at public day secondary schools in Imenti North sub-county Kenya were unfriendly to students’ academic endeavours. Students lack of separate rooms from where they could do their studies as well as inappropriate and unreliable lighting systems at home spelt doom for their education. This led to their failure to concentrate, discouragement and low morale. As a result, many students failed to do teachers assignments resulting to some teachers sending them out during their lessons, punishing them with manual work in the school compound during the lessons or requiring them to do the assignments during the valuable class time. For these students, it is a double tragedy. They lose studies at home and at school. Even when they made efforts to complete those assignments, they always had a step or two to do in order to catch up with the others. They always lagged behind in the syllabus. The study also concludes that parental income levels have far reaching effects on students’ education at secondary school.

The earning ability of the parents determined the level at which they prioritised education for their sons and daughters. For the high income parents, there was sufficient awareness that good education is the key to good life hence the need to provide all the learning materials required and early payment of school levies so as to tame time wastage. These parents had also the audacity to question what their children did in school because they had fully met their part of the bargain. Their children reasonably did better because they had to account for every minute spent in school under uncompromising supervision of their supportive parents. For the poor parents, secondary school education was a god-send opportunity for which they had very frail control over.

Due to little awareness and self-blame for inability to provide to their children, they cannot not bring their children to account for their time in school. Even during school academic clinics, they resolutely blamed themselves for their children’s poor performance. That is why in these occasions, many of the parents absconded, were non-committal or disinterested with their children’s performance in school. The head teachers decried an alarming failure by parents to attend school parents’ meetings. This can be attributed to parents’ fear of reminder that they had failed to do their part in supporting their children’s education. It can further be concluded that students’ inadequate possession of the necessary learning materials in the classroom seriously hampered their progress in learning. Time wasted when students are sent outside or home because they do not have one item or another, is difficult to recover and the
victims are likely to lag behind throughout the term or even a whole year. Even when they are made to share, there is a lot of time wastage. Some students also feel uncomfortable with sharing their learning materials with their classmates and if pressed to do so they can switch off from learning.

REFERENCES

*****
HOME-BASED FACTORS INFLUENCING SCHOOL COMPLETION RATE OF BOYS IN PUBLIC DAY SECONDARY SCHOOL IN MBEERE SOUTH SUB-COUNTY, EMBU COUNTY ‘KENYA

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ABSTRACT

The government of Kenya introduced Free Day Secondary Education (FDSE) with a view to increase secondary school education access and raise completion rate of students who were initially deemed unable due to high cost of secondary education. Despite this, a number of students fail to complete education. The purpose of this study was to determine the completion rates of boys in public day secondary schools against the backdrop of free day secondary education. It aimed at establishing the home based factors that affect completion rate. The target population was 2590 students in day secondary schools, 25 principals and 220 teachers. A sample of 338 respondents, comprising of 10 principals, 120 teachers and 208 students in form two, three and four were used in the study. Students were randomly selected. The principals, guidance and counseling and deputy principals were purposively selected. For the other teachers, it was random selection. Correlation research design was used to investigate the selected factors that influence boys’ completion rate. The study employed two theories: The Classical Liberal Theory of Equal Opportunity and Herzберg’s Two Factor Theory. Questionnaires were used to collect data from the students and teachers while interview was used for the principals in the sampled schools. Pilot study was conducted in Embu West sub-county, which has similar environmental characteristics as Mbeere South Sub-county to test the reliability of the research instruments before the actual data collection. Twenty-eight students and twenty-three teachers were used in the pilot study. The reliability coefficient of completion rate was 0.748; home based factors 0.772... The data obtained was analyzed by use of both descriptive and inferential statistics. Descriptive statistics used was frequencies, mean and percentages and standard deviation. The inferential statistics used was linear regression and ANOVA. The hypothesis was tested at α=0.05 significance level. The Statistical Package for Social Sciences (SPSS) version 23.0 computer software program was used to analyze the data. The study established that there is a relationship between completion rate and home based factors. The study would assist the education policy makers to waive all levies charged students who enroll in public day secondary schools especially in arid areas such as Mbeere South.

Keywords: Completion rate, Home based factors, Public Day School, Motivation and Hygiene Factors.

INTRODUCTION

The universal declaration of human rights in 1948 by UN declares education as basic human right. Education is one of the most important components a nation has in her disposal for promoting sustainable social and economic development. Education leads to increased productivity as a means of human resource development for communal benefit (MOEST, 2002). Kenya is a signatory to the international protocol that established Education for All (EFA), World Economic Forum (WEF) which was held in Dakar Senegal in 2000. Consequently Kenya is committed to; elimination of poverty as a hindrance to educational development, promotion of human rights through provision of Education and attainment of sustainable development by the provision of quality basic education for all (Republic of Kenya, 2003).

According to Miller (2015), over 1.2 million students drop out from high school in USA. About 25 percent of high school students fail to graduate from high school on time. USA which had some of the highest completion rate among the developed countries now ranks 22 out of 27 in terms of completion. The drop-in completion rate has fallen 3% from 1996 to 2010 (Miller, 2015). In 2010, 38 States in USA had higher graduation rates. Vermont had the highest, 91.4% graduating and Nevada had the lowest 57.8% of high school students graduating (Balfariz, 2014). Education completion for students is also a problem in countries of South Asia such as Bangladesh, India, Nepal, Pakistan and Sri-Lanka. According to Haq and Haq (2000) the rate of participation in schooling is low and the quality of education is not good in some countries. However, in the second half of the twentieth century there has been an, education explosion. Enrolment in this South Asia has greatly gone up (UNDP, 2001). Some families cannot afford their children’s daily meal and other expenses related to their education. As a result, they force their children to quit schooling and engage in income generating activities or support family in household chores (Woldehana, Jones & Tefera, 2006). There is repetition of grades and if there is no perceived learning improvement the family advises the learners to take up alternative option of quitting schooling. The lower rate of secondary school participation could be attributed to lack of educational facilities to accommodate the demands by graduates of the...
upper primary cycle. The ratio of primary to secondary is 30,000 primary schools to fewer than 2000 secondary schools that is a ratio of 15:1. Hence, there is overcrowding in secondary schools (World Bank, 2004).

According to Kenya Institute for Public Policy Research and Analysis (KIPPRA), (2006) Kenya Vision 2030 is relying on the education sector to deliver the necessary skills and build adequate human capital to achieve and sustain Kenya as a middle-income economy. However, the survival rate from class one to form four is below 20 percent while those who survive from class one to university is 1.69 %.

Table 25: Boys Enrolment and Completion Rate Nationally

<table>
<thead>
<tr>
<th>Form</th>
<th>Year</th>
<th>Boys</th>
<th>Completion Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Form 1</td>
</tr>
<tr>
<td></td>
<td>2011</td>
<td>276,965</td>
<td>2012</td>
</tr>
</tbody>
</table>

Source: Kenya National Bureau of Statistics

Table 2 shows that between 2011 and 2014 the national completion rate for boys was 90.35% or 26729 boys dropped out or failed to complete secondary education in Kenya.

Boy’s education completion can greatly be attributed to home-based factors. Students from larger households are less likely to participate in education compared to smaller one. This is in connection with provision of labour for family sustenance and educating younger members of the household, or stand-in in case of family shocks such as sickness (Ngondi, 2010). Others include; parents level of education, economic status, religious background, values, interests of the parents and expectations for their children, age of the household head, gender among others (Odaga, 2007). Parents with little or no education perceive education as a waste of time and cannot assist their children in school work. These parents hasten to withdraw their children from school in order for them to help domestic chores at home. This could be the contributory factor to low completion rate of boys in the area of study.

Table 26: Completion Rate of Boys in Embu County

<table>
<thead>
<tr>
<th>Form</th>
<th>Year</th>
<th>Boys</th>
<th>Completion Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Form 1</td>
</tr>
<tr>
<td>Mbeere South</td>
<td>2011</td>
<td>1650</td>
<td>2012</td>
</tr>
<tr>
<td>Mbeere North</td>
<td>1321</td>
<td>1319</td>
<td>1316</td>
</tr>
<tr>
<td>Embu East</td>
<td>1900</td>
<td>1870</td>
<td>1875</td>
</tr>
<tr>
<td>Embu West</td>
<td>1758</td>
<td>1853</td>
<td>1753</td>
</tr>
<tr>
<td>Embu North</td>
<td>1326</td>
<td>1318</td>
<td>1303</td>
</tr>
</tbody>
</table>

Source: National Bureau of Statistics

Table 2 shows that there is lower completion rate of boys in Mbeere South Sub-county compared to the other sub-counties. The higher completion rates in Embu County could be attributed to the third and fourth repetition of students after KCSE. KNEC allows students to sit the form four exam as many times as one wishes. The cohort completion rate was not available.

Statement of the Problem

Completion rate among students is concern since in day secondary schools, it remains below hundred percent according to Ministry of Education. There has been need for increased completion rate of secondary education in the country. The government introduced Free Day Secondary, bursary for needy and disadvantaged students all in line with the sustainable development goals and Kenya vision 2030. Based on a number of studies carried out on the completion in secondary school education, a number of factors have been cited as causing lower completion. In Embu County, the rates were higher, but this study if carried out in Mbeere South would look into the causes of lower completion rate of boys in public day secondary schools compared to the other sub counties in the same location. Statistical economic data obtained from the national bureau of statistics shows that boys’ completion rate in Mbeere South was lower compared to other sub-counties. This study to investigated some selected home, school and social factors that may have affected the completion rate of boys in public day secondary schools in Mbeere South.

Objectives of the Study

i. To establish the relationship between home based and completion rate of boys in public day secondary schools in Mbeere South Sub County.

ii. To determine the relationship between school based and boys’ completion rate in public day secondary schools in Mbeere South Sub County.
iii. To determine the relationship between the social factors and completion rate of boys in day secondary schools in Mbeere South Sub County.

Research Hypotheses
The following hypotheses were tested at $\alpha = 0.05$ significance level

$H_01$: There is no statistically significant relationship between home-based factors and boys’ completion rate in public day secondary schools in Mbeere South Sub County.

$H_02$: There is no statistically significant relationship between school-based factors and boys’ completion rate in public day secondary schools in Mbeere South Sub County.

$H_03$: There is no statistically significant relationship between social factors and the boys’ completion rate in public day secondary schools in Mbeere South Sub County.

METHODOLOGY
Research Design
This study adopted correlation research design. This is a quantitative method of research where two or more variables from the same group of participants are used by the researcher to determine if there is a relationship or co-variation. According to Nachmias and Nachmias (1992) the designs enables the researcher to come up with solutions to problems and guides him in various stages of the research. This design was appropriate since it would be used to determine the relationship between selected home, school and social factors and how they affect the completion rate of boys in public day secondary schools.

Sampling Procedure and Sample Size
According to Orodho (2012) the items selected for a study constitute a sample: sampling is the process of selecting a member of individuals of the population as representative of the entire group. According to Kathuri and Pals (1993), a population of 2835 requires a sample of 338 study respondents obtained from the twenty-five schools (Appendix 1). The sample size consisted of 10 principals, 120 teachers and 220 students. The students in form two, three and four were randomly selected but teachers and principals were purposively selected as shown in Table 4.

Table 27: Sample Size

<table>
<thead>
<tr>
<th>Description</th>
<th>Population</th>
<th>Sample size</th>
<th>Sampling procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principals</td>
<td>25</td>
<td>10</td>
<td>Purposive</td>
</tr>
<tr>
<td>Teachers</td>
<td>220</td>
<td>120</td>
<td>Purposive</td>
</tr>
<tr>
<td>Students</td>
<td>2590</td>
<td>208</td>
<td>Simple Random</td>
</tr>
<tr>
<td>Total</td>
<td>2835</td>
<td>338</td>
<td></td>
</tr>
</tbody>
</table>

Research Instruments
This study utilized questionnaires and interview schedule to obtain the data. Questionnaires are research instruments that gather data over a large sample (Tromp, 2006). The questionnaire is a convenient tool for the study since it enables the researcher to gather bulk information within limited time span and with minimal cost. It facilitates easy and quick acquisition of information. The instrument gives the respondents ample time to give well thought and researched answers. There were questionnaires for students (Appendix II). The questionnaires were divided into sections A B C D and E. Section A covered the bio data of the student. Section B contained the views of the students on the completion rate of the boys. Section C was on the home-based factors, section D covered the school-based factors and E captured the social factors that affect the completion rate of the boys. The questionnaire answered by teachers (Appendix III) had five sections as the ones given above only that it was more detailed in the bio data since it captured responsibility in the school, gender, age and qualifications.

Table 28: Summary of Reliability Test Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of items</th>
<th>Cronbach Alpha</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion Rate</td>
<td>5</td>
<td>0.748</td>
<td>Reliable</td>
</tr>
<tr>
<td>Home Based Factors</td>
<td>5</td>
<td>0.772</td>
<td>Reliable</td>
</tr>
<tr>
<td>School Based Factors</td>
<td>5</td>
<td>0.793</td>
<td>Reliable</td>
</tr>
<tr>
<td>Social Factors</td>
<td>5</td>
<td>0.702</td>
<td>Reliable</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>0.7537</td>
<td>Reliable</td>
</tr>
</tbody>
</table>
Reliability test checks for consistency of measurement instruments. This study used Cronbach’s alpha to test reliability, a threshold of 0.7 was used. This study found a reliability of above 0.7 for all variables and the overall reliability indicating that the instrument was reliable.

Demographic Characteristics of the Student Respondents
The age and form of the student respondents was captured in Table 8

Table 6 Age Bracket and Class of Student Respondents

<table>
<thead>
<tr>
<th>Student’s age</th>
<th>No.</th>
<th>%</th>
<th>form</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-15</td>
<td>13</td>
<td>5.9</td>
<td>2</td>
<td>57</td>
<td>26.7</td>
</tr>
<tr>
<td>16-17</td>
<td>142</td>
<td>65.1</td>
<td>3</td>
<td>89</td>
<td>41.7</td>
</tr>
<tr>
<td>Above 18</td>
<td>63</td>
<td>28.8</td>
<td>4</td>
<td>67</td>
<td>31.4</td>
</tr>
<tr>
<td>Total</td>
<td>218</td>
<td>99.8</td>
<td></td>
<td>213</td>
<td>99.8</td>
</tr>
</tbody>
</table>

Table 6 shows that majority of the students were in form 3 aged 16-17 years followed by those above 18 years and in form four. This indicates that many students in day secondary schools are in the right ages as estimated by the current education curriculum in Kenya and can give correct responses.

Responsibility of Paying School Fees and Education Attainment of the Parent
Students were asked to indicate who bore the responsibility of paying fees and also the education attainment of the parent. These responses are shown in Table 9

Table 7: Parent Education Attainment and Fees Payment Responsibility

<table>
<thead>
<tr>
<th>Education attainment</th>
<th>No.</th>
<th>%</th>
<th>Fees payment</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never gone to school</td>
<td>2</td>
<td>0.9</td>
<td>Both parents</td>
<td>133</td>
<td>60.7</td>
</tr>
<tr>
<td>Primary</td>
<td>70</td>
<td>32.1</td>
<td>father</td>
<td>38</td>
<td>17.3</td>
</tr>
<tr>
<td>Secondary</td>
<td>134</td>
<td>61.4</td>
<td>mother</td>
<td>46</td>
<td>21.0</td>
</tr>
<tr>
<td>College/University</td>
<td>12</td>
<td>5.5</td>
<td>guardian</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>Total</td>
<td>218</td>
<td>99.9</td>
<td></td>
<td>219</td>
<td>99.9</td>
</tr>
</tbody>
</table>

Table 7 shows that 61.4% of the parents had attained secondary education and would wish their children to attain the same. It is also evident that 32.1% had primary education an indication that they may also value education. Literate parents can appreciate the benefits of education and are likely to assist and support students in school. Only 5.5% had achieved post-secondary education hence secondary students may lack role models or people in the society worthy emulating.

On fees payment, 38.3% of the parents were singly paying school fees a condition which may be brought about by dysfunctional families or orphan hood whereas 60.7% had both parents paying school fees. Only 0.9 percent had their fees paid by the guardians. The findings are relevant as they shed some light on gender roles considering that 21.0% of mothers compared to 17.3% of fathers were paying fees for their sons.

Number of Siblings and Parent Occupation
Respondents were requested to indicate the number of siblings in school and the occupation of their parents and the responses are shown in Table 10

Table 8: Number of Sibling in School and Parents’ Occupation

<table>
<thead>
<tr>
<th>Number of siblings</th>
<th>No.</th>
<th>%</th>
<th>Parents occupation</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>22</td>
<td>10.1</td>
<td>Farming</td>
<td>146</td>
<td>72.1</td>
</tr>
<tr>
<td>2</td>
<td>37</td>
<td>17.1</td>
<td>Self-employed</td>
<td>47</td>
<td>21.4</td>
</tr>
<tr>
<td>3</td>
<td>58</td>
<td>26.5</td>
<td>business</td>
<td>16</td>
<td>6.0</td>
</tr>
<tr>
<td>4</td>
<td>69</td>
<td>31.9</td>
<td>Private/public employed</td>
<td>11</td>
<td>0.5</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
<td>13.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>216</td>
<td>99.4</td>
<td></td>
<td>220</td>
<td>100</td>
</tr>
</tbody>
</table>
It was observed that 72.2% of the students had between 3-5 siblings in school. The larger the family the higher the possibility of students failing to complete education because of the fees burden especially in low economic potential areas. 27.2% had only one or two siblings hence possibility of less fees burden. Most of the parents, that is 72.1% were farmers. Farming compared to self-employment, business private or public employment may not be a lucrative venture owing to unfavorable weather pattern experienced in the county of the study bearing in mind that the area is semi-arid. According to (Woldehana, Jones & Tefera, 2006) in large families, children’s education is likely to suffer if the family income is not consistent. In some cases, children are called upon to boost the family income by seeking employment or standing in for the parents as go out to work. They also observed that in families where money is scarce, food becomes an issue and hungry students do not concentrate in class and are likely not to complete school.

**Home Based Factors**

Elements of independent variable home based factor were analyzed as shown in the Table 9

<table>
<thead>
<tr>
<th>Statement</th>
<th>Students Mean</th>
<th>Interpretation</th>
<th>Teachers Mean</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The parent level of education may affect secondary school completion rate.</td>
<td>2.100</td>
<td>Disagree</td>
<td>3.058</td>
<td>Undecided</td>
</tr>
<tr>
<td>Parental level of income affects secondary completion</td>
<td>3.374</td>
<td>Undecided</td>
<td>3.100</td>
<td>Undecided</td>
</tr>
<tr>
<td>If the mother is the head of family students are unlikely to complete secondary education</td>
<td>2.091</td>
<td>Disagree</td>
<td>2.239</td>
<td>Disagree</td>
</tr>
<tr>
<td>The age of the parents determines whether students’ complete secondary education</td>
<td>1.977</td>
<td>Disagree</td>
<td>2.352</td>
<td>Disagree</td>
</tr>
<tr>
<td>If a student comes from a large family he may not complete secondary education</td>
<td>2.0004</td>
<td>Disagree</td>
<td>2.593</td>
<td>Disagree</td>
</tr>
<tr>
<td>Overall</td>
<td>2.309</td>
<td>Disagree</td>
<td>2.668</td>
<td>Undecided</td>
</tr>
</tbody>
</table>

Key: SD 1.00-1.79 D1.80-2.59 U 2.60-3.39 A 3.40-4.19 SA 4.20-5.00

According to Table 9, students felt that the parental level of education; mothers being household heads and parent age do not influence their secondary completion. The teachers’ respondents felt the same. According to Ersado (2005) parental education is the most consistent determinant of child’s higher attendance rate and drop out. Parents who have attained a certain level of education might want their children to achieve at least the same level. Despite that, many uneducated parents send their children to school and support them to complete secondary education. The teachers disagreed on mothers heading families, family size and age and how it affects completion rate. They were undecided on parental level of education and income.

Parental income predicts school achievement and completion behavior according to (Rumberger & Larson, 2002). Students from poor households also complete secondary education contrary to (Levin 2005) who observed that social economic status is a significant predictor of completion mostly for boys. Nakajo and Okumu, (2008) observed that completion is influenced by some households’ characteristics. Aged parents according to (Holmes, 2003) appreciate the importance of education and influence their children to stay as school. Gomes (2002) asserted that students from larger families are less likely to complete education compared to smaller ones.

Young, uneducated and not well to do parents also send and support their children in school. The findings did not concur with Dachi and Garret (2003) who observed students from poor background are mostly unable to attend school and concluded that students from better off households were more likely to remain in school whilst those from poorer were more likely to have attended or dropped out once they enrolled. Glick and Sahn (2000) research in Guinea indicated that where household incomes increased there was greater investment in children’s schooling. Levia, (2005) observed that social economic status is a significant predictor of completion mostly for boys, which was not supported by this study.

**Home-Based Factors Descriptive Statistics**

To test for normality of data, descriptive statistics was used. The mean was used to determine the average of the data and standard deviation was used to measure dispersion from the mean. This was explained by Table 16.
Table 10: Home-Based Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion Rate</td>
<td>3.3782</td>
<td>0.69585</td>
<td>340</td>
</tr>
<tr>
<td>Home-Based Factors</td>
<td>2.484</td>
<td>0.76436</td>
<td>340</td>
</tr>
</tbody>
</table>

Table 10 data is normal, unbiased and it can be used reliably to make inferences in this study. The mean represents generalization of data indicating that the data values were average. The standard deviation for the variables are not close to zero which depicts that values are not concentrated around the mean, all variables had almost the same mean and deviations implying that it would have similar effect on the independent variable.

Testing Hypothesis
The hypothesis (HO₁) stated that there is no statistically significant relationship between home-based factors and boys’ completion rate in public day schools in Mbeere South sub-county

Table 11: Model Summary on Home Based Factors

Predictors: (constant) Home Based Factors.

From Table 11, the study established that R is correlation coefficient of 0.333 which shows a positive relationship implying that the degree of association between the home-based factors and boys' completion rate is positive. R Squared is 0.111 which means that 11.1% of the completion rate was affected by the home-based factors. 89.1% may have been affected by other factors such as social and school-based factors which are not in the model.

Table 29: ANOVA on Home Based Factors

Predictors (constant) school-based factors.

Table 12 indicates that sig(p) was 0.000 and F was 9.8070. Since sig(p) was < 0.005 and F was > 2, the null hypothesis was rejected. Therefore, there is a statistically significant relationship between completion rate and home-based factors.

Table 30: Regression Coefficient on Home Based Factors

To confirm the findings from Table 12 a regression analysis on home-based factors was carried out as shown in Table 13. It was found out that t was 6.487 and p was 0.000 since t was > 2.00 and p was 0.000 and < 0.05 the null hypothesis was rejected thus there is a statistically significant relationship between completion rate and home-based factors. The study concurred with Collins findings among the American students who observed that the low family income, single parenthood, a situation where one or both parents did not complete high school education resulted to low completion rate of students (Collins, 2008). The same was also observed by (Ersado, 2005). Nakajjo and Okumu (2008) also found out that among the Ugandan students the completion rate was low if the students were orphans or if the mother was the head of the house hold.

Gomes (2002) realized that the size of the family was a determinant of the completion rate. In large families, the rate of drop out was high. This was because a large percentage of economically active members of the family may not be economically productive, thereby becoming households’ dependent. The age of the parents according to (Holmes,
also influenced the completion rate of students as he observed that aged parents want their children to stay at school. Higher parental education is associated with increased access to education, higher attendance rates and low drop-out rates. Parents who have attained a certain level of education might want their children to achieve at least the same level or higher (Woldehana, 2006).

CONCLUSION AND RECOMMENDATIONS
Home based factors affected the completion rate of boys in public day secondary schools some Parents were unable to pay school fees for their children. Due to economic constraints. In areas such as Mbeere South which are arid the government should wholly support students who enroll in public day schools

REFERENCES
Enyegue Parfcit Eloundou (2003): Tradeoff between family size and Education, Abrice notes

*****
INFLUENCE OF SCHOOL FEEDING PROGRAM ON ACCESS TO EDUCATION IN PUBLIC DAY SECONDARY SCHOOLS IN EMBU WEST SUB-COUNTY KENYA

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Corresponding Email: judywaithera100@gmail.com

ABSTRACT
School Feeding Program (SFP) is social safety net that provides educational benefits to the most students, thereby increasing access to education. SFP in Day Secondary Schools is a strategy of improving access to education. The government of Kenya introduced Free Day Secondary Education in 2008 in order to improve access to education but the responsibility of providing students with meals was left to parents. Board members introduced a feeding program where parents pay for lunch. The purpose of this study was to determine the influence of school feeding program on access. The research used correlation research design. The researcher used both purposive and simple random sampling techniques to select 360 respondents comprising of 260 form 2 and form 3 students, 90 teachers and 10 principals. Questionnaires and interview schedule were used to collect data. Reliability of the instruments was determined using Spearman Brown split half technique. A reliability coefficient of 0.888 was accepted. Validity was ascertained by supervisors from the Faculty of Education and Resources Development of Chuka University and other experts. The data was analyzed by use of inferential and descriptive statistic with the help of the Statistical Package for Social Sciences (SPSS) version 21 for windows. The inferential statistic data was presented in linear regression to test the hypotheses, while descriptive statistics was presented in tables, frequency, percentage and mean. The results indicated that most respondents supported the School Feeding Program hence there was a significant increase in access. This research concluded that School Feeding Program is important in enhancing access in day schools. The teachers and the Ministry of Education find the study useful because the finding helps them understand better the issues related to school feeding program. The study findings form a frame of reference for further research on influence of School Feeding Program to education.

Keywords: Access, Meals, Day Schools, Influence, Board

INTRODUCTION
Education is upheld as a fundamental right globally. It is therefore considered as the most important factor for achieving sustainable development and used as an important means for changing attitudes and behaviours. The United Nations Hunger Task Force (UNHTF, 2004) made seven recommendations on how to achieve the first Millennium Development Goal (MDG). These were stated in their report that aimed at reducing hunger especially among students. One of the strategies identified by the UNHTF to achieve this goal was the implementation of School Feeding Programs (SFPs). The UNHTF considered the School Feeding Program as an important tool towards improvement of education. Their point of view was that School Feeding Program’s could increase school attendance, especially for girls. Furthermore the UNHTF recommended comprehensive community and school based feeding programs that included not only school feeding, but also systematic de-worming, micro nutrient supplementation, take home rations, safe cooking facilities, clean drinking water, improved sanitation, education on HIV/AIDS, health, nutrition and hygiene was to be included. All these provide a good base for improving schools, keeping students healthy and engaging the community (UN, 2005).

The law to start serving lunches was first launched in Holland in 1900. This involved the provision of lunch to about 80% of students motivating them to attend school (FAO, 2005, Gunderson, 2011). Teachers gave support to the program and a recommendation was made which led to a national order that schools in urban centres should provide lunch for their children and the government provided funds for this (Gunderson, 2007). England passed an education provision of meals act in 1905 which led to the coming up of non-governmental organizations to support school feeding programs. By 1930, the school feeding programs had spread to other countries like Italy and United Kingdom. A study on impacts of school feeding programs to school access revealed that School Feeding Programs have indeed positive influence on school enrolment, class attendance and students’ retention status (Meng & Ryan, 2003). Ahmed (2004) conducted a study in food insecure areas of Bangladesh to see the impact of school feeding program on access to education. He concluded that school feeding leads to increased time spent in school, increased attendance and increased retention rates (Ahmed, 2004). According to Buttenheim (2011) reductions in diseases like anaemia were significant impacts in retention of students undergoing School Feeding Programmes in Burkina Faso. The School Feeding Program was also introduced in Malawi and it was called Food for Education (FFE). It served
school meals and snacks in order to reduce short-term hunger and achieve commonly expected academic outcomes to improve academic access, completion and transition (Buttenheim, 2011).

Kindi (2014) stated that Tanzania has made efforts to address the issue of school enrolment, attendance and academic achievement in most drought prone food insecure areas. The School Feeding Program was one of the interventions because hunger was the most common cause of low enrolment, poor attendance and low academic achievement. However since the introduction of School Feeding Programs little has been done to most schools in Tanzania, to improve school attendance and retention. In Kenya, the School Feeding Program was started in 1966 by National School Feeding Council. Kenya’s school feeding program has experienced continued expansion and refinement, especially during the past decade. Since the introduction of free education for all Kenyan students, school feeding programs have developed alongside national policies of increased student health, and attendance (MoE, 2004). From its inception, it has targeted food inequality in the most vulnerable areas of Kenya, including school districts in the ASAL and informal urban slums of large cities such as Nairobi and Mombasa (Espejo, 2009).

The Kenyan Government introduced Free Day Secondary Education where each child receives tuition fee from the national government. The parents were expected to cater for other needs including meals for their children. The school Boards of Management initiated a school feeding program sponsored by parents (MOE, 2008). The basic education act (2013) made education free and compulsory in Kenya. Kenya’s vision 2030 pillar on education and training partly states that overall goal is to reduce illiteracy by increasing access to education, increasing transition rate in secondary schools and raising quality and relevance of education and retention. However this has not been easy to achieve. There is therefore need to study the influence of school feeding program on access, retention and academic achievement of students in public day secondary schools because this will seek to fill the knowledge gap.

Enrolment increased in most schools after the introduction of FDSE (Free Day Secondary Education). The introduction of a school feeding program in day schools was meant to enhance the access, retention and academic achievement of students in Public Day Secondary schools with the aim of increasing the retention rate. The table indicates that, positive outcomes are being recorded as regards access to education. There is an increase in school enrolment in most schools. The efforts being made do not however realise a hundred percent completion rate because the challenges of dropout still persist.

Table 31: Enrolment and drop-out rates in day secondary schools in Embu West from 2008-2014

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Schools</th>
<th>Enrolment</th>
<th>Drop-out</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Boys</td>
<td>Girls</td>
</tr>
<tr>
<td>2008</td>
<td>18</td>
<td>1500</td>
<td>525</td>
</tr>
<tr>
<td>2009</td>
<td>20</td>
<td>2000</td>
<td>1172</td>
</tr>
<tr>
<td>2010</td>
<td>22</td>
<td>2385</td>
<td>1365</td>
</tr>
<tr>
<td>2011</td>
<td>22</td>
<td>2522</td>
<td>1625</td>
</tr>
<tr>
<td>2012</td>
<td>22</td>
<td>2600</td>
<td>2085</td>
</tr>
<tr>
<td>2013</td>
<td>23</td>
<td>2622</td>
<td>2385</td>
</tr>
<tr>
<td>2014</td>
<td>25</td>
<td>2863</td>
<td>2398</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td>16,492</td>
<td>11,555</td>
</tr>
</tbody>
</table>


Objective

The study was guided by the following objective
To establish the influence of school feeding program on access to education in public Day Secondary Schools in Embu West Sub-county.

Significance of the Study

It may help principals have effective implementation of the feeding program in their schools. The findings in the study may contribute to the existing body of knowledge of School Feeding Program and its influence on access to education in day secondary schools.
LITERATURE REVIEW
School Feeding Program and Access to Education
A School Feeding Program is mainly implemented with the purpose of increasing academic access and is centred on how hunger affects learning (Lawson, 2012). A study conducted in Jamaica revealed that school meals indeed improve education of beneficiaries (Lawson, 2012). The study showed that school performance indicators, that is enrolment, attendance, and dropout rate, repetition of grades, school attainment levels, cognitive function, and classroom behaviour improved in response to school feeding. This is because the provision of school meals reduces the parent’s involvement thereby promoting enrolment and improving attendance (Lawson, 2012). He continues to maintain that there are consistent positive effects of SFP on energy intake, micronutrient status and school enrolment of learners. According to World Food Programme (2010), School meals do act as an incentive for parents to send students to school; furthermore, it may increase enrolment and attendance rate. India has had a tradition of SFP since 1920 largely controlled by the state governments with some external assistance (Akanbi, 2011).

Despite all these benefits of School Feeding Program, Lawson (2012) estimated that between the years 2003-2005, nine hundred and twenty three million children in the world were chronically hungry, many of whom were children from developing countries. Limited resources have sabotaged the implementation of School Feeding Programs which in turn has affected school attendance and enrolment in schools. Feeding programs are important as they are politically and socially accepted means of addressing hunger in the world, however, they are not easy to administer. This hunger may then be addressed through provision of School Feeding Program in schools especially to vulnerable and disadvantaged students who are considered at risk of malnutrition (Lawson, 2012). Graham (2008) indicated that the Problems of malnutrition cannot be overcome by a school meal program which provides less than 15 percent of the recommended daily allowance for calories. The meals provided in a School Feeding Program therefore should be balanced and of right calories. However, the provision of fewer calories in a program may improve school attendance and enrolment (Graham, 2008). School Feeding Program (SFP) can also increase enrolment if they are targeted at the right communities or populations (Bundy and World Bank, 2011). The program is more likely to have a positive result on enrolment when they are integrated with a facilitative learning environment and appropriate health and nutritional interventions. It is also important to note that not all School Feeding Programs provided would yield positive effects. Bundy(2009) found out that School Feeding Programs do not always achieve the same effect because factors like modality of the program, gender of the beneficiaries and types of food provided can influence the program outcomes.

Mexican Progress program is one example of school feeding program as it provides sizable cash transfers to households if students have a minimum attendance of 85% of school days. The program has resulted in substantial changes in middle school enrolments and calorie intakes (Schultz, 2004; Coady, 2003). It has also resulted in significant positive change in the attendance of already enrolled students (Schultz, 2000). School feeding program has been found to effectively increase class attendance because students receive the meal only when they attend school (Dheressa, 2011). A study on the effects of school breakfast in rural Jamaica showed that overcoming school hours hunger could lead to better concentration and learning hence improve school attendance (Ahmed, 2004). Ahmed evaluated the impact of school feeding on attendance in Bangladesh as well and found that the SFP had a significant positive impact on class attendance. The program increased class attendance of the students who were involved in the program by 1.34 days per month (Ahmed, 2004). A study on impacts of school feeding on students in Bangladesh showed that school meals contributed to high student enrolment and retention (DelNinno, 2004). Achan (2012) found a positive effect on access to education. Despite the complex nature of the contributions of the school feeding programs to students learning and attendance (Bundy, 2009), the available studies show positive results on the contribution of school feeding programs to students’ enrolment and student attendance (Jomaa, 2011). Vermeersch and Kremer (2004) conducted a field-study in Western Kenyan schools to evaluate the impacts of School Feeding Program on school enrolment and attendance and found that students who were fed spent 35.9 percent of the time in school compared to 27.4 percent in those not fed and this difference was statistically significant. The School Feeding Program increased access of both students who were previously enrolled and students who would not have gone to school in absence of the program. School feeding programs, therefore are more likely to improve daily school attendance (Vermeersch, 2004).

Theoretical Framework
Maslow’s Hierarchy of Needs
Maslow defined a need as a physiological or psychological deficiency a person feels the compulsion to satisfy.
The Schultz (1961) Theory of Human Capital
The Schultz (1961) Theory of Human Capital says that it’s not easy to have the fruits of modern agriculture and abundance of modern industry without making large investment in human beings.

METHODOLOGY
Research Design
This study adapted correlation research and descriptive design. According to Nachmias and Nachmias (1992), research design enables the researcher to come up with solutions to problems and guides him in various stages of the research. Correlational research is used to analyze the degree of relationship between two variables (Mugenda & Mugenda, 2005).

Population of the Study
The target population of this study was 2775 respondents from 25 public day schools comprising of 2500 students from form 2 and form 3 and a population of about 250 teachers and 25 principals. According to the ministry of education guidelines, a standard class should have 45 students.

Table 32: Education Zones of Embu West Sub-County

<table>
<thead>
<tr>
<th>Zone</th>
<th>Number of Schools</th>
<th>Student Population</th>
<th>Teachers Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Division</td>
<td>15</td>
<td>1488</td>
<td>172</td>
</tr>
<tr>
<td>Nembure Division</td>
<td>10</td>
<td>1012</td>
<td>78</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>2500</td>
<td>250</td>
</tr>
</tbody>
</table>

Source: Sub-County Education Office

Table 33: Showing Category of Participants and Population

<table>
<thead>
<tr>
<th>Category of Participant</th>
<th>Total Population</th>
<th>Number</th>
<th>Methods of Sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principals</td>
<td>25</td>
<td>10</td>
<td>Purposive Sampling</td>
</tr>
<tr>
<td>Teachers</td>
<td>250</td>
<td>90</td>
<td>Simple Random Sampling</td>
</tr>
<tr>
<td>Students</td>
<td>2500</td>
<td>260</td>
<td>Simple Random Sampling</td>
</tr>
<tr>
<td>Total Population</td>
<td>2775</td>
<td>360</td>
<td></td>
</tr>
</tbody>
</table>

Research Instruments
The study utilized questionnaires and interview schedule. A questionnaire had questions in a definite order. The interview involved oral or verbal responses. Questionnaires are research instruments that gather data over a large sample (Tromp, 2006). The questionnaire is a convenient tool for the study since it enables the researcher to gather bulk information within limited time span and with minimal cost. The instrument gives the respondents ample time to give well thought and researched answers. The questionnaires were divided into sections A, B, C, D and E. Section A elicited views on demographic information of the respondent, section B gave the general information about SFP, section C captured views of the respondents about influence of SFP on access to education.

Interview Schedule
Interview schedules were used to obtain data from the principal on the Influence of School Feeding Program on access to education in Public Day Secondary Schools. An interview is the oral administration of a questionnaire (Mugenda & Mugenda, 2003). It makes it possible to collect data required to meet specific objectives of a study. The interview guide consisted of open-ended questions, which covered demographic information about the respondent, information on School Feeding Program, and questions on the objectives.

Reliability
Reliability measures degree to which a research instrument yields consistent data after repeated trials. Random error is deviation from true measure due to factors that have not effectively been addressed by the researcher.

Validity
The instruments were presented to the supervisors and other experts in the department of education, Chuka University who improved the content validity. Necessary adjustments were made on the instruments to enhance and establish their validity.
Data Collection Procedures
The researcher obtained an introductory letter from the post graduate school of Chuka University after clearance by Chuka University Ethical Committee. The Research Permit was then sought from National Commission for Science, Technology and Innovation (NACOSTI). The researcher presented the permit to the Embu West sub-county director of Education to seek for permission to collect data from the schools.

Data Analysis Procedure
Quantitative data was analyzed using descriptive statistics such as mean, frequencies and percentages with the aid of computer based statistical package for social science (SPSS) version 21. To test the hypothesis the inferential statistics – linear regression was used.

### Table 34: Summary of Variables as Statistics

<table>
<thead>
<tr>
<th>Research by Hypothesis</th>
<th>Independent variables</th>
<th>Dependent variables</th>
<th>Statistical Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>H01-There is no statistically significant relationship between school feeding program and students access to education in day secondary schools of Embu West Sub-county</td>
<td>Influence of school feeding program</td>
<td>Access</td>
<td>Regression</td>
</tr>
</tbody>
</table>

### FINDINGS AND DISCUSSION

#### Response Rate

**Table 35: Response Rate of Respondents**

<table>
<thead>
<tr>
<th>Respondent Categories</th>
<th>Sample Respondent</th>
<th>Returned Questionnaires</th>
<th>Response Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>90</td>
<td>89</td>
<td>98.9</td>
</tr>
<tr>
<td>Students</td>
<td>260</td>
<td>256</td>
<td>98.5</td>
</tr>
<tr>
<td>Total</td>
<td>350</td>
<td>345</td>
<td>98.75</td>
</tr>
</tbody>
</table>

#### Demographic Information

**Table 36: Age of Student Respondents**

<table>
<thead>
<tr>
<th>Age of the Students</th>
<th>frequency</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-14 yrs</td>
<td>2</td>
<td>0.78</td>
</tr>
<tr>
<td>15-17 yrs</td>
<td>211</td>
<td>82.42</td>
</tr>
<tr>
<td>15-17 yrs</td>
<td>43</td>
<td>16.79</td>
</tr>
<tr>
<td>Total</td>
<td>256</td>
<td>99.99</td>
</tr>
</tbody>
</table>

**Table 37: Gender of the Respondents**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Teacher Frequency</th>
<th>%</th>
<th>Students Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>33</td>
<td>37.07</td>
<td>102</td>
<td>39.2</td>
</tr>
<tr>
<td>Female</td>
<td>56</td>
<td>62.20</td>
<td>154</td>
<td>59.2</td>
</tr>
<tr>
<td>Total</td>
<td>89</td>
<td>99.27</td>
<td>256</td>
<td>98.5</td>
</tr>
</tbody>
</table>

#### Responsibility of Paying School Fees

**Table 38: Responsibility of Paying School Fees**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both Parents</td>
<td>72</td>
<td>28.13</td>
</tr>
<tr>
<td>Father</td>
<td>50</td>
<td>19.53</td>
</tr>
<tr>
<td>Mother</td>
<td>101</td>
<td>39.45</td>
</tr>
<tr>
<td>Guardian</td>
<td>33</td>
<td>12.89</td>
</tr>
<tr>
<td>Total</td>
<td>256</td>
<td>100</td>
</tr>
</tbody>
</table>
Occupation of Guardian

Table 39: Occupation of Guardian

<table>
<thead>
<tr>
<th>Occupation of Guardian/Parents</th>
<th>Students Frequency</th>
<th>Students Percent</th>
<th>Teachers Frequency</th>
<th>Teachers Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farming</td>
<td>146</td>
<td>56.50</td>
<td>46</td>
<td>52.1</td>
</tr>
<tr>
<td>Self-employment</td>
<td>68</td>
<td>26.20</td>
<td>31</td>
<td>34.4</td>
</tr>
<tr>
<td>Business</td>
<td>26</td>
<td>11.00</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Private/public employed</td>
<td>16</td>
<td>6.29</td>
<td>11</td>
<td>12.2</td>
</tr>
<tr>
<td>Total</td>
<td>256</td>
<td>99.99</td>
<td>89</td>
<td>99.99</td>
</tr>
</tbody>
</table>

Access to Education

Data was collected from respondents on the objective, which was on how school-feeding program helps to achieve access to education. An interview schedule was also conducted on the principals. The results are presented in means in the Table 12.

Table 40: School Feeding Program and Access to Education

<table>
<thead>
<tr>
<th>Item</th>
<th>Student Mean</th>
<th>Teacher Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>The SFP provides good nutrients and is part of what attracted learners to join this school.</td>
<td>2.38</td>
<td>2.68</td>
</tr>
<tr>
<td>SFP makes parents encourage learners to go to school because it makes them spend more time in school.</td>
<td>3.40</td>
<td>3.13</td>
</tr>
<tr>
<td>Provision of meals saves time in secondary school and this encourages students to join school.</td>
<td>3.55</td>
<td>3.32</td>
</tr>
<tr>
<td>The quantity of food in this school attracts students to join it as it satisfies their short term hunger.</td>
<td>2.80</td>
<td>2.46</td>
</tr>
<tr>
<td>Students like coming to school because they are provided with rice for lunch.</td>
<td>2.52</td>
<td>2.43</td>
</tr>
<tr>
<td>SFP makes students attend lessons in good time because the meals are always ready in time.</td>
<td>3.70</td>
<td>3.46</td>
</tr>
<tr>
<td>Overall mean</td>
<td>3.05</td>
<td>2.91</td>
</tr>
</tbody>
</table>

Key: S D; 1.0-1.79, D; 1.80-2.59, U; 2.60-3.39, A; 3.40-4.19S A; 4.20-5.00, (SA); 4.20-5.00.

Overall, the respondents were undecided about most of the aspects on the SFP as shown by the overall mean of 3.05 for students and 2.91 for teachers respectively. This implies that there are other factors that influence the students access to education apart from the school feeding program. These results disagree with the findings of (Schultz, 2000) that school-feeding programs resulted in significant positive change in the attendance of already enrolled students. School feeding program has been found to effectively increase class attendance because students receive the meal only when they attend school (Dheressa, 2011). Following an interview with the principals, it was noted that the principals concurred with most of the views given by the students and teachers.

Model Summary of School Feeding Program and Access to Education

The correlation (R) indicates the correlation between dependent variable that is access to education and the independent variable that is school feeding program predicted by the model. The coefficient of determination (R²) determines the changes of variation in the dependent variable as explained by the independent variable. The Table 13 shows the values of R and R²

Table 41: Model Summary

<table>
<thead>
<tr>
<th>Predictors: (Constant)</th>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to Education</td>
<td>1</td>
<td>.427</td>
<td>.182</td>
<td>.180</td>
<td>.81397</td>
</tr>
</tbody>
</table>

b. Independent Variable: School-Feeding Programme

To determine the degree or strength of the influence between the variables the study sort to determine the correlation between the variables in order to determine the strength of the influence at 0.05 significance. From Table 14, the correlation coefficient was 0.427 with p-value of 0.000 which was found to be significant at 0.01 in a 2-tailed test. An improvement on the school feeding program will lead to an increase in access to education. There is a statistically significant positive influence of school feeding on access to education in Embu West sub-county.
Table 42: Regression coefficients

<table>
<thead>
<tr>
<th>School feeding program</th>
<th>Access to education</th>
</tr>
</thead>
<tbody>
<tr>
<td>correlation</td>
<td>0.427**</td>
</tr>
<tr>
<td>Sig (2-tailed)</td>
<td>0.000</td>
</tr>
<tr>
<td>n</td>
<td>350</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).

CONCLUSIONS

The increase was not very high because some parents were reluctant to pay for the school feeding program levies due to the government’s insistence that day secondary education is free. Some parents either withdrew the students from school or refused to take them to school because they were unwilling to pay for the lunch levy. There was some improvement, though not satisfactory, on access to education, which implies that there are other factors that influence the student’s access to education in day secondary schools apart from the school feeding program. The school feeding program had a positive influence on access to education in Public day schools.

RECOMMENDATION

The government and school administrators and other education stakeholders should support and improve the provision of meals. They should also sensitize the community on the challenges that the boy child in day secondary school is experiencing.

SUGGESTIONS FOR FURTHER RESEARCH

A study should also be conducted on the influence of School Feeding Program on enrolment of students in private day secondary schools.

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ENTERPRISING ARTS, HUMANITIES AND SOCIAL SCIENCES

TRANSFORMED MASCULINITY IN MARGARET OGOLA’S THE RIVER AND THE SOURCE AND I SWEAR BY APOLLO

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ABSTRACT
There has been extensive literary research on gender in Kenya and Africa in general. A lot of these literary scholarships in Kenya have tended to ignore male characters by concentrating on highlighting the woman and her struggle for emancipation from male dominance which has relegated the male character to the periphery. This study has attempted to fill this gap by exploring masculinity discourse. The study has concentrated on the representation of male characters in the two texts. The objective of the study is to interrogate the transformation of masculinities in Ogola’s The River and the Source and I Swear by Apollo. The study has been grounded on two theories: hegemonic masculinity and African feminism. Reformed hegemonic masculinity has been used to show men who have embraced changes or do not exhibit patriarchal tendencies. African feminism helped in the need to consider universal conditions that the African man and woman have experienced other than concentrating only on gender issues. The study is important because the male gender has often been viewed universally as the oppressor of the woman resulting to her subsequent subjugation that leads to the men being undermined and stereotyped. The study has used qualitative research design whereby an in-depth analysis of the primary texts has been done to show how Ogola has presented her male characters in order to determine the various constructions of masculinities. The data from the primary texts has been analysed as per the stated objective. The findings of the study showed men who do not possess patriarchal tendencies, men releasing power at various levels. Some men almost fully support women while others do it partially. This study will augment debate on gender studies not only by literary scholars but also development partners on the importance of including men in gender discussions to enhance social growth and development for gender parity.

INTRODUCTION
Masculinity and femininity are concepts that are very emotive in literary studies. Ouzagane & Morrel (2005) use the term masculinities to represent various constructions of the male gender that this study has incorporated and also shows how they have been misrepresented and stereotyped. According to these critics, the term masculinities entail the spirit of exclusion as the male characters act independently without patriarchal manipulation. Taylor & Francis (2015) show how men use practical methods in creating equality between men and women. Ouzagane & Morrel (2005) emphasise the need to correct the distorted image men have been granted. Presently, some men do not live as...
expected by patriarchy because they display their emotions freely without any inhibitions (Reeser & Gottzen, 2018). Some educated African women writers and critics stated that African gender problems cannot be solved by ignoring or vilifying the male gender (Achufusi, 1996). McFadden (2016) states that presently, women still antagonise men because they want to subvert patriarchy. Africa is still currently undergoing changes in the political and economic landscape (McFadden, 2015) that need an all-inclusive gender co-operation.

LITERATURE REVIEW
Introduction
Discussion on gender shows how African women writers viewed women as the discriminated gender while the male gender is shown as ‘the forgotten gender’.

Gender: Gutknecht & Butler distinguish sex from gender by stating that ‘Gender identity specifies whether a person is male or female’ (1985, p.139). The maleness or the femaleness of a person is determined at birth by the appearance of the genitalia. Clothes identify gender but hide one’s sex (Zimmerman, 1987). Masculinity and femininity is a result of socialization.

Causes of Women Subordination
Few women literary works were noted in the 1960s (Jones, 1987), a period that can be labelled the ‘dark ages’ because of lack of education and belief that man subordinated the woman (Cleaver, 2003). Some men are also subordinated for exhibiting feminine characteristics (Ouzagane & Morrel, 2005).

The Forgotten Gender
The entrance of the African woman writer into the literary field herald doom for the male gender (Ogundipe, 1987) because he became the ‘forgotten gender’ as studies concentrated on the female gender. This study interrogated Ogola’s male characters.

Complexities of Masculinity
The society elevates men but the same society vilifies and stereotypes them. Such complexity causes dilemma for men that sometimes results to disillusionment (Reeser & Gottzen, 2018) such that there is need to understand the societal responsibility of ‘being a man’ (Cleaver, 2003, p.5). Studies need to save men from literary doom (Ouzagane & Morrel, 2005). Ouzagane & Morrel (2005) shows the importance of also viewing how western colonialism has affected masculinity in Africa an argument also expressed by the African feminists that include Ogundipe (1994) and Achufusi (1994, 1996), who are interested in viewing the African woman’s status and the problems she experiences. Ogundipe (1994) is of the opinion that, as a continent, Africa is faced with many issues other than gender problems that is always given a lot of prominence. Ogunyemi (1985) argues that the unity of the African continent is paramount to gender discourse. In addition to this, Aidoo (1996) further states that both man and woman have experienced the ravages of external catastrophes like capitalism, colonialism and neo-colonialism. Contemporary scholars, for example, McFadden (2015) and Taylor & Francis (2015) also show the importance of including men in development agendas. De-gendering and re-gendering are two processes that create complexity in masculinity that this study found very helpful in the analysis of male characters. Harcourt (2015) refers to de-gendering as neutralizing gender issues in various fora. Agadjanian (2005) discusses de-gendering as a process whereby the male and the female gender work side by side for a common good. The process creates gender unity as man and woman generate solutions to counter obstacles or celebrate successes leading to gender unity and equality. Weston (1998) defines regendering as ‘to cause a person to be seen to have a (new, different) gender identity role’ (1998, p.170). Weston (1998) notes that however much human beings try to regender, it is never very easy to disengage from masculinity. Re-gendering as partial transformation for men.

The Iconized Female versus the Stereotyped Male
Over-glorified female characters in literary criticism are referred to as iconized women while the male characters are vilified to the extent of giving them stereotypical labels. Baraza (2004) views Ogola as a writer who contests stereotypical portrayal of women. Baraza lays a lot of emphasis on how Ogola deliberately obliterates the male characters with the sole purpose of elevating the female characters with the intention of emancipating them by giving them a louder voice than men. While Baraza’s study dwells on comparison in characterization with the viewed of reinventing the female character, the present study is a masculinity study; it concentrated on the male characters in the novels and how they affect the women and the whole society both positively and negatively. Baraza’s study was also propelled by stereotypical portrayal of girl character and woman by extension, while the
present study was propelled by stereotyping of male characters in female literary studies. Jose (2005) investigates whether Ogola is sensitive to the socio-cultural condition of the African woman. Accordingly the man in Ogola’s texts changes as a result of social changes which subsequently impact directly on the African woman who ends up reinventing herself. Jose (2005) also over-emphasises the role of African motherhood that translates to successful families while the present study emphasises on role of fatherhood. While Jose (2005) indicates that colonialism influenced man by classifying him as either traditional or modern, this study investigated man’s initiative to help the woman to rise above repressive customs and practices that has its origins in the so much vilified traditional and patriarchal pre-independent society. Atsango (2006) looks at the physical, psychological and spiritual journey of the women characters in Nwapa’s Efuru and Ogola’s The River and the Source; with the journeys highlighting the plight of women in third world countries. The present study differs from Atsango’s in that, while the former concentrates on the women characters, the present study was keen on exploring how Ogola presents her male characters in order to liberate the men from the blanket blame of women subjugation. The study explored the men that rose above masculinity. While Atsango justifies the fact that women’s marginalization is culturally oriented and has its foundation in the traditional society, the present research looked out for men who are sensitive to the women’s plight even in the traditional society but are overshadowed by patriarchal stereotyping.

METHODOLOGY
Qualitative research was used because it of elicited greater depth of response and understanding to the area of research. The data collection entailed close reading of the selected texts and key points in relation to male character representation and any other supportive evidence were noted down. Library research enhanced the study through interrogation of data on female writings, especially the African female writers’ studies and writings on the relevant theories. The study applied the content analysis approach to the study of the two texts. Detailed information of the idea being studied was gathered and the researcher established relationships or trends from the obtained information. Textual analysis was done as per the objective using the hegemonic masculinity and African feminism tenets.

FINDINGS AND DISCUSSION
The discussion yielded men who are not tied down by traditions that result to subordination of women. Such men value the women and grant them physical and emotional support. These men also value morality; Mark is remorseful for being unfaithful to Elizabeth. They protect their families religiously and acknowledge the women who help them succeed. The men are supportive to their fellow men; for example, the Dutch priest helps Young Kembo to complete his training in priesthood. This contestation has also been shown by men relinquishing important aspects of patriarchy like leadership and marriage as with the case of Owuor Kembo junior who opts to join priesthood while Obura opts to tour the outside world instead of marriage. In terms of marriage; men search far and wide and avoid localised marriages. Mark marries outside his region while Aoro marries out of his tribal boundary. John Courtney takes a very bold step out of his race. Transformed men express their emotions freely without fear of being labelled weak contrary to patriarchal beliefs. Kembo cannot hide the feelings he has for Akoko when he goes to ask for her hand in marriage. These men are also swift in embracing changes; for example in courtship whereby they even allow women to propose marriage as seen in Wandia proposing to Aoro while some couples themselves arrange for marriage negotiations instead of their parents; for example Mark and Elizabeth. Characterisation establishes round characters like Aoro whose development is plausible and consistent in relation to masculinity. Such men have contradicting characteristics. At one point in time Aoro clings to masculinity and patriarchy but later undergoes transformation and is receptive when defeated by a woman when he accepts defeat from Wandia and respects and views her as a fellow human being. Subversion of masculinity was also noted through the character portrayal of young men whereby the young men are also shown as very conscious of their environment that has mainly been destroyed by older men. Johnny notices the poverty caused by greedy politicians and the exploitation of the multinational companies. Transformation exhibited in the study include fathers cherishing fatherhood and viewing it as a tool to strengthen motherhood as shown when John acknowledges being Johnny’s father. However, it has been shown that man’s involvement in colonial narrative has been destructive as in the case of Maumau rebellion that caused a lot of death and destruction of family units.

Through the assessment of varying faces of gender power contestation, it was noted that there are chauvinistic men who cling to power and are not ready to relinquish this to women as such will be a show of weak masculinity. Such men can result to using force or violence to exert their masculinity. On the contrary, there are also docile men who are non-fighters. Characters like Pilipo, Nyaroche and Kongoso are despised by both men and women and labelled footloose. Such men end up in total self-destruction. Contrary to masculinity, some men are ready to share power with women. Such men fit very comfortably in domestic domain that has been traditionally relegated to women; for
example Mark helps Elizabeth with domestic work and Aoro helps Wandia. There are versatile and reformed men who have conceded much more power to the women. Women working or living with such men are allowed to make decisions in areas that were mainly men’s domain. Women are the greatest beneficiaries in such instances. For example, the women are allowed to actively participate in the affairs of their families, like choosing of marriage partners for their children, owning property like cattle, farms and farm produce to mention but a few. Chief Kembo in *The River and the Source* is an example of a versatile man who makes a lot of concessions to Akoko. Men in this category have also been shown as conceding their power to their sons; for example John in *I Swear by Apollo*. Such men also empower women with political leadership as seen in *I Swear by Apollo* where there is a woman president who is granted political power to correct the mess created by male politicians.

In the assessment of men contesting power amongst themselves, the study found out that men show off their wealth, and status in functions like marriage negotiations. Once again, universalism of literature is exhibited whereby the white men from Germany and Britain struggle for the control of colonies in Africa to show that universally, men attempt to show that they are masculine by indulging in acts of violence to prove who is stronger. The white men are shown as a superior masculinity as they are able to come to African and convince some of the black men like Obura to fight for them in the First World War. The study exhibited professional power struggle in *I Swear by Apollo* especially in the medical field whereby the male student doctors as in the case of Johnny are asked unattainable questions by their lecturers as in the case of Dr Gara (who want to prove his masculinity). The young trainee doctors are made to fail their exams for trying to express their knowledge because they also believe they are masculine enough and seem to pose as challengers of their seniors. However, in the case of Johnny and his consultant Matagaro, the study has shown that some older men are ready to build the younger ones professionally. Doctor Matagaro is ready to make Johnny a better doctor by allowing him to operate on a delicate patient. Nevertheless, though man exhibits heroism as a sign of being masculine as in the case of Johnny, every man has to be responsible for their actions and deeds.

In an assessment of the relationship between sons and fathers, some young men; for example Johnny assert their masculinity against parental dominance while some fathers; like Mark practise highhandedness over their sons to keep them in check as prescribed by patriarchy. There is existence of territorial supremacy among adolescent boys as in the case of Gitau and Mugo. The boys indulge in drugs to prove that they are not girls who are termed weak. The boys also indulge in violence to show who the strongest man is; all which are qualities of masculinity. Heterosexual relationships like in the case of John and Becky revealed that there is the existence of a cold war among men and men like John have had their male ego destroyed to an extent of feeling shy to ask for divorce from their unfaithful wives in the belief that they truly love their wives. In their masculine notions, they assume that they cannot hurt women because women are harmless. The moral voice in fiction is echoed through moral contestation among men as seen in the case of Father Tony and Brett whereby the former lectures the latter on the kind of family he is going to build after marrying Alicia because Brett is an atheist.

Finally, in assessing transformation through de-gendering and re-gendering, the study demonstrated that de-gendered men exhibit almost total transformation as they are ready to work with women in all spheres of life and especially in the economic field. A clear case is seen in the relationship between Aoro and Wandia who are both medical doctors and go through the same challenges in their profession exhibits transformation because he trusts Wandia and entrusts her with professional issues like the case of their son’s illness. Men who undergo re-gendering find total transformation difficult or unattainable as seen in the case of Odongo who works alongside his wife Jael but re-establishes a higher position for himself. In conclusion, it can be said that the male characters have been portrayed as people who are letting go off the fanatical beliefs and practices of masculinity that is embedded in patriarchy. Though slow and gradual this is the beginning of liberation of women who becomes the greatest beneficiaries. The timid men created by Ogola happen to be flat characters who remain the same throughout in the texts: a proof that masculinity is very complex and not homogenous. The portrayal of young male characters is a strength in Ogola’s work. Young men like Johnny, Mugo and Brett though minor, surprise the readers and are powerfully very resilient and conscious of their communities. Through them, Ogola is empowering the youth and particularly the male youth who have apparently been relegated in limbo as a result of the fight for the girl child. Men contesting power amongst themselves is an inherent feature in masculinity and is not easy to eradicate as it expresses male ego and man’s quest to defeat other men. In the portrayal of the white men and male youth, the writer wants to illustrate that male ego goes beyond race or age and that it is universal. The de-gendered and re-gendered men enhance women’s economic empowerment and shows that women with proper backup of men and law are better off and are deemed emancipated.
REFERENCES
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TEACHING ENGLISH FOR USE AND EXAMINATION IN PRIMARY SCHOOLS IN RUAKA TOWN, KENYA.

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ABSTRACT
Research carried out in Kenya estimates that as few as 25% of the citizenry can use English language (EL) with ease. For example, UWEZO 2016 report states that only 36.3% of class 3 boys and 43.4% of class 3 girls could do class 2 work in English with ease. The media also recently reported that in Nairobi 49% of mothers were unable to read a standard two story book even though 95% of them had completed secondary school. Uwezo further reports that majority of the police officers undergoing vetting were unable to in speak English fluently throughout their interview and had to switch to SHENG or Kiswahili mid-stream. This is despite the fact that English language has been given prominence in Kenya, since it is the official and national language, and the medium of instructions in the education sector. This implies that learners are exposed to English language in all spheres. Consequently, this study sought to find out the causes of limited proficiency among Kenyans by interviewing both the English teacher and selected primary school students and observing English teaching in the schools. My study used a multi stage sampling technique to randomly selected 5 primary schools in Ruaka and conveniently select 6 English teachers and 25 students from the 5 schools. The qualitative data was analyzed using content analysis. My findings indicated that the proficiency of 60% of the teachers interviewed was hampered by their pronunciation. The varieties of Englishes being taught in the 10 schools also deviated from the British variety that is prescribed by KICD. Ranking of students also put pressure on the teachers to teach English for passing examination. TSC policies on promoting teachers did not help either. The study recommends ranking of students be removed completely, one variety be standardized and taught uniformly in all schools, and preferably, that computer assisted language learning (CALL) be used to enrich the methodology and especially pronunciation teaching. Lastly, that the teacher training institutions increase focus on the phonology of English language.

Keywords: English language content analysis, role learning, policies, proficiency, medium of instruction

INTRODUCTION
English language is an important language in Kenya, yet proficiency in it has been an ongoing debate among the stakeholders in education for a very long time. The importance of English is attributed to it being a global language (PennyCook, 2010). Many countries have accordingly embraced English language in their education sector, while some use it as the official language in a bid to participate in the global arena. In Kenya, the official educational policy states that English is the medium of instruction (MOI) from grade 4 onwards (Nabea, 2009; Nyatuka, 2014). However, Trudell and Piper, (2014); Bunyi, (2013) and Muthwii, (2002) report that most private and some public primary schools begin teaching English from grade one arguing that they want to give their students a head start with the language. As the MOI, all subjects, with the exception of Kiswahili and other language based subjects, are taught using English language, and the language is also taught as a subject. Thus Kenyan students learn the language while using it to also learn the curriculum. Other than being the MOI, English language is one of the two official languages in the country, playing the role of the language in government business, judiciary, and media among others. This makes the use and subsequent proficiency in the language an undeniable requirement for all Kenyans.

Despite this importance of English in Kenya, research conducted in the country estimates that as few as 25% of the citizenry can use English language with ease. For example, Sure and Ogechi’s (2009) and UWEZO, (2016) reported that by Class Eight majority of the students were still unable to communicate effectively using English. From Sure and Ogechi’s research it is reasonable to conclude that majority of learners who complete primary level education would encounter myriad of challenges coping with the academic English demands of secondary school. Uwezo, (2016) report states that only 36.3% of class 3 boys and 43.4% of class 3 girls could do class 2 work in English with ease. The Star newspaper in (2016) reported that in Nairobi 49% of mothers were unable to read a standard two story book even though 95% of them had completed secondary education. Uwezo further reports that majority of the police officers undergoing vetting were unable complete their interview in English fluently and had to switch to either the pidgin Sheng or Swahili. Bunyi, (2008) and Gathumbi, (2008) report that most Kenyan students are not proficient in English by the end of Class Three for those schools that start teaching the language in standard one. This is despite the fact that English language is accorded more teaching time resulting in more exposure.
This limited proficiency has been attributed to the fact that Kenya has other languages; Swahili and Sheng, which are preferred for wider communication other than the English language, and that English language is still considered as a foreign language. One commonly blamed factor for the limited proficiency has been attributed to the then change in curriculum from the older 7-7-3 system to the new 8-4-4 system and recently to the competent based curriculum. The 8-4-4 system which is still largely in use advocated for an integrated approach to the teaching of English language which aimed at completing the overstretched syllabus content at the expense of the important and proven language teaching skills like drills, discussion, and dramatization among others (Athiemoolam & Kibui, 2012). The implication of this has been that the teachers are compelled to complete the syllabus without regards as to the mastery of the language.

The variety of English to be taught in schools is yet another challenge since Kenya Institute of Curriculum Development (KICD) dictates that the British English and by extension the Received Pronunciation (RP) be taught (Kioko and Muthwii, 2001). This pauses a challenge since even the teachers who are expected to teach the British variety are not conversant with the variety. For example, the curriculum expects that the English teacher teaches 20 vowels, yet the Kenyan variety only has 5 vowels. Other researches have also shown that there are more than 5 varieties of Englishes being taught in the Kenyan schools. Most teachers are conversant with the Kenyan variety which is heavy lased with indigenous language accent, localized sentence structure and vocabulary drawn from code mixing. The Teacher training institutions also teach varied varieties as opposed to the British variety. This leaves the teacher teaching a combination of varieties with a leaning on the Kenyan variety which is considered as wrong. So which variety should the learner be proficient in, when in primary school he/she was exposed to the Kenyan variety, and in secondary school, he/she is exposed to other varieties? How about the teacher? Which variety that he/she is conversant with should be the accepted standard variety?

Coupled with the challenge in variety of English is the fact that the course-books require a set of linguistic resources which are different from everyday language making it difficult for the learners to reconcile what is learnt in the classroom and how they are expected to talk. Most learners therefore opt for the easier way out and discard the classroom English all together since it is difficult. Cummins (1984) distinguished two types of language proficiency. The first one is; Basic Interpersonal Communication Skills (BICS) which refers to all the skills one needs to have acquired, and which are necessary for communicative competence such as; vocabulary, grammar and rules for appropriate use of language in daily communication. The second type of language proficiency is the Cognitive Academic Language Proficiency (CALP), which refers to higher order language skills necessary for academic success. Acquiring such skills typically takes 5 to 10 years to develop (Collier, 1995), and must be taught in an English classroom Cummings, (1980, 1984) report that interaction with native speakers of a language lessens the period that is required for one to become proficient in the language. This lack of practice makes Kenyan learners to take longer than 5 years to develop basic interpersonal communication skills (BICS) in English since even learners who live in English speaking countries take between 3-5 years to master BICS. Apparently in Kenya, most learners are not able to even master the BICS let alone the CALP.

The methodology employed by the English language teachers also causes a challenge especially since the teacher is expected to adopt an integrated approach. This approach integrates English with literature and consequently limits the time teaching specific skills. The result is certain key skills which can enhance proficiency such as teaching vocabulary, pronunciation and reading skills to be under taught. Ellis (1999) and Coady (1993) report that formal instruction for vocabulary acquisition and comprehension is beneficial in L2 learning. However, in the Kenyan context giving adequate time to teaching such skills is not possible due to the implementation of the ‘integrated approach’ which essentially reduces the time available for formal instruction in vocabulary, pronunciation and reading comprehension skills. Thus this study sought to establish whether in Kenya learners are taught English for the sole purpose of passing exams or so that they are able to be proficient in the language even after school.

**Theoretical Perspective**

This study was informed by Stephen Krashen’s Monitor (Krashen, 1985). This theory outlines hypotheses that should be taken into consideration where second language acquisition is concerned. Krashen's theory of second language acquisition consists of five main hypotheses:

- Acquisition-Learning hypothesis;
- Natural Order hypothesis;
- Input hypothesis;
- Monitor hypothesis; and,
- Affective Filter hypothesis.

Krashen said there are two independent systems of second language performance: 'acquired system' and 'learned system'. 'Acquired system' or 'acquisition' is the product of a subconscious process similar to the process children undergo when they acquire their first language. It requires meaningful interaction in the target language - natural communication - in which speakers are concentrated not in the form of their utterances, but in the communicative act. The "learned system" or "learning" on the other hand is the product of formal instruction and it comprises a conscious process which results in conscious knowledge 'about' the language, for example knowledge of grammar rules. According to Krashen 'learning' is less important than 'acquisition'. The acquisition and learning hypothesis was useful because through it I found a basis for explaining that learning does not necessarily lead to acquisition.

Through the Input hypothesis, Krashen attempts to explain that the learners’ ability to acquire a second language is promotional to the relevant input that the learner is exposed to. The Input hypothesis is therefore only concerned with 'acquisition', not 'learning'. According to this hypothesis, the learner improves and progresses along the 'natural order' when he/she receives second language 'input' that is one step beyond his/her current stage of linguistic competence. For example, if a learner is at a stage 'i', then acquisition takes place when he/she is exposed to 'Comprehensible Input' that belongs to level 'i + 1'. Since not all of the learners can be at the same level of linguistic competence at the same time. The study found that the input available to the learner was indeed (i+1) which was in line with what Krashen prescribed. This implied that as much as the learner was exposed to relevant input, learning did take place but there was very little acquisition.

Finally, the Affective Filter hypothesis embodies Krashen's view that a number of 'affective variables' play a facilitative, but non-causal, role in second language acquisition. These variables include: motivation, self-confidence and anxiety. Krashen claims that learners with high motivation, self-confidence, a good self-image, and a low level of anxiety are better equipped for success in second language acquisition. Low motivation, low self-esteem, and debilitating anxiety can combine to 'raise' the affective filter and form a 'mental block' that prevents comprehensible input from being used for acquisition. In other words, when the filter is 'up' it impedes language acquisition. On the other hand, positive affect is necessary, but not sufficient on its own, for acquisition to take place. My study used the affective filter hypothesis to establish whether students learn English for use or for examinations? The study found that the both the teachers taught English for examination while the learners learnt English for to a larger degree for examination, and to a smaller degree for use. This was because the learners preferred to use Sheng and Swahili as opposed to English language.

METHODOLOGY
This study used a qualitative research methodology whose purpose was to explain the reasons for the limited proficiency without quantities.

Research Objective
This study was guided by the following research objective to describe the reasons why students lack proficiency in English language despite being exposed to it in schools

Research Question
This study was guided by the research question: Why are students unable to acquire English language and display proficiency even after extensive exposure in schools? In asking this question, my intent was to establish whether English language is being taught so that learners can be proficient in it and use it as a lifelong skill, or is it being taught for the sole purpose of passing exams?

Sampling Procedure
Using a multi stage sampling technique, my study divided sampling into three levels to reflect the three levels that were key to the study.

Level 1
In level one, random sampling was used to pick 5 out of 9 primary schools in Ruaka town through lottery method. The 5 schools constituted 50% of the primary schools in that area. These schools included both 3 public and 2 privately owned schools.
Level 2
In this level convenient sampling was used to pick out teachers who teach English language in the school. Only teachers who teach learners in grades 7 and 8 previously Standard 7 and 8 were included in the study. This was because these students would still be expected to sit the 8-4-4 end of primary school exams. All this gave the study a total of 6 teachers.

Level three
Students who perform well in the English subject and were in standards 8 were conveniently sampled in all the 5 schools giving the study a total of 25 students.

Sample Size

<table>
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<tr>
<th>SN</th>
<th>Sampled Item</th>
<th>Number</th>
</tr>
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<tbody>
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<td>1</td>
<td>Schools</td>
<td>05</td>
</tr>
<tr>
<td>2</td>
<td>English Teachers</td>
<td>06</td>
</tr>
<tr>
<td>3</td>
<td>Learners</td>
<td>25</td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
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Data Collection
Data for this study was collected through the use of interviews and observation. The teachers were interviewed with the aim of ascertaining their views on why there most learners are not proficient in the English language despite the fact that they are overly exposed to the language. 25 students were also interviewed to find out their view on the general lack of proficiency in the English language.

Data Analysis
Content analysis was used when analyzing the qualitative data obtained from the field. This type of analysis involves three phases. For this study the 3 phases followed included; preparation phase, organizing phase and reporting phase. In the preparation phase the data was coded and concepts were retrieved using deductive content analysis. Deductive content analysis involved operationalizing the structure of analysis on the basis of previous knowledge drawn from the theoretical perspective. This was achieved by the researcher reading through the transcribed data make sense of the whole, aimed at understanding the data and breaking them down into smaller meaning units. After breaking the data into smaller meaningful and manageable units, the researcher checked whether all aspects of the content had been covered in relation to the objectives of the study (Burnard, 1991). The original data was re-read alongside the final list of meaning units.

The data was then condensed to match the two sets of interviews. These two sets included i) English language teachers and ii) students. Latent content analysis was then carried out to extract thematic headings, which gave rise to different categories (themes). Once the themes were established, the analysis and writing up process to adapt the results began (Elo, and Kyngäs, 2007).

FINDINGS
1. Dilemma of the English teacher who is expected to teach a variety that even he/she is not conversant with. This makes the teacher to resort to teaching the vocabulary and the rules of the language with the aid of an open book and guide. But once the book is closed, the teacher reverts to the English that he/she knows which is a mixer of many varieties such as the; American, Scottish, Irish, North of England and Australian’ (Platt et al., 1984, cited in Kioko and Mutwi, 2001). Other researchers express the same dilemma when they say that ‘the teaching and examinations concentrate on drilling and testing out of existence forms of speech that even the teachers will not use freely when they do not have their textbooks open before them’. Consequently, the teacher cannot act as a model of the variety s/he is teaching and so ends up prescribing ‘do what I say but not what I do, so that you can pass the examinations’. For example, the teachers are expected by the Kenya Institute of Curriculum Development (KICD) to teach Received Pronunciation (RP) speaking skills when they too cannot speak the variety that they are expected to teach. For this reason teachers resort to teaching the rules of the RP variety without enthusiasm, which is picked by their learners who in the end come up with a variety that is predominantly Kenyan. This kills the attitude of learners and they shun from speaking their English variety, making it very difficult to attain the required proficiency.

2. Ranking of schools created a demand on the teachers because they were always aspiring to produce best students. This meant that they teach for examinations rather than for lifelong skill.
3. TSC policies of demanding a performance contract yet one’s performance is gauged against his/her ability to make students pass examinations.
4. The duration for which learners are supposed to master and be proficient in English is also not realistic since there are limited opportunities for practice outside the school.
5. Students reported that whatever they learnt in class many times was not applicable when they are speaking because the way they are taught is different from the way they ordinarily speak.
6. They preferred to speak in Sheng and so they lacked practice both in the school and in their homes. This they said was because both at home and in school, including when they were speaking with their teacher or other teachers, the people they were speaking with often spoke either in mother tongue, or in sheng or in broken swahili.
7. Students reported that they lack role models.
8. Punishment if one fails the language causes them to resent the language.

RECOMMENDATION
1. Students need to be taught the registers of English: the examinable British English with RP, and the one used for communication across Kenya.
2. Computer assisted language learning (CALL) be used to enrich the methodology used since CALL brings into the classroom real time experiences and provides adequate and relevant tasks for practice.
3. The teacher training institutions increase focus on the phonology of English language.

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CONNOTATIVE MEANINGS OF BUSINESS NAMES IN CHOGORIA TOWN

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ABSTRACT
Naming is an important aspect of our everyday life. Practically everything in the world has a name for easy identification. Naming as a semantic process derives from the understanding that words are names or labels for things. Names communicate and tell stories about people and circumstances surrounding their birth (Fadahunsi, 2013). Among things that are named are businesses. When a business person decides to start a business, they spend a lot of time thinking about the name that they will give to their business for names are not haphazardly chosen and given. Business names have connotative meanings. This is the meaning affected by context. Relevance Theory is used to analyze the names pragmatically in regard to the implicit inferences in these names. The findings of the study established that though business names are mainly used for identification of businesses, the component of meaning cannot be ignored. The experiences of the business owners and context carry the meaning of the names.

Keywords: Meaning, Naming, Connotation, Context, Relevance Theory.

INTRODUCTION
Names are labels that are used in identification. Everything in the world bears a name. Marjie-Okyere (2015) argues that names are words which form the larger part of a language of a given community and therefore should be looked at within a linguistic context. Among things that are named are businesses. When a business person decides to start their business, they spend a lot of time thinking about the name that they will give to their business for names are not haphazardly chosen and given. Naming in businesses is therefore very important for apart from being used for identification of businesses, these names are meaningful and among other things, reflect the values and philosophies of business people.

Research Methodology
The researcher used stratified random sampling to sample the various business types in the location of the study. This sampling procedure was used to ensure that there is representation from the various business types. Purposive sampling was then used to sample those names that were used in the study.

The Concept of Meaning
Meaning is what a word conveys, signifies, expresses and its inner and psychological importance. It is the idea of the word or the action (Gerba, 2014). Linguistic semantics studies meaning in a systematic and objective way. Since meaning as a concept is not static, a great deal of the idea of meaning still depends on the context and participants in the act of communication. It is in context where a word constantly acquires new meanings (European Scientific Journal, 2013). Reference relates to things, people, and events in the world. It is the object or entity to which a linguistic expression relates. Thus, the referent of the word boy is a human being called boy. If meanings were restricted to reference, many words without obvious referents will be left out. It will be difficult to explain the meaning of prepositions, conjunctions and other grammatical units. Again, several linguistic expressions may relate to single referents. To avoid these limitations, semantics use the words denotation and connotation to distinguish between meaning based on ostensiveness (pointing) or reference and extension. In the case of names one has to distinguish between the denotation (reference) of the name and its connotation (intention) (New Encyclopaedia Britannica, 2005). Yule (2010) makes a distinction between conceptual meaning and associative meaning. Conceptual meaning is the type of meaning that dictionaries are designed to describe. It is synonymous with primary, central, logical, cognitive or denotive meaning. It is the first ordinary meaning listed in dictionaries which is not affected by the context or emotional overtones associated with the act of communication. It covers those basic, essential components of meaning that are conveyed by the literal use of a word. Some of the basic components of a word like ‘needle’ in English might include “thin, sharp, steel instrument.” These components would be part of the conceptual meaning of needle.

The associative meaning is affected by the context, background, time and the cultural realities of the users of the language. This type of meaning is not static. It is variable and open-ended. Indeed, associative meaning reflects individual differences. There are individualized intentions and interpretations. Different people might have different associations as connotations attached to a word like ‘needle’. They might associate it with pain, illness, blood, drugs, thread, knitting, or hard to find (especially in a haystack) and these associations may differ from one person to the
next. These types of associations are not treated as part of the conceptual meaning of words (Yule, 2010). Associative meaning is therefore the connotative meaning. The connotative meaning contains elements in the conceptual meaning of a word and the individual’s personal interpretation of what is communicated. That interpretation is based on the personal experience of the hearer. This means that the connotative meaning varies with the experience of people in communication. It may also vary from society to society.

Chandler (2002) makes a distinction between denotative and connotative meanings. He claims that while the distinction between literal and figurative language operates at the level of the signifier, that between denotation and connotation operates at the level of the signified. Beyond its ‘literal’ (denotation) meaning, a particular word may have connotations. In semiotics, denotation and connotation are terms describing the relationship between the signifier and its signified. Meaning includes both denotation and connotation. ‘Denotation’ is the definitional, literal, obvious or common sense meaning of a sign. It is what the dictionary attempts to provide. The denotation of a representational visual image is what all viewers from any culture and at any time would recognize the image as depicting. The word ‘connotation’ is used to refer to the socio-cultural and personal associations (ideological and emotional) of the sign. Connotation is thus context-dependent. Signs are more open to interpretation in their connotation rather than their denotation. Connotation and denotation are often described in terms of levels of representation or levels of meaning.

The Concept of Naming

The Oxford Dictionary defines a name as a word or a combination of words consisting the individual designation by which a person, place, animal or thing is known or spoken of. Muzale (1998) argues that in many Bantu and Interlacustrine groups in particular, names have synchronic meanings and are intended to play a certain role in social life. Therefore, if any kind of cultural, historical or pragmatic information is included, then names have meaning. Anindo (2016) argues that names are not meaningless signs but a cultural must for communication of ideas. Marjie-Okyere (2015) claims that it is the society that gives names and so they determine what a person, place, or thing should be named. She adds that names are even more unique when they are given in relation to the tribal background: events, settlements, history and the language of the person.

Naming proceeds from the description of the immediate and concrete objects to making abstract statements about events. The meaning of sentences requires understanding both the meaning of individual words and the syntactic context in which the words are embedded. Words can denote a literal meaning or core meaning and connote a halo of associative meanings.

Naming as a semantic process arises from the understanding that we use words to name or label things. For Gardiner (1954) names, unlike (other) words, are identificatory marks recognizable, not by the intellect, but by the senses. Anindo (2016) claims that names are important part of our society since they designate individual people, places and things and, fulfill the desire for unique identification. Carroll (1985) claims that people name all kinds of other things-buildings, streets, companies, computer files, events and pets.

Geeraerts (1994) argues that deciding how to name something is a matter of choice. The choice may be influenced by consideration of formality and linguistic appropriateness. A word structured in a certain way and carrying a given meaning can be used as a business name and not personal name since different rules govern each category.

As one picks their business name, they need to strive for creativity and uniqueness. For Lehrer and Kittay (1992) some business people will be creative enough to come up with names that make extensive use of sound patterns. These include: alliteration (For instance, Crystal Cut and Curl-for a salon and barber shop), rhyme (For example, swirl and Curl- for a salon) and consonance (For instance, Scissors Wizards- for a barber shop). Others will use puns in naming their businesses. For example, ‘Meating point’- for a butchery, ‘A Cut Above’ –for a barber shop and ‘Shear Genius’-for a barber shop.

The Concept of Context

Context refers to the situation, events or information that is related to something and that helps one to understand it. It is the surroundings, circumstances, background or setting that determines, specify or clarify the meaning of an event or other occurrence (Werth, 1999). In linguistics, ‘context’ means the previous and subsequent linguistic material in a given text. The term is used for anything in the indefinitely large surrounding of an utterance, from the intention of the speaker to the previous topic of conversation to the objects discernible in the environment (Werth,
Aspects of politeness, shared beliefs, cultural features and social organization play an important role in the interpretation of meaning. (Werth, 1999).

**Inference**

To infer is to deduce something from evidence of any linguistic form. According to Chiluwa (2008), inference is the process of working out meaning or the intention of the speaker from the text available to you. When a speaker makes an utterance, whatever the hearer directly receives from the utterance is what he infers. For inference to take place, the hearer has to be familiar with the socio-cultural background of the speaker. Sperber and Wilson (1986) maintain that inferential comprehension is a central thought process with free access to conceptual memory. This implies that comprehension is a global process in the sense that “any conceptually represented information available to the addressee can be used as a premise in this inference process”. The study was out to find out the deductions that hearers can get from the business names.

**Intention**

Adegbija (1999) defines intention as the target goal that abounds in the mind of the speaker. The intention of a speaker has to do with what the speaker intends, what he has on his mind pertaining to the utterance he is about to utter. Usually the hearer infers from the speaker’s utterance. Therefore, intention and inference work together. The study looked at the intention that the business owners have in mind when naming their businesses thus.

**Theoretical Framework**

This study was guided by Relevance Theory. Relevance theory is a cognitive theory propounded by the cognitive scientists Dan Sperber and Deirdre Wilson. This theory seeks to explain communication that takes into account implicit inferences. It attempts to capture the notion of relevance in communication situations through contextual effects. It argues that the hearer/reader/audience will search meaning in any communication situation and having found meaning that fits their expectation of relevance will stop processing.

Context always plays a part in communication. One way of conceiving how thoughts are communicated is by the speaker only conveying as much information as is needed in any given context, so that the audience can recover their intended meaning from what was written or said as well as from the context and implications. In this conceptual model, the author takes into account the context of communication and the mutual cognitive environment between the author and the audience- shared knowledge. This study was out to find out how business people contextually give their businesses names and how their intended meaning of these business names can be got from context. Relevance theory is based on the cognitive principle and the communicative principle.

**Relevance and Cognition**

In relevance-theoretic terms, any external stimulus or internal representation which provides an input to cognitive processes may be relevant to an individual at some time. According to relevance theory, utterances raise expectations of relevance not because speakers are expected to obey a co-operative principle and maxims or some other specifically communicative convention, but because the search for relevance is a basic feature of human cognition, which communicators may exploit.

Intuitively, an input is relevant to an individual when it connects with background information he has available to yield conclusions that matter to him. In relevance-theoretic terms, an input is relevant to an individual when its processing in a context of available assumptions yields a positive cognitive effect. The most important type of cognitive effect achieved by processing an input in a context is a contextual implication, a conclusion deducible from the input and the context together, but from neither input nor context alone. The relevance of the business names can be interpreted by connecting the contextually available background knowledge of the words in these names thus yielding the intended meaning.

**Relevance and Communication**

The core of relevance theory is the ‘commutitive principle of relevance’ which states that by the act of making an utterance the speaker is conveying that what they said is worth listening to i.e. it will provide ‘cognitive effects’ worthy of the processing effort required to find the meaning. On the relevance-theoretic view, the task facing the hearer is to form and confirm hypotheses concerning speaker intentions. Wilson and Sperber (1986) call this ostensive- inferential communication.
The term ostensive and inferential describe two complementary aspects of the same process of communication. It is an ostensive process because it involves the communicator in producing a stimulus that points towards her intentions, and inferential because the audience uses the stimulus in an inferential process of comprehension as evidence for what those intentions may be. Ostension then means making manifest to the audience an intention to make something manifest whereas inferential process is one which “starts from a set of premises and results in a set of conclusions which follow from, or are at least warranted by the premises” (Sperber & Wilson, 1986). These arguments were relevant in the analysis of the intention of business people in giving their businesses these names.

Every ostensive act of communication (the lexical ‘clues’ that are explicitly conveyed when one speaks/ writes) will have the following:

i. The informative intention- to inform an audience of something. The speaker purposefully gives a clue to the hearer as to what she wishes to communicate. It makes manifest or more manifest a set of assumptions.

ii. The communicative intention- this is the intention to inform the audience of one’s informative intention. The hearer infers the intention from the clue and the context-mediated information. The hearer must interpret the clue, taking into account the context, and surmise what the speaker intended to communicate. Understanding or the communicative intention is fulfilled as soon as the informative intention is recognized; even if it is itself not fulfilled (Sperber & Wilson, 1986). As Sperber and Wilson (1986) put it: informing modifies the cognitive environment of the audience, while communication modifies the mutual cognitive environment of the communicator and audience.

The main thesis of Sperber and Wilson (1986) is that “an act of ostension carries a guarantee of relevance, and that this fact makes manifest the intention behind the ostention” (Sperber & Wilson, 1986). This was applicable in the study in that the intended meaning of these business names were got from the context and implications of the words used to name them. Business people, when giving their businesses names, take into account the context of communication and the mutual cognitive environment between them and their customers.

Connotative Meanings of Business Names
Business names have connotative meanings. This is the associative meaning; the meaning dependent on the context of the word(s). Relevance theory is used in the analysis of these meanings, which involves deducing the context of the names and explanation of other aspects of pragmatics in the names.

Connotative Meanings of Shops

Ebenezer Shop
The business owner explains that he is religious and that he acknowledges God as his ‘Ebenezer’. This means that the far he has gone in his business, the Lord has helped him. Contextually, he explains that he started small and had challenges of debts and lack of capital. These were his enemies just as Philistines were the enemies of Israelites. He says that he was almost closing down the business, but through God’s help it picked. This explanation is the implicit premise that is used in deriving the connotative meaning of the business name. Just like Samuel erected a stone to commemorate the help God had given to the children of Israel to help them conquer their enemies, the business owner argues that he gave his business the name to act as a reminder to him of how God had been faithful to him by restoring his dwindling business. One can infer that the business owner uses it as a way of acknowledging the help that God has given him in his business for he attributes his success in business to God.

Baraka Animal Feeds Shop
The business owner explains that the shop sells quality livestock feeds. These feeds are high yielding in that when fed to livestock, they produce quality products, which when sold fetch farmers profits, hence getting the value for their money. He says that these are the blessings that farmers get from the feeds sold in the shop. The owner says that due to the high quality of feeds sold in the shop, the business has continued growing for it has attracted many customers. The shop name therefore connotatively means that the feeds sold in the shop are a blessing to farmers in terms of their end results. Contextually, one can infer that the feeds sold in the shop are quality and that the intention of the business owner is to praise his business in a bid to attract many customers.

Connotative Meanings of Hotels

Morning Glory Hotel
The owner explains that it is in the understanding of the quality of services that customers look for in a hotel that he decided to give the hotel the name. He says that the hotel provides high quality services symbolized by the morning
glory plant that climbs to a high level. Thus, the services ‘climb’ high. The owner explains that just as the plant has flowers of variety of colors, the hotel prepares a variety of delicious dishes. The hotel is also clean symbolized by the fragrance, attractiveness and beauty of the morning glory plant flowers. Thus, the hotel name connotatively means that the hotel is clean, prepares variety of mouth-watering dishes and is determined to provide high quality services to ensure that the customers leave the hotel satisfied and get the value for their money. The intention of the business owner in naming the business so is therefore to praise it.

Eden Fruits and Juice Café
The owner says that she named the business in the context of the Garden of Eden stated in the Bible. God created Adam and Eve and gave them fruit-bearing trees for food. Connotatively, the owner explains that the business is divine; that the café was provided to the owner by God just like He provided the Garden of Eden to man. She says it is God who provided the capital that was needed to start the business. She also says that just as the Garden of Eden had a variety of pleasant fruits for food to man, the cafe sells variety of fruits and makes sweet juice from these fruits. The business owner says that her intention of naming the business so is to acknowledge God for the provision of the business as well as praising the business since the Garden of Eden was divine.

Connotative Meanings of Salons

Kinky Divas Salon
Divas are famous because of their success or accomplishments in the society. Kinky hair is stylish. When a lady is plaited using kinky hair, she looks natural and elegant. It is in this context that the business owner gave the business the name. She says that the salon endeavors to provide quality plaiting services using kinky hair to the customers with the intention of making it famous for its services just like divas are. She says that just like divas are famous due to their accomplishments, so does the salon endeavor to be famous in plaiting using kinky hair. She says that quality plaiting services are the accomplishments the salon is geared to. The intention of naming the salon so is therefore to praise its services.

Glorious Salon
The owner explains that she acknowledges the fact that it is God who is the source of all the blessings and so any time one is blessed by God they need to thank Him for the blessing. It is in this context that the business owner gave the business the name. She says that she gave this name to the business with the intention of giving glory to God for His help. She acknowledges God as the provider of the business in that He provided her with the capital to start the business for it was hard to get it. She claims that He is the glorious God and so He deserves all the glory and honor for His provision.

Connotative Meanings of Barber Shops

Fine Touch Kinyozi
The business owner explains that any customer who gets into a barber shop would want to leave the shop looking sharp after a shave. It is in this context that he decided to give the shop the name. He says that the barbers in this shop are qualified and committed in their work such that they ensure that their customers leave the shop contented with the services given. He explains that the barber shop endeavors to provide a quality and affordable shave to the customers such that they feel satisfied and get the value for their money. By so doing, the barber shop has continued attracting many customers. Contextually, the intention of the name is therefore to advertise the business as a quality one. From the name, it can be inferred that the business is out to offer barber services of superior quality.

Prince Cut Kinyozi
The business owner explains that he gave the business the name in the context of the kind of privileges that princes get due to their class in the society. Prince is a title of nobility and those in this social class are more privileged than other classes in the society. He explains that the barber shop is out to provide barber services that make customers feel treated in a special way. The business name means that the barber shop is a quality one and provides services of high class and still at affordable prices. The owner explains that the customers who visit the barber shop to get a shave are treated in a kingly way and given privileges that may not be available in many other barber shops. After the shave, the customers’ heads are massaged and washed with warm water, applied spirit and scented oil. He explains that this is what is equated to a princely treat. The barber shop also strives to maintain a high level of cleanliness and hygiene. The business owner explains that by living up to the name of the barber shop by providing quality services to the customers, the business has earned him many customers. Contextually, the intention of giving
the business this name therefore is to praise its services so as to attract many customers. One can therefore infer from the name that the business provides quality services to the customers.

Connotative Meanings of Boutiques

Global Fashions Boutique
Anything global applies worldwide. This means that it has passed the test of locality, is approved all over the world and therefore must be of good quality. The clothes and shoes that are sold worldwide adhere to the changing trends. They are not constant but keep changing with the passage of time. Therefore, fashions keep on changing and once new wears are out, the previous ones are declared outdated. The business owner says that it is in context of these that he gave the business the name. Connotatively, the name means that the business owner recognizes that fashion trends keep on changing and therefore the clothes and footwear sold in the boutiques are not local but can be found anywhere in the world. The owner therefore claims that he sells stylish, quality and genuine items taking into account the changing trends in the fashion world so as to keep his customers fashionable. Therefore, any time he realizes that there is a new fashion in the market, it is always made available to the customers. This has earned the business many customers. The intention of naming the business so is therefore to praise it by informing the customers and the general public of the high quality of the wear sold in the shop.

Classic Fashions Boutique
The business owner explains that anything that is classic is judged to be of high quality, outstanding and has a standard of excellence and therefore is of recognized value. A garment that is classic is of a simple and elegant style. Classic designs are known to be enduring. It is in this context that he gave the business the name. He says that the boutique has attracted many customers as it endeavors to live up to its name by selling high quality ladies’ shoes, clothes and handbags. These items are elegant, unique and long lasting hence valuable. He says that by naming the business so, his intention was to make known to the general public that the boutique is out to sell quality wear so as to attract many customers to buy these items. From the name, the inference is that the items sold in the boutique are of high quality.

Connotative Meanings of Butcheries

Neema Butchery
The owner of the business says that he appreciates the fact that God is gracious to humanity. It is in this context that he decided to give the business the name. He believes that it is only through God’s sufficient grace that the business exists. He explains that his intention was to acknowledge God’s provision of the business for it was hard for him to get a business premise. He says he was able to get it through God’s grace. He also believes that the same gracious God will see to it that his business thrives.

Connotative Meanings of Chemists

Chogoria Apex Chemist
The business owner explains that in business, there is a lot of competition. It is very rare to find only one business type in an area. The availability of many businesses of the same type in an area leads to competition. It is only the business that stands out from the rest of the businesses of the same type that gives it an advantage over the others. One of the ways in which a business can stand out from the others is in the quality of the services it provides. It is in context of this that the business owner decided to give the business the name apex. Anything at the apex is bound to be good. He says that the business is at the peak in the services it provides. It is out to ensure that its customers are satisfied with the quality and high class services offered. The chemist is therefore the best in terms of customer relation and similarly, sells genuine drugs and at affordable prices. This, he says, has attracted many customers to the business. The intention of the owner is to praise the business in terms of the quality services offered to the customers in a bid to attract many customers to the chemist. From the name apex one can therefore infer that the services offered to the customers in this chemist are at the peak.

Connotative Meanings of Bars

Friends Corner Pub
They say that ‘A friend in need is a friend in deed’. It is when one is in need that they know their true friends. True friends are loyal and faithful. They should be there for companionship and more so to support each other at all times, and especially in times of need. Real friendship is a matter of give and take. It is on the basis of these assertions that the owner gave the business the name. Connotatively, the business owner explains that the name means the pub is a meeting place where friends meet to drink and keep each other company. Majority of the customers who are friends
to the business owner frequent the joint to ‘promote’ their own friend. The owner in return appreciates the customers in that in case there is a certain beer brand promotion of any kind, the first priority is given to these customers. The owner claims that a bond has developed between her and the customers, who are loyal and supportive, hence the success of the business. She says that the business has been expanding owing to this friendship because these friends of the bar owner have also influenced their other friends to buy from the pub. The owner says that the intention of naming the business so is to acknowledge and appreciate the role that true friends can play in the success of one’s life. She attributes the success of the business to the help she gets from the friends.

Connotative Meanings of Hardware Shops

**Omega Hardware Shop**

In Christian belief, it is God who is the Alpha and Omega, the beginning and the end. The business owner explains that it is in this context that she gave the business the name. The name connotatively means that God is the beginning and end of the business. By this, the owner means that God is one who provided the business and also sustains it and thus the business will live long. The owner says that she believes it is God who provided the capital to start the business and the business has since been thriving. The success of the business is therefore attributed to the doing of the Lord. Contextually, the intention of giving the business this name is therefore to acknowledge God’s help in the business. The name means the business owner recognizes God as source and sustainer of the business.

**CONCLUSION**

The study revealed that business names are meaningful in addition to acting as identification for businesses. It was also established that in determining the connotative meanings of these names context played a big role. The study also established that different business people have different motivations for giving their businesses those names.

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UNDERSTANDING AUDIENCE CHANNEL LOYALTY IN VERNACULAR TELEVISION

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ABSTRACT
Television, one of the most pervasive media in the world today was introduced in Kenya in the 1960s. Kenya Broadcasting Corporation TV the only station then was government owned and controlled. In 1992 the government liberalized the airwaves thus ushering in private commercial TV channels. The new-found media freedom has witnessed an upsurge in the number of vernacular television channels. Unlike mainstream media that use Kiswahili and English, vernacular televisions use unconventional methods, including broadcasting in the indigenous language spoken by their target audience. The study employed the descriptive survey research design to examine what roles other than the traditional roles of media, are played by vernacular TV. Baite TV, a vernacular TV station based in Meru County, Kenya was purposively selected for the study. The objective of the study was to determine how effective vernacular televisions have been in communicating messages to their audiences, and the strategies they use to achieve their objectives. Using the agenda setting and uses and gratification theories, the station’s target audience and content were examined with a view to understanding the high ratings of the station. Among the novel approaches are the packaging of the programmes, the relevance of the content and the choice of language used. Their proximity to the local community and community participation also has a bearing on the popularity. The programming, content and choice of language have given the station a wide reach and carved a niche among the audience. Being rural based, the station provides grassroot support to communities thus playing a positive role in social development. Due to proximity and constant contact with the community, they work with the community in projects implementation. Community members participate enthusiastically when they are involved in identifying, prioritising and implementing projects. When communication is done through the indigenous language the messages have an impact and reach more people.

Keywords: Vernacular television, audience, rating, programme, broadcast, channel

INTRODUCTION
Vernacular Television refers to television stations that use local indigenous languages in their broadcasts. The stations mostly rely on digital platforms and are conveyors of innovations which are crucial to the development of local communities (Spore, 2011). Vernacular TV informs the community on new farming methods and link community organisations to the government by providing them with a platform in local languages to express their opinion. Lasswell (1948) and Wright (1986) identify four main functions of media content; that is surveillance of the environment, correlation that is connection or interpretation of events, transmission or communication, or the passing on of values and cultural norms, and entertainment, which is relaxation and leisure. The two studies provide insight into the content of media programmes and the social impact that the media stations expect to have on the community. Vernacular television stations expose the plight of those afflicted by calamity and make appeals to the authorities and donors for the community’s help. Occasionally they use their own resources to aid the destitute. This is one way in which vernacular TV contributes to social development by assisting those with serious personal and family problems that require remedial intervention.

The first vernacular TV station in Africa was started in Nigeria in 1992 (Adebayo, 2015). Other vernacular TV stations in other countries followed later. Vernacular television is a fairly new phenomenon in Kenya having been introduced in the country in 2011. KASS TV the first ever vernacular television in Kenya was started broadcasting in Kalenjin in 2011. Vernacular television stations fit in the description of alternative media which differ from mainstream media in a number of ways including their independence, their opposition to the status quo, and the audience segment they represent (O’Sullivan, 1994). Though vernacular media have many similarities with alternative media, vernacular media attempt to redefine the communication realm (That is the relations between informers and informed) and to enhance, through the acquisition of simple technology, the possibilities that people have of intervening in the process of information and production (Atton, 2015, Council for the Development of Vernacular Media, 1977). This study sought to find out how vernacular television has impacted on the social well-being of the communities that they target and the strategies they use to endear themselves to the audience thus building a solid clientele.
Although there are many TV stations in Kenya, Baite TV has built a strong following of loyal viewers. The Vernacular television packages its products and services with a view to serve its customers and interact with them and other channel partners by ensuring that the audience get the right experiences from the programmes that they broadcast. The experiential approach has worked well for the Station with consumers choosing the brand over other competitors. The experiential loyalty is largely what keeps the audience watching the television station’s programmes. By offering relevant content that resonates with the community and using their language, the Station connects with the people who have consequently identified with the Station as a brand. The Station has created an emotional and memorable rapport between user and brand. This acceptance is crucial for messages to be received and accepted by the audience. Moemeka (2000) avers that media campaigns can be used effectively to boost community health. Disease preventive actions are novel methods of dealing with illness in rural communities, their acceptance has to be induced by information and explained by communication. He further argues that, an effective media should not “dump information” rather, it should enhance mutual exchange of ideas and acquisition of knowledge. That is, for media messages to be effective, the people should take part in the crafting of the message (Moemeka, 2000). This study shed light on the way vernacular TV has captured the imagination of the audience by engaging local communities to participate in socio-economic activities that bring about social development.

Baite TV engages the audience to participate in its programmes, thus delivering an experience that people cannot get elsewhere, the station then correlates it with the niche it has in the market (Livingstone, 1998). This has enabled the Station to build a sizeable number of loyal viewers. The opportunity to participate in relevant and proximate programmes has endeared the audience to the station (Muhoro, 2003). The immediate rewards are valued and act as incentives for valued channel partners to continue participating in the Station’s programmes and projects. The Station has leveraged experiential loyalty rewards and invested in programmes that empower the audience members with the experiences and opportunities that matter to them thus cementing a meaningful connection between the people and the TV brand (Lury, 2011). The Station is able to draw customers to its brand through relevant and compelling messages delivered at the appropriate time. The messages are designed to build awareness among customers and encourage them to choose the station every time by giving them easy access and disseminating impactful information. Channel partners are key to the growth of the vernacular TV station’s business.

**Objectives of the Study**

The following were the objectives of the study:

i. To assess the social development content in Baite TV Station
ii. To examine the strategies used by Baite TV Station for social development
iii. To determine how the audiences receive Baite TV programmes
iv. To establish how audiences evaluate Baite TV programmes

**Statement of the Problem**

Though studies have been done on the traditional role of television, most of them have focused on the conventional role of TV, namely, informing, educating and entertaining. The studies have concentrated on media other than Vernacular TV. Little attention has been given to the role played by vernacular television in social development. Since vernacular broadcasting on TV is fairly new, the role that these channels play in social development, the strategies they use and the way they have impacted on the audience have not been studied. Specifically, no studies have so far been done on vernacular TV stations in Meru and how their programmes have been used to improve the social well-being of the local community. This study examined how Baite vernacular TV station based in Meru addresses its viewers’ immediate requirements by broadcasting in their indigenous language and what contributes to the station’s popularity. This is the knowledge gap that this study intended to close.

**METHODOLOGY**

The section contains the following aspects of the study: research design, location of the study, theoretical framework, target population, sampling techniques and sample size, research instruments, data collection and data analysis procedures. The study was anchored on the agenda setting theory and the Uses and Gratification theory. Agenda setting phenomenon was advanced by McCombs and Shaw (1977) who postulated that by emphasizing an event the media influence the audience to view the event as important. The media sets the agenda for public discussion and focuses on topics they wish to enhance and sustain (Muhoro, 2003). While uses and gratification theory is concerned with how people (audience) use the media to meet their needs and interests, the agenda setting theory is about the media determining the media content that the audiences prioritize as important. The theory further postulates that when an issue is given a lot of attention by the media, the public believe that the issue is
important. By so doing, the media changes a person’s perception of what is important. McCombs and Shaw (1977) noted that during the 1968 presidential election in the US there was a correlation between what issues the media emphasized and how the issues were ranked by voters in Chapel Hill, North Carolina. They added that the media do not tell people what to think but tell them what to think about. In other words when an issue captures the public’s attention, the issue is likely to affect government policy (Rodman, 2012). This study used the agenda setting theory to explain how vernacular television stations set the agenda among their audiences by giving prominence to programmes and emphasis to specific news items. According to Baran (2012), the media are able to influence what we think about by introducing a topic and covering it extensively or repeatedly thus making it everyday conversation. This way the media is able to influence public opinion. Audiences listen and view programmes and read newspapers that are in agreement with their thinking.

Agenda setting theory was used to demonstrate the link between the choice of programme content and how it impacts or it is intended to impact on the target audience. For example, while mainstream government-owned media use the national language to deal with national issues, vernacular TV and radio stations use the local language to tackle issues that are important and affect local communities. This television study was based on audience research to understand whether vernacular TV stations play a role in social development and how they package their programmes in order to reach and appeal to their audience. The study was intended to show whether media content has been used to make an impact on the socio-economic development of the audience and the strategies that the Station uses to win and retain a loyal audience segment.

The uses and gratification theory has its origins in early audience studies done in the 1920s. The studies showed that people tune in to media that satisfy their needs and desires (Katz, Blumler & Gurevitch, 1973-1974). The theory seeks to explain why individuals use the mass media. Uses and gratification theory is a positivistic audience-centred approach to understanding mass communication. The communication theory was developed from communication studies conducted by theorists who believed that the media is all powerful in influencing people and that the media could, therefore, be used to change peoples’ behaviour (Katz, Blumler & Gurevitch, 1973-1974). My view is that the media has some power and is capable of influencing peoples’ behaviour. However, I do not subscribe to the view that the media is all powerful in this respect since people have the capacity to think and make choices on what to view and what not to view. During the research, it became evident that some viewers believe in toto whatever they see on their favourite channel. Which means that vernacular TV can have tremendous influence on them. It also became apparent that the audience decides and deliberately selects what to watch. This gives a lot of weight to the uses and gratification theory on which the study was pegged.

Data Analysis
This section describes specific procedures which the researcher used to collect and analyze the data in order to address the objectives of the study. The study employed the descriptive survey research design. Descriptive survey seeks to find the relationship between the independent variables and the dependent variables after an action or event has already occurred without the interference of the researcher (Brewer & Kubn, 2010). The independent variables in this study were vernacular TV programme content and audience evaluation while the dependent variable was social development. The researcher’s goal was to determine whether the independent variable affected the outcome or the dependent variable by comparing two or more groups of individuals. According to Gall & Gall (1996), in this design, the researcher does not manipulate the variables under study but rather examines the variables in their existing conditions. This study was conducted within the already established audience of Baite TV, a vernacular station and media practitioners working for the Station.

In this study the sample comprised 400 randomly sampled respondents drawn from four purposively selected sub-counties. One hundred questionnaires were administered in each of the selected sub-counties. According to Krejcie and Morgan (1970) a sample size of 384 is adequate for a population of up to 1 million. The sample size in this study was therefore, appropriate. Out of the 400 questionnaires distributed, 377 were returned, this translates to a 94.25 percent return rate. Twenty three questionnaires were not returned or were returned unfilled. This amounted to 5.75 percent non-return rate. The information collected from the respondents was coded and categorized into qualitative and quantitative data. Descriptive statistics such as percentages and frequencies were used to describe and summarize the obtained data. This analysis was facilitated by the use of the computer software known as Microsoft Excel. Qualitative data from questionnaire, interview, and observation was analysed thematically and by use of excerpts. The open-ended questions were analyzed using content analysis by grouping common themes. Open
ended questions facilitate use of content analysis and enable respondents to bring out pertinent issues that may not be easily captured using closed ended questions.

**Data Presentation**

Objective 4 was to evaluate the audience’ views on contribution and effectiveness of Baite TV programmes in fostering interpersonal development and self-esteem. The results are presented in Table 1. Many respondents, comprising 8.1 percent opined that Baite TV programmes assisted the poor by providing material needs. The table shows that 7.18 percent indicated that the programmes motivate them to assist the needy. They assist the needy by making cash donations or contributing materials. The material needs include bedding, clothes, building materials, foodstuff and so on. Quite a big number of respondents representing 6.95 percent assist in the building of houses. Indeed, the TV station has often mobilized resources from the community and put up houses for the destitute. In the table, 6.93 percent said that Baite TV programmes assist in provision of business start-up funds. Another 6.87 percent indicated that the programmes assist in provision of health and assistance to the sick. The station does this by paying medical bills, providing wheelchairs and removing jiggers from the afflicted. Besides, 6.67 percent opined that the TV Station was the voice of the poor. The station offers an opportunity to the poor members of the community to explain their needs and appeal for assistance live on air. Baite TV station then organizes how to provide the necessary assistance with the audience contributing towards the cause. A sizeable number of respondents accounting for 6.64 percent said that the programmes provided a forum for debate. In their daily rounds the TV crew gives ample time to community members encountered to express their opinions. Their views are broadcast live and recorded to be replayed later in video clips. A similar percentage, that is 6.44 percent felt that the programmes assist in provision of funds.

Table 1 shows that most respondents credited Baite TV programmes for their involvement in social development. Some 5.69 percent of respondents indicated that the programmes assisted in provision of education in the form of scholarships, fees and bursaries. This assistance is welcomed by poor parents who are not able to pay school fees due to poverty. Baite TV offers training opportunities to deserving people. This was indicated by 5.43 percent of the respondents. Those who indicated that the programmes assist in provision of business opportunities were 5.41 percent. The TV Station pays for their fees and upkeep in the training institutions. This is a strategy Baite TV station has used to touch the hearts of many and gain their support. The programmes assist in farming (provision of farm inputs and advice to farmers) was chosen by 5.38 percent of the respondents. This is the area that the government and other development agencies can exploit to reach many farmers with extension messages at a go and real time. Provision of water to the community was cited by 4.84 percent. As the residents have indicated, the TV Station has provided pipes and plastic water tanks to residents in some dry areas of Meru. However, some of the funds used by Baite TV station could have been sourced from the Constituency Development Fund (CDF) kitty. This is a government fund which is disbursed to counties through the members of Parliament.

**Table 1: Audience Evaluation of Baite TV Programmes and their Contribution to Social Development**

<table>
<thead>
<tr>
<th>Area of social development</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>The programmes assist needy individuals (materially)</td>
<td>316</td>
<td>8.14</td>
</tr>
<tr>
<td>The programmes assist in provision of funds</td>
<td>250</td>
<td>6.44</td>
</tr>
<tr>
<td>The programmes assist in provision of health/assisting the sick</td>
<td>267</td>
<td>6.87</td>
</tr>
<tr>
<td>The programmes assist in provision of education (scholarships/fees/bursaries)</td>
<td>221</td>
<td>5.69</td>
</tr>
<tr>
<td>The programmes assist in provision of water</td>
<td>188</td>
<td>4.84</td>
</tr>
<tr>
<td>The programmes assist in provision/construction of houses</td>
<td>270</td>
<td>6.95</td>
</tr>
<tr>
<td>The programmes assist in Farming (provision of inputs and advice to farmers)</td>
<td>209</td>
<td>5.38</td>
</tr>
<tr>
<td>The programmes assist in provision of food</td>
<td>217</td>
<td>5.92</td>
</tr>
<tr>
<td>The programmes assist in provision of employment</td>
<td>230</td>
<td>5.92</td>
</tr>
<tr>
<td>The programmes assist in provision of training opportunities</td>
<td>211</td>
<td>5.43</td>
</tr>
<tr>
<td>The programmes assist in provision of business opportunities</td>
<td>210</td>
<td>5.41</td>
</tr>
<tr>
<td>The programmes assist in provision of a forum for debate</td>
<td>258</td>
<td>6.64</td>
</tr>
<tr>
<td>The programmes link the community to the government</td>
<td>217</td>
<td>5.59</td>
</tr>
<tr>
<td>Baite TV is the voice of the poor</td>
<td>259</td>
<td>6.67</td>
</tr>
<tr>
<td>The programmes assist in provision of business start-up funds</td>
<td>269</td>
<td>6.93</td>
</tr>
<tr>
<td>The programmes motivate me to assist the needy</td>
<td>279</td>
<td>7.18</td>
</tr>
<tr>
<td>Totals</td>
<td>3884</td>
<td>100.00</td>
</tr>
</tbody>
</table>

*Source: Survey data*
The funds are donated to needy persons to assist them to cater for their daily needs such as food. Those who said that the Station provides food were 5.9 percent with a similar number indicating that the station provided employment. As an entity Baite TV station has created employment to journalists and other personnel who man the station. These results clearly show that Bate TV station audience perceive the programmes as providing a forum for interpersonal interaction during the meetings organized by the Station and which are screened live. The Station makes appeals for donations through its programmes, and also allows the afflicted to make appeals. By airing graphic details of the destitution, some of the programmes like Okolea evoke feelings of compassion, pity and rallies the audience to action. Due to their self-esteem, the audiences are motivated to action to assist their less fortunate brothers and sisters to get out of their misery. In this way, Baite TV mobilizes the people to act through communication to the larger community.

Majority of the respondents either agreed or strongly agreed that the programmes in Baite TV play a role in the social development of the community. This is done in a process akin to Participatory Rural Appraisal. However, the difference is that in PRA, the idea is conceived by the community who then join hands in solving the problem at hand. In the present case, the idea is conceived by the Station and communicated to the community via the TV channel exhorting them to participate. Due to the popularity of the TV Station, the message reaches a big audience in real time. These findings agree with a study done in Nigeria by Sanni (2013) which found broadcast media to be effective in disseminating messages on economic matters to rural communities. The study found that the communities improved their career skills thereby improving their economic standard, financial standard and even provided employment for some of the unemployed residents. Sanni (2013) recommends that broadcast media should package their programmes with the aim of enlightening the rural populace on certain issues in order to realize rapid growth and development. According to (Thomas, 1994, Moemeka, 2000, Livingstone & Lunt, 1996, Parvizian, 2011), development programmes ought to involve community participation for them to get the necessary support and to succeed. This is exactly the approach taken by Baite TV which actively engages the audience in the programmes designed to help the poor and needy members of the community.

The agenda setting theory is about the media determining the media content that the audiences consume and what the audience perceive as the most important issues. Baite TV as a mass medium sets the agenda for public discussion, the TV station then focuses on topics it wishes to prioritise and support (Muhor 2013). The projects supported in this way are the ones that are within Baite TV Stations own agenda which includes winning support from the community. The people who are the consumers of media messages use them to communicate and to participate because they derive gratification from the programmes. As postulated in the uses and gratification theory, the people use the media to gratify their needs and interests.

RESULTS AND DISCUSSION
Objective Number Four was to establish how audiences evaluate Baite TV programmes. In this objective the researcher set out to evaluate the audience’ views on the contribution and effectiveness of Baite TV programmes in the area of interpersonal development and self-esteem. As a mass medium Baite vernacular TV is involved in mass communication by delivering messages to thousands of people simultaneously through its broadcasts. Many media campaigns aim at creating awareness; increasing knowledge; changing beliefs; or raising salience in order to indirectly affect attitudes or behaviour.

This is the premise on which Baite TV operates as it encourages people to learn more (education). When people learn they change their behaviour and attitudes. This change in behaviour will eventually emancipate them from their current woes. The audiences value the content and images in the programme which appeal to their emotions and feelings such as anger, sympathy and empathy and motivate them to act and participate. Once these feelings are aroused, the audience can easily be mobilized to action through appeals. This is the method that Baite TV uses to mobilize the audience.

The language used to communicate a message may hinder successful dissemination of information if the target audience does not understand the language. Baite TV Station has resolved this challenge by using the vernacular language spoken by majority residents in Meru. Majority of the respondents agreed that the programmes in Baite TV play a role in social development of the community. Baite TV has provided an avenue for free expression, national debate and self-criticism and eventual social progress. In this way, vernacular television can be used as an agent for social change.
CONCLUSIONS
Vernacular television has been used in sectors like agriculture, health and education to effectively realize social
development. Social development entails improvement of the quality of life and meeting the needs of the poorest in
society by providing them with primary needs such as health care, clean water, basic education, sanitation and
family planning. It entails providing food security and basic education and diversification of production structures.
These are the social development issues that Baite TV has been involved through community empowerment which
has enabled it to accomplish these tasks successfully.

Baite TV interacts with specific disadvantaged groups and encourages social groups to participate in the production
of programmes on issues that are relevant and affect them. The television station is highly valued, as a powerful tool
for tackling complex social problems involving the youth, promoting the rights of the child, fighting female genital
mutilation, fighting the jigger menace, supporting persons living with disability, and fighting illiteracy among
others. Baite TV programmes have assisted the poor by providing material needs. In addition, the programmes assist
in provision of health and assistance to the sick. Besides they provide shelter by constructing houses for the
destitute and derelict among the community members, including the provision of wheel chairs, food, farm inputs and
advice to farmers.

Baite TV programmes motivate viewers by appealing to them to assist the needy through contributions in cash and
in kind. This is how they awaken the self-esteem of individuals who then feel obliged to help. Baite TV is viewed as
the voice of the poor for it champions for their rights and provides them with a forum for debate and a platform on
which to express their views. It is thus regarded as the mouthpiece of the poor and the marginalized. Baite TV
programmes assist in provision of business start-up funds to needy members of the community. The TV Station is
lauded for providing funds for development through its various programmes. This is done through its unique
approach in which it mobilizes the community towards giving support to projects within their locality.

Baite TV Station uses its programmes to identify youths who require training. They are then given training
opportunities with the ultimate aim of securing employment or being self-employed. The TV Station uses its
programmes further to assist in the provision of bursaries and scholarships to needy students identified by the
community. In this way Baite TV programmes play a big role in the social development of the community. The
audience view Baite TV as the watchdog of society. The Station exposes evils in society such as corruption, greed,
and other ills including theft of public funds. Members of the community who may be inclined to embezzle public
funds may hesitate when they know that somebody is watching and that they will be exposed.

RECOMMENDATIONS
During Okolea and other public rallies organized by the Station, leaders educate and explain issues on social,
economic and political aspects thus raising peoples’ awareness. These are some of the social development issues that
Baite TV can continue to tackle. The media, and especially vernacular television, are suitable channels who through
community groups, the church and the government can deliver the much needed development in the rural and other
areas that have for a long time been ignored by mainstream media.

For vernacular TV to survive in the competitive media market, they must carve a niche in the industry. They have to
understand consumer behaviour and the market they are operating in. Kibera and Waruinge (1988) define consumer
behaviour as the process whereby individuals decide whether, what, where, when and how, and from whom to buy
goods and services. With this in mind, organisations consider consumer needs and wants, and this leads to the
formulation of the marketing concept. It is therefore important for any organization to understand consumer needs
for them to survive in today’s competitive business world. Media houses must understand consumer needs and
behaviour and design their programmes and marketing strategies to incorporate the behavioural needs of consumers.
With more support in terms of resources from the community, National and County Government and other
development agencies, vernacular TV stations like Baite TV can accomplish a lot more in bringing positive changes
in society. It is important that the audience understand and believe in the brand and product on offer for them to
continue to watch and to believe in it. Baite TV does this by ensuring that partners remain on board and are fully
motivated through programmes that are simple yet engaging.

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MEDIA PARTICIPATION AND CULTURAL NORMS AROUND MUGAMBO JWETU FM

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ABSTRACT
Community media have been lauded for the opportunity they provide to enhance participation and therefore democratic culture. In Kenya, a growing number of community radio stations have been founded partly under this logic since 2004. As of 2017, there were about 25 operational community radio stations. However, but exactly what participation consists of or what bottlenecks participation faces is not extensively laid out in either the country’s legislation or the stations’ best practices. This paper explores the daily interactions of a Kenyan ‘community radio community’ with the programmes of a radio station in their midst. It examines the media rituals at different times of the day by various sections of the community in relation to the content of the station, Mugambo Jwetu FM. Through this, social norms that determine participation and the new social formations that occur through participation on the other hand, are revealed. The data used are drawn from field research conducted in 2014 and 2015.

Keywords: Participation; community; speech communities; radio; audiences; community radio; listenership; culture

INTRODUCTION
The idea of imagined communities created through media consumption is well outlined by Anderson (1984/2006) in his description of the rise of nationalism. He argues that through the consumption of the same news media, particularly newspapers, individuals were, through their imagination, united to other individuals consuming the same media. While this idea was put forth in relation to the formation of European nations, it still is of value in reflecting on the constitution of community through shared media consumption. Speaking from a micro-level, Fiske (1992) argues that while it is difficult to observe culture, examining media consumption practices – that is, how people do ‘audiencing’ - is a valuable entryway into understanding how a social system functions and how people adapt to it. He considers audiences to be ‘social formations’ based on the shared activity of audiencing, and argues that audiencing practices are a glimpse of culture in practice. From the perspective of mediated citizenship, engagement in and through the media is conceptualised as a way in which civic agency is expressed, and a civic culture, characterised by participation by all, is created (Dahlgren 2005; Dahlgren 2012; Schrøder 2012). Such a participatory culture reduces the concentration of power in specific hands, and creates a more equitable society.

Participation is a key concept when it comes to community media. It is one of the features that distinguishes community media from other media, and is more and more conceptualised as a part of development projects. It is used in the field of politics and democracy, as well as in the field of communication and development. Participatory communication is conceptualised by communication scholars as part of people’s right to communicate (Thomas 2008), a tactic to challenge powerful discourses (Carpentier et al. 2001), a way in which communities cultivate and exercise their citizenship (Rodriguez 2016; Jenkins & Carpentier 2013), and express their voice (Petit et al. 2009). Kenyan community media operate under the requirement of participation as one of their defining features.1 However, exactly what participation entails seems to vary for each station.

Meadows et al (2009) point out that participation in community media enhances other broader societal concepts such as democracy and citizenship, because the production and reception of community media at the very least disturbs the power relations between audience members and media producers. They view community media participants as being more empowered to participate in democratic processes. They therefore argue that apart from focusing on a content analysis of community media, it is vital to examine how community media facilitate ‘community organisation’.

However, participation has also been called a ‘floating signifier’ (Carpentier n.d.), alluding to the fact that it is a term that has no fixed definition; rather, it is a label that has been used to refer to so many things that it has no stable meaning. To help ‘fix’ the term, Carpentier refers to Arnstein’s ‘ladder of participation’ which delineates levels of participation. Arnstein (1969), speaking from a political perspective about citizen participation in government projects, provides a scale that attempts to capture participatory intensities, escalating from non-participation, to tokenism to citizen power. For her, true participation occurs when the people who are usually marginalised have a

1 Section 46 (F) of the KICA (2009) Act
say in the decision-making process on issues that affect their lives. In other words, it is about the sharing of the power to decide.

In this paper, I explore the ways in which specific sections of the community interact with Mugambo FM’s programme content. In exploring audience activity contextually, I keep in mind that such activity is embedded “in a complex network of ongoing cultural practices and relationships” (Ang 2012, 149). The rest of the paper proceeds as follows. First, I introduce the station and describe the methodology used to access audience practices. In the next section, I lay out the data indicating media consumption practices. Subsequently, I discuss audience participation in two specific shows, and conclude by laying out the implications of these participatory practices.

**Mugambo Jwetu FM**

Mugambo Jwetu FM was established through funding by the UNESCO and the government of Finland, and received support from the local government via the Constituency Development Fund (CDF)\(^2\) kitty in the form of premises in which to set up the station. The station has been on air since 2008 and is located in Tigania West, a rural area 244 kilometers north-east of Nairobi city, Kenya’s capital. The main income generation activity in the Tigania area is growth and export of the Miraa (Khat) plant. With this activity come related issues such as children dropping out of school because they can earn quick money picking and packing Miraa, the spread of HIV/AIDS due to prostitution associated with the quest for quick money, high crime levels and family disintegration. These are some of the issues that the radio station seeks to address (Fairbairn and Rukaria 2010).

Mugambo Jwetu FM is part of a Community Multimedia Centre (CMC) project. The CMC offers computer, internet, phone, fax and photocopying services to the community with the aim of “community empowerment through ICT” (Mugambo Jwetu CMC 2013). It also offers training in computer literacy both to the community members and to members of the civil service working in the surrounding government offices. The CMC is a project of a community group known as ‘Mugambo Jwetu’ (meaning ‘Our Voice’), from which the station derives its name. It is this group that manages the centre, in the form of a management board consisting of community representatives drawn from different sectors such as gender, religion, and culture. The committee meets at least three times per year, and more often if necessary.

The station’s daily affairs are run by the station manager, who oversees several radio producers and presenters, a secretary, the computer training school teacher, and an intern. The individual show presenters produce their own shows, each of which runs for about 3 to 4 hours, starting from 5am till 10pm. Community members needing any of the CMC services deal with the secretary or intern, while those who want to meet the station manager are free to walk into his office without a prior appointment.

Until June 2014, the station was housed in the Constituency Development Fund (CDF) office premises, which is in the vicinity of other government offices. From July 2014, the station moved to a rented building in the Kianjai town centre, citing that the higher ground in the town centre offered better transmission possibilities. However, the rest of the CMC has remained housed at the CDF offices.

**METHODOLOGY**

This article draws on data collected during fieldwork conducted in 2014 and 2015 in the framework of a research project delving into the roles and reception of community radio in the Kenyan media landscape. Both quantitative and qualitative methodology was employed for the broader research project which explored three stations, and this article draws on data specific to Mugambo FM which was generated via both methods.

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\(^2\) Now called ‘NG-CDF’ - The National Government Constituencies Development Fund (NG-CDF). As per http://www.ngcdf.go.ke/index.php/about-ng-cdf: it is “a fund established in 2003 through an Act of Parliament, the CDF Act 2003. The Act was later reviewed by the CDF (Amendment) Act 2007, and repealed by CDF Act, 2013 which was succeeded by the current NG-CDF Act, 2015. The Fund is domiciled within the ministry in charge of national economic policy and planning, currently the Ministry of Devolution and Planning. The main purpose of the Fund is to enhance infrastructural and socio-economic development at the grass root level in order to reduce poverty by dedicating a minimum of two and half per cent (2.5%) of all National Government’s share of annual revenue towards community projects identified at constituency level by the communities.”
The quantitative methodology consisted of an audience survey around the station, using questionnaires as a tool. The survey radius was based on the station’s identified signal-reach, based on transmitter strength and the approved broadcasting radius. Cluster sampling was employed in selecting the respondents for the questionnaires. Cluster sampling is a form of probability sampling in which, instead of sampling individual units which may be geographically dispersed, the sampling is done from groups that occur naturally in the population such as neighbourhoods or schools (Teddle & Yu 2007). The station’s broadcast area was divided into clusters based on trading centres. A total of 115 questionnaires were randomly administered in each of the trading centres. In the course of the questionnaire administration, which took four days in the Mugambo FM vicinity, an effort was made to ensure that a roughly equal number of males and females were interviewed. Hence, an element of purposive sampling – “selecting units (e.g., individuals, groups of individuals, institutions) based on specific purposes associated with answering a research study’s questions”(Teddle and Yu 2007, 77) - was undertaken based on population characteristics. The aim was to get data across various demographic categories.

The goal was to administer a minimum of 100 questionnaires in the station broadcast area, and a maximum of 115 questionnaires should time and resources allow, while also creating a margin for returned questionnaires that may be unusable. The minimum of 100 questionnaires was settled on in view of the population figures on one hand, and in view of Mugambo FM’s identity as a community radio station on the other hand. Mugambo FM’s signal coverage area has over 5000 inhabitants, who were all considered to be potential listeners. For large populations (categorised as more than 5000), 100 respondents offer a 95 percent confidence level, with a +/- 10 percent margin of error. The ideal number of respondents for a minimal margin of error (+/- 2.5 percent) is 1000, and larger commercial stations making financial decisions based on listenership data may opt for this larger sample. However, in a community broadcasting context, 100 respondents can offer an indicator of listenership patterns and favourite programmes (Gordon 2012). Therefore, the sample size was partly grounded in time and resource considerations, as well as on a reasonable margin of error that this number would offer. This being an exploratory survey, the sample size was considered sufficient for the research purpose.

The qualitative methodology consisted of observation of work flows at the radio station, in-depth individual interviews with producers and focus group interviews with the station audiences. Focus group participants were drawn from lists of callers to the station and fan groups. The focus groups were delineated along demographic lines into three categories: one gender-mixed group of youth (younger than 25 years of age), one of women (older than 25 years of age) and another of men (older than 25 years of age). Working with relatively homogenized focus groups was aimed at identifying age-specific and gender-specific audience preferences. The interviews were audio recorded, transcribed and anonymized, the latter being a condition agreed upon by both audience members and producers so that the focus group participants would be free to air their genuine comments. Due to the small geographical reach of the station and due to the research methodology, without anonymization the station management and producers would easily recognize which audience members made which comment, which was a concern for some focus group participants.

Station Conceptions of Mugambo FM’s community
The communities of community radio in Kenya are primarily defined in terms of geographic context, albeit over different distances. Since these community stations broadcast on FM frequencies, their reach is limited to a certain geographical area. For Mugambo FM, ‘community’ seems to be all who speak the local language around the station, regardless of distance from the station. The station plans are therefore strengthening and expanding the signal so that “we will have the privilege of having advertisements, and therefore better income flow…for our comfort, to give us better equipment and even to improve motivation to work” (MT 2014). Indeed, in early 2014, during this research’s pilot study, Mugambo FM was keen to acquire a stronger transmitter and move its mast to the topographically higher nearby urban centre, in order to broaden its reach. The station manager was therefore involved in writing proposals to secure funding for this, and negotiating with the providers of possible premises for the location of the transmitter. This move was accomplished later that same year.

This conception of community agrees with Anderson’s description of the formation of national consciousness, in which, much as formal national boundaries were not based on the reach of a particular print language, having a common print language created an automatic boundary between those who understood the language and those who

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3 Statistical calculation programmes indicate a margin of error of +/- 10 for random sampling sizes of 100 out of large populations (over 5,000). See for example http://www.surveysystem.com/sscalc.htm
did not. It also created the imagination of being connected to others who understood the language, even when they did not know each other individually. In the case of Mugambo Jwetu FM, the audience is demarcated as all who understand the station’s language of transmission and are therefore able to ‘consume’ the station’s content; they are a community by virtue of their shared audience.

**Characteristics of Mugambo FM Community**

Figures from the survey point to a community that is moderately educated and engaged in business as their main income-generating activity, as shown below. As per Figure 1, the community around Mugambo FM cannot be characterised as illiterate. Almost half of the respondents (44%) have attained at least a secondary school education, and another 27% have at least a primary school education. The third largest proportion of education levels is 18% which represents those who have post-secondary education (college, university or technical training institute). Five percent have a vocational training, usually pursued after primary school education. Only two percent of the respondents have no formal education at all.

As regards occupation, the majority of the respondents surveyed stated that they engage in business activities. This majority is equal across genders; 38 men and 38 women, in total 76 people, named business as their occupation. This represents about 70% of the respondents. This is plausible, given that even among those who own farms and till them, the main way of earning an income is through selling their produce. Farming was the next most cited occupation by the respondents, stated by 13% of the respondents. Only three respondents stated that they were in formal employment, and only three were unemployed. These figures, laid out in Figure 2, imply that most of these respondents would be outside their homes during the day as they attend to their business activities.

![Figure 1. Community Education Levels](image1.png)

![Figure 2. Community Occupational Activities](image2.png)
Radio Listenership Patterns in Mugambo FM Community

In the survey, a majority of respondents in the Mugambo FM broadcast area indicated that they listen to radio. This was reflected across all age groups interviewed. Out of 108 respondents, 105 (97.2%) stated that they listen to radio, meaning that less than three percent of the people interviewed do not listen to radio at all. Out of these, 85 respondents (80.9%) indicated that they listen to radio daily, as seen in Figure 3. This point to radios being an important part of the communication media these community members access in their daily lives.

![Figure 3. Frequency of listening to radio](image)

Mugambo FM Listenership

When it comes to listenership specifically to Mugambo Jwetu FM, there were two different figures. First, respondents were asked to mention which radio stations they listen to, without being given options by the interviewer. In this scenario, 59 out of the 108 people interviewed mentioned Mugambo FM. This is almost 55% of the respondents. Later in the questionnaire, respondents were asked directly if they listen to Mugambo Jwetu FM. In this case, 73 respondents answered in the affirmative. This is over 67% of the respondents. This disparity in findings could be attributed to respondent bias. It is therefore more probable that the true percentage of listeners to Mugambo Jwetu FM is closer to 55% than to 67%. This is nevertheless a high percentage of listeners from the station’s envisioned target audience.

Delineated by age and gender, Mugambo FM draws its largest listenership from the 31-40 age group (50.9%), closely followed by the 21-30 age group (44%). The popularity of Mugambo FM among this demographic may have to do with its community ties in form of self-help groups which double up as fan groups, whose members span this age range. In terms of gender, males outnumber females in listenership to the station in the 21-30 and 31-40 age groups, as displayed in Figure 4.

Listening Frequency

In the survey area, of those who stated that they listen to Mugambo FM, 71% tune in to the station daily, followed distantly by 22.03% who tune in every two to three days. This is indicated in Figure 5.

Favourite Mugambo Jwetu FM Content

Out of the available Mugambo Jwetu FM content, the morning show, Ciairaro (‘Overnight happenings’), was the most frequently mentioned show that respondents listen to. This is followed in popularity by Jamaican Express (Reggae Show), and the third most listened to show was the evening talk show, Twirane (Let us talk to each other). This is indicated in Figure 6.

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The total number of usable questionnaires
Figure 4. Age and gender of Mugambo FM listeners

Figure 5. Frequency of listening to Mugambo FM

Figure 6. Favourite Mugambo FM content
These findings are in line with the previous finding that the majority of radio listeners tune in to radio in the morning and evening. As well, it is a reflection of the stated content that respondents said they seek from radio in general. In group discussions, the majority of respondents said that they listen to radio in order to catch up on local news. Ciairaro (‘overnight happenings’), the morning news show, performs this news function. Also of note is that although a low number of respondents indicated that they tune in to radio in the afternoon, the reggae show came out as a strong favourite among Mugambo FM listeners. Among the youth, reggae was their top listenership choice, as reflected by the listenership figures for Jamaican Express, the reggae show. It is these two programmes that I focus on for the rest of the paper. I explore the interactions of the listeners with the two shows, and from these draw conclusions about the community norms that are revealed.

Early Morning Show - Ciairaro
At Mugambo FM, the early morning show begins between 5 and 6 am, and consists of news of the day and a selected discussion topic. The timing of the show arguably keeps in mind the typical Kenyan listener’s schedule, which involves being awake and getting ready to leave the house early in the day in order to be at work by 8am, whether one’s own business enterprise, formal employment or contract work that is assigned every morning. For farmers, milking takes place before dawn and cultivation starts early. At this time of the day, as the average adult is busy doing things around the home, the radio acts as a companion that keeps them informed and entertained. Indeed, as presented in the quantitative findings above, the most popular radio listening times were first thing in the morning and last thing in the evening. The listeners gave these times as the most convenient for them to listen to radio, and indicated that they usually listen to radio at home.

The Mugambo FM early morning show features newspaper reviews of the national news. At this station however, there is a specific slot for community members to call in and contribute to the news agenda. This is reflected in the show’s name: ‘Ciairaro’, translated into ‘Overnight Happenings’. This show includes a news roundup of events in the locality, and the content is moulded both by the community members and by the show host. People call in with information about happenings overnight from their villages. The show host gives guidelines on the kind of content expected: nothing currently in court or being investigated by the police, and nothing of purely personal interest (i.e. it has to be relevant to the community). In addition, anonymous calls are not entertained – anyone who calls in should be ready to give their name – “even a fake name, but a name” (TD, Producer, Mugambo FM 2014). The host then selects an issue for discussion, and asks community members to call in with their opinions about the same. At times this may be a local issue, at other times it may be an issue on the national news.

The whole community participates in discussion, he mentions that “even old Mamas, they call me, just to debate, to discuss the issue we are debating…I have some 3 fans, who are old Mamas over 70, and they are calling…” (TD, Producer, Mugambo FM 2014) Another producer who alternates on the same show mentions that the target audience is “Everyone in the community. We try to have something for everyone” (MN 2014). However, interviews with different groups in the community regarding their participation in the show reveal a different picture. Whether intentionally or not, it is almost exclusively the adults in the community who contribute to this show.

The youth state that they do not feel that they have the right to call in, and explain it in this way: If there is a show contributed to largely by the adults you will take it as belonging to them, so even if it is something interesting to you as a youth, you will not have the confidence to contribute to the discussion. If you are with your parent you tell them your opinion and then they can call into the station on your behalf, because you don’t want to be heard commenting on that issue…we are afraid to be heard “oh, so-and-so is a gossip” especially when we meet in the afternoons as youth in the market. (Mugambo Youth 2014).

This thought is echoed by the adults, who state that the morning show is their special show, and the youth should focus on ‘their’ show, that is, the reggae show in the afternoon. As a respondent during group discussions explained, “The youth don’t call in the morning. They know the morning is for the adults….those are issues for adults, the youth should let us be….. Even my son at reggae time tells me ‘now let me have the radio’ and I let him have it to listen to the reggae show” (Mugambo Women 2014).

Much as the show’s producers assume that the show is open to participation by the whole community, participation in the show follows the already existent social norms - in this case, that young people should not engage in conversations where adults are speaking. As such, participatory parity in the Habermasian sense is mediated along age lines. Fiske (1992) sees audiencing – the practices of audiences - as a way of understanding culture. In the case
of this show at Mugambo FM, the delineated participation in audiencing the show demonstrates community values. It brings to mind Moemeka’s description of communication norms in what he characterizes as communalistic societies, of which African societies may be said to be a part.

He points out that verbal and non-verbal communication are delineated along age lines: Whereas elders have the right to communicate mostly verbally, young children and youths are, by tradition, expected to communicate mostly nonverbally. Because younger generations are presumed to have limited experience in life, they are expected to watch and listen, and act according to what is judged to be the best for them in the context of the overall welfare of the community (Moemeka 1998, 133)

In such societies, should the young people have something to say about an issue being discussed by their elders, then they would be expected to communicate these views through someone who has the right to communicate in that situation: another adult. Such a community defers to gerontocracy, that is, the older someone becomes, the more traditional and social authority they garner in the community (Moemeka 1998). This seems to be the case in the community around Mugambo FM: at least as far as this morning show is concerned, certain sections of the community have more right to speak than others based on age. Calhoun (1993) however argues that there is no ‘primordial’ tradition that has always existed; rather, all traditions (including those that make up ethnic groups) are created. Further, he sees tradition as grounded less in the historical past and more in everyday social practice. It is the tacit knowledge which guides participation in social life, and is therefore not rigid. It is often reinterpreted and reshaped to fit contemporary situations. This is arguably the case for the Mugambo FM morning show, where both the youth and the adults implicitly agree that the show should be contributed to by adults and not by youth, and act in a manner that upholds this thought. This idea is verbally stated by both groups almost as an ‘obvious fact’, and is reproduced and reinforced by social censure among the youth, where they fear losing social standing among their peers if they should be heard participating in this show.

Apart from debating on national issues and giving community updates, the Mugambo FM morning show also tackles specific community issues which offer the possibility to tackle ‘taken-for-granted’ issues that have an impact on the community. One example is the fact that children in the area walk to and from school before dawn and after dark, because they are enrolled in ‘good’ schools far away from their villages. Not only is this exhausting for the students, but it is also unsafe for them, and often costlier for their parents. However it has long been seen as a necessary practice to ensure academic success.5 Discussing this issue is a way of challenging the assumptions around this practice, and seeking an alternative way to achieve desired outcomes. It is not an explicitly political issue, but it is certainly one of importance to the community, questioning the existent relations between ‘good’ and ‘bad’ schools, and thinking through ways to re-imagine these. It is an example of the community engaging in meaning-making processes through community media, by asking questions such as ‘is the only way to ensure our children get a good education to enrol them in far-off schools?’ Schudson (2002) argues that the most important value of news media to society is their role as cultural actors. They do not indoctrinate individuals but rather, establish “a web of meanings and therefore a web of presuppositions, in relation to which, to some degree, people live their lives” (Schudson 2002). In the case of Mugambo FM, the station arguably goes beyond establishing this web of meanings. In offering space for debates on previously unquestioned ways of doing life, it creates room for the community to challenge established meanings and norms and co-generate new ones. Hence, community radio acts as a dialogic space in which fresh value systems are discursively produced.

Afternoon Show – Jamaican Express
In the afternoon, Mugambo FM airs a youth programme. The Mugambo FM programme is themed on reggae, and goes by the name ‘Jamaican Express’. As regards the actual content of this show, one notes that there is no hard news on offer, but rather, entertainment in the form of music. However, this programme goes beyond entertainment to function as an arena where identities are created and enhanced. The show is targeted at the youth in the broadcast areas, and works with the assumption that youth are available to listen to radio in the early afternoon hours. This

5 During discussions with the station staff, it emerged that one of the issues under discussion in the community was how to strengthen schools in the local area. Parents in the area usually opt to enroll their children in schools that perform well in primary school and secondary school national exams (referred to as ‘good’ schools), even if this means ignoring a nearby school and taking one’s child to a school many kilometres away. The idea is to give their child an opportunity to perform well in the national exams, which determine one’s entrance to the next level of education.
supposition may not be far-fetched. As the women in Mugambo FM pointed out, “The afternoon is for our children. Mostly we are not at home at that time – we are out in the farm” (Mugambo Women’s group interview, Urru, 10.12.14). This programme is located because parents are often away from home at this time, and even when they are at home, they are aware that there is a show that the youth like listening to, and therefore willingly let them tune into it if there is only one shared radio for the household. As well, even if the youth may still be engaged in house chores at this time, they use the radio as a companion to keep them entertained as they work. This programming considers social context and is designed to fit into the daily schedule of the community. It highlights the function of the radio outside of its content, specifically its intersections with daily activities. When a station is embedded in a community, it is better to tailor not only its content but also its programming schedule to fit the social context.

Taking a closer look at Mugambo FM’s ‘Jamaican Express’ show offers some insights into how the youth participate in radio programmes, and further expands the idea that different sections of the community interact in various ways with the programmes and are in those moments interpellated into specific formations. To start with, the producer herself goes by a pseudonym on the show, ‘Empress Natty’, but uses her real name on Facebook, which she also uses to communicate with audience members. It is interesting that online, the show host goes by her real names, while on air, she goes by her pseudonym. Similarly, the youth who contribute to the show go by reggae-related pseudonyms. This challenges the notion of online space as being the place where social identities are created and played out. In the Jamaican Express show, radio is more of the place where social identity is constructed, rather than on the internet. This might hint at difficulty in accessing the internet for the youth of the area and therefore using the radio as an alternative sphere to carry out activities that other youth might carry out online. It could also point to the notion that the social function of radio among youth in the African context has been overlooked, especially keeping in mind orality as a cultural trait. Radio has been viewed as a medium through which to receive information, but as suggested here, plays an equally important social function of identity construction.

The Jamaican Express show discusses social issues, often revolving around relationships. In this slot, the youth offer their opinions and ask for advice from each other and from the show host. Often, the show host asks a question or raises a topic, and then asks the listeners to contribute to the topic and request for the songs that they would like her to play. The youth contribute to this show through Facebook posts, SMS and calls. As the programme runs, the producer checks her Facebook account and responds to comments and song requests.6

The reggae show producer sources the latest hits from the internet knowing that her audience is interested in and aware of international trends in reggae music. The show features a mix of languages, and is not limited to Meru, the local language. The producer speaks in Kiswahili, English and Sheng7, and the international reggae music played is mostly in English. As such, the audience for this reggae show is delineated not only by age, but also along language lines. Given the additional variable of language used for the show, I view the youth who participate in the afternoon show as a separate speech community within the Mugambo community. They are youth embedded in the community around Mugambo FM, but are simultaneously also an independent speech community.

The language of the afternoon show at Mugambo FM is one that clearly sets it aside from other programming, as explained by the youth interviewed:
Youth 3: [The reggae show] inspires me….you may get some information in some reggae [songs] that may help you in life.
Interviewer: Information like? You know information can be anything. Is it mathematics, is it English?
Youth 3: No, it can improve even your way of life even you can hear some pronunciation of words, English words that you were not aware of before. (Interviewee 3, Mugambo Youth, Urru, 09.12.14)

In this case, the show offers not only entertainment but also implicitly provides English language tips. Morgan offers a useful definition of speech communities as “groups that share values and attitudes about language use, varieties and practices”, based on the premise that “language represents, embodies, constructs and constitutes meaningful participation in society and culture” (Morgan 2014, 1). She further states that, “What is fundamental to both speech and community is that a system of interaction and symbols is shared, learned and taught, and that participants and members are aware they share this system. This is why speech communities are one way that language ideologies

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6 Noted during observation sessions at the station in 2014/2015
7 A Kenyan creole consisting primarily of English and Kiswahili but which also borrows words and expressions from Kenya’s local languages
and social identities are constructed” (Morgan 2014, 2). In the case of this show, there is a construction of social identities and a system of interaction going on, for instance the idea that the youth listen to the show in order to be able to speak in a certain way.

As Morgan elaborates, many people operate within multiple speech communities in order to participate in words and ideas exchange, and to represent their identities as ‘full social actors’. Speech communities are organized “around people who want to share their opinions, identities, thoughts and solidarities and generally communicate with their evolving social world” (Morgan 2014, 18). Similarly, the fact that youth speak in other languages during the afternoon show does not mean that they do not speak their local language at home – they do. But in the moment of listening to the reggae show and contributing to it, they express their membership in another speech community, through a specific form of self-expression that befits the listening community that they are a part of. They use the show as a space to exchange ideas pertinent to them, through the use of codes they have developed. They put on the identity befitting the speech community they are members of at different times of the day, creating and enhancing their multiple identities.

As earlier stated, in their contributions to the show, the youth often identify themselves using nicknames, taking up different identities from their ‘official’ ones. In addition, they speak in a mixture of their local language and Jamaican patois, the latter used in much reggae music, and in this way communicate using a code that the adults don’t understand. Through this show, the youth have an arena to openly converse about issues that they might not be comfortable discussing in the hearing of adults. Since they are on air and cannot prevent any adult from tuning into the station and listening to them, they create their own alternative on-air meeting space with its own language code to keep out those who do not belong and keep connected those who do. As one mother put it, “they start saying ‘reee….leeee….’ things we don’t understand. But they themselves understand, and you see that your child is engaged with the radio, even when they are doing their washing you see they are enjoying themselves listening” (Interviewee 2, Women’s Group Interview, Urru, 10.12.14). As such, this speech community is marked by its simultaneous exclusivity of adults and inclusion of youth.

In some instances, apart from the use of special language, song requests are a way of contributing to debates on the show, as explained by one youth during group interviews:

**Interviewer:** So what are the debates on the reggae show about?
**Youth 2:** It can be a discussion about relationships, for example, how youth relate. And young people start to call in with comments and questions.
**Interviewer:** And do you contribute to this show?
**Youth 2:** Of course…. For example, you can request a song within that motion [i.e. debate]. Let’s say if the debate is talking about how youth behave, you ask for Lucky Dube’s\(^8\) song ‘A question is a crime’, so I contribute to the discussion through that song. (Interviewee 2, Youth Group Interview, Urru, 09.12.14)

Through clever use of a code recognised by fellow youth, that is, song lyrics which are familiar to the show’s listeners, the contributor communicates a certain message. The message, which hints at the idea that youth are not allowed to raise questions, illustrates the youth’s repertoire of communication resources from international music. Community-youth-specific issues are discussed, but the tools used for discussion are drawn from outside the community – a foreign language and an international song – which have been appropriated into the local context.

Audiencing practices in this show also are a way in which cultural norms are reproduced. For instance, it is frowned upon for adults to participate in the reggae show. As one youth answered to the question ‘why can’t adults also contribute to the reggae show’,

If you are known to really love reggae – and you are a grownup - especially a woman – it can be said that you are a drunkard or you go to clubs excessively. People will wonder how come you know those songs. If you hear such a person even naming artistes it is shocking, now you see that woman is digital! You get suspicious (Interviewee 3, Mugambo Youth Group interview, Urru, 09.12.14).

The ‘suspicion’ about an adult and especially a woman being familiar with reggae indicates a clear demarcation of ideas about what it means to be young person and what it means to be an adult, male or female, in the community. These ideas in turn determine who can participate in which programme and who cannot. The expectations by the

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\(^8\) A South African reggae artiste
youth regarding how adults should behave hint at the successful reproduction of a habitus, that is, unquestioned beliefs or understandings which serve as the basis for disputing or questioning other claims (Calhoun 1993), and which, Calhoun argues, is what bounds a nation or ethnic group. The demarcations of participation in radio programming in Mugambo FM acknowledge and reinforce already-existent cultural structures. Hence, participation in different programmes is mediated through cultural norms, because each programme is not equally open to the participation of all.

CONCLUSION
For the community in which Mugambo FM is located, radio listenership is a daily activity. Radio listenership takes place chiefly in the morning and in the evening, before listeners leave home for work and after they get home in the evening. This implies that radio listening is an active engagement which is done purposely at specific times, rather than mere background noise. From this pattern, one notes that radio listening is not concurrently done with activities where one may not be able to concentrate on the programming, but rather, is more “a discrete act, anticipated in time or marked off from the day’s activities in some other way” (Couldry 2011, 223). It is construed as a distinct leisure activity. During different time slots in the course of the day, distinct publics and communities are constituted through their audiencing practices. During the morning show at Mugambo FM, deliberative publics are constituted through debating on community issues. However, this deliberative public sphere of the early morning show is not open to everyone; rather, it is delineated according to age lines. For the afternoon show, Mugambo youth are constituted as a separate speech community. They not only deliberate on youth issues, but do so in a language different from that spoken at home, which locks out their parents.

As demonstrated in this article, engagement with radio programmes is based on pre-existent community characteristics. The station’s community has in place different types of community organisation, not only due to the presence of a media outlet in their midst, but also based on their pre-existent social ties. Mugambo FM thus in a sense facilitates community organisation as proposed by Meadows et al (2009), but does this through responding and adapting to pre-existent forms of community organisation, rather than creating new forms of social organisation. Thus, although broadcasting to the same geographical community all day, through the content it offers, community radio acts as an arena for the interpellation of different sections of the community into diverse configurations at various times of the day. As such, examining communities’ diverse engagement with media content is valuable for further understanding how communities are structured, the ways in which they are evolving, and what values they hold dear.

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ABSTRACT
This paper aims at exploring the concept of knowledge economy and its related aspects to the economic growth and elements surrounding this idea. First, it is worthy to note that knowledge economy is referred to as a system based around the brain power or the capital intellectual. Simply put, knowledge economy is regarded as the optimum production of services on the basis of knowledge-intensive practices that significantly contribute to an accelerated speed of a scientific advancement of the technical growth, and thereby contributing to the rapid obsolescence. Therefore, knowledge economy largely depends on the intellectual abilities of a system that the physical inputs for instance the natural resources used in the conventional or the traditional production. Indisputably, the recent economic growth of various economies in the developed nations has been driven by the technologies based on knowledge dissemination as well as production of the information. The rise of the technology in early years of 1950s extended the proliferation levels of technological advancements such as personal computers. Later, this technology led to a massive growth of other technologies such as internet and emails. These new developments re-created the nature of operations in the entire economy at large. Therefore, knowledge economy enhanced the growth of various industries by providing them with professional services and more so transitioning of knowledge-intensive models of production (Powell 200). Since its origin in early 1950, this body has undergone significant developments and changes. As a result, new and diverse concepts have been established to support science-based industries that have led to diverse economic as well as social economic growth as professional services continue to influence more industries. Despite all these benefits, there is a good deal of debate that questions the involvement of this concept especially is areas that do not entirely depend on knowledge intensive systems.

Keywords: Knowledge, Productivity, Labour, Science-Based Industries, Economic Growth, Technological Change

INTRODUCTION
As pointed out by Prusak and Davenport (1998) knowledge refers to a fluid mix of framed values, experience, expert insight, contextual information, and that offers a ground for incorporating and evaluating the new values, experience, contextual information. It instigates and is used in the minds of knower’s. The knowledge arises as a changing process of learning that takes place among teams, individuals, communities and organizations (Hawkings, 1994). The ancient economy based on the use of factors of the production; labor, land, entrepreneurs and capital in the process of production. The economic value was majorly based on productivity as well as the effective utilization of old-style production factors. But in the current world, economies are faced with two new factors of production that’s knowledge and information. Malhotra (2003) states that knowledge differs from the physical assets and it requires the understanding in form of quality as well as the content of outcomes of performance. The technological advancement and the globalization are reagents for the utilization of information and knowledge in the process of production. The societies started to rise into the societies of information which have created the knowledge economy. The intellectual capital and knowledge are the most significant resources for competitiveness and growth and it is an idea of a change from an industrial society to a knowledge society (Kline, 2006). Intellectual capital is as well considered influential in the enterprise value determination and the national economic performance (Petty and Guthrie, 2000). Neef (1998) claims that understanding the nature of knowledge is a pre-requisite for successfully utilizing it in a meaningful way. In fact, while appearing to support such a claim, Hoppe (1997) goes further in asserting that the understanding of knowledge must be put into an evolutionary context that explains how and why the use of knowledge has spread in economic and social activities. Tackling such a definition from an evolutionary point of view also brings into the discussion those who believe that knowledge is not a new concept but it is as old as human existence (Mokyr, 2002).

According to Hoppe’s view, accumulation of knowledge is an old as well as an endless evolving process of learning that persons and the societies have been backing to. This knowledge concentration begins with individuals who add up to the creation blocks of the societies by mounting different skills to the accumulation as well as use of knowledge. Only persons can know as well as what they know relies on their experience, perceptions, inference and memory. The knowledge is thus refined, shaped and gradually shaped by the events that fellows indulge in during
their period of stay as well as their lifetime, improved by the interest and improbability that cherish the uninterrupted knowledge conception process through daily experience and communication with others (Hoppe, 1997).

In a knowledge economy, the knowledge is the elementary factor of production that contains three characteristics; it can be utilized again and again without being taken up by that use, it can be used by several persons at the same time, it can be used in various different places simultaneously. Knowledge can yield economic worth through dispersal of information into the creation process. The economics of knowledge are very different from an ordinary goods and services. The creation, distribution and application of knowledge are the bases of the knowledge economy (Hogan, 2011). A knowledge based economy is defined as “an economy that is capable of knowledge production, dissemination and use; where knowledge is a key factor in growth, wealth creation and employment, and where human capital is the driver of creativity, innovation and generation of new ideas, with reliance on information and communication technology (ICT) as an enabler (www.jeg.org.sa/data/modules/contents/uploads/infopdf/1820.pdf). In literature the main knowledge economy variables are listed as: ICT readiness, electronic government index, the capacity of internet infrastructure and usage, investment on R&D for organizations, etc.

Asgeirsdottir (2006) emphasized four important factors that need to be taken into account when countries and their institutions want to promote their knowledge economy: stable macroeconomic policies, knowledge based economic activities, globalization and new organizational form based on investing high information and communication technology (ICT) and respond customer demand. Much of the macroeconomic research on the knowledge economy has focused on the linkage between technology and labour productivity, defined as the amount of output given a unit of labour input (Powel and Snellman, 2004). Economic growth and greater productivity can be achieved when the intellectual capital accumulated. In the knowledge based economy, intellectual capital is a core factor (Seon, Joung, Bum, Byoung, Lee and Ho, 2006).

The “new concept of economy” was put forth in the 1990s to explain the transition from a traditional industrial economy to the one based on technology. In its heyday, the new economy was said to be characterized by rapid productivity growth, rapid technological change (particularly associated with computers and IT), and the absence of business cycles and inflation. The dotcom crash and the 2001 recession largely ended such a rosy view of the new economy, but the term continues to exist and is often used to denote a concept similar to the knowledge economy. In its current formulation, the new economy is “knowledge-based, globalized, entrepreneurial, IT-driven, and innovation-based” (Atkinson and Andes 2010). Thus, both concepts stress the importance of knowledge and technology, with the new economy concept also explicitly emphasizing entrepreneurship and globalization.

In both popular literature and policy analysis, it is very common to make use of the terms such as high-technology and knowledge intensive or the knowledge based in a somewhat loose way, as though they are interchangeable terms. For example, the complete title of a recent Milken Institute report is North America’s High-Tech Economy: The Geography of Knowledge-Based Industries (DeVol, et. al. 2009). However, the terms “knowledge intensive” and “knowledge economy” are much broader concepts than the high-technology sector as conventionally defined. The definition of “high technology” used by the U.S. Bureau of Labor Statistics is based solely on the proportion of scientists, engineers, and technicians in the workforce (Hecker 2005). The Organization for Economic Cooperation and Development (OECD) considers only manufacturing sectors in its definition of high technology and is based on research and development (R&D) expenditures (OECD 2011). (The OECD is an international organization of 34 countries founded in 1961 to stimulate economic progress and world trade.

The concept of “innovative class” propagated by Richard Florida (2002) contain some similarities with the famous knowledge economy. The “creative class” or the “creative economy” concepts focus exclusively on the human capital segment of the knowledge economy. They identify a creative, highly educated and/or skilled workforce as the key factor for economic development in postindustrial economies. In practice, the Florida definition of creative class workers is very similar to what are termed “knowledge workers” in knowledge economy discussions (managerial, professional, and related occupations), but Florida emphasizes the importance of what are termed “the supercreative core” who “fully engage in the creative 4 process” as the real driver of new ideas, innovation, and economic development. The contention that the creative class is the key to economic growth has been subject to criticism as being based on casual observation and not supported by empirical evidence (Malaga, 2004).

Over the previous numerous decades, a great number of commentators and scholars have maintained that the cutting edge of an economy in both developed and developing nations has risen to be driven by technologies based on
information and knowledge as well as dissemination. These current technologies which came up in the late 1950s, extended with the propagation of personal computers, and then flowed theatrically with the prevalent utilization of email and other internet related extensions have considerable potential to remake the nature of work and the economy. Nevertheless, our understanding of the purported knowledge economy remains rather hazy, clouded by enthusiasts who are quick to offer labels and assessments without much attention to evidence. Still others see a growth industry in providing professional services to organizations and nations to assist them in the transition to knowledge intensive modes of production. If the knowledge economy is measured by the rise in knowledge management services among consulting firms or by the rapid growth in intellectual property as a legal specialty, then its growth has been considerable. Critics, however, argue that much of the growth is precisely in selling information technology and related services. Of great concern in this section is to sort through these debates and provide an overview of the scholarly literature in the social sciences on the knowledge-based economy. This paper presents evidence for the acceleration in knowledge production and discuss the key issues that have been addressed by the empirical literature.

The concept of knowledge economy covers a great array of events and the interpretations. At minimum three sections of research fall under this category. The very old technique, with its inceptions tracing back to the initial 1960s, emphases on the birth of new science-based firms and their key role in social and economic change. Some analysts include professional services and other information-rich industries such as publishing in this category, noting the marked growth in employment in these sectors of the economy over the past three decades (Machlup 1962, Porat 1977, Stanback 1979, Noyelle 1990). A core idea unifying this strand of work is the centrality of theoretical knowledge as a source of innovation (Bell 1973). The new growth theory in economics (Romer 1986, 1990) could be included here as this work stresses the importance of knowledge in economic growth, noting that discoveries differ from other inputs because they are non-rivalrous and fuel further innovation.

There has is ongoing of a good deal of the debate in the field of economics over whether particular industries are especially knowledge-intensive. Plentiful effort has entered into assessing how much these segments contribute to the growth in productivity (Brynjolfsson & Hitt 2000, Gordon 2000). Since the expansion of the knowledge-intensive firms and the accompanying efficiency increase occurred in the context of unusual macroeconomic and financial-market developments in the 1990s, a good deal of popular literature asserted that the knowledge economy operated differently from the past in some fundamental way. Although few scholars now accept such claims, much recent research in sociology and labor economics has focused on whether new kinds of jobs and novel forms of work organization have emerged in recent years. The degree to which new modes of work are particularly tethered to the knowledge economy is not altogether clear, and just how different these work arrangements are from older ones is the subject of much debate (Kochan & Barley, 1999).

A third element of work is far more slim and decision-making in the orientation that focuses on the role of learning and continuous innovation inside firms (Drucker 1993, Nonaka & Takeuchi 1995, Prusak 1997). Some administrations look to be particularly respectable at knowledge of production as well as the transfer, and researchers are interested in understanding why and whether these practices can be replicated. Such inquiry is potentially widely applicable, but the core concern of this line of work has been more applied. The broader sociological and economic implications concerning whether knowledge is codified or tacit, and what kinds of social arrangements enhance or impede knowledge generation and transmission have recently begun to attract attention (Cowan et al. 2000). Still, systematic empirical research on this topic is scarce and has not dealt with its implications for employment practices.

The key components of a knowledge economy include a greater reliance on intellectual capabilities than on physical inputs or natural resources, combined with efforts to integrate improvements in every stage of the production process, from the R&D lab to the factory floor to the interface with customers. These changes are reflected in the increasing relative share of the gross domestic product that is attributable to “intangible” capital (Aubomovitz & David 1996). Of great concern, many alternative labels and definitions are more expansive than ours, but we choose to keep the focus on the production of novel ideas that subsequently lead to new or improved goods and services and organizational practices.

We begin with a review of the evidence in support of the argument that key sectors of the economy are more reliant on knowledge generation and dissemination today than they were in the past. We then turn to the debate regarding whether recent technological advances have, in fact, raised productivity. We note that many of the most far-reaching
effects of any new general purpose technology are not fully realized unless accompanied by related organizational and social adaptations (Rosenberg 1982, Bresnahan & Trajtenberg 1995, Helpman 1998). We examine the evidence as to whether new forms of more flexible work practices that embody technological change are becoming prevalent. We note that employment and work are becoming disaggregated, as more tasks are performed outside of the formal boundaries of a firm. We then consider distributional consequences of a knowledge-based economy, in terms of wages, unemployment, and jobs.

THEORETICAL REVIEW

The economists have come up increasingly ideal models regarding the economic growth that offer the theoretical support for the importance of knowledge accumulation, and empirical analyses of the sources of economic growth in the United States and other countries provide statistical evidence of the key role of knowledge as the most important source of growth in advanced economies. The traditional model of economic growth is based on the well-known concept of the production function in which the two primary economic inputs — labor and capital — are combined in a production process with known techniques. In the context of a national or regional economy, the analysis is framed in terms of a so-called “aggregate” production function in which an economy’s productive capacity is a function of three variables: its labor force, its stock of capital equipment, and its level of technology. Based on such an economic model, three sources of growth are evident: (1) growth of the labor force; (2) growth of the stock of capital; (3) improvements in technology. Hepburn and Bowen (2013) identify three different school of thoughts on the extent to which environmental and resource constraints will limit economic growth.

The first perspective presumes that owing to technological progress the environmental factors institute no limitation to economic growth. This viewpoint forms the basis of most standard neoclassical and endogenous growth models. These approaches do not explicitly model environmental limitations and allow for unlimited growth. Thus, there is also no need for political intervention.

The original neoclassical growth model (Solow 1956) explains economic growth only via labour and capital and the exogenous driver Total Factor Productivity (TFP). According to Solow sustained growth cannot be supported by capital accumulation only, since returns are diminishing. Indefinite economic growth gets possible in this model through the introduction of (exogenous) technological progress. Even the inclusion of natural resources in the neoclassical growth model still allowed for unbounded growth that is supported by exogenous technological progress (Stieglitz 1974; Dasgup-ta/Heal 1979).

Over the past 30 years, new endogenous growth models (Romer 1990; Aghion Howitt 1992) have been developed to consider the fact that the rate of technological progress is itself determined by forces that are internal to the economic system. In these models technical change that is based on the creation of new ideas supports unlimited increase in economic output. Many of these models abstract from environmental limitations. They conclude that infinite growth is not only possible, but a likely outcome. Some endogenous growth models include environmental limitations, but also conclude that sustained growth is possible.

EMPIRICAL LITERATURE

The conventional economic growth theory sees the economic growth as a result of two factors that’s labor supply growth and labor productivity growth (Solow 1957, 1987). Anything that raises the quantity or quality of the factors of production available to the economy or improves the technology available to the economy contributes to economic growth. Economic growth leads to increases in real income and rising living standards. Knowledge accumulation also contributes directly to enhancing living standards by providing new or improved products and services. The creation of knowledge and the application of the accumulated stock of knowledge have had an increasingly important contribution to the growth process. (The discussion in this section is based on Blakemore and Herrendorf (2009).Labor productivity growth depends on growth in productive inputs such as capital intensity and labor quality. The part of economic growth that is not explained increases in inputs is referred to as multifactor productivity, or the Solow residual. Growth in multifactor productivity results from technical progress and improved efficiency. Alongside growth in labor productivity in the late 1990s, the U.S. economy enjoyed a revival in multifactor productivity. Many of the enthusiasts of the knowledge economy quickly claimed that investments in technology were driving the growth by creating broader productivity gains in the form of economy wide spillovers [Organization for Economic Co-operation and Development (OECD) 2000]. The empirical evidence of spillover effects has been mixed, however. Whereas Griliches & Siegel (1992) found a relationship between computer investments in U.S. manufacturing industries and multifactor productivity growth, Stiroh (2002) found no
correlation between ICT investments and multifactor productivity growth in U.S. manufacturing industries. More careful empirical research at the firm level has shown that the contribution of information technology investments to productivity growth exceeds the contribution of other investments—but only when coupled with significant organizational changes.

According to Chavula (2010) the knowledge is at the heart of economic growth, which increases the ability to take advantage of existing technologies and innovations, enhanced competitiveness and productivity. The knowledge economy in which a general purpose technology provides a powerful infrastructure that increases productivity and offers new opportunities to any knowledge-driven activity (Foray, 2006). For economic growth, many countries are seeking to shift their economies to technology-based economy and started to adapt their economies with knowledge-based economy. Knowledge, as embodied in human capital and technology, has always been an important contributor of economic development.

In a sequences of research studies, Brynjolfsson & Hitt (1995, 1996, 2000) and Black & Lynch (2000, 2001) indicate that the technology aids the complementary organizational reserves, which, in turn, reduce costs and improve output quality and thus lead to long-term productivity increases. Black & Lynch (2000) found that manufacturing plants with a greater proportion of non-managerial workers using computers were more productive. Brynjolfsson & Hitt (1995, 1996) analyzed data for 367 firms between 1988–1992 and found a clear positive relationship between information technology investment and firm output, but also wide variation among firms. Moreover, in a study of 600 of the Fortune 1000 firms, Brynjolfsson & Hitt (2000) illustrate that although computers contribute to output growth in the short term, the returns to computers are two to eight times greater when measured after three to seven years.

In a cross-sectional survey of organizational practices in 400 large U.S. firms, Bresnahan et al. (2002) find an interaction effect between the value of information technology investments and both increased worker autonomy and labor force skills. Similarly, drawing on a survey of 4100 U.S. firms, Black & Lynch (2001) found that productivity gains from technology investments were often associated with workplace changes, such as profit-sharing plans and employee participation in decision making.

For the research works for Europe Kratena and Sommer (2014) quantify different resource use scenarios for Europe with a disaggregated dynamic New Keynesian (DYNK23) model covering 59 industries and five income groups of households. One scenario assumes a focus shift in technological change from labour/capital saving towards energy/resource saving (without any change in the overall TFP growth), which could be reached either by enhanced investment in R&D or by the taxation of energy and resources. Such a shift leads to more employment and higher disposable household income. Energy demand and greenhouse gas (GHG) emissions increase less than in a business as usual scenario, while DMC/capita is (only) slightly decreased (due to rebound effects from increased household income). Meyer et al. (2011) pointed out that the policy mix of taxation, recycling, information as well as the consultation has the probable to introduce a win-win circumstances with the rising GDP and employment on the one hand, and falling material requirements, especially for metals, in almost all countries on the other hand. This study suggests that absolute decoupling of economic growth from material consumption does not necessarily need a general global agreement. A reduction of Total Material Requirement (TMR) by 1% is accompanied by an increase in employment of 0.04 to 0.08%, which corresponds to 100,000 up to 200,000 jobs for the EU-27.

The promotion of eco-technology and eco-innovation can also be viewed as an important factor to job creation. Innovation (especially eco-innovation) as well as investments in green technologies are a vital part for augmenting resource productivity. In this context, public finance is important. On the one hand, direct public spending, e.g. investments in R&D for environmental technologies or cleaner infrastructure provision, plays a central role. On the other hand, also indirect instruments (e.g. different forms of public guarantees) should not be neglected, as they are able to promote green investments by households and firms (UNEP 2010).

One group of economists that has taken a broad view of the relationship between the economy and society argues that information technology is best described as a general purpose technology, similar to the telegraph, steam engine, and the electric motor (Bresnahan & Trajtenberg 1995; Rosenberg 1976, 1982). The true value of a general purpose technology comes from a series of complementary innovations rather than directly from the original technology. Thus, the gains from a general purpose technology are limited more by managers’ ability to invent new organizational processes and structures than by technological capacity (David 1990, Brynjolfsson & Hitt 2000).
Introducing a novel technology without appropriate organizational changes can lead to significant productivity losses, as any benefits of the new technology are offset by negative interactions with existing organizational practices. For example, Brynjolfsson et al. (1997) describe how the introduction of computer-based manufacturing equipment failed because workers continued to work according to time-tested practices. The disjuncture between old and new sets of work practices made the transition impossible and resulted in productivity losses.

Baily & Gordon (1988) explain how respected paper-based measures still remained in an office after computers were introduced. Similar kinds of mismatches between a new technology and preexisting organizational practices and structures have characterized many of the shifts to earlier general purpose technologies. The introduction of the electric dynamo (David 1990) and the steam engine (von Tunzelmann 1978) required matching between the innovative technology and existing and new practices. Seen in the light of historical research on the adoption of technology, the long-expected gains in productivity from investments in information technology are not fully realized until complementary institutional arrangements are developed.

Loveman (1994) assessed the productivity of large manufacturing firms between 1978 and 1984 and realized that the returns on investment in information technology were essentially negative. In the same vein, in a successions of studies on manufacturing industries, Morrison & Berndt found that the gross marginal product of technology investment was less than the costs associated with them (Morrison & Berndt 1990, Berndt & Morrison 1995). The lack of evidence of a positive relationship between technology investment and productivity measures was termed the “productivity paradox.” The findings of the early studies were captured by economist Robert Solow’s (1987, p. 36) widely repeated quip: “You can see the computer age everywhere except in the productivity statistics.”

Stiroh (2002) assessed the relationship between information and the communications technology (ICT) capital intensity and the labor-productivity growth across U.S. manufacturing firms between 1973 and 1999 and realized a positive relationship between information based technology investment and the productivity growth. Those manufacturing industries that invested most heavily in information technology in the late 1980s and early 1990s enjoyed productivity gains in the late 1990s. To be sure, there are still skeptics, such as Gordon (2000), who argues that the Internet and information technology in general have had a less significant effect on the economy than earlier inventions such as electricity. By and large, however, there seems to be a general consensus that investments in information and communication technologies have fostered productivity growth. Much of the contradiction between the more recent findings and much earlier studies has been attributed to the use of more appropriate and comprehensive data (Hitt et al. 1999). Studies using macro level data tend to fail to find a linkage between technology and productivity, whereas studies relying on more fine-grained, firm-level data have captured much more of an effect of technology on productivity. This pattern of results suggests the difficulty of measuring aggregate output. Consider, for example, the difficulty of capturing the efficiencies realized by being able to check on the Web for the balance in your checking account.

Since the late 1970s, different organizational innovations and staffing practices, such as quality circles, job rotation, use of teams, and broad job definitions, have become increasingly common (MacDuffie 1995, Cappelli et al. 1997, Lawler et al. 1998). Osterman (1994) surveyed 694 U.S. manufacturing firms and found that 35% of firms with 50 or more employees had adopted 2 or more of these flexible work practices. The key link between workplace reform and the knowledge economy is that new flexible practices are most commonly found in firms that compete in international product markets, emphasize quality, or have a technology that requires highly skilled workers.

Knowledge Work and Workers Implications on Labor Relations

The evolution of knowledge work and knowledge workers concepts suggests certain implication on the labor relations and management studies. Drucker (1999) emphasized the importance of enabling the knowledge workers to identify the working tasks themselves, suggesting that they are the most knowledgeable about their jobs. This will allow the knowledge worker to distinct which are the knowledge work tasks that includes essentially knowledge creation and innovation, and consequently focus his or her effort on them, while delegating other tasks to less skilled workers. Accordingly, the organization will hold the knowledge worker responsible of the self-assigned tasks and empower him or her fully to achieve them. Based on a multistage ethnographic study, Kogan and Muller (2006) suggested that knowledge workers create their own strategies, processes and techniques that can be distinguished from the organizational ones. The knowledge workers’ performance is suggested to be enforced by continuous learning, updating of the body of knowledge, and sharing and teaching what they know with others. Moreover, Drucker (1999) highlighted the importance of knowledge work quality rather than quantity, for this what makes the
production unique and competitive. He added that knowledge workers should be treated differently, by perceiving them as business partners, for they own the needed knowledge and they are mobile. If not doing so, the organizations may endanger themselves of losing their competitive edge.

Debating the issue of knowledge workers’ productivity, some scholars and practitioners indicate the importance of extracting maximum productivity of the knowledge worker by minimizing his or her distraction time, while others find slackness in work as a necessity to foster collaboration and create a context for innovation and creation. Spira (2007) stated that each worker loses 2.1 hours per day of productivity due to different kinds of distractions. Distraction may be caused by the increasing technology and accessibility, interaction with colleagues, and the overload reasoned by many and various tasks where an individual may be unable to focus on a particular one as he or she should be. This may cause stress, problems in work-life balance, and overall decreasing productivity which eventually affects organizational profitability. On the other hand, Howe and Levin (2007) favored relevant slackness over no slack at all. People are suggested to be allowed to experiment, learn and take risks, and this needs an environment that encourages leniency and flexibility. They argue that 70 percent of workplace learning occurs informally. Also if knowledge workers are pressured for performance, they might focus on productivity and thus emphasizing their strengths which eventually prohibit employees from developing themselves through minimizing their weaknesses, creating new skills, and widening their knowledge body.

Knowledge Work and Workers Critique
Knowledge workers’ distinction as a unique working class is argued to be inaccurate and lacks empirical evidence. Collins (1997) refused this differentiation, for what is perceived as knowledge workers is not but a re-categorization of existing occupations, such as experts or professionals. He noticed that the intend to differentiate the knowledge worker from others through highlighting their knowledge diversity, social status, or responsibility is not accurate in differentiating their tasks from “traditional work” but it has to deal with adequate management styles in dealing with employees, reflecting how the writers wanted to be dealt with in their organizations. Alvesson (1993) indicated that this classification is a product of wishes and state of self-reflection that certain job holders want to achieve.

A lot of the current jobs that require high years of experience and formal education don’t fall under traditionally considered professions, which provide the job-holder with a superior occupation in the workforce. So, knowledge workers seek recognition by classifying themselves as a distinct group, the same scenario executed by professionals through professionalization. “The myths of technocracy, certain knowledge, altruism, rationality, and neutrality are seen as ideologies for justificatory purposes” (Alvesson, 1993, pp.999). Moreover, Knights and Murray et al. (1993) stated that this claimed high qualifications accompanied with knowledge worker are a method of positioning professionals and managers in an elite group. This indicates a new classification of the workforce based on knowledgeable and none or weakly knowledgeable workers. By this classification, knowledge workers claim prestigious position over other workers. This prestige will accompany their position with power and task delegation for other non-knowledge workers.

Consequently, organizations are endangered to focus on what they perceive as knowledge workers, identifying them as players “A”, and thus Guthridge and Komm et al. (2008) expressed their concern that this may lead to short-sighted managerial practices, for “B” players are the majority of the workforce. They are steady performers who are capable and should be trained and developed as other classified working groups. On the other hand, the importance of knowledge in performing occupational tasks is not a unique distinction among working classes, for all workers need knowledge to perform their jobs. Collins (1997) realized that all kinds of work, even the ones classified as unskilled, requires a minimum amount of knowledge, and there is no clear threshold to identify the intensity of knowledge in an occupation that qualifies as a knowledge work one. He added that maybe this hassle is caused due to the change in the workplace’s environment such as automation, increasing complexity, and lesser physical effort required at work.

Knights and Murray et al. (1993) added that this classification could be signaling the changes in work organization towards knowledge intensification and the ability created by information technologies to enable de-layering and employee acquisition of multi-skilling. Additionally, the idea of retaining knowledge workers in their positions or area of expertise is causing several setbacks. Because knowledge workers are expected to be more satisfied with doing what they know how to do best, Guthridge and Komm et al. (2008) stressed the disadvantage of keeping knowledge workers within their occupational specialization and not promoting them to the middle level management, in addition this practice is encouraged by the popularity of delayering organizations. This will cause
lack of talents for top management, for the middle-level management is considered as training and experience stage to gain the skills and prepare the employee for top management tasks. According to their.

CONCLUSION
Several social scientists have documented the transition underway in advanced industrial nations from an economy based on natural resources and physical inputs to one based on intellectual assets. We document this transition with patent data that show marked growth in the stocks of knowledge, and show that this expansion is tied to the development of new industries, such as information and computer technology and biotechnology. The literature on the knowledge economy focuses heavily on knowledge production, however, and attends less to knowledge dissemination and impact. This neglect is unfortunate because a key insight of the productivity debate is that significant gains in productivity are achieved only when new technologies are married to complementary organizational practices. Information technology that facilitates the broad distribution of knowledge is not successfully tethered to a hierarchical system of control. Thus one cannot assume that there is a natural link between knowledge production and flexible work, as new information technologies open up novel possibilities for both discretion and control.

A focus on knowledge dissemination might also aid the analysis of the skills mismatch thesis. The argument that some classes of workers are highly disadvantaged by technical change is too simple, although clearly older, less-skilled, and minority workers have borne the brunt of the transition to an economy based on intellectual skills. But fine-grained studies of how some less-skilled workers acquired the necessary technical skills to work in new settings are rare, and would be valuable. The debate over skills also reveals the relative lack of standard metrics in this area of research. Patents have become an appropriate measure of stocks of knowledge, but we lack any comparable indicators of skills, and too often researchers rely on occupational labels or categories. Yet such labels are easily changed by the stroke of a pen. Consider the thousands of polytechnic schools worldwide that have changed their names to universities. Such “upgrading” is part of a movement to signal membership in a knowledge economy, but accurate substantive measurement of the knowledge economy remains far from resolved. The challenge for social science research is to connect the abundant quantitative indicators with qualitative studies of substantive changes in organizational practices and their outcomes.

Evaluation of consequences of augmenting resource productivity for employment presents a considerable challenge. There are many analyses that incorporate many aspects on various levels, such as firms, sectors, and economy as a whole, or individual countries, the Europe-an and the global level, short and long term effects as well as ex post and ex ante assessments. It seems to be the case that resource productivity improvements can create sizable ad-ditional employment. However, sometimes only gross effects are taken into account, ignoring the potential of job losses in resource and energy intensive industries. Also labour market rigidities, reducing the displacement of workers across sectors, contributing to the maintenance of structural un-employment are often not considered. Some analyses solely focus on the short-term effects on employment going hand in hand with involuntary un-employment, but neglect the long-term effects on growth and productivity (Bowen/Kuralbayeva 2015).

RECOMMENDATION
Davenport (2002) suggested that management should realize that if they want to enhance the productivity of their organization’s knowledge workers then they should identify each group of them separately and accordingly specify the needed interventions. This is due to his realization that knowledge workers are not homogenous due to different levels of routinized tasks, interaction, judgment, and complexity of work. Finally, knowledge work and workers are suggested to mandate various implications on the labor relations. It is claimed that they have different needs which should be addressed by management in terms of working conditions such as specially tailored compensation systems and managerial styles. However, because knowledge work and workers definition and thus differentiation haven’t still reached a consensus, their implications are vague. Most of the propositions are theoretical and not empirical in nature. Moreover, nobody can claim that knowledge workers’ workplace implications are exclusive to them. Nevertheless, rival explanations exist to justify the changing working conditions such as generational changes, legislations and the increasing employees’ awareness and needs.

REFERENCE


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EFFECT OF TRANSPORT INFRASTRUCTURE INVESTMENT ON ECONOMIC GROWTH IN KENYA

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ABSTRACT
Transport infrastructure is central to the attainment of sustainable economic growth rate of a country. Due to this reason, the Kenyan government has shown commitment to improve transport infrastructure in the recent past by spending 4.5% of Gross Domestic Product on the transport and infrastructure sector. However, this expenditure is below the global spending threshold of 14% of GDP to the sector and it signifies underinvestment of transport infrastructure that has resulted into poor transport system which is the main bottleneck that not only limits realization of the 10% economic growth rate but also the socio-economic development in the country. While based on unbalanced growth theory, this paper analyzed the effect of transport infrastructure investment on economic growth in Kenya for the period 1990 to 2017. A causal research design was used to establish the cause – effect relationship among the variables of the study. The Error Correction Model was estimated using Ordinary Least Squares regression technique. Granger causality test revealed a unidirectional causality running from economic growth to transport infrastructure investment thus supporting Wagner law. Cointegration test confirmed existence of long run economic relationship among the study variables. The paper found that transport infrastructure investment has a positive coefficient of 0.1120 and statistically significant effect on economic growth with a p-value of 0.0263 < 0.05. This means that a unit increase in transport infrastructure investment increases economic growth by 11.20% other factors remaining the same. The paper also established that public investment has positive and statistically significant effect on economic growth while private investment has negative and statistically insignificant effect on economic growth. Interestingly, labour force had negative and significant effect on economic growth. Therefore, the paper concluded that transport infrastructure investment impacts economic growth in Kenya positively and significantly. Conclusively, the paper recommends the government to increase its annual budget allocation to the transport and infrastructure sector since this will enable development of new integrated transport infrastructure and at the same time allow for rehabilitation and maintenance of existing transport infrastructure facilities. This will go a long way in increasing trade and mobility that will lead to high productivity that ultimately propels the economy into sustainable economic growth.

Keywords: Infrastructure, transport infrastructure, investment, economic growth, Error Correction Model, Kenya

INTRODUCTION
Efficient, affordable and effective transportation systems facilitate rapid economic growth and reconstruction, poverty eradication and wealth creation. United Nations Human Settlement Programme [UN- HABITAT] (2011) defines infrastructure as all basic inputs into production and requirements for the proper functioning of the economy. Transport is classified as economic infrastructure along with energy, water and sanitation and Information and Communication Technology (Fedderke & Garlick, 2008; Hansen, 1965). Mayekiso (2015) defines transport infrastructure as a dynamic group and economic asset that builds space and defines mobility. Good transport linkages reduce transport costs, road congestion and promote industrial development throughout the country (Keho & Echui, 2011). Furthermore, Ighodaro (2009) asserts that transport infrastructure not only facilitate the direct provision of services to consumers but also provides intermediate inputs that enter into the production of other sectors and raise factor productivity. Therefore, conceptually transport infrastructure refers to physical structures, such as roads, railways, ports and airports that enable the passage of vehicles, freight and people. However, inefficient transport systems increases time spent stuck in traffic and also wastes time that could be spent engaged in more productive activities (United States National Economic Council, 2014). As a matter of fact, it estimated that poor urban transport system in Nairobi accounts to a loss of 2% of GDP (Republic of Kenya, 2007).

Ministry of transport Integrated National Transport Policy (2009) highlights that transport sector in the country consists of road transport, rail transport, maritime and inland water transport, pipeline transport, air transport and Non-Motorized and Intermediate Means of Transport (NMIMTs). Crafts (2009) argued that road network is the most important type of transport infrastructure. In United Kingdom, road network is the dominant means of transport accounting 73% of passenger traffic and 65% of freight moved (Eddington, 2006). UN-HABITAT (2011) also reports that road transport in Africa is the dominant mode of motorized transportation accounting 80% of goods traffic and 90% of passenger traffic in the continent. However, it is reported that majority of African countries faces huge costs associated with transportation which directly leads to high cost of doing business and indirectly
contributes to high cost of goods and services. The road transport in Kenya is unimodal accounting 93% of freight and passenger carriage (Moyaki, 2015). Ethiopia follows closely where it accounts at a range of 90% to 95 % and Nigeria where it carries more than 95% of domestic passengers and freight (Kayode, Babatunde and Abiodun, 2013). This shows the relative importance of road transport in both developed and developing countries and therefore investment in rail, water, and air transport is low.

African Development Bank (2010) report that the total road network in Sub Saharan Africa is only 204 km per 1,000 km² of land area with only about 25% being paved and this compares lowly to the world average of 944 km per 1000 km² of land area. Mehne (2002) reports that Kenya’s roads covered a distance of about 42,000 km and 63,663 km in 1963 and 1997 respectively, compared to Germany where the entire length of roads was 231,280 km in 1997. As Cheteni (2013) reports, South Africa has 754,600km with 16.7% paved and the remainder gravel roads. Africa Development Bank (2014) reports that there is 160,886km of road network in the country with only 7% paved. Poverty Reduction and Economic Management Unit Africa Region (2011) reports that about 56% of the road network is in poor condition which reflects many years of neglect and inadequate financing and maintenance. The paved road network has been expanded from 2000 km in 1963 to 11,600 km in 2006 (Republic of Kenya, 2006).

AfDB reports that the total length of paved roads per 10,000 inhabitants in Kenya is 2.19km, which is less than the East Africa Community member countries’ average of 2.53km. The life expectancy of roads in Kenya is 8 years and this is far shorter than the roads in Germany with a life expectancy of 40 years (Mehne, 2002). Cheteni (2013) asserts that in 2007, South Africa had more than 60% of roads with a life span of more than 25 years old and this was an increase from 28% in 1998. Kant attributes the low life expectancy in Kenya to lack of governmental responsibility for road maintenance, the climatic conditions, the condition of vehicles, which are often overloaded and carry inaccepitable axle loads and corruption. Moreover, Ministry of Transport Integrated National Transport Policy (2009) highlights that transport sector in the county is characterized by high costs for passengers and freight, weak public and private institutions, and low levels of investment. Furthermore, Kenya Institute for Public Policy Research and Analysis [KIPPPRA] (2016) also reports that public transport system in Kenya is characterized by informal practices, lack of planning and standards and poor maintenance thus making it unsustainable.

AfDB (2010) argues that rail networks are least developed in Africa with very little additions developed in the colonial period. The bank further reports that as of 2007, Africa had 69000km of rails of which 55000km were operational most in southern and northern Africa. According to Cheteni (2013) South Africa has the largest rail system in Africa covering about 20 872 km with 8931km electrified. It is reported that, in 1962 the total length of Kenya’s rails was 2,069 km and by 1988 it had been extended to an entire length of 2,733 km all one-meter-gauge single tracks. According to Africa Infrastructure Country Diagnostic [AICD] (2010), due to deterioration of the railway infrastructure, freight traffic on the rail corridor has declined to less than 1 million tons per year and handles less than 6% of the cargo passing through the northern corridor that links Kenya, Uganda, Rwanda, Burundi, the Democratic Republic of Congo, parts of Tanzania, southern Sudan, and Ethiopia. But in order to revive the rail subsector which since 1990 slowed down in its operations and performance National Transport and Safety Authority [NTSA] (2016), the government of Kenya is investing heavily on Standard Gauge Railway Line with the phase 1 being complete at a tune of Ksh.327 billion.

Kenya has a domestic air transport market that is the fourth-largest in Sub-Saharan Africa following South Africa, Nigeria, and Mozambique (AICD, 2010). However, Jomo Kenyatta International Airport is one of the three main international gateways in Sub-Saharan Africa but faces capacity constraints as the airport’s terminal capacity is 2.5 million seats while actual passenger traffic is much higher reaching 4.3 million seats in 2005 and an estimated 6.3 million seats in 2007. Moreover, marine transport is the main mode of transport for moving freight to and from Africa and it accounts over 92% of Africa’s external trade with a total coastline of 30,725 km (UN HABITAT, 2011). However, United Nations Economic Commission for Africa [UNECA] (2009) points out that African ports handle only 6.0% of global traffic, of which about six ports, three each in Egypt and South Africa, handles about 50% of Africa’s container traffic. AICD (2010) reports that in Kenya there is lack of rail-port interface and this has become a major bottleneck in the movement of freight. Additionally, AICD reports that Mombasa port handles more than 16 million tonnes of cargo annually and this number is projected to increase to 30 million tonnes a year by 2030. But, the port is congested because of inadequate capacity, exacerbated by the low capacity of rail and road transportation from the port. All the same, in order to realize an integrated transport system in the country and also with some of its neighboring countries, Lamu Port South Sudan Ethiopia Transport corridor (LAPSSET) is underway all geared to improve transport infrastructure in the country.

Proceedings of the 6th International Research Conference

Page 416 of 702
The Kenya’s economy grew an average of 6.6% for the period 1964 to 1973. However, this growth rate was not sustainable and the economic growth rate decreased from the late 1970s continuing until 2002 when the economy recorded a negative growth rate of 0.2%. Poor infrastructure mostly bad roads, inadequate energy supply, inadequate water supply, weak institutional framework and weak performance of agriculture and manufacturing sectors were among the key factors which contributed to this economic decline. In 2003 the economy recovered from a low of 0.5% to 6.1% in 2007. With the post - election violence shock in 2007/2008, the growth rate decreased sharply but the economy grew at an average of 4.7% in 2008-2012. During the period 2013 - 2018 the economy has grown at an average rate of 5% which is below the 10% economic growth rate which has not been achieved since 2012.

Transport infrastructure investment is remains critical for sustainable economic growth and development of both developed and developing countries. Due to a period of rapid growth in transport demand in China from 1981 to 1990, transport investment amounted to 1.3% of GDP annually (Byoungki, 2006). Additionally, Byoungki asserts that it has been conservatively estimated that the annual economic costs of not having adequate transportation infrastructure in China during the past several years amount to about 1% of China’s GNP. After a long period of low funding to transport sector in Kenya, 1.5% of GDP was allocated for maintenance, rehabilitation and development of the road network in the year 2006 (RoK, 2006). Further, Nyaosi (2011) notes that transport budget also increased from Ksh 86 million to Ksh 5,864 million in 2002/03 and 2005/06, respectively. Moreover, the Republic of Kenya (2018) reports that an average of 4.5% of GDP (8% of total government expenditure) has been spent by the government on the transport and infrastructure sector against a global benchmark funding to the sector of 14% of GDP. This signifies underinvestment of transport systems in the country and therefore transport infrastructure investment in the country is inadequate to meet the country’s needs and envisioned 10% economic growth. Yet, for the country to achieve this growth rate the transport sector is expected to play a greater role than it had ever previously done in all key sectors of the economy.

According to Ministry of Transport Integrated National Transport Policy (2009), transport sector’s contribution to GDP averaged 6.4 % per annum over the period 1960-2000 with very little fluctuation. The policy also argues that ideally this percentage should be around 10% of GDP. Over the period 2002-2006 the contribution of transport and storage to GDP fluctuated upwards from 1.6% in 2002 to 7.3% of total GDP in 2006. KIPPRA (2017) reports that transport sector (road, railway, port, air) contribution to GDP was 7.9% in 2016. This shows an improvement though this contribution is below the 10% ideal rate.

Mixed findings have been obtained on the relationship between transport infrastructure investment and economic growth in literature. Bosede, Abalaba and Afolabi (2013) found that transport infrastructure has positive and significant effect on economic growth in Nigeria while Chukwuemeka, Nyewe and Njenke (2013), Charles, Onuchuku and Tamuno (2018) found that transport infrastructure has negative and insignificant effect on economic growth. In Kenya, Mburu (2013) established that transportation infrastructure has a positive and significant effect on economic growth in Kenya for the period 2005 to 2012. Additionally, Moyaki (2015) and Mugambi (2016) found positive and significant relationship between road infrastructure and economic growth in Kenya. Therefore, it is evident that few studies have been carried out in Kenya on transport infrastructure investment and economic growth and the existing literature is not in consensus on transport infrastructure investment - growth nexus. It is against this background that a paper on effect of transport infrastructure investment on economic growth in Kenya was carried out from the year 1990 to 2017.

Statement of the Problem

Kenya has been making strides in ensuring a competitive economy through massive public investment in transport infrastructure as guided by Vision 2030 so as to achieve the envisioned 10% growth rate. Globally, 14% of GDP should be allocated to transport and infrastructure sector but Kenya has only managed to allocate 4.5% of GDP (RoK, 2018). This illustrates underinvestment of transport infrastructure in the country, as evidenced by poor transport system characterized by congested and bad roads, lack of road-rail interface thus congested railways, and capacity constraints in airways and ports, compared to ever increasing demand of transport services by the fast growing population. These transport infrastructure bottlenecks have limited economic growth and socio - economic development in the country. Therefore, this raises doubt on the role of transport infrastructure on the achievement of sustainable economic growth rate of 10% which has not been achieved since the year 2012. Economic theory predicts a positive relationship between transport infrastructure investment and economic growth. Previous international studies in this area have resulted into conflicting findings where some established positive effect and others negative effect thus leading to unending discussion in literature on transport infrastructure investment –
growth relationship. Despite Mburu (2013) using a small sample size of 10 years, he found a positive and significant relationship between transport infrastructure and economic growth in Kenya. Though Moyaki (2015) and Mugambi (2016) found positive and significant results, they modelled only road infrastructure and economic growth in Kenya thus leaving other transport systems like air, railway and water. Therefore, these research gaps motivated a paper on the effect of transport infrastructure investment on economic growth in Kenya for the period 1990 to 2017 to be carried out.

**Objective of the Study**
The aim of the paper was to determine effect of transport infrastructure investment on economic growth in Kenya.

**Hypothesis of the Study**
Transport infrastructure investment has no statistical significance effect on economic growth in Kenya

**LITERATURE REVIEW**

**Empirical Literature**
Aschauer (1989) seminar work has over the year’s sparked unending debate in literature on the relationship between public infrastructure and economic growth. While using both cross sectional and panel data analysis, Boopen (2006) analyzed the contribution of transport capital to growth for a sample of Sub Saharan Africa (SSA) and a sample of Small Island Developing States (SIDS). In both cases, the analysis concluded that transport capital has been a contributor to the economic progress of these countries. The study further revealed that in SSA case, the productivity of transport capital stock is superior as compared to that of overall capital while such is not the case for the SIDS where transport capital is seen to have the average productivity level of overall capital stock.

By employing OLS regression technique, Bosede et al (2013) evaluated transport infrastructure improvement and economic growth in Nigeria for the period 1981 to 2011. Their study adapted a model used by Sahoo et al. (2010) and found that transport infrastructure had a positive and statistically significant relationship with economic growth in Nigeria. The study recommended that the waterways and railways to be opened up so as to reduce pressure on the road network. Similarly, Ighodaro (2009) while exploring transport infrastructure and economic growth in Nigeria, found that no causality existed between road development and economic growth and that road development was significant in determining economic growth in Nigeria in the long but not in the short run. On contrary, Fasoranti (2012) while examining the effects of government expenditures on infrastructure and the growth of the Nigerian economy over the period 1977 to 2009 observed that government expenditure on transport and communication imparted negatively on growth while expenditures in agriculture and security were not significant in the growth of the economy. The recommendation of the study was that the government must adopt stringent controls on its expenditure on infrastructure so as to increase growth rate of Nigerian economy.

In a similar study in Nigeria, Chukwuemeka et al. (2013) investigated public spending on transport infrastructure and economic growth for the period 1981 to 2010. By employing OLS regression method, the study however found that public spending on transport infrastructure is negatively related to growth and insignificant and it recommended that the government must ensure adequate funding of transport sector. Yet public spending on electricity, water supply, education and health infrastructure had positive and significant relationship with real GDP in Nigeria. Likewise, Charles et al (2018) in Nigeria found that government expenditure on construction, transport and communication had negative and insignificant relationship with economic growth and recommended adequate funding to the sectors analyzed so as to boost economic growth.

Kayode, Babatunde and Abiodun (2013) analyzed an empirical analysis of transport infrastructure investment and economic growth in Nigeria from 1977 to 2009 while using OLS estimation technique. The empirical model used by the study was developed from the endogenous growth framework in which transport investment entered into the production function as an input. The study found that transportation played a positive but insignificant role in the determination of economic growth in Nigeria and therefore suggested that an increase in public funding and complete overhauling of the transportation system in Nigeria. All these studies had inconclusive findings on the relationship between transport infrastructure investment and economic growth in Nigeria thus raising the need to carry out a similar study for the case of Kenya and make comparisons of the findings.

Keho and Echui (2011) conducted a study on transport infrastructure investment and sustainable economic growth in Côte d’Ivoire using co-integration and causality analysis for the period 1970 to 2002. The study found that the
public investment in transport infrastructure, private investment and economic output are co-integrated. The results of the granger causality test revealed that public investment in transport does not have a causal impact on economic growth; conversely economic growth was found to have unidirectional causal impact on transport investment both in short run and long run thus supporting Wagner’s law. The study found that an increase in GDP and private investment has a positive effect on government investment in transport infrastructure, associating the level of public spending on infrastructure to the degree of economic development.

Mburu (2013) carried out a study on the relationship between government investment in infrastructure and economic growth in Kenya for the study period 2005 to 2012. Mburu established that transportation infrastructure had the highest effect on economic growth in Kenya with a positive elasticity of 10.56. Additionally, Moyaki (2015) evaluated the relationship between road infrastructure and economic growth in Kenya for the period 1963 to 2014. OLS method was used and simple linear regression was conducted. Solow’s neoclassical growth model of economic growth was the basis of this study unlike this current study which was underpinned on unbalanced growth theory. The findings were that public investment in road infrastructure has positive effect on economic growth. Similar results were found by Mugambi (2016), who while investigating the role of public and private sectors in road infrastructure investment and economic growth in Kenya between 1980 to 2014, found that public and private expenditures on road infrastructure impacts economic growth positively though public coefficient was higher than that of private sector. The study recommended for more sensitization of the PPPs Programme.

Theoretical Literature

Unbalanced Growth Theory

Hirschman (1958) formulated this theory; it stipulates that investment should be made in selected sectors rather than simultaneously in all sectors of the economy due to shortage of capital in developing countries. The theory argues that a deliberate unbalancing of the economy according to a pre-designed strategy, is the best way to achieve economic growth in an underdeveloped country more so in the early stages of development. Hirschman noted that investments in strategically selected industries or sectors of the economy will lead to new investment opportunities and pave way to further economic development.

Further, the theory argues that the unbalancing of the economy with large investment in Social Overhead Capital (SOC) or infrastructure will bring about increase in private investment in the form of direct productive activities (DPA). SOC investments indirectly subsidize agriculture industry by cheapening various inputs, which they use, or by reducing costs. Hirschman points out that the SOC includes investment in education, public health, communications, transportation and conventional public utilities such as electricity, water, irrigation and drainage schemes. The theory also contends that unless SOC investments provide cheap or improved services, private investments in DPA will not be encouraged. Thus, the SOC approach to economic development is to unbalance the economy so that subsequently investments in DPA are stimulated. However, the balanced growth theory by Nurske (1953) argues that economic growth in underdeveloped countries can also be stimulated by large simultaneous investments in numerous industries and still economic growth occurs.

Conceptual Framework
Research Methodology

Model Specification

Transport infrastructure investment influences the productive capacity of an economy through its use as a direct input in the production process (Kayode et al. 2013). Therefore, transport infrastructure investment entered the Cobb Douglas production function as the third input while public investment, private investment and labour force were used as moderating variables. The equation for modelling was presented as follows:

\[ Y = f(Tii, L, PI, PRV) \]

Econometrically the model to be estimated was expressed as;

\[ \log GDP_t = \beta_0 + \beta_1 \log (Tii)_t - i + \beta_2 \log PI_t - i + \beta_3 \log PRI_t - i + \beta_4 \log Lt - i + et \]

where,

Log GDP = Logarithm of GDP
Log Tii = Logarithm of transport infrastructure investment
Log PI = Logarithm of public investment
Log PRIi = Logarithm of private investment
Log Lt = Logarithm of labour force

Data Collection and Measurement

Data on economic growth, public investment and private investment was obtained from World Development Indicators while data on transport infrastructure investment was obtained from Kenya National Bureau of Statistics Economic Surveys. Economic growth was measured using GDP growth while transport infrastructure investment was measured using real development expenditure. Public investment was measured using gross fixed capital formation while private investment was measured using gross fixed capital formation for private sector.

Data Analysis and Estimation Techniques

Data was log linearized in the excel package and then imported for analysis with the aid of PcGive Ox metrics and Eviews statistical softwares packages. This involved generation of the Error Correction Model (ECM) and Ordinary Least Squares (OLS) technique was used in regression analysis. The overall significance of the model was tested using F-statistic at 5% significance level. Further, the goodness of fit of the model was evaluated using coefficient of multiple determination R squared. The statistical significance of the coefficients was made using the t - probability value at 5% significance level. To avoid spurious regression, time series property tests carried out were stationarity, granger causality and cointegration.

RESULTS AND DISCUSSION

Stationarity Test

The assumptions of the Classical Linear Regression Model (CLRM) necessitate that the variables under consideration are stationary which means that mean, variance and covariance are time invariant. Augmented Dickey-Fuller (ADF) by Dickey and Fuller (1979) was used to test unit root. Incase ADF test was greater than the critical value at 5% significance level then, the null hypothesis that there is unit root would be accepted. But, this would be rectified by differencing these variables to make them stationary. Stationary test results are discussed in Table 1 below.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Form</th>
<th>ADF Test at 5% = -3.60</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNGDP</td>
<td>Level</td>
<td>-4.473**</td>
<td>Stationary</td>
</tr>
<tr>
<td>LNTii</td>
<td>Level</td>
<td>-1.880</td>
<td>Not Stationary</td>
</tr>
<tr>
<td>DLNTii</td>
<td>1st Difference</td>
<td>-6.430**</td>
<td>Stationary</td>
</tr>
<tr>
<td>LNPi</td>
<td>Level</td>
<td>-4.390**</td>
<td>Stationary</td>
</tr>
<tr>
<td>LNPRii</td>
<td>Level</td>
<td>-1.895</td>
<td>Not Stationary</td>
</tr>
<tr>
<td>DLNPRIi</td>
<td>1st Difference</td>
<td>-4.669**</td>
<td>Stationary</td>
</tr>
<tr>
<td>LNL</td>
<td>Level</td>
<td>-1.821</td>
<td>Not Stationary</td>
</tr>
<tr>
<td>DLNL</td>
<td>1st Difference</td>
<td>-4.849**</td>
<td>Stationary</td>
</tr>
</tbody>
</table>

From Table 1 above, LNGDP, LNPi were stationary in level form. However, LNTii, LNPRii and LNL were not stationary in level form but upon taking first difference they all became stationary.
Granger Causality Test
Granger causality test helps in deciding the direction of relationship between two or more variables (Kaur and Malhotra, 2014). The null hypothesis of non-causality between the variables at 5% significance level was rejected if p-value < 0.05 and accepted if p-value > 0.05.

Table 2. Shows the granger causality test.

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>Obs</th>
<th>F-Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNTII does not Granger Cause LNGDP</td>
<td>27</td>
<td>3.12593</td>
<td>0.08977</td>
</tr>
<tr>
<td>LNGDP does not Granger Cause LNTII</td>
<td>27</td>
<td>5.60298</td>
<td>0.02634</td>
</tr>
<tr>
<td>LNPI does not Granger Cause LNGDP</td>
<td>27</td>
<td>4.76845</td>
<td>0.03899</td>
</tr>
<tr>
<td>LNGDP does not Granger Cause LNPI</td>
<td>27</td>
<td>0.01450</td>
<td>0.90516</td>
</tr>
<tr>
<td>LNPRi does not Granger Cause LNGDP</td>
<td>27</td>
<td>2.87418</td>
<td>0.10295</td>
</tr>
<tr>
<td>LNGDP does not Granger Cause LNPRi</td>
<td>27</td>
<td>0.29987</td>
<td>0.58902</td>
</tr>
<tr>
<td>LNL does not Granger Cause LNGDP</td>
<td>27</td>
<td>0.03419</td>
<td>0.85485</td>
</tr>
<tr>
<td>LNGDP does not Granger Cause LNL</td>
<td>27</td>
<td>0.97613</td>
<td>0.33301</td>
</tr>
</tbody>
</table>

Economic growth (measured by LNGDP) was found to have unidirectional causality on transport infrastructure investment and not conversely, thus supporting Wagner law. Public investment had unidirectional causality with LNGDP. Private investment and labour force had neutral causality meaning they are independent of each other.

Co-integration Test
Co-integration refers to a long-run equilibrium relationship between variables whereby two or more variables may wander away from each other in the short-run but move together in the long-run (Enders, 1995). Co-integration was tested using Engle-Granger (EG) two step methods. EG test postulates that if the residuals from the OLS estimation of the non-stationary variables are stationary, then the series is co-integrated. This implies that the ECM should be conducted on the variables at their first difference. The null hypothesis was rejected if the p-value was less than 0.05 meaning co-integration exists and accepted if otherwise. Table 3 shows the co-integration test findings.

Table 3. Test Results for Stationarity of Residuals

<table>
<thead>
<tr>
<th>D-lag</th>
<th>ADF</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>-3.633**</td>
</tr>
<tr>
<td>1</td>
<td>-4.876**</td>
</tr>
<tr>
<td>0</td>
<td>-5.321**</td>
</tr>
</tbody>
</table>

ADF test Statistic at 5% = -1.96
The results from Table 3 indicate that ADF statistic is less than the critical values at 5% significance level, leading to rejection of null hypothesis of unit root. Thus, the residuals are stationary signifying presence of cointegration or long run relationship of the study variables.

Error Correction Mechanism
Error Correction Mechanism is a model that tries to restore equilibrium in case the economic variables wander away from their long-run path. The prior test for cointegration revealed existence of long-run relationship among the study variables and thus ECM technique was used to determine the speed and adjustment to shocks. The ECM results are shown in Table 4.

Table 4. Error Correction Mechanism Results

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t-value</th>
<th>t-probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.02588</td>
<td>0.01896</td>
<td>-1.36</td>
<td>0.1924</td>
</tr>
<tr>
<td>DLNTii</td>
<td>0.3633</td>
<td>0.04605</td>
<td>7.89</td>
<td>0.0000</td>
</tr>
<tr>
<td>DLNTii -1</td>
<td>0.1120</td>
<td>0.04544</td>
<td>2.46</td>
<td>0.0263</td>
</tr>
<tr>
<td>DLNPi</td>
<td>0.1196</td>
<td>0.01597</td>
<td>7.49</td>
<td>0.0000</td>
</tr>
<tr>
<td>DLNPi -1</td>
<td>0.4276</td>
<td>0.01447</td>
<td>29.6</td>
<td>0.0000</td>
</tr>
<tr>
<td>DLNPRIi</td>
<td>-0.3506</td>
<td>0.03865</td>
<td>-9.07</td>
<td>0.0000</td>
</tr>
<tr>
<td>DLNPRIi -1</td>
<td>-0.04344</td>
<td>0.03551</td>
<td>-1.22</td>
<td>0.2401</td>
</tr>
<tr>
<td>DLNL</td>
<td>-0.7857</td>
<td>0.05435</td>
<td>-14.5</td>
<td>0.0000</td>
</tr>
<tr>
<td>DLNL -1</td>
<td>-0.7354</td>
<td>0.06288</td>
<td>-11.7</td>
<td>0.0000</td>
</tr>
<tr>
<td>ECT</td>
<td>0.9776</td>
<td>0.02969</td>
<td>32.9</td>
<td>0.0000</td>
</tr>
<tr>
<td>ECT-1</td>
<td>-1.008</td>
<td>0.03719</td>
<td>-27.1</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

R² = 0.997423   F (11, 15) = 527.7 [0.000] **   DW= 2.22
The regression results from Table 4 are presented in the following model

\[ GDP = -0.02588 + 0.1120Tii + 0.4276Pi - 0.04344PRIi - 0.7354L - 1.008ECT \]

The results in Table 4 shows that the model had a constant of -0.02588 meaning economic growth will grow by a negative of 2.5% independent of the variables included in the model. This denotes the importance of transport infrastructure investment, private investment and labour force in expanding the productive capacity of an economy. The overall model is significant since the F statistic had a p-value of 0.000 < 0.05. R² was 0.997423 meaning that 99.74% of the variations of economic growth can be explained by transport infrastructure investment, private investment, public investment and labour force. The DW statistic was 2.22 signifying absence of autocorrelation. The coefficient of Error Correction Term was negative and statistically significant with a speed of adjustment of 100.8% from actual growth in the previous year to equilibrium rate of economic growth. Thus there is equilibrium between short run and long-run relationship between economic growth and the modeled independent variables.

Transport infrastructure investment had a positive coefficient of 0.1120 with a p-value of 0.0263 < 0.05. This denotes that a unit increase in transport infrastructure investment will increase economic growth by 11.20% holding other factors constant. The implication of this finding is that increasing government spending on transport infrastructure is an enabler for high economic growth in the country. Since the p-value was 0.0263 and is less than 0.05, the null hypothesis was rejected at 5% significance level. The study findings agree with Boopen (2006), Bosede et al. (2013) in Nigeria, Moyaki (2015), Mugambi (2016) and Mburu (2013) in Kenya who found a positive and significant relationship between the transport infrastructure investment and economic growth. The findings are also disagree with Chukwuemeka et al. (2013) and Charles et al. (2018) in Nigeria who found that public spending on transport infrastructure has a negative and insignificant effect on economic growth. Fasoranti (2012) also in Nigeria found that government expenditure on transport and communication was statistically significant though it imparted negatively on economic growth.

Public investment were found to have a positive coefficient of 0.4276 and a significant p-value of 0.0000 < 0.05. This means that a unit increase in other public investment increases economic growth by 42.76% other factors held constant. This implies that public investment is capable of raising economic growth in Kenya. Private investment had a negative and insignificant effect on economic growth with and it had a coefficient of -0.2401 > 0.05. This means a unit increase in private investment decreases economic growth by 4.344% holding other factors constant. This implies that government investment in transport infrastructure crowds out private investment thus supporting crowding out hypothesis. Labour force was also found to have negative coefficient of 0.7354 and significant p-value of 0.0000 < 0.05. This means that a unit increase in labour force decreases economic growth in the country by 73.54%.

CONCLUSIONS
The study determined the effect of transport infrastructure investment on economic growth in Kenya for the period 1990 to 2017. From regression analysis, the conclusion arrived at was that transport infrastructure investment has a positive and statistically significant effect on economic growth in Kenya.

RECOMMENDATIONS
Following the findings of the study, the recommendations suggested include;

The government needs to increase budget allocation to transport sector in Kenya. This is because transport infrastructure in the country has been cited to be inadequate in terms of accessibility. Therefore, this budgetary increment will help develop new integrated transport infrastructure and also maintain and rehabilitate majority of the existing transport infrastructure facilities in the country thus them to be an enabler for the achievement of the 10% economic growth rate.

The government should tighten the control measures that govern infrastructure development for transport projects in the country, especially during planning, execution and implementation phases while facilitating regular monitoring and evaluation throughout these projects’ life cycle. This will help in identify loopholes for the thefts of public funds allocated to transport sector.

REFERENCES


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CAREER ADVANCEMENT AS A COPING MECHANISM OF WIDOWERS AND WIDOWS IN MERU COUNTY, KENYA

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ABSTRACT
Widowhood is a state of losing a spouse through death and has been on the increase in Kenya and all over the world. A spouse’s death may affect the widowed persons’ psychosocial wellbeing, as and may cope with it differently such as in career advancement. In Meru community, few researches have been done on career advancement as a coping mechanism of widowhood. Therefore, the purpose of this study was to determine how career advancement as a coping mechanism is used by comparing widowed men and women in Meru County Kenya. The researcher used the ex post facto’s causal-comparative research design. The target population was 80,332 widowed men and women in Meru County and the accessible population was 192 widows and 192 widowers in four Districts that were purposively selected making a total of 384 respondents. Data was collected by use of questionnaires which were administered to widowed persons and two Focus Group Discussions for widowed persons were held in each of the four selected Districts; one for the widowers and another for widows. The instruments in the study yielded a reliability of 0.81 which was found suitable for the study since it was higher than the acceptable reliability of at least 0.7. Piloting of the instruments was done in Tharaka-Nithi County to establish reliability of the research instruments. Data analysis was done by use of descriptive and inferential statistics. Data analyses were done by use of Statistical Package for Social Sciences Version 17 for windows. The findings revealed variations in career advancement as a coping mechanism of widowhood where widows had lower rates of career advancement than the widowers. Finally, the findings may assist the widowed men and women to cope better psychologically and socially with their state of widowhood as they bring up their families single handedly by advancing their careers.

Key words: Widowhood, Career advancement, coping mechanism, psychosocial wellbeing, Widow/ Widowers

INTRODUCTION
During the widowhood accommodation stage, the widowed person has a new way of looking at the world. Entering this stage does not mean the end of depressed feeling or an end to pain of his or her loss. The widowed person learns for instance, that he or she can laugh and live a normal life, can enjoy people and look forward to getting up in the morning. Moreover, they may begin a change in the old habits of daily living that framed their lives into developing new ones appropriate to their current situation through career advancement. Women continue to be educated at an inferior rate to their counterparts, increasing their reliance upon men and this has adverse effect more on widows. They are also limited from owning, acquiring, and controlling property throughout Kenya, regardless of social class, religion, or ethnic group. If widowed women attempt to assert property rights over men or in-laws, they are often ostracized by their families and communities. This practice of disinheriting seems to be on the rise, particularly in areas hit hard by poverty (Mutua, 2002).

Throughout Kenya's history, women have been subjected to consistent rights abuses while shouldering an overwhelming amount of responsibilities. A prominent example of this relates to agriculture, which creates over 80 percent of Kenya's jobs and 60 percent of income. Currently, women in Kenya do the vast majority of agricultural work and produce the majority of food. Yet they earn only a fraction of the income generated and own a nominal percentage of assets. Only 29 percent of those earning a formal wage throughout the country are women, leaving a huge percentage of women to work in the informal sector without any better pay. The effect is severe where nearly 40 percent of households are run solely by women and because of a lack of fair income, nearly all these homes suffer from poverty or extreme poverty (Mutuma, 2011). That is why the study sought to compare how career advancement as a coping mechanism is used by widowed men and women.

Other grave women's rights abuses continue to be practiced throughout the country. These include wife inheritance where widows are inherited by male relatives of the deceased husband and ritual cleansing (Patricia, 1995). The cleansing is a requirement of sex with a man of low social standing to cleanse a widow of her dead husband's evil spirits. These cultural practices maintain low self-esteem for women while completely ignoring the threat of HIV/AIDS. One out of every eight adults in rural Kenya and almost one out of every five adults in urban areas are infected with HIV. The infection rate in girls and young women is exponentially higher than in their male
counterparts (World bank, 1995). Since women are predominantly infected by their husbands, they are essentially left to die when their land, home, and assets are taken from them by their husband's family. The cultural norms described here affect the majority of women in Kenya; yet the government consistently tries to provide resources for the empowerment of women but to a smaller extent. Despite their increasing numbers, women including widows, women have tended to enter the workforce in lower – status; lower paying jobs and remains clustered in a limited number of conventional careers hence limiting career advancement (Tinklin, Croxford, Duckling & Frame 2005).

In the modern society, views about how a recently widowed man or woman should behave have been altered immeasurably over the years. Long gone are the set periods of time for mourning a spouse, and the biblical notion that a widow is obliged to marry her deceased husband's brother has all faded from today's modern society (Ngunga, 2009). Marriage Missions International Reports (2011) that once the pain of loss subsides, widows and widowers, are often uncertain about what their future holds. Friends and family may urge them to look for another partner or encourage them to never find another mate. Once a possible partner has been found, the anxieties arise again where one begins to wonder about other people's views and expectations about the career advancement. It is surprising how other people perceive remarriage and career advancement since the widowed persons develop fears of being considered unfaithful to a loved husband or wife who has already passed on (Scolt & Allen, 1990).

**Study Objective**
To determine whether there are differences in career advancement used by widowed men and women to cope with widowhood in Meru County of Kenya.

**Research Problem**
The widow or widower may genuinely feel blameworthy; usually their self-blaming thoughts are unrealistic since they are overly harsh on themselves. They stretch their imaginations to believe they would have prevented death. They feel as guilty as if they had intentionally brought themselves or others harm which is rarely the case. However, all people feel guilty during a time of loss. What widowed persons do is to get a support system to help them sort out these feelings by minimizing the unrealistic guilt. For example, career advancement can help to separate realistic from unrealistic guilt by asking questions during the recoil stage, where many widowed persons are not prepared for the negative feelings that are experienced. As a result some widowed persons advance their careers in order to cope with their state of widowhood that has diverse challenges.

**METHODOLOGY**
This section presents a description of research design, location of the study, population of the study, sample size and sampling procedures, instruments, data collection and data analysis procedures.

**Research Design**
*Ex post facto’s* causal-comparative research design was utilized because two groups of widowed persons (widows and widowers) were compared in order to find out how career advancement as a coping mechanism of widowhood is used. The study was carried out in Meru County Kenya.

**Sample of Research**
The researcher used simple random sampling technique to select four districts from the eight districts in Meru County, Kenya. According to Ogula (1998), a sample size of 384 respondents is acceptable for a descriptive research with a population of 100,000. In this study, the target population is 80,332 and therefore a sample size of 384 is deemed appropriate. Out of the 384 widowed persons that were selected, 192 were widows and 192 were widowers who were purposively selected. From this number, 48 widowed men and 48 widowed women were sampled in each District by use of purposive sampling technique.

**Instrument and Procedures**
The study utilized questionnaires and Focus Group Discussions to collect data from the respondents. The items in the questionnaires were open and closed-ended. Furthermore, Focus Group Discussions helped to capture the in-depth information by probing further on career advancement as a coping mechanism used by widowed persons. The issues raised were recorded in a recording list for reference and in order to assist the researcher in data analysis.

**Data Analysis**
Career advancement as a coping mechanism of widowhood was explored to establish whether differences exist in career advancement of widows and widowers. The data that was collected from the questionnaires and Focus Group Discussions was analyzed using descriptive and inferential statistics. Descriptive statistics including frequencies and percentages was used and inferential statistics included the t-test to compare means of widows and widowers in Meru County, Kenya. Mugenda and Mugenda (1999) notes that t-test is an ideal statistical tool when comparing the means of two groups. Career advancement as coping mechanism was established and compared in widowed men and women. The significance level was set at $\alpha=0.05$ and Statistical Package for Social Sciences (SPSS) version 17 was employed in the entry and analysis of data. According to Borg (1996) SPSS is the commonly used set of computer programme in social science research. The programme is comprehensive, integrated collection of computer programmes for managing, analysis and displaying data. The results of the data were presented in summary using frequency tables, bar graphs and pie charts that enhanced clarity and brevity. Furthermore, from the Focus Group Discussions, some excerpts giving the responses of widowed men and women were presented in themes and summaries. These were very useful because they gave more in-depth information about career advancement as a coping mechanism of widowhood.

Results of the Research

Comparison of Career advancement Widows and Widowers

Career advancement refers to a widowed man or woman going to pursue further his/her education in a higher institution of learning after the loss of a spouse. The results are as indicated in Table 18.

### Table 1. Responses of Widowed Men and Women on Career Advancement as a Widowhood Coping Mechanism

<table>
<thead>
<tr>
<th>Category</th>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Widows</td>
<td>34</td>
<td>26</td>
<td>3</td>
<td>29</td>
<td>100</td>
<td>192</td>
</tr>
<tr>
<td>Widowers</td>
<td>27</td>
<td>83</td>
<td>0</td>
<td>14</td>
<td>83</td>
<td>192</td>
</tr>
</tbody>
</table>

It is evident in Table 18 that 34 widows strongly agreed and 26 agreed to the items in the questionnaire that they advanced their careers after the loss of their husbands through death. However, 27 widowed men strongly agreed and 68 agreed to the same. This was an indication that men outnumbered the widowed women in going to higher institutions of learning due to socio-economic problems widowed women had compared to widowed men. It was further noted that 29 widows disagreed and 100 strongly disagreed with going to advance their careers in order to cope with the state of widowhood. As noted earlier in the social-economic status, widowed women were not as financially stable as widowed men. They also experienced more problems with in-laws, discrimination and issues of wife and property inheritance that affected their psychosocial lives. To shed more light, means, SDs and Independent Sample t-test analysis, on career advancement as a widowhood coping mechanisms was computed as shown in Table 19.

### Table 2. Comparison of Career advancement as Widowhood Coping Mechanism

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>Mean</th>
<th>t-value</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Widows</td>
<td>192</td>
<td>2.29</td>
<td>17.37*</td>
<td>1</td>
<td>0.000</td>
</tr>
<tr>
<td>Widowers</td>
<td>192</td>
<td>1.61</td>
<td>41.10*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*denotes significance at $\alpha=0.05$

The results in Table 19 show that mean differences existed between widows and widowers joining higher institutions of learning as a coping mechanism of widowhood. Widowers outnumbered the widows in career advancement. The mean for widows was 2.29 whereas that for widowers was 1.61 points. This implies that widowers were turning to education as a coping mechanism more than widows. Therefore, a look at the mean scores and standard deviations (S.Ds) should provide substantive difference. The obtained t-value (t=41.10, P < 0.05) is indicative of statistically significant differences in career advancement of widows and widowers in Meru County. Moreover, from Focus Group Discussions, Some widowed men talked about career advancement as a coping mechanism better than widows as in Excerpt 1.

**Excerpt 1.**

**Researcher:** Do you find career advancement a better coping mechanism after the loss of your spouse?
Francis (Widower): I have thought seriously going back to college since I lost my wife six months ago. I feel I need to keep myself busy though I fear that my two children are young and require my attention. Anyway, I have already applied to join a master’s course and when I am admitted to the University my parents will be left with them. It will help me overcome my grief when I get busy.

Joyline: (widow) I think advancing my career would not work for me now. I’m thinking about my children career advancement first now that I’m alone. My in-laws would bring issues in my inheritence and may view the idea as waste of resources.

Richard (Widower): My friend has grieved his wife for a couple of months, but after telling him to further his education like I did, he is better. When one changes the home environment and meets new friends one overcomes the grief faster.

Jolly: (widow) On going to further my diploma I wouldn’t like because who will take care of my children? Secondly no finances since my children are young.

From the excerpts widowed men who are educated considered career advancement as the best coping mechanism. This is because it gives them a newer and better environment than home. It also makes them always busy in class which makes the grieving process fade away faster with time. However widows were of contrary opinion that they had no finances, in-law support and gave priority to their children Education first. Ntozi (1997) also observes that, because widowers use strategies that tend to be more cognitive than emotional in nature, they do well with books and other educational resources that help them help themselves. Because of the unique problems widowers have assuming new responsibilities, they can benefit from programmes that focus on skill-building and self-care education to help them successfully manage those tasks of daily living important to health, functioning, and independence. Issues of greater concern for widowers might include meal planning and preparation, housekeeping, and doing laundry (Ntozi, 1997).

**CONCLUSION**

Differences existed in widowhood coping mechanisms among widowed men and women. Widowed men coped better than widows in their state of widowhood by advancing their careers. The study established that young widows were not supported by their in-laws and educated widowed persons practiced live apart together kind of remarriage relationships and advanced their careers secretly as one widow noted. Old and semi-illiterate widowed persons were against career advancement as a coping mechanism.

**REFERENCES**


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ABSTRACT
Oral literature used to play a pivotal role in pre-colonial Africa in many communities for it was used to transmit the traditions, values, and history of their community to successive generations. This was mainly done by grandparents in the evenings and during ceremonies and other cultural rites of passage such as initiation. Initiation into adulthood through circumcision for girls and boys was and is still highly valued because of its great impact in the lives of the initiates. Traditionally, initiation as a rite of passage had social, psychological, economical, political, and religious impact on the life of an individual and community because instructions given to the initiates were comprehensive, covering all aspects of the community. However, the coming of colonialism introduced Western formal education and religion, technological products and medical practices which led to enlightenment of communities on the health hazards of traditional initiation practices. In addition, Human Rights Activists also sought to fight the traditional initiation practices that threatened the lives of the youth. In response to this, different communities looked for a safer mode of initiation of boys and girls from childhood into adulthood. This resulted to introduction of Alternative Rites of Passage to replace the traditional circumcision of boys and girls. This study set out to find out how Igembe people have incorporated oral songs, narratives and proverbs in Alternative Rites of Passage ceremonies as a tool of communication. The study is guided by one objective: to discuss how oral songs, narratives and proverbs are used to inculcate values and virtues during ARP among the Igembe people. The research is guided by functionalism theory that is used to analyse oral forms by looking at the functions they perform in the life of the society. Field research was done to collect raw data which was augmented with data collected from the library. The data was collected using informal interviews, participant observation method and video recording in the girls’ seclusion sites and graduation ceremonies organized for the initiated boys and girls. The instruments used were a video camera, pens and books. Analysis of data has established that despite the changes that have taken place in the society; Igembe people have significantly incorporated use of traditional oral art forms as a tool of communication during Alternative Rites of Passage in the literate society just as it did in the preliterate society. Analysis of the data collected reveals that the main values inculcated are: morality, unity, integrity, being hardworking, sagacious, faithful, focused, determined, prayerful, self disciplined, forgiving and empathetic to other people’s plight among other values. The initiates’ mentors were of varied age groups, educated and professionals of all genders. This study offers new insights into the understanding of the role of oral poetry, narratives and proverbs performed during Alternative Rites of Passage in inculcating values and virtues to initiates among the Igembe people of Meru community of Kenya.

INTRODUCTION
Significance of Oral Literature
Oral literature has always played a key role in the lives of many African communities. Ngugi (2003) says that literature does not exist from a vacuum, but receives direction, shape and its importance from emerging issues in specific communities. The content of oral literature reflects socio-economic, cultural and any other changes that happen in any sphere of life. Consequently, oral literature is expected to adapt to the new changes in the society so that it can serve the same function it used to serve in the past as a medium of cultural transmission from one generation to the next. Mbiti (1969) argues that because of the oral culture of traditional African groups, people in the past relied heavily on oral speech forms, dramatic performances and ritual symbolic forms to communicate important ideas, beliefs and values of the community. The awe and mystery that often characterizes the initiation into adulthood ceremonies particularly favours communication of the accumulated wisdom of the people including the ideal of harmonious coexistence in the community to future generations. Similarly, oral literature in the contemporary society is expected to foster peaceful coexistence of members of a community by inculcating values and virtues that promote unity among members of a community.

Chesaina (1997) views oral literature as one of the most vibrant aspects of the African’s cultural heritage. It is both a reservoir and a creative expression of cultural values hence a vehicle for propelling a society along its moral path. Unlike written literature that is handed down verbatim, oral literature is always recreated and modified during
performance. Its vibrancy is maintained by cultural development because there is no culture that is static. Oral literature thus responds to cultural changes and adapts to changing historical and social circumstances where new genres are created and the old ones acquire new overtones.

Proverbs
Miruka (1994) defines a Proverb as a brief statement full of hidden meaning that is accepted and used by a community as an expression of truth or wisdom. Miruka further says that proverbs are used to comment on situations, describe or sum up a discussion. They are also used to point out the nature of events and hence express the perceptions of the speaker about an event. Finnegans (1970) argues that the expanded imagery in proverbs make them memorable and applicable to a wide range of issues. Finnegans further says that, proverbs reflect the wisdom and beliefs of the people who use them. Thus, they are instrumental in lending colour and liveliness to oral narratives, conversations and other forms of utterances. Chesaina (1997) views education as a major function of the Kalenjin proverbs. In a traditional Kalenjin setting, proverbs are used in socialization of the youth during their initiation into adulthood. Chesaina adds that the didactic value of Kalenjin proverbs is not confined to the African traditional era. Most of the values enshrined in the proverbs are as relevant to the contemporary cultures as they were to their ancestors’ cultures. Chesaina further adds that in conversation, Kalenjin proverbs are used to facilitate communication between those concerned. They are also used to illustrate a point or merely to make statements in an enjoyable manner. Just like among the Kalenjin community, proverbs are used to inculcate values and virtues in initiates during Alternative Rites of Passage ceremonies among the Igembe people.

According to Ohwovoriole (2009), a proverb is an instrument of cultural transmission and its study can give a penetrating picture of the people’s way of life, their philosophy, their criticism of life, moral truths and social values. It is a literary expression of wisdom which offers the speaker a medium for the projection and fulfillment of a variety of socially desired goals. This study adds to Ohwovoriole’s research because one of the key goals of initiation in Igembe is to pass valuable aspects of the cultural values of the Igembe people to the initiates through different genres of oral literature performed during Alternative Rites of Passage.

Oral Poetry
Kabira (1987) posits that a song is the most flexible genre in oral literature because it is easy to accommodate new ideas or words and fit them into song without altering the structure, rhythm or body movement involved. This flexibility makes the song the most responsive genre to everyday life and to the changing circumstances. Songs therefore function as a medium for values, entertainment and political mobilization. This flexibility in songs is evident in the songs sang during ARP ceremonies among the Igembe people because the wordings change while maintaining the rhythm and structure of some of the songs sang.

Chesaina (1997) views Kalenjin songs as part and parcel of the people’s way of life, a means of expressing their world view and maintaining a cultural direction through transmitting the society’s values and attitudes. They also have a didactic purpose which is to inculcate accepted norms in the youths and the adults alike. In ritual songs and dance, songs enable the participants to attain physiological as well as psychological therapy. The performance of songs during ARP among the Igembe people also elicits a lot of joy and excitement among performers and audience who freely participate in them. Thus, these songs act as a form of entertainment as well as a didactic tool where virtues are extolled and vices condemned in a bid to offer the initiates the desired direction of the community. Nyaga (1997) suggests that songs are incorporated in traditional circumcision rituals among the Meru people to serve different roles such as: to express the eagerness of boys to get circumcised, sorrow for the fear that their circumcision might be cancelled or postponed, pass advisory messages to the initiates who would be told the duties of newly initiated boys, pass on the expectations of the community as far as his morality is concerned, ridicule cowardice and advise initiates to respect one’s parents. Some of these songs aimed at inculcating moral values in the initiates who are being prepared for the responsibilities of warriorhood in the community. In addition, the songs sang during traditional circumcision of girls encouraged the girls to endure the pain during circumcision so that one would not exhibit cowardice. This study also affirms that presently; songs are used during initiation ceremonies to play a significant role in perpetuating varied didactic messages to the girls and boys who are initiated through Alternative Rite of Passage in the contemporary society.

Musembhi (2014) discusses the evolutionary changes of themes that are addressed through circumcision songs over the years in response to the social changes among the Akamba community. She largely attributes these changes to educational, economic, religious, western culture and technological influences. Whereas Musembhi discusses the
thematic changes in the context of circumcision songs of boys; this study on the other hand specifically discusses values and virtues inculcated through songs performed during ARP of both boys and girls.

Oral Narratives
Finnegan (1970) points out oral narratives have never and will never be conservative. According to her, the possibility that folktales have been handed down through generations from the remote past in a word-perfect form is indeed improbable. To her, verbal flexibilities of oral narratives in particular and oral literature in general, greatly empower the competent narrator who can re-embroider a story to give it contemporary relevance as well as suit it to its audience and occasion. Finnegan’s idea of re-embroidering narratives is shared by later scholars such as Maxamed Daahir (2005) who supports the view that stories can be made relevant through embroidering of old story lines and motifs to suit new concerns and environments. Maxamed further says that the skillful and conscious use of certain elements of tradition and legendary characters by the oral artist could be useful in terms of linking the past and present especially in the case of a society experiencing the transition from a traditional to a modern way of life. Akivaga and Odaga (1982) affirms that oral narratives are traditionally the embodiment of wisdom and moral lessons to their audience. This is because there is no narrative that is told without the intention of being didactic. Behaviour, attitude and values are instilled on people through morally imbibed narratives that touch on virtually all aspects of human life. This study concurs with Akivaga and Odaga’s argument that narratives are told with an intention of them being didactic but differs with them that they were traditionally used. This study reveals that even during modern times, oral narratives are used and are as important as they were in the preliterate society. This study goes a step further and discusses the specific values and virtues that are inculcated in initiates during ARP among the Igembe people.

Chesaina (1997) posits that oral narratives are derived from day to day experiences of a community. Their thematic content usually reflects the worldview of that particular narrator and the community. This is because the way we interpret the world around us in turn influences the type of stories we narrate to educate the youth about the culture in which they are growing in. Oral narratives of the Kalenjin community thus, reflect their cultural values and heritage. Similarly, the Igembe people just like the Kalenjins have their own unique culture and values that are reflected in their oral narratives that are narrated to initiates during ARP ceremonies. By studying these oral narratives used during ARP among the Igembe people; one is in a position to understand what their values and their attitude towards life is.

The Somali people are great story tellers with most of their narratives being didactic. These narratives reflect the kind of values the Somalis cherish such as loyalty, courage, fairness, intelligence and generosity (Ahmed, 2012). The analysis of narratives performed during ARP among the Igembe people agrees with Ahmed’s assertion on the didactic role of oral narratives in inculcation of values that mirror the values that a community fosters. On the other hand, the significance of oral narratives in the society is emphasized by Akambi (2014) who suggests that among the Yoruba community, narratives are used to pass moral values to the children. Whatever moral value the storyteller desires to pass across to the audience forms the basis of the story he chooses. This study therefore concurs with Akambi on the significance of narratives in inculcating moral values which is one of the things this study discusses.

Rites of passage into adulthood
Different communities embrace circumcision of both boys and girls because of different reasons. WHO (2007) reports that one third of boys aged below fifteen years are circumcised all over the world for varied reasons. Some believe that it enhances cleanliness, improves prevention of STIs and HIV/AIDS, as well as enhances sexual performance. In addition, circumcision is a ritual that allows boys to transit to the next stage of adult life. According to Nyaga (1997), the circumcision of boys among the Meru is a definite stage when one becomes a complete member of the community and is accorded social rights and obligations such as getting married and the right to own property. Kanake (2007) posits that, the introduction of the Christian Hospital Initiation (CHI) of males in Meru as an Alternative Rite of Passage (ARP) to replace the traditional circumcision of boys was mainly done by the Methodist church since 1969-1976 as a result of the Methodist church evangelical movement that had rocked the Meru region since then. Since then, CHI has been getting support from the health workers, Christians from other denominations, government administrators and the elite mainly because of the HIV/AIDS phenomenon. This is in a bid to end the "one field, one knife" tradition method of traditional circumcision that is detrimental to the health of the initiated boys. After initiates leave their seclusion site, their reintegration into the society is accompanied with festivities in their different homes, seclusion sites and churches where their promotion into adulthood is celebrated by members of the initiates’ family and the community at large. During such parties, the initiates are advised by
different speakers of varied educational backgrounds, gender and age groups who come to grace the occasion. Some of the speakers given an opportunity to advise the initiates make use of proverbs, songs and oral narratives to pass their messages to the initiates.

The report by WHO (2008) says that circumcision of girls just like that of boys has been going on for many centuries in many parts of the world as a rite of passage into womanhood and marriage. Despite immense awareness of the dangers on the victims in many aspects of their lives and efforts to stamp it out; the practice thrives and persists in many parts of the world. Several reasons advanced for its persistence include: cultural, mythical, political, religious, sociological, hygienic, psychosexual, and for economic gains. According to reports by (Kenyatta, 1938), clitoridectomy first erupted in Kenya as a conflict zone in the mid 1920s and accounts of its practice and controversy hit the press in London in 1929. This fracas over the ownership of women’s bodies took place in mission settlements where Western education, religion and social ideals clashed with African social organization and traditional customs among many African linguistic groups that engaged in female circumcision.

Whereas the colonial government and the leading African political organization, the Kikuyu Central Association tolerated the custom of circumcising girls; reformist forces in the British political system and Protestant Missions in Kenya challenged the right of communities to uphold what was seen as a barbaric custom. From the mid 1920s, the powerful protestant missions put pressure on the Kenyan government to outlaw female circumcision because of its harmful effects on women’s health and for the reasons of the dignity and equality of women. The Kenyan government hesitantly supported the initiatives of the Protestant Missions, urged on by the then prominent feminists’ politicians who were appalled at what they knew of the custom and its consequences. The resistance against female circumcision has gained momentum from then henceforth with varied, slow but gradual success among the diverse linguistic groups in Kenya as more groups have emerged to fight the injurious practice. Athaus (1997) argues that other African woman’s networks and organizations such as Maendeleo ya Wanawake Organization (MYWO) in Kenya that focuses primarily on issues such as reproductive health and women’s rights have been campaigning against circumcision of girls giving it a fresh impetus. MYWO is involved in campaigning against the practice and calls for an Alternative Rite of Passage (ARP) for girls to replace the destructive practice of female circumcision. Today many girls in different parts of Igembe have abandoned circumcision practice and instead have embraced Alternative Rite of Passage practices. In this context, Alternative Rites of Passage (ARP) becomes the alternative to traditional initiation of boys and girls into adulthood. The crusaders for ARP advocate for Christian Hospital Initiation (CHI) for boys and Ntaanira Mwari na Mugambo Mwana Athome (Circumcise the girl with the word of mouth so that she can pursue her education) for girls (among the Igembe people). These rites of passage give the initiated boys and girls opportunities to transit into adulthood without unnecessary pain and suffering. The Constitution of Kenya (Republic of Kenya, 2010) chapter four (4) also backs it up by advocating for the protection of every person (both males and females) from being compelled to observe, perform or undergo any cultural practice and provides the right and freedom from torture, cruel, inhuman or degrading treatment of every Kenyan citizen. Thus, many communities in Kenya are careful on how they initiate their boys and girls into adulthood lest they are accused of violating the law. This has made ARP for both girls and boys popular and more acceptable to different communities such as the Igembe people as the only reprimand that can facilitate transition of their youth from childhood into adulthood with minimal harm.

Through the ARP ceremonies, the girls are given the same cultural education as those that are given to the girls who undergo the “cut”. This ensures that the girls are well versed with the ways of the tribe during a one week’s seclusion period which simulates the traditional healing period after the actual circumcision. Some of the speakers and mentors called upon to advise these initiates in seclusion and on their graduation day use genres of oral literature as a channel of communication to the initiates. Thus, use of oral literature in Alternative Rites of Passage (ARP) among the Igembe people of Meru County of Kenya: is an emerging phenomenon that allows oral literature to mingle with modern practices. The Igembe people are one of the linguistic groups of the Meru community who are mainly found in Meru County which is one of the forty seven counties of Kenya. Macharia (1975) posits that the Meru people are categorized into nine dialectal groups depending on the dialect that they speak. These are: the Tigania, Igembe, Imenti, Miutini, Igoji, Mwimbi, Muthambi, Chuka and Tharaka.

Statement of the Problem
Oral literature has always played a key role as a tool of communication in most African communities especially during cultural rites of passage. Traditional circumcision for boys and girls as a rite of passage into adulthood among
the Igembe people of Meru County has been replaced with Alternative Rites of Passage (ARP) where oral literary genres feature as a means of educating the initiates. The didactic values of these genres of oral literature used in ARP occasions have not been evaluated. This study seeks to interrogate the values and virtues inculcated during Alternative Rites of Passage ceremonies among the Igembe people. This study presents new insights on the social role of oral literature in a rapidly changing social-cultural environment.

Objectives of the Study
To analyse the values and virtues inculcated through the oral poetry, proverbs, and narratives used when counseling of initiates during Alternative Rites of Passage among the Igembe people.

Justification of the Study
This study is going to be part of the many studies done by various scholars on the functions of the different genres of oral literature in the society. Traditional initiation of boys and girls into adulthood through circumcision prepares them for their future responsibilities and roles as mature and dependable adults in the community. It is during this time that the cultural values and virtues of the society are inculcated. With the introduction of ARP in modern times for both boys and girls; oral literature is still being used as a tool of communication when counseling the initiates. Therefore, there is need to examine this tool of communication used during ARP and the value of the messages passed on to the future generations in a bid to understand a community’s philosophy and attitude towards different aspects of life. This is because literature acts as a mirror of the society that has given birth to it. This study contributes to the existing knowledge of the dynamic role of oral literature during ARP that is becoming a common phenomenon in many communities in Kenya. Since the study explores the values inculcated during ARP among the Igembe people in Igembe South constituency; it contributes to new insights in understanding of the cultural values of the traditional genres of oral literature in modern societies.

Scope of the Study
Data for this study was collected in three wards (Kanuni, Kiegoi/Antubochiu and Akachiu) in Igembe South Constituency of Meru County in Kenya.

Theoretical Framework
This study discusses the values and virtues in oral poetry, narratives, proverbs communicated to initiates during Alternative Rites of Passage among the Igembe people of Meru County using a framework of the Functionalism theory. Malinowski Bonislaw (1944) emphasizes the importance of studying social behaviour and social relations in their concrete cultural contexts through participant-observation. Malinowski’s theory involves understanding a particular item by identifying its function in the contemporary operation of that culture. He adds that culture is essentially an instrumental apparatus by which man is put in a position to better cope with the concrete, specific problems that face him in his environment in the course of satisfaction of his needs. From the dynamic point of view as regards the type of activity, culture can be analysed into a number of aspects such as education, social control, economics, and systems of knowledge, beliefs and morality and also modes of creative and artistic expression. Malinowski Bonislaw adds that every activity in the community is significant towards having a cohesive society. This is important to this study because Alternative Rite of Passage (ARP) is depicted as a vital ritual among the Igembe people through which girls are trained with life skills and moulded to have a certain common acceptable cultural training after the ban of Female Genital Mutilation (FGM). Similarly, the boys who embrace ARP are also initiated into adulthood in a safer and more hygienic environment. The initiation of these boys is socially accepted just like the traditional initiation. During ARP for both boys and girls, effort is made to inculcate the cultural values of the community to ensure that the community remains cohesive. These values are imparted in the initiates through oral literature genres used as a tool of communication. Malinowski Bonislaw (1944) further argues that institutions function for continuing life and normality of an organism, or an aggregate of organisms as species. He believed that culture is always instrumental to the satisfaction of organic needs. Malinowski’s assertions guide this study in the analyses of the specific values inculcated through ARP and how these values help in social control of the behaviour of the youth through moulding of the character of the initiated boys and girls so that they can fit in the normative pattern of the Igembe community.

Durkheim Emile (1895) is a functionalist who emphasizes two concepts of social solidarity and collective conscience. Solidarity involves the feeling that one belongs to a common society and has certain shared basic values in common with other people. On the other hand, collective conscience represents the social forces that help bind
people together or integrate them into the collective behaviour that is a society. Durkheim’s contribution is useful to this study because it guides in the analysis of values inculcated through the oral narratives, proverbs, and songs and how they help in identity formation and socialization of candidates initiated through ARP so that they can embrace a common acceptable behaviour acceptable among the Igembe people.

Parsons Talcot (2005) stipulates that all parts of a society have a purpose or function and certain needs. In this respect each institution in society faces certain problems that have to be solved if it is to both exist and function properly. The first problem includes goal attainment. This means, there is need to set goals for human behaviour and also to determine the means by which these goals can be achieved. Secondly, it involves adaptation which involves procuring the means to achieve valued goals by providing the physical necessities of an institutional life.

Thirdly, it entails integration of people so that they can feel that they belong; and one way of achieving this is by giving them something that they can hold in common such as values and beliefs. The ability of an institution to integrate its people successfully is vital for its continuation and internal harmony. Fourthly, there is need for latency to be found in the society. This involves development of social control mechanisms that serve to manage tensions, motivate people, and resolve interpersonal conflicts and the like within the institution. In this respect, Talcot Parson’s contribution is useful to this study in the analysis of the social benefits of genres of oral literature and ARP in imparting societal values to the initiates so that the ARP initiates can be smoothly integrated and accepted in the society as mature and responsible people in a society experiencing change.

METHODOLOGY

Research Design
This research uses a qualitative research design which allows primacy of data where the researcher and the researched genres of oral literature interact freely leading to the generalization of concepts which are a product of the research. Qualitative research design further allows the researcher to immerse himself/herself in the “real” world of the participants by observing, questioning and listening to them. This ensures that the data collected mirrors the realities of the community being focused on to ensure its reliability and validity.

Location of the Study
The research is restricted to Igembe South Constituency in Meru County. The area is popularly known for its strict adherence to the traditions of the Igembe people especially the traditional circumcision of both boys and girls as a rite of passage into adulthood. However, this is now being challenged by the Alternative Rites of Passage.

Target Population
This study focuses on values and virtues communicated to initiates through proverbs, oral poetry and narratives. This study uses purposeful sampling in choosing genres of oral literature to collect and the seclusion sites and graduation ceremonies of initiates to visit in order to collect data so as to achieve the desired results. There are three (3) songs, ten (10) proverbs and three (3) narratives identified for this analysis. The data collected is either in Kiswahili, Kimeru or a combination of Kimeru, Kiswahili and English languages. This multilingualism could be because some of the performers and speakers during ARP were engaged in code switching.

DATA ANALYSIS
The data collected has been transcribed in the language(s) it was originally performed in. This was later translated into English language which is more universally accessible. This translation has been done to ensure that those people from outside the geographical area of the local dialect also benefit from the information gathered. This is done carefully to ensure that the nearest equivalence in meaning is retained because translation can sometimes distort meanings due to cultural meanings that are attached to certain words and concepts.

FINDINGS AND DISCUSSION
This study interrogates the role of oral literature in inculcating desirable virtues and values during ARP ceremonies among the initiates of the Igembe people. This is because every society has a responsibility of ensuring that it brings up generations of people who have virtues and values and are conversant with the norms of the society by correcting and guiding those who are wayward. If this is not done, then there would be a disconnect in the society between the younger and older generations and this can cause discord among its members. Each society is thus obliged to ensure that its progeny is well versed with the dos of the community by inculcating into them the desirable values that the
society admires especially when the youth are being initiated into adulthood. This is because it is in adulthood that they are expected to be independent, responsible and mature in all the decisions they make.

Proverb no.10, Kaaba riiwa ririega nkuluki ya mbeca (having a good name is better than having money) is used by pastor Joseph Muriki to remind an initiate that it is important to be a man of integrity than to possess monetary wealth. This is because with a good name in the society one can dine and wine with the kings. This can consequently open opportunities for one that can help one gain all the wealth in the world than having ill gotten money through stealing Miraa (khat) and from other dubious means such as engaging in drug trafficking. This advice is given to encourage the initiate to shun all the other people in the community known to engage in wicked activities such as selling of drugs and who are loathed by everybody because of their evil and destructive activities prevalent in the village where this particular initiate resides in.

Being sagacious is a treasured virtue among the Igembe people because such a person is able to make the right decisions and subsequently evade trouble. That is why Proverb no.7, Ugetania na mpunduka ukaunduka yayo (if you befriend a person with crooked ways, you will also become crooked as s/he is) is used by Ms Karambu Mururu when advising the initiated boys on the need to be careful when choosing friends because one’s acquaintance can greatly influence one’s character either in a positive or negative way. A crooked person would definitely influence one to be wicked. Hence the need to caution the youth against such bad company; after all, bad company ruins good morals. On the other hand, a good person would influence one to be altruistic. The same message of being judicious when choosing friends is echoed in proverb no.8, Uti mwamba na mutegeri (There is no difference between a thief and his/her accomplice) that is used by Mr Robert Mwirigi to remind the initiated boys to be wise when choosing friends. This is because with time one may get negatively influenced by them. In any case, even if one does not participate in their wicked ways, they would always be accused of the crimes committed by their friends because of their association. This can defame the integrity of one who befriends somebody with a dubious character. It is also believed by the Igembe people that to a great extent, one’s friend determines one’s character.

The initiates are further reminded to be perceptive when choosing friends for no man is an island. In life, each person will always be compelled to befriend somebody at one point in time as illustrated by proverb no.4, Uti mbiti itirimunyanya wayo (There is no hyena that has no friend of its own) by Pastor Julius Kaunyangi. This implies that in life, there is nobody, who does not have a friend irrespective of their character. In this context, the initiated boys are being advised that they should be ready to meet and interact with all kinds of people from different parts of the country when they join high school. These friends could be either the morally upright ones or the wayward ones. However it is important for the initiated boys to be prudent enough to know whom not to befriend. This is because if you agree to befriend a bad person that is metaphorically being compared to a hyena; then you must be prepared to get harmed by this person at one point in time in future. The hyena is used to symbolize a treacherous being associated with meanness and all kinds of wickedness. This means being insightful when choosing friends is obligatory if one aspires to avoid such people whose character is questionable and who can mislead one.

The same message of being judicious when choosing friends is reiterated in story no.1, Kaana Kamwe (One Child) by Bishop Alice Mutuma narrated during the graduation ceremony of boys initiated through ARP. The exemplum is used by the speaker to betone the need to be sagacious when choosing friends. In this story, a young boy refuses to wear a pant and shoes while going to school because his friends are not wearing the same. Instead of the boy being happy and enjoying the privilege and the comfort of wearing these attires that other children could not afford to wear; he chooses to downgrade himself to their level by refusing to wear them so that he is accepted in their company. The moral lesson is that if one associates oneself with mediocre people; one would consciously or unconsciously ape their mediocre ways so that one can fit in their company. Therefore, one should be wise enough to choose friends who add value to him because friends determine what kind of a person one is and would be in future. Hence, one should endeavour to interact and associate with wise people who can add value to oneself.

Proverb no. 2, Mwathoa kirira, nuuri kiawe (The one to be advised is one who has his own wisdom) is used by Margaret Kanampiu during the graduation ceremony of initiates to advise them to be wise. This is relevantly used in this context because as a newly initiated adult; one is bound to receive varied pieces of advice from different people. Igembe people believe that once one is initiated into adulthood through circumcision, one receives educational instructions from one’s mentors while in seclusion that empower one with the rich knowledge that enables one to make wise decisions at all times. This is as far as issues affecting one’s life in different stages of development from childhood into adulthood are concerned. This includes but not limited to educational, marriage, relationships with
opposite sex and peers, respect for others and acquisition of property. Thus, this speaker assumes that when she tells the initiates to shun bad company that can ruin their destiny, it is just a reminder to them because they had already received such instructions earlier on while in seclusion. In this particular context, the speaker reminds the initiates the need to shun their peers who can mislead them into drugs and immorality that can ruin their destinies. The speaker uses this proverb to remind them to always keep in mind the knowledge imparted in their lives before making any decision whenever confronted with a challenging situation. This is because, Igembe people believe that knowledge is power in the sense that a foolish decision can lead to disastrous consequences. On the other hand, a wise decision saves one from plunging into costly and cataclysmic situations such as drug addiction and contraction of HIV/AIDS through immorality that one can plunge into if not careful.

Narrative no.2, Mwana Umwe (One child) by Bishop Alice Mutuma is narrated to the initiated boys and their parents on their graduation ceremony. The narrative reminds the initiates that actions have consequences and thus the need for them to have self discipline even when their parents fail in instilling the right values in them. This is because at the end of the day, the initiates are the ones who would face the wrath of their own mistakes. In this story, a woman has a son whom she loves very much. However, this woman is so overprotective of the son that she never allowed the husband to punish their son even when he committed any offence. This woman would always talk ill of the husband to the son when the husband was not around. With time, the son lost respect for the father and even started to beat him up. One day, the son beat his father till he died. The boy is arrested and sentenced to death in a court of law. The moral lesson of the story is that every action one takes in life has consequences irrespective of the excuses one may give or have for committing a crime.

The boy in story no.2 blames the mother for not teaching him to do the right thing but this does not set him free from the long arms of the law because ignorance has no defence. The boy is found guilty and is sentenced to death. Through the story, the initiates also learn that there is justice in the world and everybody is held accountable for his or her own misdemeanors and felonies. These narratives therefore demonstrate how oral narratives can be used to inculcate self discipline and castigate ignorance, irresponsible parenthood, violence and disrespect to one’s parent. This is just as Okoye (2000) posits that; the didactic purpose of oral literature is achieved through a careful selection of themes (mainly involving an exhibition of some vices or wickedness) and manipulation of the story or songs in such a way as to result in the punishment of the vice or reward of the virtue. Through the story, the initiates are warned and advised to change from their evil ways lest one day they would pay for their wickedness just like the son who used to beat his father and lastly killed him is sentenced to death. The mother also got her share of punishment by being widowed and childless for bringing up her child irresponsibly.

Story no.3, Mwekuru na mukure wawe (A woman and her husband) narrated by Gladys Muthoni to the girls while in seclusion teaches them about being morally upright in marriage life. It also underscores the need for girls to be tolerant and altruistic. This story highlights the attributes of a good woman from the point of view of the Igembe people. In this story, a woman gets married to a man younger than her. The couple works hard and becomes wealthy. The man decides to marry another beautiful and younger woman claiming that his wife is aged. One day, the man brings his young mistress home in order to humiliate the first wife. The first wife who is God fearing welcome them so well and treated them with kindness. The second wife consequently decides to desert him out of guilt consciousness. The man later repents and apologizes to the first wife infront of a congregation in the church where the lady is an active member. This paves way for a family reconciliation and reunion. The moral lesson inculcated in the initiated girls is that one should be tolerant in marriages just like the first wife is till her husband reconciles with her. On the other hand, women should be empathetic to the plight of other women like the second wife was when she left her husband after she realized that the first wife was being mistreated because of her. The first wife is therefore able to redeem her marriage by being kindhearted and patient. The inability of this man to keep the two wives as his wives implicitly criticizes the viability of polygamous marriages in the contemporary society among the Igembe people.

The need for people to be kindhearted and empathetic to the plight of the others is also emphasized in proverb, no.9, Ukinjiira baungi marinya injua ya manene na ya manini niitu noowe kuu (As you dig trenches for others, dig deep ones and shallow ones for you may end up falling in one of them) that is integrated in story no.3. The proverb is used to emphasize the fact that all those who wish and plan wicked things against others would one day suffer the consequences of their own actions. This is because the man in the story is humiliates when his second wife deserts him just as he had humiliated his first wife earlier on in pursuit of the younger and more vibrant woman. This man in the story takes the second wife home is to humiliate the first wife whom he thinks is old and...
ugly. He does this by showing off his new younger wife who unfortunately embarrasses him by deserting him. The moral lesson in the proverb is that the evil things you do to others would one day come to haunt you and lead you to your destruction. Therefore, one should be considerate of others as one plots to harm them lest the plot backfires on the person planning the evil things against others.

The aforementioned story no.3 sheds light on the challenges of marriage life that the initiated girls should be prepared to counter in life. In the story, the innocent woman who is not vindictive is rewarded handsomely when the humiliated husband begs for forgiveness from her in front of many people in the church and is transformed into a good husband. This kind of moral teaching is necessary to the initiated girls who would one day have families. The initiated girls are thus encouraged to know that marriage institution has challenges and one can overcome them through perseverance and forgiveness. Thus, oral literature becomes an instrumental tool of ensuring stability of marriages in the society just as Parsons Talcot (2005) posits that there is need to have latency in any society. This involves having control mechanisms that serve to manage tensions, motivate people and resolve interpersonal conflicts within institutions. Therefore, through the oral narrative the initiates learn that for the marriage institution to be protected, the marriage partner who errors like in this story is punished accordingly and the legitimate marriage partners are allowed to reconcile. This is because the presence of stable families ultimately ensures the existence of a stable community and nation.

Proverb no. 3, *Mutaane ni uria uri na into biawe* (The one who is circumcised is one who has his own property) is used by Pastor Gitonga Kaithungu to impress upon the initiated boys to be hardworking in their education. The initiates are encouraged to pursue their education to the highest level possible till they are able to get jobs that can sustain them financially. This way, they will avoid shortcuts such as thievery of *miraa* or engaging in drug trafficking in order to sustain themselves. This is because education is viewed as the main tool of economic empowerment of the people among the Igembe people.

Song no. 2, *Kiretherio* by Pastor Jeremiah Gitonga encourages the youth to be religious by being prayerful, going to church and by reading the word of God. This is a cultural song that has been embellished to inculcate Christian virtues because majority of Igembe people have embraced Christianity. Hence, the song advocates for inculcation of Christian religious doctrines and virtues among the youth for they believe that by doing so; the initiates would be better members of the community just as Mohammed (2007) observes that religious values can be depicted as spirituality which acknowledges the existence of God and finally results in humanism and good manners:

Soloist: Timothy my son, do not refuse to go to church,  
If you refuse God’s prayers, you are ruining the honour of being a circumcised person.

Audience: Yes

Soloist: He says that if we follow the footsteps of Jesus  
the son of God, my son you will get eternal life,

Soloist: If you become a Bible reader my son you will move closer to Go and you will get salvation

Proverb no. 1, *Itigua ta ina, igua ta ithe* (If it does not resemble the father, it resembles the mother) by Mercy Nkatha is used to encourage the initiated boys to emulate the good character traits of their parents and other people in the community who are successful in their professions as a result of hardwork and determination in their academic studies. Song no.1, *Kiretheretie* sang by Kirema Masharufu during the graduation ceremony of initiated boys also gives hope to the newly initiated boys to be hard working in school irrespective of their social background. This is because those who excel in school would get support from the members of the community to pursue their dreams in education even if their parents are unable to do so because of abusing alcohol. This reflects the harambee spirit that is prevalent among the Igembe people where less fortunate children are sponsored by the community through holding communal money raising ceremonies:

Soloist: As long you work hard in your studies,  
I truly tell you even if your father drinks local liquor until he falls on the trenches,  
you will be taken to school.

Audience: Yes
Proverb no. 5, *Icau ria muti yungii, littilumataa muti yuungi* (The bark of another tree, cannot stick on another tree) is used by Gladys Muthoni to advise the initiated girls in seclusion to be contented by their humble family backgrounds. The metaphor of a bark of a tree to compare it to the girls and a tree to compare it to their family backgrounds is aptly used since the imagery is identifiable from the environment of the initiates. The initiates are advised not to seek refuge in their relatives or friends’ homes that are more financially privileged than them because they can never be fully acceptable there just as it is hard to permanently stick the bark of a different tree on another tree. Instead they should learn to appreciate and be contented with what their parents can afford to provide them with. This is significantly used to remind the initiated girls that their families and homes are always the best anchor that one can have in life. Therefore, the proverb acts as a commentary on the bad habit prevalent in the area where the initiated girls come from. Such a comparison of sticking a bark of a tree on another tree is something that each of the girls has never seen happening and thus it seems impractical. In this context, the initiated girls understand that it is only their parents who can always give them unwavering support and love them unconditionally rather than strangers that the girls would wish to be associated with just because they are more financially endowed than their parents. Proverb no.6 *Uuithoe aria uwikinyila* (You will scratch yourself the farthest you can reach yourself) by Gladys Muthoni is also used to advise girls initiated to be contented by what their parents can afford to provide for them rather than get engaged in irresponsible relationships such as engagements with sugardaddies or “sponsors” to give them money. This is because at the end of the day, those “sponsors” may end up demanding sexual favours from them. This can consequently expose them to HIV/AIDS infections and other STDs.

The similes in the song no.3, *Ancia Murungu* by Masharufu Kirema advises the initiates to embrace unity amongst themselves when the singer says, “unite like Mt Kenya or like Nyambene forest”. The initiates are reminded that if they unite together; they can achieve insurmountable things in the world. It is significant to note that a forest or a mountain comprises of many trees. Similarly, for the initiates from Igembe to be successful and be famous; they must come together in oneness and support one another in everything because unity is strength. This is because one tree cannot be a forest; just as an individual cannot be a community.

This reflects the philosophy the Igembe people want their children to embrace and believe; power of togetherness amongst themselves for the sake of prosperity:

Soloist: Let them come together  
Audience: God  
Soloist: In unity  
Audience: God  
Soloist: Like the forest  
Audience: God  
Soloist: Of Nyambene  
Audience: God  
Soloist: With unity  
Audience: God  
Soloist: Like Mt Kenya

**CONCLUSIONS**

Songs, proverbs and narratives are used as indispensable tools of communication in Alternative Rites of Passage to promote social solidarity of the Igembe people and maintain harmony through articulating values that the community treasures as the fibre that binds the community together. Consequently, the initiates transit into adulthood as well informed, responsible, mature people who are socially acceptable adults in the society for they understand the dos of the community. The values inculcated into the initiates through the genres of oral literature performed during ARP include: being prudent, religious, hardworking, contented, faithfull, patient, humane and empathetic to the plight of others among other virtues. These values extolled are a reflection of what the Igembe people treasure most and consider as the norm. These values are extolled so that those who embrace them can continue exhibiting them for they reflect what the Igembe people believe in and admire.

Secondly, the flexibility of the three genres of oral literature enables them to be used to address contemporary issues that affect initiates in all aspects of their lives such as those related to their family life, health, education, cultural, social, religious and economic statuses. Some of the genres of oral literature are embroidered and manipulated easily depending on the performer’s creativity in order to respond to the issues at hand. The spontaneity of the songs and narratives used and the artistry of the performers of these genres enable them to be used to address varied
contemporary issues in the community in a creative and meaningful way. This creativity makes the performances quite memorable and interesting to the audience.

Thirdly, the oral literature performed during ARP complements the work done by the Ministry of Health and NACADA in curbing the spread of STIs and drug abuse respectively. If the initiates heed to the advice given to them during ARP ceremonies and embrace the values extolled, they would become good citizens. Consequently, the initiates would have fewer conflicts with the security forces of the country and few indiscipline cases in schools and homes. There would also be few family conflicts if the initiates embrace values that encourage spouses to treat each other justly. This way oral literature promotes cohesiveness among members of a family and community by propagating the desirable values amongst its members.

Fourthly, it is observed that majority of the mentors and counselors whose data is used are literate, professionals or retired officers who are selected because of their professional expertise. Most of the narrators of the stories are mainly young people contrary to the believe that it is only the elderly who are good narrators. Such narrators are able to respond to contemporary issues in their environment and address them in their mentorship programs to the initiates as viewed by the narrators.

Fifthly, the propagation of both Christian religious virtues in cultural ceremonies and traditional values in ARP Ceremonies indicates infiltration of Western Christian religion in African cultural rites of passage. It also points out to the fact that Igembe people of Meru community is at crossroads as it tries to blend tradition and modernity, cultural and Christian values. Thus, oral literature acts as a mirror of the realities in the environment of the oral artist. Finally, this research affirms that oral literature is integral and fluid in ARP ceremonies among the Igembe people. Some of the genres of oral literature used, are artistically coined on the spur of the moment in order to applaud desired values while at the same time entertaining the audience. This demonstrates that literature is live and dynamic for even old well known genres are embellished and given new overtones in order to appropriately address any issue that the artists and speakers deem need attention in the society.

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*****
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UTANGULIZI


Maneno Muhimu: Fasihi, Fasihi Simulizi, Methali, Wamuthambi, Mwonoulimwengu, Kisiasa.

UTANGULIZI


Maneno Muhimu: Fasihi, Fasihi Simulizi, Methali, Wamuthambi, Mwonoulimwengu, Kisiasa.

UTANGULIZI


Maneno Muhimu: Fasihi, Fasihi Simulizi, Methali, Wamuthambi, Mwonoulimwengu, Kisiasa.
mazingira ya kibiashara, mifumo ya kilimo, elimu, mazingira ya kufanyia kazi, huduma za kiafya, hali ya usalama na ustawizi wa miundomsingi.

**Jamii ya Wamuthambi**


**Dhana ya Mwonoulimwengu**


Dhana ya Methali

Mwonoulimwengu wa Kisiasa katika Methali za Wamuthambi
Katika kubainisha mwonoulimwengu wa kisiasa katika methali za Wamuthambi, utafiti huu uliongozwa na mihimili ya nadharia ya ethnomethodologia. Kwa mujibu wa nadharia hii, wanajamii hujichunguza, hutafakari, hutathmini na kupitisha hukumu kwa tabia zao. Mwonoulimwengu wa kisiasa wa Wamuthambi ulibainishwa kwa kuzingatia tafakukuri, hukumu, tathmini na kwa kujululiza wa masuala ya kisiasa ya mamalaka, sheria na uongozi katika methali zao. Methali kumi tofauti zimechanganuliwa katika kila suala kama njia ya kufafanua mwonoulimwengu wa kisiasa wa Wamuthambi.

Mamlaka


Methali familia iliyo na wavulana waliotahirwa haipitiwi owyo, inawasawiri wavulana waliotahirwa kwa wenyewe uwezo wa mtoni unaopendekewa wa wenyewe mamlaka. Katika jamii asili ya Wamuthambi, shughuli za waliotumika za waliotahirwa za wavulana waliotahirwa wao wanaobola kuwa wamechukua kuwa katika uwezo wa mtoni unaopendekewa wa wenyewe mamlaka ili kufanya majukumu na mtoni unaonprice kwenda wa muamalat. Wamuthambi katika methali hii ni kwamba, wanaohudumu ambacho wamechukua kuwa katika uwezo wa mtoni unaopendekewa wa wenyewe mamlaka ili kufanya majukumu na mtoni unaonprice kwenda wa muamalat.

Wenye mamlaka huthaminiwa na kupewa heshima kuwa sababu wao huchukula kuwa wenye hekimu inayowawezesha kuwa na maono kuhusu jamii. Utambuzi wa hekimu ya wenye mamlaka unadhihirika catika

Proceedings of the 6th International Research Conference  Page 445 of 702

Sheria


Proceedings of the 6th International Research Conference

Page 446 of 702
Kweli, kati ya kijishoka, kitika na wasiwasi wa mwili wa wuzi, huyo ni ndefu ya kijishoka, limetumika kwa kuashiria mtu mwenye ugumu wa kufuata kaida na taratibu zile zinazoondoa. Kuna mafalada au mafalada au kupatikana na tovuti tovuti hiyo ili wengine wakatawa hatari zao katika wahi zao, au kupatikana na tovuti tovuti hiyo ili wengine wakatawa hatari zao katika wahi zao. Kuna mafalada au mafalada au kupatikana na tovuti tovuti hiyo ili wengine wakatawa hatari zao katika wahi zao. Kuna mafalada au mafalada au kupatikana na tovuti tovuti hiyo ili wengine wakatawa hatari zao katika wahi zao.
Uongozi

Uongozi ni madaraka anayopewa mtu kusimamia shughuli au asasi fulani. Yaani ni kitendo cha utekelezaji wa uwezo aliciopewa mtu ili kuwavezeshwa wanaongozwa kutumia nguvu, stadi, vipaji na raslimali nyingine kuafikia malengo fulani. Uongozi huwa na majukumu mazito ambayo huhitaji sifa mahususi hasa kwa kiongozi aliyeshika usukani. Sifa zinazomwezesha kiongozi kufaulu huji kita pakubwa katika uwezo wa kiaiki ali nao na wala si katika sifa za nje za umbo lake. Taaswira kwamba sifa za kiongozi huwa kwenye uwezo wake wa kiaiki huwa kikabili kwa kushinda hali hatari. Neno makalio (matina) limetumika kiishara kumaanisha unene wa viungo vya mwili. Methali shujaa hana makalio, humaanisha kuwa mtu mwenye sifa ya ushuwezi hawezi kutambulika kwa kuwabili tu unene wa mwili bila kutilia maanani kigezo cha uwezo wake wa kiaiki. Katika mukutadha wa uongozi, kiongozi ambaye huhitajika kuwa shujaa ili afaulua katika majukumu yake ya uongozi, anafaa kutambulika kwa kigezo cha uwezo wa kiaiki unaodhishiriza sifa za uongozi kama vile ushuwezi. Kwa mujibu wa methali hii, Wamuthambi huwa na falsafa kuwa uwezo wa kiaiki na sifa za uongozi ndiyuo vigezo vikuvi vinyofoa kutumia kumi kiongozi wala si unene wa mwili. Kwa kiaike kiguzu cha kutambuva uongozi chafaa kuwa uwezo wao kiaiki, pana uwezekano wa kiongozi kutoa kwa wazazi, aila, nasaba au mahali popote pale. Wazo hili limekikatiza katika methali methali zaifutaza: Gana wa ntûrûme ati kînyanya (Mamaye kondoo dume hana mkia pemene) na Gana wa ntûrûme ati ngoji (Mamaye kondoo dume hana pembe).


Katika mukutadha wa uongozi, rungu nzuri (nchûgûma mbega) humaanisha kiongozi mzwiri aliye na uwezo wa kiongoza na kulinda jamii. Rungu itakayoweza kutekeleza kazi ya ulinzi kutambulika hata kabla ya kuchimba liko kwa kikoo la kushinda hali hatari. Sawa na rungu nzuri, mtu aliye na uwezo wa kutekeleza majukumu ya uongozi hasa ya ulinzi kutambulika mapema sana kwa huwa anaonyesha dalili za uwezo wake. Kwa mujibu wa Wamuthambi, uwezo wa sifa za uongozi ndi mambo yanayoediharisha mapema za kwa njia wazi wala hayawezi kufikia. Kwa misingi huu, uongozi unafaa kuwekeza kwa uwezo wa sifa za uongozi kwa kiongozi huwa na falsafa kutambulika mapema. Mbali na uwezo wa sifa za kiongozi kuweza kiguzi kiguzi cha kafaishita uongozi, tajriba husaidia uongeza kiaufula katika majukumu yao. Wazo hili limetumika katika methali methali zaifutaza: Gana wa ntûrûme ati kînyanya (Mamaye kondoo dume hana mkia pemene) na Gana wa ntûrûme ati ngoji (Mamaye kondoo dume hana pembe).

Methali methali zaifutaza za kiongozi ndivyo vigezo vinvyofaa kutumika kwa kiongozi wala si unene wa mwili. Kwa kiaike kiguzu cha kiongozi kuweza chafaa kuwa kwa uwezo wake wa kiaiki, pana uwezekano wa kiongozi kutoa kwa wazazi, aila, nasaba au mahali popote pale. Wazo hili limetumika katika methali methali zaifutaza: Gana wa ntûrûme ati kînyanya (Mamaye kondoo dume hana mkia pemene) na Gana wa ntûrûme ati ngoji (Mamaye kondoo dume hana pembe).

Katika methali shujaa huangushwa na gunzi, Wamuthambi wana mtazamo kuwa sharti uongozi uielewe, uhidhibiti na kuendesha kazi yake kwa uangalihfu wa halisi ya juu iliyi ili usikafadhheheka kwa kuangushwa na mambo madogo. Mzalendo huu unaweza kuyawezesha nafasi zao zinazo tolea kwa viongozi na kwa uongozi wao. Wazito hilo linadhirihiwa katika methali, Mjiu urii mukurru atigwijaga nderi (Familia iliyo na mzee haivamini na tai). Tai ni ndege nkubwa mwa makula mwa mulihi na makali, kumina shartu uongozi ambapo kiongozi anaweza kuchumisea. Kwa hivyo, mukurru mawiwa na mume, miongoni mwa kuchumisea na mwanafunzo katika kiongozi hawakakosha wakati wa kiongozi wa ndani. Chama chache chako cha kiongozi hawakakosha wakati wa kiongozi wa ndani unapata nafasi ya uongozi wawili katika kwa msimamo wa methali.

Uongozi huu huwa na majudii mwa familia na hivyo humpata nafasi ya kiongozi wao. Wito, uthibitisha ishara ya kuchumisea na kuchuma. Kwa hivyo, mukurru utapata nafasi ya kiongozi wa ndani na kiongozi wa wawili. Wao wako na kiongozi wa wawili kwa mafunzo katika kwa wenzake wawili wawili. Miongoni mwa kuchumisea na mwanafunzo, wafuasi wana kuchumisea na wafuasi wana wawili waweza kuwa na kuchumisea.

Uongozi huu huwa na majudii mwa familia na hivyo humpata nafasi ya kiongozi wao. Wito, uthibitisha ishara ya kuchumisea na kuchuma. Kwa hivyo, mukurru utapata nafasi ya kiongozi wa ndani na kiongozi wa wawili. Wao wako na kiongozi wa wawili kwa mafunzo katika kwa wenzake wawili wawili. Miongoni mwa kuchumisea na mwanafunzo, wafuasi wana kuchumisea na wafuasi wana wawili waweza kuwa na kuchumisea.

Hitimisho


MAREJELEO


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ABSTRACT
Khat was introduced in Siakago to improve the socio economic lives of producers; it seems not to be doing very well. The purpose of this study was to determine the social and economic activities of the people of siakago of mbeere before introduction of khat. The study employed descriptive research design. The target population was 380 people who were Khat producers in Siakago division. A total of 196 people were randomly sampled and interviewed from 6 sub location. The instruments to collect data were interview schedule, focus group discussion and observation schedule. Secondary data was collected from archival, oral sources and secondary sources. Khat existed in Siakago long enough before it was discovered, used and cultivated for economic purposes. Khat adoption and commercialization in Siakago occurred within a decade and by 1980, the crop had spread in many areas altering the previous form of production. The adoption of khat production was as a result of its economic benefits attached to its sale. Labour was provided collectively and shared among men and women in the family. Production was mainly aimed at curbing food insecurity. The Siakago people engaged in trading activities to exchange for what they did not produce. Khat production and use resulted in extinction of social relations and gender roles as men spent much time in khat chewing joints. School-going pupils were absorbed by khat farms to provide cheap labour for cheap money thus dropping out of school. The previous decentralized trading methods were replaced with a more centralized one characterized by central trading centres. The study may be of great importance in the whole county as it may create awareness on both positive and negative impacts of Khat farming. The results of the study may also provide empirical data that can be utilized by other scholars in carrying out related studies.

Key Words: Khat, Social and Economic Activities, History of Khat, Siakago of Mbeere

INTRODUCTION
Background of the Study
The historical evidence for the beginning of Khat suggest that the practice originated in the southern Red Sea area (Yemen or Ethiopia) prior to the mid-fourteenth century (Weir 1985). Rodinson (1977) believes that there is evidence to the introduction of the drug into Yemen around 1300 A.D., but Schopen’s (1981) opinion is that the use of stimulant existed in Yemen in the early 13th century. Kennedy (1987) assessment indicates that use of the drug may well have begun in Yemen at least as early the 12th century and diffused to Ethiopia at that period. There are a number of legends in both Yemen and Ethiopia about the discovery of Khat plant. According to Ethiopian and Yemeni legends the properties of Khat were discovered by Yemeni goatherd who observed the effects of the branch on his goats. The goatherd tried it himself and found his activity and energy increased and he was able to stay all night to pray. Khat production in the past has been a custom practice only by certain social or ethnic groups in the parts of Africa and Arabian Peninsula where it is grown. However, on the context of Khat in East Africa, Carrier (2003) stated that originally Khat trees grew wild in most of East and Southern Africa bushlands and forests. Oral literature has it that Khat was discovered as a useful substance by shepherds while out with their flocks. As is custom of many shepherds to taste the plants which their flocks seem to like, Khat, a tree that seemed to be liked much by goats and sheep, was not exceptional. The taste of the substance triggered the interest of the shepherds and they gradually started chewing the twigs obtained from Khat trees. Other areas with long history of Khat in Africa includes: Somalia, Sudan, Djibouti and Madagascar, while in the East African region Khat has had a substantial history in Uganda and Tanzania. In South Africa Khat is found among the Xhosa in the Eastern Cape. In all the mentioned countries of East and South Africa, the history of Khat dwells on more curbing use of Khat by highlighting its negative social impact in the communities Carrier (2003); Carrier (2005).

According to Mugendi (2017), in Mbeere and more specifically in Siakago’s locations of Riandu, Siakago, Gituri and Thura, diversification to Khat production started in mid 1980s. Since 1980s a new variety of Khat emerged in the local market centers although in small quantities and selling locally normally called ‘muguka’. The word ‘muguka’ in the local direct means steady and resistance to change of weather. The term is given to this variety due to it resistance to weathering out during the dry seasons. However, since mid-1980s in Mbeere just like other khat producing areas of Kenya, Khat farming in Siakago came with changes in agricultural production of the areas. Gitiri et al (2002) observes that previously miraa in Siakago used to grow naturally in the bush lands and was not of any
economic value. However, the economic advantages of new crop Khat had caught up the attention of people as the substance came to be a good source of income where many peasant farmers began growing Miraa Mwaniki (2006) observes. The most significant dimension of this crop was the economic value it brought to the farmer compared to cotton and tobacco in Siakago (Wanja, 2010).

In Siakago, small scale holders began growing Khat in small patches of land and distributed throughout the markets both locally and nationally (Nelly, 2013). The labor input on Miraa farming was minimal in comparison to tobacco and cotton which ensures good returns therefore making it a good economic investment for many households. In reference to Mbeere demographic survey of (2010), more land has continued to been used for Miraa cultivation in Siakago divisions than other cash crops. Mugendi (2017) noted that in Siakago region, the traditional food crops such as maize, beans, pigeon peas, black peas and millet which was produced to feed the region was being abandoned due to over cropping of Khat (Muguka) in the lands previously occupied with subsistence crops questioning the future of diversification on the idegenius food crops. However, Khat production in many producing regions, Khat is a very pervasive commodity (unwelcome), because when examined socio-culturally, the chemistry of Khat takes centre stage and it gets strongly demonized, but when Khat is examined from economic perspective, the economic value of miraa over rules all the negativities associated with it which may be the same with Khat production in Siakago as observed by (Mwangi, 2009); (Njiru, et al, 2013); (Mugendi, 2017). Kathata (2017), on his study of socio-cultural changes in the farming and use of Khat in Igembe from 1940-2014, observed that Khat was politically and socially gurded commodity where the policy maker face stiff opposition when they propose diversification in farming.

Kathata further observed that regardless of millions of money in circulation in Igembe, the money is owned by men who traditionally own Khat plants and they spend the fountune in town by eating in towns and really found in the households. Men don’t support their families making women the bread winners of the families (Kathata, 2014). Diversification into Khat production as a strategy to improving household’s income is common in Siakago Division of Embu County. It is an outstanding cash crop, very profitable to farmers as it is grown in the local market as well as for the export market (Carrier, 2005; Mwenda, et al., 2003). As a cash crop it provides employment to many people; farmers, middle men, businessmen, and transporters. In terms of Khat exports, on daily basis about 5 tons goes to Amsterdam, 7 tons to London and 20 tons to Somali while over 40 tons are consumed locally and within the region (Maitai, 1996). However, in spite of the increased diversification into Khat production in Mbeere especially in Siakago, there are still high poverty levels among the rural households estimated to stand at 57.4%. This implies that more than half of the total population lies below the poverty line (Mbeere District Vision Strategy, 2015). Hence the contributions of Khat production to the rural households socio economic live in Siakago remain uncertain. This scenario necessitated a study on the socio-economic impacts of Khat production on rural households of Siakago division, Mbeere Sub County.

**Statement of the Problem**

In every region of the world it is necessary to find or develop appropriate techniques for production. The goal of any agricultural production is to ensure continued food security for the involved community or country through income sustainability. Although Khat was introduced in Siakago to make the area agriculturally sustainable and improve the socio economic lives of producers, it seems not to be doing very well in spite of its high income because the people are unable to meet most of their basic needs. Poor households and deprivation of social infrastructure is still witnessed in the area. Hence Khat contribution to the rural household’s socio economic lives has not been given scholarly attention. This scenario necessitated a study on the socio economic impacts of Khat production on rural households of Siakago Division in Mbeere sub-county from 1980-2018.

**Purpose of the Study**

To assess the social-economic impacts of Khat production on rural households in Siakago Division, Mbeere Sub-county; Embu County from 1980 to2018.

**Objective of the Study**

To examine the social and economic activities of the people of Siakago of Mbeere before introduction of Khat.

**Research Question**

What were the socio-economic activities of the people of Siakago of Mbeere before introduction of Khat?
Significance of the Study
The study underscores the socio economic impacts of Khat production in Siakago Division. The findings of the study may help the government devise better policies that can promote the living standards of the people in the area. The study will also be of great importance in the whole county as it will create awareness on both positive and negative impacts of Khat farming. The research will also be useful to scholars of history on anthropology and archaeology. Art, social science and political studies who would wish to conduct the research on the impacts crop diversification in reference to Khat.

LITERATURE REVIEW
Social and Economic Activities of Siakago before Introduction of Khat
The Siakago people belong to the Ambeere ethnic group of Bantus speaking people, who are related to the Embu people since they share almost similar language and other customs (Mwaniki, 2010). The two groups have a history of economic and social ties, including the sale of food from Mbeere to Embu, and the sale of Mbeere labor especially in drought years (Mwaniki, 2008). The land use and soil management history of Ambeere were however, radically different from Embu because of the difference in agro-ecology, governmental programmes, and ties to the national market (LUCID, 2004). According to Mwaniki (2008); Mwaniki (2010); Brokensha and Riley (1977) in between 1950’s and 1960’s, most Siakago was mostly covered by bush or grassland that was used for raising large herds of goats and cattle. The vegetation was basically derived savannah, created by many years of grazing animals and use of fire (Brokensha and Riley 1977). Siakago was traditionally millet growing and goat raising zone. Indeed the history of Siakago shows that they considered themselves as herd’s tit-for-tat rustling of animals (and women) from Machakos Kambas, and were victims of rustling by the Maasai (Mwaniki, 2008) and (Mwaniki, 2010). Shifting cultivation, or rotational bush fallow, of millet and sorghum was done on small fields in wetter areas and on better soils, as allocated by clan elders every year (Njiru et al., 2013). As Mwanikis study shows that the Ambeere of Siakago were herdersand practiced shifting cultivation, the study would like to establish how this form of persant social and economy was interpreted by the diversification to Khat production.

People moved together in small groups, shifting their crops and homes, within the relatively small area controlled by their clans. Ties to urban centers and markets were weak, due to few schools and bad roads (Muriuki, 1974). Mixed farming was central to the economy and the most important crops are maize, millet, sorghum, beans, cassava, sugarcane, bananas, and mangoes. Ordhiambo et al., (2004), shows that cash crops such as tobacco and cotton were introduced in the area between 1960 to 1970s and they became the most important cash crops for the two decades. The people of Siakago valued livestock, particularly cattle, sheep, and goats, as source of wealth and prestige and their distribution varied by ecological zone (Michela, 2005). Herd sizes tended to increase in the low-lying areas. Chickens and ducks were everywhere, but owning them carried no prestige. The Siakago people also exploited a number of wild-food resources such as fruits. The most important and valued wild food is honey. It was eaten raw and used in the preparation of beer (Mwaniki, 1974) and (Mwaruvie, 2012). Muriuki (1974) study also focused of self-sustainment of people of Siakago through mixed farming, while Odhiambos, study shows when cash crops were introduced in the area. Both studies did not show the impact of changing economy of Siakago within that timeframe nor the drivers of diversification in the area. According to Mbugua (2002); Njiru et al.,(2013) and Mugendi (2017), land was traditionally a plentiful resource in Siakago and individuals or family groups could claim pieces of uncultivated bush and begin clearing it for cultivation. Pasturage was also freely available. Once land was claimed, it remained inalienable within the founding patrilineal segment, although an individual could pledge his piece of lineage land in exchange for livestock or some other value. The pledge was redeemable because an individual could regain his land on repayment of what he had received in exchange. Lineage land was inheritable by male descendants. A woman did not inherit lineage land but was allocated gardens by her husband from his own lineage property. This pattern has been altered dramatically since the end of World War II as land has become a commodity, convertible into cash and controlled increasingly by individuals rather than groups. Beginning in the 1950s and continuing with the independent government, this pattern has gained legal sanction, as individual ownership has become the centerpiece of a land-reform program. Contemporary land tenure thus emphasizes individual ownership of registered plots of land. The constraints previously exercised by one's lineage on the use or disposition of land are now greatly diminished. The study by Mbugua (2002) and Njiru et al (2013) gives an insight of how land was distributed and the form of ownership which is important to the study, since by extension the land size and availability was paramount indicator of Khat ownership and cultivation in Siakago division.

According to Mwaniki (2008), the Ambeere had patrilineal descent organized lineage of varying depth. The muci, or home, constituted a shallow lineage, which sometimes embraced four generations. It held land collectively. Lineages
in turn were embedded in dispersed non-corporate exogamous clans. These formed non-exogamous moieties. In the 1960s, when land became scarce, larger lineages grew more important. They mobilized to press claims for very large parcels of land. These parcels could then be divided among the membership, according to government directive. Descent coalitions consisting of several lineages of the same clan also emerged to establish their interests in sizable blocks of land. Terms of address and reference were distinguished for several categories of kin. Bifurcate-merging terminology marked Ego's parental generation. In Ego's generation, a variant of the Iroquois system occurred. Parallel cousins and siblings were equated, but both were collectively differentiated from cross cousins. Patrilateral and matrilateral cross cousins were categorized together or separated by descriptive terms. Grandparents and grandchildren used reciprocal designations. Various classificatory usages and other extensions of primary kin terms were utilized. All men of father's generation and clan were classed as fathers. Members of father's age set or generation set are similarly classified. Mwaniki (2008), give a good impression of how lineage owned land, but as analyzed, and reported events same clan also emerged to establish their interests.

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the two locations of Siakago division namely Muminji and Nthawa. The two locations are the highest producers of Khat in Siakago division. The study being descriptive in nature, there was need to have at list two categories of respondents which was crucial in comparision of the information provided. Thus, the two categories was the ‘producers’ and ‘consumers’. The produce group involved farmers at household level, both men and women since they held different view towards khat farming on social and economic impact at household level. The second group was consumers group targeting the khat harvesters commonly referred to as (mukei), small scale traders, chewers (consumers), transporters and bookers to complete the chain who were expected to give life experience of Khat market chain, origin of Khat and motivational factors towards diversification to Khat in the division. The two major producers of Khat were Nthawa with a population of 26,727 and Muminji with 16,728 (CBK, 2009).

Sampling Procedures
The study collected data from all farmers engaged in Khat production in Siakago Division of Mbeere North SubCounty. The study zeroed down to Nthawa and Muminji location of Siakago division owning to their leading role on Khat production, and resource constraints in term of time to conduct the study. Other factors considered were the locational factor such as the accessibility and proximity to the main Khat collection centers, selling sheeds and transport routes were an important consideration for narrowing down to the two locations. Further, in respect to the homogeneity of Khat production in the study area, 3 sub-locations per location were purposively selected to get 6 sub-locations and the respondents were indentified using simple random sampling method. This was also based on their geo-physical characteristics such as accessibility and physical existence of Khat in the farms, closeness to local Khat correction and trading sheeds. The selected sub-locations are shown in Table: 1.

Table 43: Basis for Selecting Sample Areas

<table>
<thead>
<tr>
<th>Locations</th>
<th>Sub Locations</th>
<th>Basis for being selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nthawa</td>
<td>Riandu</td>
<td>Proximity to road which is key in Khat transporttition, Expansive Khat farms, Is a Khat collection center.</td>
</tr>
<tr>
<td>Siakago</td>
<td>Proximity to tarmac road, Expansive Khat farms, High Population, Big Town, High number of Khat selling sheds</td>
<td></td>
</tr>
<tr>
<td>Gitiburi</td>
<td>Proximity to tarmac road, Expansive Khat farms, Has Khat marketing sheeds, Is a Khat collection center</td>
<td></td>
</tr>
<tr>
<td>Muminji</td>
<td>Karambari</td>
<td>Proximity to tarmac road, Expansive Khat farms, Has Khat marketing sheeds, Is a Khat collection center</td>
</tr>
<tr>
<td>Kirie</td>
<td>Proximity to road which is key in Khat transporttition, Expansive Khat farms, Is a Khat collection center</td>
<td></td>
</tr>
<tr>
<td>Gangara</td>
<td>Proximity to tarmac road, Expansive Khat farms, Has Khat marketing sheeds, Is a Khat collection center</td>
<td></td>
</tr>
</tbody>
</table>

Source: Field Work (2018)

Sample Size
According to the 2009 National Population Census, the cumulative population of the 6 Sub Locations was over 10,000. Since the total population is greater than 10,000, an ideal sample size was determined using the following formula by Mugenda and Mugenda (2003).

\[ n = \frac{Z^2pq}{D^2} \]

where,

- \( n \) = the desired sample size (if the target population is greater than 10,000), \( Z \) = the standard normal deviation at the required confidence level (standard value of 1.96), \( P \) = the proportion in the target population estimated to have characteristics being measured (0.5), \( Q \) = 1 - \( p \), \( D \) = the level of statistical significance (per cent margin error)

In the case of the study,

\[ n = \frac{1.96^2 \times 0.5(1 - 0.5)}{0.07^2} = 196 \]

A sample size of 196 was adopted and identified through simple random sampling method. This translated to the administration of 32 instruments per sampled Sub location. The sample subjects were determined randomly based on the assumption that they would adequately explain the dynamics of Khat production in the study area and the fact that the study was geared towards answering research questions specific to Khat production. In addition, the sample was considered optimum in terms of efficiency, reliability and representatives, in line with the argument by Kothari (2003) that the sample size should neither be excessively large, nor too small, but rather optimum. An optimum
The sample size is that which fulfills the requirements of efficiency, representatives, reliability and flexibility. The sample size is shown in Table 2.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Groups</th>
<th>Sample size</th>
<th>Percentages (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Producers</td>
<td>Farmers Male</td>
<td>60</td>
<td>30.6%</td>
</tr>
<tr>
<td></td>
<td>Farmers Female</td>
<td>60</td>
<td>30.6%</td>
</tr>
<tr>
<td>Consumers</td>
<td>Pickers</td>
<td>15</td>
<td>7.6%</td>
</tr>
<tr>
<td></td>
<td>Retailers</td>
<td>15</td>
<td>7.6%</td>
</tr>
<tr>
<td></td>
<td>Brokers</td>
<td>15</td>
<td>7.6%</td>
</tr>
<tr>
<td></td>
<td>Transporters</td>
<td>15</td>
<td>7.6%</td>
</tr>
<tr>
<td></td>
<td>Chewers</td>
<td>15</td>
<td>7.6%</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>196</td>
<td>100</td>
</tr>
</tbody>
</table>

Research Instruments
Data was collected using an interview schedule, focus group discussions and observations.

Data Collection Procedure
The study used three types of data that is primary data/oral, secondary data and archival data.

Data Analysis and Presentation
A thematic data analysis was undertaken in this study. A thematic analysis is the most useful in capturing the complexities of meaning within a textual data set (Tesch, 1990). It is also the most commonly used method of analysis in qualitative research. In this study, thematic analysis process involved data familiarization, coding, categorization, identification of patterns and interpretation of the patterns. The identified data was used to develop themes that address study objectives. Thus, themes in this study was related to the historical origin and the development of Khat production and trading in Mbeere Sub County; the socio economic impacts of Khat production both positive and negative among rural households since 1980 to 2017 and the measures put in place by the government to address the impacts of Khat. The data was first grouped in accordance to research instrument under the identified themes. This was followed by a comparison of the themes emerging from various data collection instruments. Finally, data addressing similar themes was merged from various data collection instruments. This ensured that the findings of the study were credible and presented the general picture on the ground.

Social and economic activities of the people of Siakago Sub County before introduction of khat in the 1980s

**Traditional Crop Production System in Siakago Sub County before 1980s**
After examination of the form of land ownership among the Siakago people, the researcher found it necessary to examine the crop production and land use among the people of siakago. This helped shed light on the food situation in the area before the introduction of khat. This was achieved by highlighting the economic activities that happened before the start of the current form of production. According to interviewees the Siakago people were hunters and gatherers during their initial settlement in the area. Hunting and gathering, therefore formed an important economic aspect in most of the pre-colonial period. The settlement formation was mainly influenced by the availability of water and proximity to farming land migunda and grazing land ruriyi (KNA/DC/EMBU/SIKAAGO/1/2/1939). They gathered vegetables and fruits such as managu, rwoga or terere (amaranthus lividus) and mukengeria (commelina benghalensis) according to Maria (2018).

According to Muruwambari (2018), Siakago people were originally gatherers and hunters “Athii”, just like the Agumba. Agricultural activities were adopted later as the community intermingled with other tribes. Nevertheless, according to (Ndwiga Josia & Eunis Wajuki, 2018) before and after 1980s the Siakago people’s life was based on mixed economies thus farming and livestock-keeping which emphasized on sheep, goats and some cattle keeping. Njeru (2018) noted that Boys and young men did hunting. They created hunting bands or groups that dispersed the hunt spoils among the band. Young boys killed different birds using slings or trapped them. The game animals mostly hunted included antelopes, rabbits, warthogs, elephants, birds thereby making hunting one of the chief sources of food (Wambari 2018). Leopard and monkeys were hunted for their skins, which were used for ceremonial purposes (Igandu, 2018). All the hunted food was just a small portion that supplemented animal and food crop production (Wanjuki, 2018). There were also several wild fruits that boys and girls enjoyed while herding like:
macuca, matunda, mbota and ndare. Bulrush millet and other millets were stored in a special store called mururu (Wambeti, 2018). Siakago farmers had knowledge on intercropping and this was based on soil types knowing which crops could be intercropped in which soils. Different crops were cultivated in different places with crops cultivated on valleys being different from those grown on ridge tops. Different mucege (Black jack), rwoga or terere (amaranthus lividus) and mukengeria (commelina benghalensis) if found growing in a certain area; this was recognized as fertile soil (Wambeti, 2018). Nonetheless, some crops couldn’t be intercropped such as millet according to majority of informants. They instead indicated that the crop could only be grown separately to allow bird scaring during crop ripening. It was also not planted during the long rains because it would be fully mature before the dry season and thus rot before it was harvested. Since early 1960s there was an increase in number of farmers who expressed interest in producing cash crops, but only a small minority had actually taken the risk (Njeru, 2018). Igandu, Ndliga and Ruamba, (2018) stated that the main cash crops grown from early 1960s up to 1980s was cotton, tobacco and to a lesser extent sunflower from mid-1970 and 1980s. In view of the few cash crops grown in the 1980s, most of the food crops, especially green grams, cowpeas and sorghum played the dual role as both food and cash crops, upon sale of surplus in good cropping seasons.

Notably, before the 1980s was not flourishing well in most areas of Siakago division, and livestock species kept were mainly indigenous breeds, which are adaptable to the marginal conditions prevailing in the Sub County, (KNA/DC/EMBU/SIAKAGO/1/14/1980: Runji, 1987: Mwaruvie, 1991). The indigenous breeds were mainly kept under free-range system and included cattle, sheep, goats and poultry. Dairy cattle, dairy goats and exotic poultry were kept in limited pockets in Siakago as per 1980 due to climatic conditions (Gachimbi et al., 2004). The researcher concluded that though the people of Siakago had adequate food before the introduction and consequently cultivation of khat they needed a cashcrop to enable meet their monetary needs. This was realized in the introduction of khat and its in line with the articulation of modes of production theory where pre-capitalist societies must embrace capitalism.

Cotton Farming in Siakago Sub County
Wagugu (2018) notes that the Siakago people experience frequent drought leading to exchange of labour for food with neighboring communities such as Embu and Chuka and therefore any new cash crop would be highly adopted by farmers to fill the existing gap in terms of cash crop and the proceed was to be used to buy food crops during drought periods. Cotton as a cash crop was introduced in the region in late 1960s and the climax of it production was in early 1970s to late 1980’s as a suitable cash crop for the region. The production reached its peak in 1984/85 with a production of 13,300 metric tons. However, there was a decline in cotton seed production after cotton industry was liberalized in 1984 and cotton production drastically reduced in Siakago (Ikiara et al., 2002). Njeru (2018) also concurs with (Ikiara et al., 2002) and adds that sometimes even cotton could not withstand the Siakago drought. It was reported however that the decline in cotton seed production from 1990 was a result of lack of finance and credit facilities for the small-scale farmers for land preparation and procurement of farm inputs, lack of organized supply of seed for planting, poor quality planting seed and poor agricultural practices leading to poor yields and low ginning outturns, lack of reliable market for farmers’ produce and delayed payments for the produce bought.

Tobacco Farming in Siakago Sub County
In early 1970s tobacco was also another cash crop introduced for the same purpose as cotton. Matiri (2002) observes that by 1970s and 1990s the areas main cash crop was mostly tobacco and cotton. In the turn of event the two cash crops were affected later by falling prices leading to farmers abandoning and shifting to other activities which would cater for their needs. Mitambo and Njoki (2018) stated that most of 1980s, tobacco drew a lot of attention of most farmers interested in cash crops in the high-potential area of in Southern Siakago. According to Ngogotia (2018) farmers had to balance the labor demands of the subsistence food economy against similar labor requirements to produce tobacco. From early 1980s-1990s, due to new cash crops introduced, the land started becoming highly prized both for its cash value and for its cash crop potential especially in tobacco in the lower area zones of Siakago and Evorore. Ruaria and Wambeti (2018) observed that, since the introduction of tobacco in early 1970s, farmers were required by the local cooperatives to cure their own tobacco. This critical aspect of tobacco culture necessitated the construction of a curing barn on each farm. These barns were considerably larger than the traditional huts or other structures around a typical homestead, and a good deal of labor went into their construction. Ruaria and Wambeti (2018) also stated that, by 1980 majority of farmers had decided to abandon raising tobacco due to their fear that the high labor expenditure for erecting a curing barn, in addition to the work of planting, weeding, harvesting, and curing the crop, would put at risk the more essential tasks surrounding the production of food crops. Ruaria and Wambeti (2018) posits that, in the past Siakago, almost every homestead had livestock shed and a
granary for storing agricultural produce for domestic consumption. But all that changed with the introduction of tobacco as a cash crop. This prompted in almost all homesteads, the livestock shed and the granary/food stores to disappear. All you could see after introduction of tobacco were dwellings and tobacco drying kilns in the compounds. Tobacco, the cash crop, had replaced the food crops and livestock and threatened the food security of every family. Yet tobacco was not yielding enough money for the people to buy food for subsistence and viable livelihoods. According to (Wabeti, 2018), a tobacco farmer, “I quit growing tobacco after I realized how little I was actually making.” I worked on my two-acre tobacco farm with my husband and six relatives to get the work done. When I began to cost their labor, I found that my annual profit was 50 shillings (less than one dollar),” she said.

**Division of Labour and Land Management in Siakago Sub County**

Agrarian activities schedule among the Siakago people stemmed at the onset of the rainy season and harvesting periods. The time between planting season and harvesting created an opportunity for people to rest while engaging in other duties like hunting, trading with neighbouring communities as well as crafts. Men were involved in hunting and fence repairs while women engaged in sisal basket making (Waturi, 2018). Prior to the introduction of the lunar calendar by the Europeans which the Siakago gradually adopted, their year was marked by two rainy seasons namely the long and short rains season. Mainly, the count of moons from the rain onset helped determine the appropriate time for planting main crops like millet and harvesting time. The short rains brought the millet season while the long rains brought the season of njavi (or maize) (Mwaniki, 1973). Land preparation was a mutual endeavor between women and men. Both genders played specific roles which predisposed making of decisions and labour division (Kariuki, 2018). As noted earlier, a prime piece of land for cultivation was indicated by the help of specific grasses or plants that thrived on it. The family head who normally owned the land would allocate portions for cultivation to his wives prior to onset of digging. Men could clear bushes and burn gathered refuse as they were perceived as stronger than their female counterparts. Men could further loose the soil while women followed with planting process (Dionisio, 2018). As the head of her own hut, a woman directed her children to work on her assigned portion of land. Initially, most of the tools used were wooden but were effective in cultivation. The most important wooden tool for men was a big digging stick known as munyago. It was made from hard woods like the minewgo, miringa and migaa (Kathunju, 2018).

**Droughts and Famines in Siakago**

The form of land ownership among the Siakago people was designed to ensure adequate food production to feed the community. There was interplay between ownership and production to mitigate food shortages. According to most informants, shortage of food was highly felt at the household more than the community level. Most food shortages in households were attributed to poor farming methods, unenterprising households, poor coordination of weeding and diseases (Igoki, 2018). Famines however, affected the entire community. Famines were either severe or occasional and the people were in a position to distinguish them easily. Severe famines were known as Yura while the occasional and less severe were referred to as Wathima (Igoki, 2018). Famines were as a result of extended drought periods experienced for over two consecutive seasons or more, invasion of crops by locusts before maturity or a combination of both calamities. As previously recorded in this context, several measures were employed to curb food shortage among the Siakago people. To begin with was the mode of preparedness for disaster culminated in the land ownership system and form of crop production. Owning several land portions and farming on fertile grounds was an attempt to curb food shortage. Secondly, crop selection was aimed at curbing food shortage. For instance, root crops such as cassavas, yams, sweet potatoes and arrowroots were grown not just for occasional consumption but to save in case of a famine. These crops survived invasion by locusts because they are tuber crops and the tubers couldn’t be affected. This scenario is similar to one recorded by Wangari in Kiambu whereby men could grow yams and cassavas which could be dug out usually in periods of famine (Wangari, 2010). In times of locust invasion, these crops were planted since their tubers could not be affected. On the other hand, people could catch locusts which were killed and consumed as a zest meant to supplement scarce food reserves such as vegetables (Wanjuki, 2018).

**Trading Activities among the Siakago people**

Excess production among the Siakago people was attributed to their form of owning land and effective food production necessitating trade. This implies that production among the Siakago people was not meant only subsistence but also aimed at trading with its neighbours. Similar too many Kenyan communities, the conditions of the ecology and the environment necessitated reliance on other people to cater for household needs. In order for the Siakago people to get commodities they did not produce, undeniable need to exchange excess produce developed among the people. Hopkins (1973) notes, ‘exchange, and subsistence activities were integrated’, it is therefore inaccurate to term societies such as the Siakago people one as having been subsistent. Thus, among many pre-
colonial societies, local trade resulted from the urge to satisfy complementary requirements in the community. Many communities similar to the Siakago people were lived in close proximity to one another and thus having surplus production was a strategy to accessing required goods. Generally, each household produced for not only subsistence but also surplus to sustain it in case of disasters and if there was no crisis, the surplus was disposed of through exchange to acquire other products (Omwoyo, 1990). In the sub-county local trade mostly involved women who did it on part time basis to secure goods, which their household lacked. The trade was small in volume and numerous people participated especially at the time of food crisis (Johana, 2018).

CONCLUSION
This chapter has highlighted the social and economic organization of the Siakago people before the introduction of khat. It has been noted that among the Siakago people land was communally owned and acted as a permanent factor of production. The Siakago people were organized into families, clans and society with a common ancestor. Power was controlled among the ruling units of families, clans and society by family heads, elders and atahmaki who settled disputes in their units of jurisdiction. The Siakago people were originally hunters and gatherers as well as crop producers (farmers) growing subsistence crops such as cereals, millet and sorghum. Tobacco and cotton was introduced later as chief cash crops in Siakago before their production went down. Labour was divided in the families depending on gender with men being involved in strenuous activities such as hunting and gathering while women and children were engaged in tilling the land and home chores. “Party system” was employed in land preparation which boosted unity in the community. Production was based solely in the rainy season with persistent droughts and famines adversely affecting the community’s food stores. They engaged in trading activities to acquire and exchange for commodities they didn’t produce or to boost their food supply. Trading was between them and their neighbouring communities such as Chuka and Embu.

REFERENCES


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ABSTRACT
Ethnic conflicts remain the biggest setback to the development of many African nations today, Kenya included. Different religions and religious organizations have responded in different ways in their effort to address this menace. For instance the Presbyterian Church of East Africa (PCEA) has initiated several peace building strategies aimed at enhancing inter-ethnic harmony in Kenya. Despite the Church’s effort in the promotion of harmony in Kenya, inter-ethnic conflicts continue to escalate in various parts of the country, notably Nairobi, Mombasa, Rift Valley and other parts of the country. This study analysed the efficacy of the PCEA peace building strategies in enhancing inter-ethnic harmony in Kenya. The study population was 1,624,345 PCEA members in following presbyteries namely Nakuru west, Nakuru east, Njoro, Elburgon, Laikipia, Eldoret and Mombasa where inter-ethnic conflicts are perceived to be dominant. From this population, a sample size of 384 respondents was obtained using Kathuri and Pals table of 1993. Simple random sampling was used to select the 384 respondents. The study used the descriptive survey research design and the instruments for data collection were questionnaires for the church elders and members, structured interview guide for church ministers and Focus Group Discussions (FGD’s) for the victims. The main findings were that the use of sermons; pastoral care and counselling; Bible study; peace building workshops; prayer movements; mainstreaming of Church standing groups; policy development by the PCEA’s General Assembly, lobbying and having a Peace desk which the PCEA has been employing as strategies to foster fostering inter-ethnic harmony in Kenya have not been effective. Ways and means should be explored to make the Strategies and Programmes employed by religions, religious organizations, Para-religious organizations, the government and other stakeholders in enhancing inter-ethnic harmony in Kenya and other parts of Africa effective. 

Keywords: Kenya, Religious Organizations, Peace Building Strategies, Inter-ethnic Harmony

INTRODUCTION
Since the end of the Cold War in 1980s, the world has witnessed an increasing number of inter-ethnic conflicts as well as other forms of conflicts ranging from religious, ethnic among others. In Africa, ethnic conflict is inherently a problem that requires effective peace building strategies to ensure ethnic tolerance and cohesion (Lynch, 2011). In Kenya, for example, there has been a marked increase in ethnic conflicts in the recent times (Onyebadi&Oyedeji, 2011). Since independence, Kenyan politics have been guided by ethnic politicking and competition, hence ethnic conflicts in 1992, 2002 and 2007/08 post-election violence which had a repugnant effect. The conflicts in Kenya are multiple and overlapping resulting from a range of factors including ethnic intolerance; historical injustices; border conflicts; ethno-regionalist sentiments and political party zoning; radicalisation; competition over land and other resources; proliferation of small arms; weak security; poverty, underdevelopment, and marginalisation. Inter-communal violence risks being increased by competition over the fruits of devolution and elite manipulation of local communities (Ombaka, 2015; Dowd & Raleigh, 2013; Halakhe, 2013; Sharamo, 2014; Boone, 2011).

The Presbyterian Church of East Africa (PCEA), in particular, has engaged in peace building initiatives in Kenya after the 2007/2008 post-election conflict Kenya (Mbogua, 2011). In doing this, the PCEA has had several strategies. Some of the strategies that are used by PCEA to bring forth Peace building and reconciliation are Dialogue, Co-ordination, Reconciliation, Participation, Training, Advocacy, Networking, Facilitation, Negotiation, Mediation and Problem Solving Workshops. (Mbogua, 2011). The PCEA actively undertakes a role towards peace building in all her Presbyteries through evangelism by using sermons and Biblical studies, having a peace desk, mainstreaming standing groups in the Church, pastoral care and guidance (Wainaina, 2015). It does this by spreading the Gospel of Christ which carries the message of salvation and belonging to one big family-the family of Christ. Another strategy employed by the PCEA in enhancing inter-ethnic harmony is having weekly prayer meetings. For instance, PCEA congregations in Eldoret have been holding weekly overnight inter-denominations prayer meetings (Keshas) to pray for the town of Eldoret (Njoroge, 2011). The Church has initiated home ‘Churches’/cells that are helpful in creating a bond of togetherness and a sense of belonging-to-one-family amongst the members irrespective of their tribal affiliations. Church visitations and having a peace desk are among other strategies employed by the PCEA in peace building. This activity is usually coordinated by the Church ministers in the presbyteries. The PCEA in Laikipia West District has similarly set up a network of districts. The districts are
group of families which meet once a week for prayers and sharing on any emergency issues. These districts channel
their problems to the congregation (Njoroge, 2011). The congregation may help the victims directly if they have the
resources or may contact the parish and presbytery for assistance. The foregoing show that the PCEA has been at the
forefront in fostering peace in areas of operation using various methods, particularly submission and confession,
mediation, dialogue, peace workshops and peace visits. In spite of this, conflicts recur, a factor that compelled us to
undertake this study so as investigate whether the strategies employed by the PCEA are effective or not.

This study was guided by the the Liberal Peace Theory advanced by Lederach (1997). Through the Liberal Peace
Theory, the concept of peace building and reconciliation is understood as a process that takes place along
approaches of conflict resolution. Wafula (2014) asserts that reconciliation is a condition that goes beyond the
conflict; however, the approach adopted in this study focuses on reconciliation as the last challenge to reach in order
to sort out a conflict. As long as you have people previously confronted not reconciled, the conflict is still there and
violence is likely to flourish anytime. Liberal peace theory thus underscores that reconciliation is fundamental in
conflictic contexts in order to get people living together in long term peace. Lederach (1997) lauds the expansion of
conflict resolution to include alternative dispute resolution, mediation, conciliation, violence prevention, early
warning systems, community reconciliation, nonviolent peacekeeping, trauma healing, second-track diplomacy, and
problem-solving workshops. Proponents of liberal peace theory argue that whatever the policy and whatever the
reasons whether religious or secular, there are powerful reasons to want citizens to support peace building
initiatives. According to the proponents of liberal peace theory, religious actors should use the modicum of religious
influence at their disposal to foster peace, justice and the common good of society. This view is premised on the
standard view that citizens should support basic liberal commitments proffered by the Church such as the rights to
religious decorum, forgiveness, and tolerance to promote inter-ethnic harmony.

More generally, proponents of Liberal Peace Theory maintain that a citizen may rely on his/ her religious
convictions to determine which individual actions promote justice and the common good and may support
interventions aimed at achieving the same even if such intervention may have no plausible material rationale. This
implies that people in communities where inter-ethnic conflict are prevalent abide by certain epistemic requirements
precisely because they support peace building initiatives in order to achieve normative propriety of their favoured
outcomes. If this is right, then, religious leaders have an obligation to aspire to persuade their religious compatriots
by appeal to religious reasons to support peace building initiatives implemented by the Church.

METHODOLOGY
This study adopted the descriptive survey research method employing a mixture of qualitative and quantitative
methods in many phases in the research process. The study was conducted in seven selected PCEA presbyteries in
Kenya where inter-ethnic conflicts have been reported dominant namely Nakuru west, Nakuru East, Njoro,
Elburgon, Eldoret, Laikipia and Pwani. The target population was 1,624,345 members from the presbyteries chosen
for this study namely; Nakuru, Eldoret, Laikipia and Pwani comprising of 103 ministers, 1620 church elders and
1622622 Ordinary Church members. The presbyteries were chosen because they cover conflict areas namely
Nakuru, Eldoret, Laikipia and Mombasa. The sample for this study was determined by using a Table for
determining the size of randomly selected sample adapted from Kathuri and Pols (1993). Kathuri and Pols (1993),
recommend a sample of 384 from a population exceeding one million. Out of the 384 recommended by Kathuri and
Pols (1993) the study selected 4 Church ministers 38 Church elders and 342 Church members who were affected by
ethnic conflicts totalling to 384 respondents. Of the 384, only 350 (91.1%) were available to provide with the
information used in this study.

Stratified simple random sampling was employed to select 4 Church ministers, 38 Church elders. The clergy and
Church elders were considered key informants as they are the ones overseeing the implementation of peace building
initiatives in the area and also are charged with the responsibility of providing pastoral care and are trusted in
preaching peace. The elders are in charge of a group of families referred to as district or home cells and are
responsible for their home cell’s pastoral needs.

To ensure the inclusion criteria were followed, the researchers interrogated church members that consented to take
part in the survey. Church members were targeted to provide information for this study as some of them might have
been affected by the conflicts and are being involved in peace building strategies initiated by the PCEA. According
to Creswell and Garrett (2008), a researcher needs to choose participants based on certain criteria that allows
him/her to arrive at the participants who are knowledgeable in the aspects that the study variables seeks to

Proceedings of the 6th International Research Conference
investigate. The study collected data using questionnaires for the Church elders and members, in-depth interview guide for the Church ministers (the presbytery moderator and the clerk) and Focus Group Discussions for the Church members who are victims. Saldana (2011) says that using multiple data gathering methods guarantees a wider spectrum of diverse perspectives for analysis and representation. Harris (2010) argues that limitation of one data collection method can be addressed by an additional method and that multiple data collection methods enhance credibility and trustworthiness.

Efficacy of PCEA Strategies in Enhancing Inter-Ethnic Harmony in Kenya

The purpose of this study was to investigate the efficacy of peace building strategies of PCEA, in enhancing inter-ethnic harmony in Kenya. This was necessary to highlight strengths of the Presbyterian Church in the process of sustainable peace building. The study evaluated peace building strategies of PCEA in peace building taking into account strategies such as Church Sermons, Pastoral care and counselling, Bible study, Peace-building workshops, Prayer movements, mainstreaming of various PCEA standing groups in peace building, Strategic direction for the Church formulated by general assembly regarding peace building, lobbying and having a peace desk.

A 5-point Likert scale was used for the respondents to rate the degree to which they agreed or disagreed with the peace building strategies used by PCEA in enhancing inter-ethnic harmony. Likert-type scaling requires multiple statements (items) to define the content and meaning of the construct being quantified. The score yielded by a Likert-type scale is a composite (summation) of the responses to the multiple items comprising the scale or subscale, not responses to single items. The data gathered using questionnaires were collated, encoded into the computer and statistically treated using the Statistical Package for Social Sciences (SPSS) version 21. The responses are captured in Table 1 below. The data in Table 1 show that sermons (Mean = 1.58), pastoral care and counselling (Mean = 1.73), inter-ethnic vocational Bible study (Mean = 1.91), peace building workshops (Mean 2.24), prayer movements (Mean =2.36), mainstreaming peace building in various PCEA standing groups (Mean =1.82), strategic directions provided by the GA on peace building (Mean = 2.41), lobbying (Mean = 2.10) and peace desk (Mean =1.88) as peace building strategies employed by PCEA are not effective. The results of the weighted mean of the responses measured on a five point Likert scale show that all had a mean less than 2.5. From the findings, all the peace building strategies employed by the PCEA in enhancing inter-ethnic harmony in Kenya that include sermons, pastoral care and counselling, inter-ethnic vocational Bible study, peace building workshops, prayer movements, mainstreaming peace building in various PCEA standing groups of the Church, strategic directions provided by the General Assembly on peace building, lobbying and having peace desk manned by Justice Peace and Reconciliation desk at the PCEA head office in Nairobi have not been effective. The responses are discussed in details below.

Church Sermons

With regard to Church sermons 187 (53%) strongly disagreed that Church Sermons had brought positive attitude change towards peaceful coexistence among inter-ethnic communities. The rest 132(38%) disagreed, 22(6%) were not sure that Church Sermons had brought positive change, 6(2%) agreed while 3(1%) strongly agreed. These findings imply that sermons implemented by PCEA as a method of peace building have not been effective in ensuring inter-ethnic harmony in Kenya as cited by the majority (53%) of the Church members. This is tandem with Wafula (2014) findings that preaching by use of sermons was not a strategic avenue for peace building in multi-religious nations like Kenya.

Pastoral Care and Counselling

The results further show that the majority 173(49%) of the Church members strongly disagreed while 127(36%) disagreed that pastoral care and counselling programme implemented by the PCEA was effective in enhancing inter-ethnic harmony. Only 7(2%) strongly agreed, while 16(5%) agreed as 27(8%) remained non-committal. Thus, it can be interpreted to mean that PCEA pastoral care and counselling has not been effective in bringing about lasting peace as cited by the majority (49%) of the Church members who took part in this study. Similarly, the ineffectiveness of the strategy was supported by 127(36%) of the members of the PCEA.

Inter-Ethnic Vocational Bible Study

The results of this study show that the majority 163(47%) of the Church members strongly disagreed while 113(32%) disagreed that inter-ethnic vocational Bible study had enabled victims of inter-ethnic conflict to reconcile hence enhancing inter-ethnic harmony. Conversely, 26(6%) strongly agreed while 14(4%) agreed and 38(11%) were neutral. The findings of this study imply that inter-ethnic Bible study used as a peace building strategy by the PCEA has seldom achieved the purpose of ensuring inter-ethnic harmony in Kenya. This is supported by the
majority of the Church elders and ordinary members that participated in this study. While 113(32%) also affirmed the ineffectiveness of the strategy in achieving the intended goal of ensuring inter-ethnic harmony, a section of the study population was of the contrary opinion by indicating that the strategy was effective as cited by 26(6%) who strongly agreed while 14(4%) agreed. However, 38(11%) of the members did not either disagree or agree. This observation is supported by Bauer and Traina (2011) and Wink (2010) who established that Bible study groups have failed to consolidate lasting peace in the community. necessary knowledge for identifying the ways in which violent interpretations can be countered and peaceful interpretations further developed.

This study interviewed 4 Church ministers who apparently supported this finding. Kimani (2018) did note that even though the Church had programmes for inter-ethnic vocational Bible study, the strategy was not well structured. Similarly, Muibei (2018) reported that the Church has been struggling hard to bring on board inter-ethnics to vocational Bible study aimed at enhancing reconciliation and galvanizing inter-ethnic harmony through more acceptable to the non-PCEA Christian populace especially in the Eldoret presbytery. These comments indicate that vocational Bible study spearheaded by PCEA as a peace building strategy was not effective.

Table 1. Efficacy of PCEA Peace Building Strategies

<table>
<thead>
<tr>
<th>Efficacy of Peace Building Strategies</th>
<th>Responses (n = 350)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>Church Sermons have brought positive attitude change towards peaceful coexistence among inter-ethnics</td>
<td>3(1)</td>
</tr>
<tr>
<td>Pastoral care and counselling of inter-ethnic conflicts victims has contributed to recovery and restoration of victims of inter-ethnic conflict thus enhancing inter-ethnic harmony</td>
<td>7(2)</td>
</tr>
<tr>
<td>Inter-ethnic vocational Bible study has enabled victims of inter-ethnic conflict to reconcile hence enhancing inter-ethnic harmony</td>
<td>22(6)</td>
</tr>
<tr>
<td>Peace-building workshops have been useful in imparting peace building skills and advocacy thereby enhancing inter-ethnic harmony</td>
<td>36(10)</td>
</tr>
<tr>
<td>Prayer movements to address inter-ethnic conflicts have facilitated healing and hope for the future for the victims</td>
<td>28(8)</td>
</tr>
<tr>
<td>Mainstreaming peace-building in various PCEA standing groups has brought about inclusion of all the society's groups towards the agenda of maintaining inter-ethnic harmony</td>
<td>6(2)</td>
</tr>
<tr>
<td>Strategic direction for the church formulated by general assembly regarding peace building has ensured harmony in delivery of peace building strategies in all thereby enhancing inter-ethnic harmony</td>
<td>18(5)</td>
</tr>
<tr>
<td>Lobbying the government to address inter-ethnic conflicts within NCCK has led to development of supportive policy has enhanced inter-ethnic harmony</td>
<td>16(5)</td>
</tr>
<tr>
<td>Peace desk</td>
<td>22(6)</td>
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</tbody>
</table>

The results of this study further show that, the mean response from all the responses as measured on five point Likert scale was 1.91. This implies that inter-ethnic vocational Bible study spearheaded by the PCEA has not been effective as a strategy of enhancing interethnic harmony in Kenya. This is in tandem Powers (2010) findings that
though Bible study is a useful tool to engage different people in peace building, the method has not achieved much due to ideological differences on doctrines and beliefs. Interreligious peace building strategies such as inter-ethnic vocational Bible study is a vital facet of peace building in societies with multiple religious’ affiliations. It is an avenue that can be explored further to achieve tangible development. It is clear that only the construction of a peaceful interpretation of Scripture can bring peace.

**Peace Building Workshops**

The results presented in Table 9 indicate that 135(39%) of the Church members strongly disagreed, 91(26%) disagreed, 64(18%) were neutral, 24(7%) agreed while 36(10%) strongly agreed that peace building workshops have been useful in stopping inter-ethnic conflicts. The results here imply that peace building workshops implemented by the PCEA have not been useful in stopping inter-ethnic conflicts in Kenya. Based on the findings, it was evident that the majority 135(39%) of the Church members strongly disputed the effectiveness of this strategy, while 91(26%) also dissented, 64(18%) remained non-committal and 24(7%) felt that the strategy was somehow effective and 36(10%) strongly agreed that the strategy was effective. In support of this, Muibei (2018) indicated that peace building workshops have failed to consolidate any meaningful gains because in most cases participants fail to implement peace building strategies imparted to them probably due to apathy or rigidity to embrace change.

The PCEA initiated a strategy of mitigating inter-ethnic conflict through engaging the conflicting communities in peace building workshops. The strategy was developed as a policy for peace building to enhance inter-ethnic harmony. The peace building workshops aim to serve as a model of inclusive development processes where participants come together as equals to bring about changes in attitudes, behaviours, systems and structures that build peace as a result of processes and linkages initiated in these workshops. In particular, to build an acceptance and an understanding of the link between change and the potential of change to contribute either to violence or to peace, to develop long term relationships and linkages between development actors at different levels and from different sectors; to acknowledge a common responsibility and building a commitment to a common way forward. The peace building workshops further aim at creating an environment where open and honest discussion takes place and building relationships that can be sustained beyond the workshop. Whereas the value of peace building workshops are well documented, the success of the strategy in achieving its core objective of promoting inter-ethnic harmony in Kenya remained unknown before this study was conducted.

The study purposely ventured into finding out what has been achieved so far by peace building workshops. The results of this study show that the mean response was 2.24 that correspond to disagree on the Likert scale. This implies that peace-building workshops have not been very useful in galvanizing inter-ethnic harmony. Conversely, peace building initiatives that do not produce any positive impact must be disconnected or re-invented. In concrete terms, this means giving the strategy a critical evaluation and organizing the strategy in a manner that is effective to respond to inter-ethnic conflict constructively.

**Prayer Movements**

The results in Table 1 further shows that the majority 118(34%) of the Church members disagreed that prayer movements initiated by the PCEA to enhance inter-ethnic harmony were useful. On a similar vein, 90(26%) strongly disagreed, 96(27%) were non-committal, 28(8%) strongly agreed while 18(5%) agreed. The results of this study show that prayer movements implemented by the PCEA have not succeeded in bringing about lasting peace in Kenya. Indeed, this is reflected by the majority 118(34%) of the Church members who disagreed that prayer movements initiated by the PCEA to enhance inter-ethnic harmony were useful. This was also reflected by the 90(26%) of the respondents who on the other hand strongly disagreed as opposed to 96(27%) who remained non-committal on this and 28(8%) who strongly agreed and 18(5%) who agreed that the strategy was effective. The results of this study are congruent with Njoroge (2011)’s findings that despite the Church having members and groups of families who meet once a week for prayers and sharing on any emergences, peace building efforts have seldom yielded much.

In the views of one of the presbytery moderators, prayer is the key that unlocks all the storehouses of God’s infinite grace and power. All that God is, and all that God has, is at the disposal of the prayer. But we must use the key. Prayer can do anything that God can do, and as God can do anything, prayer is omnipotent (Warutere, 2018). Thus, prayer is a powerful constituent of religious norms and values that addresses the most profound existential issues of human life. Prayer opens the heart not only to a deep relationship with God, but also to an encounter with others, marked by respect, understanding, esteem and love. This spirituality, with roots in, for example, the dignity
of every person, active nonviolence, reconciliation and the gift of diversity is richly influenced by the PCEA tradition in which prayer movements have been initiated.

**Mainstreaming Church Standing Groups**

The results of this study also indicate that mainstreaming various Church groups in peace building was not efficacious either. Out of the 350 Church members that took part in this study 154(44%) strongly disagreed, 144(41%) disagreed, 32(9%) were neutral, 14(4%) agreed while 6(2%) strongly agreed. The findings can be interpreted to mean that inter-ethnic harmony in Kenya has not been achieved through PCEA’s intervention of mainstreaming Church Standing Groups in peace building. This is according to 154(44%) who strongly disagreed with the sentiment that the strategy was effective, 144(41%) who also disagreed, 32(9%) remained neutral, that is, they could not explicitly say the strategy worked or not while 14(4%) of the respondents agreed the strategy was effective and 6(2%) that strongly agreed the strategy was working.

This study interrogated the efficacy of mainstreaming various PCEA standing groups in peace-building. This was aimed at establishing whether inclusion of all the Church groups in peace building initiatives has enhanced her agenda of maintaining inter-ethnic harmony in Kenya. The vision of mainstreaming various PCEA standing groups in peace-building was to propagate peace-building ministries among the churches and civil society organizations through consultations, seminars, cell groups, seminary courses, and other modes of communication and education. An analysis from the participants’ responses show that the mean responses was 1.82 measured at a 5-point Likert scale corresponding to disagree.

This implies that mainstreaming various PCEA standing groups in peace-building has seldom achieved its goal of enhancing inter-ethnic harmony. Drawing on findings, it can probably be argued that the weakness of mainstreaming PCEA standing groups in peace building may be as a result of two factors. First, some groups or individuals may have reservations about working with actors of a different religion or those opposed to the intersection of religion and peace building. Second, religious peace actors may be perceived to be proselytizing, by actively seeking to attract religious membership or conversion. Though there is instrumental value in integrating Church standing group’s in peace building efforts, it is important to stress that progress towards mainstreaming of Church groups in peace building goals is neither a given outcome nor will it follow a linear process of change. It is therefore important that PCEA re-thinks her strategies in mission work and especially on peace building.

**Policy Directions on Peace by the PCEA General Assembly**

The result of this study show that the majority 156(45%) of the Church members disagreed while 61(17%) strongly disagreed that policy directions on peace provided by the PCEA General Assembly (GA) to the presbyteries have been effective in enhancing inter-ethnic harmony through bolstering lasting peace. Conversely, 37(11%) agreed and 18(5%) strongly agreed while 78(22%) remained non-committal. The findings imply that the policy directions on peace building provided by the GA to her members in a cascaded framework have not been effective in ensuring inter-ethnic harmony in Kenya. This is manifested in the responses from the majority 156(45%) of the Church members who indicated their resentments. A similar resentment was reflected by 61(17%) who strongly disagreed that policy directions on peace building provided by the General Assembly of PCEA to the presbyteries have been effective in enhancing inter-ethnic harmony through bolstering lasting peace. The responses from 37(11%) and 18(5%) who either agreed or strongly agreed was not significant to tilt the balance, while 78(22%) appeared not to affirm or disapprove that policy directions on peace building provided by the General Assembly to her members were effective in ensuring inter-ethnic harmony or not.

The PCEA General Assembly formulates and provides policy directions on peace building and conflict management to its members in the respective presbyteries in Kenya. It does so by providing direction to all her congregational members and affiliates (Kaania, 2018). The General Assembly is the Church’s supreme legislative, administrative and judicial authority, and like all other subordinate church bodies and congregations, is governed by the church constitution (Njoroge, 2011). Under the policy slogan “Peace building is the believers’ calling” the General Assembly of PCEA has provided direction to the respective presbyteries to work with communities, Churches and institutions in order to avert, transform, mediate and resolve conflicts.

The General Assembly practice of developing and providing policy directions on peace building has not been effective in enhancing inter-ethnic harmony in Kenya (Mean = 2.41). A verbatim response from Gichunge (2018) supports this finding when he reported that “Most congregations have no rules or structure for helping people
negotiate or collaborate, towards achieving peace. I have not yet been in a Church that has a decent set of programmes on how to deal with inter-ethnic conflict mitigation in this region. The study postulates that although religious structures are strategically placed in ensuring continued cohesion in the area, they lack adequate capacity. Peace building strategies must be coherent and tailored to the specific needs of the communities concerned, based on national ownership and should comprise a carefully prioritized, sequenced and therefore relatively narrow set of activities aimed at achieving the objectives. This information is useful to state and non-state actors as well as institutions seeking to foster sustainable peace through enhancement of inter-ethnic harmony in Kenya. The disconnect between numerous peace building interventions strategies among conflicting ethnic communities and its dismal impact should form a basis of interest for future studies.

**Lobbying through National Council of the Churches of Kenya (NCCK)**

This study sought to find out if PCEA strategy of using the National Council of Churches of Kenya (NCCK) to reach out and influence the government to create legislation on peace building has achieved this goal. The results obtained show that the majority 142(40%) of the Church members strongly disagreed, 94(27%) disagreed, 66(19%) were neutral on this while 32(9%) and 16(5%) agreed and strongly agreed respectively. The findings of this study imply that though the PCEA has used NCCK to lobby the government to come up with effective mechanisms to mitigate conflict, the strategy has seldom achieved this goal. This can be attested by looking at the respondents’ perceptions regarding the matter. Going by this, it was evident that the majority 142(40%) of the Church members strongly disagreed that PCEA’s strategy of using the NCCK to reach out and influence the government to create legislation on peace building has achieved any tangible deliverables. On a similar vein, 94(27%) disagreed, 66(19%) were neutral on this while 32(9%) and 16(5%) agreed and strongly agreed respectively. In a study of the struggle against “Ethnic Clashes” in Kenya, Klopp (2009) established that the moral leadership and organization of the National Council of Churches of Kenya (NCCK) is one of the few key counter forces to the dangerous violence experienced in society.

This Church-led peace-building approach is legitimised in part by the Church’s moral and spiritual authority, providing her with a certain leverage to mitigate conflict. Furthermore, the Church enjoys a special niche to lobby government and contribute to policy changes. Specifically, the study sought information on whether reaching out to the government singly or within NCCK to address inter-ethnic conflicts has led to development of supportive policy for enhancing inter-ethnic harmony in Kenya. Founded in 1913 during the United Missionary Conference, NCCK has vast experience in the area of peace building and conflict management. By using Church networks as a platform, different actors have tried to involve in peace-building processes in Kenya. This Church-led peace-building approach is legitimised in part with reference to the unique position the Church holds locally in these societies, and in part because their leaders are held in high esteem nationally and transnationally. The summed scores of the responses (mean = 2.10) show that the corresponding Likert inference is disagree. This therefore leads to the conclusion that the PCEA strategy of using NCCK to reach out and influence the government to create legislation on peace building has not completely achieved this goal.

A verbatim response obtained from Ndambiri (2018) show that for NCCK, policy advocacy was and continues to be a strategy for long term healing and reconciliation. The Council was involved in influencing the passage of pieces of legislation such as the Truth, Justice and Reconciliation Act, National Cohesion and Integration Act, The Constitutional Review Act of 2008, and the Witness Protection Act in the Kenyan Parliament. The other facet of advocacy that the NCCK was involved in as indicated by Murang’a (2018) was in the domain of transitional justice. Additionally, as part of advocacy, NCCK is involved in monitoring the process of the Kenya National Dialogue and Reconciliation Project (KNDR) as parts of efforts to ensure that the reform process was underway following the signing of the National Accord on February 28, 2008, a process that laid the framework for a coalition government for the sake of national unity. Among other issues, the Council continued to lobby the government to address the plight of internally displaced persons in areas such as compensation and resettlement.

On a similar vein, Mwangi (2018) indicated that despite challenges faced, NCCK has played a great role for the conflict management of 2007 election violence in Kenya. In general, Mwangi asserts that since religious institutions have a deep understanding of the local context and to all levels of power community, nation-giving them the ability to work to address conflicts successfully on multiple levels. Mwangi (2018) continues to point that the PCEA has been partnering with the government through NCCK in the national process of reconciliation, supplementing the government’s top-down strategy with bottom-up approaches.
**Peace Desk**

The study further investigated the impact of having a peace desk on peace building and enhancing inter-ethnic harmony. The results of this study indicate that the majority 163(47%) strongly disagreed, 113(32%) disagreed, 48(14%) were neutral while 4(1%) agreed and 22(6%) strongly agreed that the peace desk at head office manned by the JPRC has been helpful in enhancing inter-ethnic harmony. The implication of these findings is that though the PCEA has a peace desk managed by Justice, Peace and Reconciliation Committee (JPRC) at the head office, the desk has not been vibrant as it used to be when the JPRC was first formed. Indeed, the lack of efficacy of the peace desk is supported by the majority 163(47%) of the Church elders and ordinary members who strongly disagreed, that it was effective, 113(32%) disagreed, 48(14%) were neutral while 4(1%) agreed and 22(6%) strongly in agreement.

This is congruent with Call and Cousens (2008) findings that much of the Church's work for peace, especially at the local level, is not well known or well understood. Thus, the Peace Desk aims to stimulate a more systematic sharing, mapping and analysis of the best practices in peace and conflict management in the Church. The results obtained show that the summed scores of the responses (mean = 1.88) correspond to disagree on a 5-point Likert scale. This therefore leads to the conclusion that the PCEA strategy of using a Peace Desk aimed at connecting peace builders from different regions and partner with other ecumenical bodies and religious organization in order to build and deepen relationships and enhance the exchange of ideas has not completely achieved this goal.

Responses from Church members were triangulated with interview responses from the Presbytery moderators. A large percentage of those interviewed noted that the Church has been involved in a number of peace building strategies. For example, Mburu (2018) explained that peace committees under the aegis of the Church play a significant role in facilitating consultative peace dialogues; act as alert systems to prevent conflict before they happen; and also raise awareness within and between the warring communities. There are several concerns however which were raised touching on the role, the structure and capacity of these peace committees. Many presbytery moderators felt that the peace committees do not have defined roles and as a result their impact at the grassroots level where the actual planning and carrying out of conflict particularly by the locals has not been realized.

Results of the Focus Groups indicate that other peace building strategies employed by the PCEA in ensuring inter-ethnic harmony in Kenya included inter-faith dialogue and missions, spearheading interfaith council of clerics and initiating religious caucuses such as “Chemchemi Ya Ukweli”. Inter-religious Council of Kenya (IRCK) is the leading interfaith body, whose central mission is to foster peace and interfaith dialogue, aimed at promoting tolerance and understanding among faith communities in Kenya through mobilizing joint actions for socioeconomic development. A prominent example of IRCK’s approach and activities was a two-day conference it organized in November 2014 on Youth for Peaceful Coexistence in Kenya. The event brought together students from institutions of higher education across Kenya to encourage interfaith conversation on countering violent extremism and radicalization among youth. Invited religious leaders from all faiths and peace practitioners interacted with the students through presentations and active dialogue. Participants sought answers as to how to engage youth proactively and actively on radicalization issues without causing tension or distrust.

The results of Pwani Presbytery reveal that religious leaders formed Coast Inter-Faith Council of Clerics (CICC) as a tool for peace building which works to promote peace in the coastal region of Kenya. CICC, a registered trust, has eight member organizations including: Catholic Archdiocese of Mombasa and SUPKEM. CICC grew originally out of a series of meetings organized by the Coastal Peace Initiative after 1997 violence in Likoni killed over 100 people over several weeks. Local faith leaders, Christian, Muslim, traditional, and Hindu came together in an open dialogue to identify the causes of the conflict and coordinate a faith-led peace effort. This led the religious leaders to realize that lasting peace can be achieved only through efforts that engage all ethnicities and religions, combining dialogue with different forms of action. According to the results of Focus Group Discussion held at St. Margaret PCEA in Pwani presbytery, it was noted that CICC has cultivated a trusting and respectful environment through a practice of open dialogue, where all member organizations willingly work together towards peace building. CICC undertakes conflict analysis in the region and works to address issues of religious intolerance, negative ethnicity and prejudice, political power struggle, poor governance, inequitable resource sharing, land ownership and utility, impunity and corruption, and unresolved historical injustices that frequently precipitate inter-ethnic conflicts.

The study further established that CICC clergy engage communities to discuss peace from a faith perspective and to diffuse community conflicts as they arise. A distinctive feature is its effort to work through all the member organizations, allowing CICC to reach communities from diverse ethnic and religious backgrounds. Their Interfaith
Youth Project, for instance, aimed to combat youth radicalization in the Kwale by teaching youth entrepreneurship, bookkeeping, peace building mechanisms, and food processing as a way to forge strong inter-ethnic and interfaith bonds and develop tangible skills to earn sustainable incomes. These are crucial for keeping youth away from violence. From this continuum, the Kwale Interfaith Youth Association (KIYA) emerged and now serves as an umbrella organization that helps coordinate youth peace building activities in Kwale with a nourishing micro-credit program. Despite this, the communities living in the coastal region have continued to experience sporadic waves of inter-ethnic conflicts. Perhaps a fuller picture of why conflicts persist even with scaled efforts such as engaging inter-faith groups in conflict intervention. This information is particularly important when attempting to gain a deeper understanding of how religion works and the many ways that it matters to people in relation to peace building efforts by the Church.

Besides CICC, “Chemchemi Ya Ukweli” is also relevant in Pwani presbytery. Chemichemi focuses on enhancing social transformation through active nonviolence, community policing, civic education, research, networking, and interreligious dialogue to achieve the rule of law, public safety, harmony and self-development. The organization has Catholic roots but has developed into an inclusive interfaith movement, linking Christians, Muslims, Hindus, and Bahai’s. Its nonviolence programs promote a culture of peace, empower peace activists, and create a support system that helps activists engage with their communities. Its holistic approach to peace involves a broad array of programs including agriculture, community policing, governance, and civic education, all designed to address systemic violence and reach out to historically oppressed communities, including women and youth. Chemichemi promotes interfaith dialogue to promote social cohesion, working with and supporting interfaith networks in communities throughout Kenya.

In the words of Munyorokun (2018), the core of Chemichemi’s peace building efforts is its training program. The training introduces community leaders to the concept of active nonviolence and encourages them to think about how they can foster it within their communities. Interested leaders then join a more intensive, five-day training where attendees are expected to share their new skills and knowledge with their own communities. Chemichemi relies on its trained peace building activists to identify and recruit new trainees to help sustain the training system. Lederach (2015) argues that religious organizations and institutions provide useful structures for reaching out to the broader population and engaging them in the peace building process. Creating vertical and horizontal networks for peace, such as between secular and religious peace builders or from the local to international level, changes the incentives for parties to a conflict, prompting them to end violent conflict and support peace. In a similar vein Muriithi (2018) reported that religious actors can generate or channel pressure for warring parties to agree to peace, address the drivers of the conflict and implement conflict transformation and reconciliation programming.

CONCLUSION
Religion acts as an agent of peace, justice and reconciliation. In this regard, religions in Kenya as in other parts of the world have employed peace building strategies that are aimed at promoting peace in areas that have been hit by conflicts. For example, the Presbyterian Church of East Africa (PCEA) has been involved in the promotion of peace, justice and reconciliation in Kenya. This has been through various strategies that are employed by the PCEA’s leadership to ensure that peace, justice and reconciliation are achieved in violence prone areas where PCEA is dominant. What is worrying is the fact that in spite of these efforts by the PCEA and other religious organizations, conflicts continue to be experienced in many parts of Kenya. From this study, it is clear that the cause of this is the fact that the strategies employed by the Church are not effective. In this regard, ways and means have to be employed to ensure that these strategies are effective. This is the only way in which peace, justice and reconciliation can be enhanced in Kenya and the rest of Africa. Religion is vital in bringing forth justice, peace and reconciliation but the methods employed have to be effective.

REFERENCES


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EMERGING TRENDS AND PERSISTENCE OF INTER-ETHNIC CONFLICTS IN KENYA

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ABSTRACT
Ethnic conflicts remain the biggest setback to the development of many African nations today, Kenya included. This study analysed the emerging trends and reasons for the persistence of inter-ethnic conflicts in Kenya. It was undertaken in the context of the Presbyterian Church of East Africa (PCEA) and was done in inter-ethnic prone Counties in Kenya including Nakuru, Eldoret, Laikipia and Mombasa. The study population was 1,624,345 PCEA members drawn from Nakuru west, Nakuru East, Njoro, Elburgon, Laikipia, Eldoret and Mombasa Presbyteries which are perceived as inter-ethnic conflicts dominant. A sample size of 384 respondents obtained through random sampling was selected from the presbyteries in the study locale. The study adopted a descriptive survey research design employing mixed methods of data collection. The instruments for data collection were questionnaires for the Church elders and members, structured interview guide for Church ministers and Focus Group Discussions (FGDs) for victims. The study established that the major reasons for the persistence of inter-ethnic conflicts in Kenya are radicalization, economic imperialism, elite manipulation, deep-rooted cultural practices and language prejudices. These are the vices that must be eradicated if at all the inter-ethnic conflicts which have been the major hiccups to the socio-political and economic development of Kenya will be effectively addressed.

Keywords: Kenya; inter-ethnic conflicts, Presbyterian Church of East Africa

INTRODUCTION
Since the end of the Cold War in 1980s, the world has witnessed inter-ethnic conflicts. In Africa, ethnic conflict is a problem that requires effective peace building strategies to ensure ethnic tolerance and cohesion (Lynch, 2011). In Kenya, there has been a marked increase in ethnic conflicts in the recent times (Onyebadi & Oyedeji, 2011). Since independence, Kenyan politics have been guided by ethnic politicking and competition, hence ethnic conflicts in 1992, 2002 and climaxed by the grave 2007/08 post-election violence which had a repugnant effect on this country. The conflicts in Kenya are multiple and overlapping resulting from ethnic intolerance; historical injustices; border conflicts; ethno-regionalist sentiments and political party zoning; radicalisation; competition over land and other resources; proliferation of small arms; weak security; poverty, underdevelopment, and marginalisation. Inter-communal violence risks being increased by competition over the fruits of devolution and elite manipulation of local communities (Ombaka, 2015; Dowd & Raleigh, 2013; Halakhe, 2013; Sharamo, 2014; Boone, 2011).

Conflicts are the major hiccups to the development of Kenya and the rest of African countries since independence (Kagema, 2015, and any effort to develop Africa must aim at their eradication. This study employed the Liberal Peace Theory advanced by Lederach (1997), which advocates that the concept of peace building and reconciliation is understood as a process that takes place along approaches of conflict resolution. This is in line with Wafula (2014)’s view that reconciliation is a condition that goes beyond the conflict. Notably, the approach adopted in this study focuses on reconciliation as the last challenge to reach in order to sort out a conflict. As long as you have people previously confronted not reconciled, the conflict is still there and the violence is likely to flourish anytime. Liberal peace theory thus underscores that reconciliation is fundamental in conflictive contexts in order to get people living together in long term peace. Lederach (1997) lauds the expansion of conflict resolution to include alternative dispute resolution, mediation, community conciliation, violence prevention, early warning systems, nonviolent peacekeeping, trauma healing, second-track diplomacy, and problem-solving workshops.

METHODOLOGY
This study adopted the descriptive survey research method employing a mixture of qualitative and quantitative methods in many phases in the research process. It was conducted using a qualitative, phenomenological in-depth interview and conduct Focus Group Discussions to examine the dynamics of inter-ethnic conflicts in Kenya and reasons for the persistence of the inter-ethnic conflicts in this country. It was undertaken in the context of the PCEA which Kagema (2012) informs that is among the fastest growing Churches in Kenya. Seven selected PCEA presbyteries located in Counties where inter-ethnic conflicts have been reported dominant namely Nakuru west, Nakuru East, Njoro, Elburgon, Eldoret, Laikipia and Mombasa were purposely selected for this study.

The target population was 1,624,345 PCEA members from the presbyteries chosen for this study namely Nakuru West, Nakuru East, Njoro, Elburgon, Eldoret, Laikipia and Pwani comprising of 103 ministers, 1620 church elders.
and 1, 622,622 Ordinary church members. The presbyteries were chosen because they are located in the conflict prone Counties namely Nakuru, Eldoret, Laikipia and Mombasa. This is reflected in Makori (2011)’s Report on Ethnic Conflict and National Security in Kenya, which showed that Nakuru, Eldoret, Laikipia and Mombasa are the worst hit Counties by conflicts in Kenya. Table 1 below shows the distribution of the presbyteries in the study locale and their population according to Church records of the year 2018. Using Kathuri and Pals (1993)’s table, 384 respondents were selected for this study. Out of the 384 respondents, there were 7 Church ministers, 38 Church elders and 342 Church members who were affected by ethnic conflicts. Simple Random Sampling was employed to identify the respondents.

### Table 1. Distribution of the Study Population

<table>
<thead>
<tr>
<th>Presbytery</th>
<th>Population of Church Ministers</th>
<th>Population of Church Elders</th>
<th>Population of Church members</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nakuru West</td>
<td>15</td>
<td>272</td>
<td>607000</td>
<td>607287</td>
</tr>
<tr>
<td>Nakuru East</td>
<td>19</td>
<td>284</td>
<td>636000</td>
<td>636303</td>
</tr>
<tr>
<td>Eldburgon</td>
<td>10</td>
<td>202</td>
<td>155000</td>
<td>155212</td>
</tr>
<tr>
<td>Njoro</td>
<td>13</td>
<td>242</td>
<td>202000</td>
<td>202255</td>
</tr>
<tr>
<td>Eldoret</td>
<td>10</td>
<td>150</td>
<td>3770</td>
<td>3930</td>
</tr>
<tr>
<td>Laikipia</td>
<td>26</td>
<td>290</td>
<td>9011</td>
<td>9327</td>
</tr>
<tr>
<td>Pwani</td>
<td>10</td>
<td>180</td>
<td>9841</td>
<td>10031</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>103</strong></td>
<td><strong>1620</strong></td>
<td><strong>1,622622</strong></td>
<td><strong>1624345</strong></td>
</tr>
</tbody>
</table>

Source: PCEA Records, 2018

**FINDINGS**

**Reasons for Persistence of Inter-Ethnic Conflicts in Kenya**

38 PCEA elders and 342 ordinary church members provided with reasons they perceived as the cause of the persistence of ethnic conflicts in Kenya. Using a Likert scale, they were required to indicate level of agreement with the reasons that were suggested by the researchers. The responses were measured on a five-point Likert rating scale provided, including ‘strongly agree’ (scored 5), ‘agree’ (scored 4), ‘neutral’ or ‘non-committal’ (scored 3), ‘disagree’ (scored 2) and ‘strongly disagree’ (scored 1). This section presents the available quantitative data which provides an overview of reasons for the trends in the persistence of inter-ethnic conflict in Kenya. This is followed by detailed information on some of the specific reasons which the study participants saw as important, their dynamics and specific contributory factors as revealed by the qualitative component of the research and supplemented by secondary data. The quantitative data obtained from questionnaires is captured in Table 2 below.

### Table 2. Reasons for the Persistence of Inter-Ethnic Conflict in Kenya

<table>
<thead>
<tr>
<th>Reasons for Persistence of Inter-Ethnic Conflict in Kenya</th>
<th>Responses (n = 350)</th>
<th>SA (54%)</th>
<th>A (27%)</th>
<th>N (14%)</th>
<th>D (9%)</th>
<th>SD (3%)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radicalization</td>
<td>190</td>
<td>122</td>
<td>22</td>
<td>4</td>
<td>12</td>
<td>4.35</td>
<td></td>
</tr>
<tr>
<td>Economic imperialism</td>
<td>204</td>
<td>94</td>
<td>12</td>
<td>16</td>
<td>24</td>
<td>4.25</td>
<td></td>
</tr>
<tr>
<td>Exclusion and marginalization</td>
<td>188</td>
<td>92</td>
<td>14</td>
<td>29</td>
<td>27</td>
<td>4.10</td>
<td></td>
</tr>
<tr>
<td>Elite manipulation</td>
<td>192</td>
<td>122</td>
<td>11</td>
<td>9</td>
<td>34</td>
<td>4.38</td>
<td></td>
</tr>
<tr>
<td>Deep rooted cultural practices</td>
<td>178</td>
<td>132</td>
<td>3</td>
<td>24</td>
<td>13</td>
<td>4.25</td>
<td></td>
</tr>
<tr>
<td>Language prejudice</td>
<td>154</td>
<td>104</td>
<td>26</td>
<td>51</td>
<td>15</td>
<td>3.94</td>
<td></td>
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</tbody>
</table>

From the results in Table 2, it is evident that economic imperialism (58%), exclusion and elite manipulation (55%), radicalization (54%), Exclusion and marginalization (54%), deep rooted cultural practices and stereotypes (51%) and language prejudice (44%) are main reasons for the persistence of inter-ethnic conflicts in Kenya. This implies that the majority of the Church elders and ordinary Church members see economic subjugation as the main reason for the persistence of inter-ethnic conflict in Kenya followed by elite manipulation, youth radicalization, exclusion and marginalization, deep-rooted cultural practices and finally language prejudices among others.
Economic Imperialism

Findings indicate that majority of members generally agree that economic imperialism is one of the main reasons for the persistence of inter-ethnic conflicts in Kenya (This because 204(58%) of the church members ‘strongly agreed’ and 94(27%) ‘agreed, indicating that 85% saw economic imperialism as the real issue ’). According to Mwadoe (2018), at the Kenyan coast, in Pwani presbytery, the indigenous groups complain of domination by “upcountry” communities in terms of economic opportunities. Indeed, such sentiments have often taken the form of calls for a neo-federal system of government at the Coast. Juma (2018) supported the views of Mwadoe by saying that Coast residents felt that all resources are concentrated upcountry and ‘Pwani’ or Coast is just a conduit.

This kind of scenario was confirmed in the Presbyteries. Following the interviews with 4 Church ministers and FGDs with 77 victims of inter-ethnic conflict comprising of 17 members in each group in Nakuru Presbytery and 60 in Eldoret Presbytery, the main contention is between the Kikuyu and the Kalenjin communities, where each community feels that the other denies it an opportunity to enjoy the county’s economic benefits. According to the FGD conducted in Eldoret, the Kalenjins perceive the Kikuyu as crafty and opportunistic since they gradually occupied their land, established businesses and overpowered themselves economically in their own soil. Since the Kalenjins have been majorly pastoralists, they feel that the Kikuyus, mainly farmers, cheated them by buying their large tracts of productive land very cheaply and thus became too powerful economically (Kinyua, 2018). Therefore, the Kalenjins after realizing the value of land economically, have decided to fight “for their right”, hence the persistence of conflicts despite many interventions. Thus issues such as corruption, poverty, inequality, Majimbo and economic growth have been reduced to a contest of ethnicities. For example, Corruption has been reduced into a “Kikuyu problem” where the Kikuyus are generally viewed as corrupt people. They are also viewed as the ones propagating ‘inequality’. The reaction to this is ‘Majimbo’ where the Kalenjins have organized themselves so as to reclaim their land (Cherono, 2018). This has been a source of conflict between these two communities living in Rift Valley (Kinyua, 2018). The responses of one of the respondents from Eldoret Presbytery can help us understand well how the situation is. She says that, “The Kikuyus think that the Kalenjins are too foolish and therefore do not know the value of land and, that is why they treat them as half-citizens. The enlightenment of the Kalenjins is the main reason for the persistence of conflicts between these two communities”.

From the FGDs carried out in Nakuru Presbytery, which is predominantly Kikuyu, the Kikuyu respondents regarded the Kalenjins as ‘lazy and non-industrious’. According to them, the conflicts arise and persist because the Kalenjins are jealous due to the progress of the Kikuyus. For example Maina (2018) argued that the Kalenjins envy the Kikuyus’ property not realizing that they get such wealth through hard work and resilience. This clearly shows that as far as some Kenyans are thinking like this we have a real problem. The government, religious organizations and other stakeholders have a heavy task if they will deal with this problem of inter-ethnic conflicts which continue to derail the development of this country and Africa as a whole. There will be need to change the attitude of communities towards each other so that they live in harmony. It is an issue that must be tackled properly. 345 (89.8%) of the respondents were of the view that the economic empowerment of the citizens by the County and National governments would play a great role in reconciling the infighting communities.

Manipulation by the Elite

192(55%) respondents strongly agreed, and 122(35%) agreed that elite manipulation was responsible for inter-ethnic conflicts in Kenya. Thus 90% of Church members saw it as a real issue. Focus Groups identified significant levels of elite manipulation of ethnic ideology for political survival in the advent of devolution. This means that elite manipulation emerged as one of the main reason for the persistence of inter-ethnic conflicts in Kenya. There is a general feeling that the elite minority are the ones who control power, wealth and influence. A similar finding was reported by Sehrawat and Sharma (2018) who posit that the state is seen as a possession of the ruling elite while at the same time alienating those who do not belong to the ruling political parties and affiliated ethnicities. In the same breadth, Botha (2014) provides the argument that political entrepreneurs use ethnic affiliation and manipulate ethnic grievances as the basis for political mobilisation. Mbugua and Rwanda (2018) support this view by asserting that a significant number of youth from certain tribes feel alienated from the national and county government employments thus show growing animosity towards them, largely because the political elites in government undermine the rule of law, making youth more vulnerable to underemployment. Similar assertions were generated in an exclusive interview with Reverend Kimani (2018), the Minister of PCEA St. Ninian’s, Nakuru who held the view that political elites incite ethnic violence for political gain.
Mbogua (2013) avers that the incentives for inter-ethnic conflict in terms of political gains are stronger than those for peace. The conflict is said to operate in a way that constantly undermines any positive institutional initiative that may try to amend the system or ameliorate the problem. Recent attempts to mitigate the use of ‘negative ethnicity’ by political elites through robust state and electoral institutions and trying to foster the emergence of cross-cutting issue based political coalitions have not succeeded in changing the status quo of ethnic politics. Thus, the role of political elite’ in instigating inter-ethnic conflicts has increasingly come under scrutiny as an emerging trend. Mumbi (2013) found that the Kenyan political elites have over time institutionalized ethnic politics and have used simmering ethnic grievances relating to land and exclusion to instigate ethnic-based electoral violence.

The role of elite pacts has been cited as a major determinant of political stability in a country, particularly a democratizing one (Guarnizo, Portes & Haller, 2003). On why some African countries have remained politically stable while others have been plagued by civil wars, Lindeman (2008) argues that the key causal factor is whether inclusive or exclusive elite bargains (pacts) are part of the political process. In other words, the levelling of inter-elite inequalities reduces the incentives for excluded political elites to instigate violent conflict. A similar view point is expressed by Orji (2010) who compared the 2007 elections in Nigeria and Kenya. Orji argues that the reason for the peaceful elections in Nigeria versus the violence in Kenya has been the informal power-sharing agreement between the country’s ethno-regional elites. Regardless of their origins, it is clear that economic discrimination has been a pathway manipulated by the political elites in Kenya. Therefore, the more intense and prevalent the economic discrimination and community balkanization of communities along these lines are, the more likely that affected groups will be mobilized to resist the demands. The resultant dispute is very likely to take on an ethnic dimension. This brings to the fore that if the issue of political elite manipulation of their co-ethnics remain unaddressed, historical narratives and grievances will continue to prevent social cohesion among communities in Kenya.

**Radicalization**

190(54%) of the respondents strongly agreed and 122(35%) agreed that radicalization especially for the youth in Pwani presbytery has exacerbated the problem of inter-ethnics conflict in the region. This implies that 89% of the citizens feel that in the coastal region of Kenya, conflicts are largely due to youth radicalization. There are dramatic regional variations in the types, tactics and perpetrators of inter-ethnic conflicts in Kenya. The nature and extent of crime and violence in the country varies according to the setting, that is, urban or rural, and the prevailing conditions of an area. The information gained was maximized by the use of key informant interviews and FGDs with respondents expected to have a broad or specific understanding of the dynamics (context and reasons for persistence) of inter-ethnic conflict in Kenya. In Pwani Presbytery, 2 clergymen interviewed and 1 FGD comprising of 11 Church members of inter-ethnic conflict indicated that youth radicalization was an emerging trend responsible for persistence inter-ethnic conflicts in the region. This is in tandem with Dowd and Raleigh (2013) findings that youth radicalization has tended to be clustered in the North Eastern regions which borders Somalia, the Coast area in the south-east, and Nairobi.

Sentiments derived from 11 victims of inter-ethnic conflict in Pwani presbytery who participated in FGD indicated that the history of youth radicalization into violence or radicalization leading to terrorism is quite contemporary and a complex psychosocial process. In trying to further espouse the issue, Munyoroku (2018) identified a number of factors responsible for the rise in violent extremism in Kenya, including the spill over of ideology, fighters and resources from Al-Shabaab’s occupation of Somalia, external actors who have exploited the instability in the porous coastal region (such as Salafi ideology and links with the Arab world), a burgeoning Muslim youth population, socio-economic disparities and lack of political representation as the main factors leading to radicalization.

In a similar vein, the results obtained from the FGD comprising of 11 members who were victims carried out in Pwani presbytery on the 27th day of October, 2018 at PCEA St. Margaret Church revealed that there were cross-cutting drivers of inter-ethnic conflicts mentioned repeatedly which included radicalization mainly caused by religious intolerance or indoctrination perpetuated mainly through ‘Madrasas. In support of Munyoroku and the sentiments of FGD, Mwandoe (2018) said that in Pwani Presbytery, the failure to address persistent land issues, engage with moderate local leaders and to establish the county government as a legitimate authority could be fuelling interreligious tensions, extremism and inter-ethnic conflict gravitated by the emerging trends of radicalization. In an exclusive interview, Mwandoe (2018) highlighted that over the last decade since 2010 many young men in Pwani presbytery have received training after being recruited by radical preachers to fight in Somalia for the Al-Shabaab. Mwandoe (2018) adds that when such youth return home, some of them still see themselves as pursuing Jihad, while others are disillusioned by the experience in Somalia. Mwandoe (2018) further posits that the
majority of the youth especially the Muslims in the coastal region are increasingly vulnerable to radicalization efforts, which are more now the standard practice. This discourse has increasingly appealed to Kenyan Muslims in the Coast. This effect is more pronounced in the Kenyan Coast. These findings indicate that inter-ethnic conflicts especially in the Kenyan Coast are a result of part of youth radicalization rooted in religious intolerance or indoctrination perpetuated mainly through ‘Madrasas’ and the spillover of Al-Shabaab’s ideology.

Social Exclusion and Marginalization
Exclusion and marginalization were cited as the other the main reasons for the persistence of inter-ethnic conflicts in Kenya. Of the respondents that took part in this study, 188(54%) strongly agreed, while 92(26%) agreed that inter-ethnic conflicts that sporadically flare-up in Kenya were as a result of exclusion and marginalization. A Focus Group Discussion involving 17 people conducted at PCEA Saint Margaret Church in Pwani Presbytery revealed the history of exclusion and marginalization of coastal people. Goldsmith (2009) describes it as the “crisis of second-class citizenship”, where the mixed-heritage Swahili are largely peripheral in post-independence Kenya.

The Coastal residents, according to the FGD members who took part in the survey, felt that exclusion and marginalization compelled them to the point of feeling that they were not Kenyans. Hence the slogan ‘Pwani si Kenya’ (Coast is not Kenya) based on secessionist tendencies. According to Nthambiri (2018), the Coast region has a long history of calling for secession from Kenya based on distinct ethno-regional identities and claims of socio-econmic marginalisation of the region. These claims of socio-economic marginalisation are of particular concern where they overlap with religious narratives used by the Muslim militants in the volatile regions.

On his part Munyoroku (2018), posits that the violence in the Coast is characterised by ‘relatively high volatility, reflected in sporadic spikes in violence, followed by relative lulls’. He asserts that until recently, street protests were the most common form of political action at the coast. Since 2008, the Mombasa Republican Council has regained momentum in its calls for secession, with a focus on land issues and economic frustration. Muthomi (2018) opines that people living in individual competitive conditions perceive ethnic out-groups as a threat, and that this in turn reinforces ethnic exclusionism. Contextual competitive conditions, particularly the presence of non-coastal citizens, also affect ethnic exclusionism. Muthomi (2018) further observes that there are close links between social exclusion and violent conflict and insecurity, both in terms of causes and consequences. There are now convincing arguments that some forms of social exclusion generate the conditions in which conflict can arise. This can range from civil unrest to violent armed conflict and terrorist activity. Severely disadvantaged groups with shared characteristics (such as ethnicity or religion) may resort to violent conflicts in order to claim their rights and redress inequalities. Group differences are not enough in themselves to cause conflict, but social exclusion and horizontal inequalities provide fertile ground for violent mobilization as has happened in the Kenyan Coast.

By analyzing why some societies with sharp horizontal inequalities suffer conflict and others do not, it became evident from the FGDs that conflict occurs most frequently when socio-economic and political horizontal inequalities are combined. While coastal communities have always nurtured the desire to exert sovereignty over their own affairs, land, and resources, the rise of the Mombasa Republican Council over the past years has imbued the issue with a renewed vibrancy and purpose (Nthambiri,2018).

Deep Rooted Cultural Practices and stereotyping others
178(51%) respondents strongly agreed, and 132(38%) agreed that deep rooted cultural practices and stereotyping were among the reasons why inter-ethnic conflicts continue to be experienced in Kenya. This implies that up to 89% of Kenyans see it as an issue. These findings agree with Wa Mutua (2017) assertion that inter-ethnic conflicts in Kenya are largely precipitated by deep rooted cultural practices such as male circumcision. A Kalenjin Church elder, Sawe (2018) said that the Kalenjins have a deep cultural practice where young men are trained to fight and even kill. She explained that young men are cultured to be war-like and whenever an opportunity for war arises they are quick to seize it. She elucidated that most of the reasons being given by the Kalenjins as the reasons for persistence of conflicts are just triggers. The real issue is that the community is ready for war any time. She emphasized that political incitement, land issues and economic dominance give the young men an opportunity to do what they are socialized to. In Laikipia, the 13 member FGD revealed that the Pokot raid other communities not just for economic gain but the vice is deeply rooted in their culture. One respondent claimed that raiding is taken as a sport. This makes inter-ethnic harmony difficult because some communities engage in battle as part of their normal life.
Other than the cultural aspect, communities living together stereotype each other so negatively that the generations that follow take the stereotypes to be factual. Different communities have a tendency of negative perceptions against each other. Ethnic stereotypes in Kenya are a major cause of ethnic tension that has led to bloodshed and displacement for many years in the county (TJRC, 2008). The FGDs in all the Presbyteries showed that stereotyping is a major reason for the persistence of conflicts in Kenya. In Pwani, Nakuru and Eldoret Presbyteries, the Kikuyus are stereotyped by all the other tribes as thieves, opportunists and land grabbers, people who love money excessively. This came out in all the FGDs and interviews and was cited as a reason as to why conflicts persist in Kenya. On the other hand, the Kikuyus regard the Coastal people and Kalenjins as lazy, non-industrious and envious; just waiting for handouts. According to FGDs carried out in Eldoret Presbytery, the Kikuyus stereotype the Kalenjins as war-mongers; people who fight for no apparent reason and are ready for a fight all the time. The FGDs carried out in Laikipia Presbytery revealed that the Kikuyu, Maasai and Turkana regard the Samburus and the Pokots as cattle rustlers thus making the pursuit of inter-ethnic harmony very difficult. As far as these cultural practices and stereotyping are not carefully addressed peace and reconciliation remain a nightmare in Kenya.

Language Prejudice and Stereotyping
The results of this study indicate that 154(44%) strongly agreed and 104(30%) agreed that language prejudice is a trigger of inter-ethnic conflicts in Kenya. This implies that up to 74% of Kenyans see this as factor leading to inter-ethnic conflicts. Similar findings were obtained by Sharamo (2014) when he found out that when a group insists on using their language in a cosmopolitan set-up, the rest who are not privy to the language feel excluded and this may occasion flare-ups. The 60 respondents who met at Ayub- Kinyua Church in Sirikwa, Eldoret town cited language choices in Church, business and general interactions in society as responsible for inter-ethnic conflicts among the various groups that lives in Eldoret. The main contention, they said, has been between the speakers of Kikuyu and Kalenjin languages. Though they cited other causes of conflicts for instance, the land issues and political incitements, they were emphatic of the fact that the insistence of the Kikuyus to use their language in complete disregard of others who cannot understand Kikuyu fuels animosity and makes it difficult for the stakeholders to address issues of inter-ethnic conflict. For example, the use of Kikuyu language in the Churches in total disregard of the presence of other communities was cited as a bad thing. The Kalenjins indicated that the predominant use of Kikuyu dialect in the Church Service makes them feel left out and makes the case for peace difficult.

The FGDs at Eldoret revealed that the trend of the Kikuyus, whom the Kajenjins view as intruders, changing the names of the indigenous Kalenjin places giving them Kikuyu names make the Kikuyus living in such places an easy target. For example, the Kiambaa PAG Church in Eldoret which was burnt and 35 people had taken refuge there killed during the 2007/2008 Post-election violence was targeted for this reason. The Church was originally called Lankia in Kalenjin language but the Kikuyus changed it to Kiambaa (Kikuyu language). Such others include PCEA Ayub Kinyua Memorial Church which was originally supposed to be Sirikwa among many others. The foregoing has made peace building efforts difficult in many parts of Rift Valley. It was because this that as noted by Ruto (2018), during the 2007/08Post-election violence most people took refuge in Catholic and African Inland Churches because they had retained the indigenous Kajenjin names. As such they were spared.

Notably, this problem is not a recent one. The reaction of the Kalenjins over what they consider the reclaiming of their ancestral land is not a new phenomenon, neither does it have its roots in the 1991/1992 ethnic clashes as it has been perceived by some people (See Githiga, 2001). As far back as 1969, the Honorable Jean Marie Seroney, who was Member of Parliament for Tinderet Constituency had drawn a controversy when he authored ‘The Nandi Declaration’ that demanded all non-Nandi residents vacate the ancestral land of Nandi. The Kenyatta government reacted by imprisoning Seroney for sedition but his ideas did not die. Ironically, in 1991/1992 President Moi’s government adopted Seroney’s template for ethnic exclusivity. He expanded to the larger Kalenjin community by evicting the Kikuyus, Luos, Luhyas and Kisiis in his bid to secure political victory in the Rift Valley. The truth is that despite public claims of reconciliation, divisions still run deep between communities in Rift Valley. As Rev. Maritim Rirei of the Anglican Church of Kenya, Eldoret Diocese puts it “The truth is that we are not making headway towards reconciliation (Rirei, 2018). These are issues that we will have to wrestle with if at all any meaningful reconciliation will be achieved in Kenya.

CONCLUSION
The dynamics of the inter-ethnic conflicts in Kenya are complex and intricate. While the Government, Church, Non-Governmental Organizations and other Peace agencies have made strenuous effort to bring forth Peace, Justice and Reconciliation in Kenya, their effort have been thwarted by the continuous persistence of inter-ethnic conflicts. The

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**Proceedings of the 6th International Research Conference**

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Page 478 of 702
factors leading to this are many as we have discussed in this paper. It is imperative that we look at ways of addressing the issues raised including Economic subjugation, Manipulation by the elite, Radicalization, Social exclusion and marginalization, outdated cultural practices and language prejudice. Unless well tackled, these vices will continue to hamper the effort to bring justice, peace and reconciliation in Kenya. We are not saying that all is lost. What we are emphasizing is that all stakeholders must join hands together so that together we can build a stable country devoid of endless inter-conflicts which only derail the development of our country.

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ABSTRACT
Marginalization has been widely linked to numerous social-economic challenges facing many countries. Marginalization is as a process by which a group or individual is denied access to important positions and symbols of economic, religious, or political power within any society a marginal group may actually constitute a numerical majority and should perhaps be distinguished from a minority group, which may be small in numbers, but has access to political or economic power. Youth radicalization in Mandera triangle, courtesy of marginalization has led to insecurity resulting in loss of lives, destruction of property and non-local workers seeking for transfer to other parts of the country. In the African context, socio-economic issues are key for radicalization processes. There is scanty literature on the correlation between marginalization and security in a developing country. The study investigated effect of marginalization on security situation in Mandera triangle. Data was obtained from all the six sub-counties, Mandera South, Mandera East, Mandera North, Banisa Mandera West and Lafey. Descriptive survey design was used in the study. Snowball sampling technique was used to identify 100 respondents from a target population of 200 youth. The sample size was distributed proportionately among the six sub-counties. Three key informants were purposively selected from institutions. A structured questionnaire was used to collect data. Descriptive and inferential statistics was used to analysis data. Statistical package for social sciences (SPSS Version 22) was used in the analysis of data. The study concludes that marginalization (β= 0.400, p<0.05) had positive significant effect on security in Mandera triangle. The study concluded that marginalization negatively affects security. From the conclusion, the study recommended that to address insecurity in Mandera, marginalization of the youth should be addressed at managerial and policy levels. The findings may inform the security sector in formulation of policies and laws in reducing marginalization and improving the security situation in Mandera Triangle.

Keywords: Marginalization, Radicalization, Security, Insecurity

INTRODUCTION
Bururia (2017) defines marginalization as a process by which a group or individual is denied access to important positions and symbols of economic, religious, or political power within any society a marginal group may actually constitute a numerical majority and should perhaps be distinguished from a minority group, which may be small in numbers, but has access to political or economic power. Africa in particular has a host of terrorist organizations that include Al-Qaida, Al-Shabaab, Wahabiya Salafist Sect in Ethiopia, the Boko Haram in northern Nigeria and the Lord’s Resistance Army, which continues to pose an increasing threat to sub-regional peace and security Cronin (2003). In the African context, socio-economic issues are key to radicalization processes. Indeed, the nexus between literacy, numeracy and the growth of radicalization has been observed in many areas across sub-Saharan Africa, including in the Sahel, North- east Nigeria, North Cameroon, North-East Kenya and Somalia. The weak capacity of the State, combined with high levels of corruption, unaccountable public administration, weak or ineffective judicial systems and security services perceived as serving the political interests of elites rather than protecting the rights of citizens are all actively fueling the rapid growth of radicalization across the African continent (UNDP, 2012).

According to Cronin (2003), the sub-region of East Africa accommodates diasporas radicalization; and is characterized by fragile states and ungoverned spaces; in addition to being anchored in the underlying axiom of Islamism. Somalia provides a safe place, training camps and opportunities for extremists to fight the ‘enemies of Islam’, Al-Shabaab have executed attacks in the region by relying on local assistance and support. Al-Shabaab has also managed to recruit Kenyan, Ugandan and Tanzanian nationals to its ranks in Somalia. However, some of these activities of recruitment and extremism are linked to the proliferation of radicalism in the region (Biegon, 2000). The radicalization of youths and their recruitment for violent and illegal activities is not new to Kenya (Hellsten, 2016). Kenya is a hot bed for radicalization as well as being home to multiple and complex domestic criminal groups besides the area also being characterized by a youth bulge. In Kenya, recruitment of individuals into radicalization is concentrated on the Kenya-Somali border and in Eastleigh estate in Nairobi which is predominantly inhabited by people of ethnic Somalis, Mandera Triangle has always been a political unit in a persistent struggle against a perceived marginalization. The youth have not been shy to coalesce in various religious-political groupings in search of recognition (Ali, 2008).
As long as citizens exclusively identify with an ethnic religious identity that is perceived to be under threat, radicalization will increase. In addition to being the victims of Al-Shabaab attacks, nationals from Kenya and Uganda are also directly involved in recruiting their fellow nationals to join the organization’s ranks. Initially, after being radicalized, these individuals leave their countries to fight in Somalia. This trend has gradually changed in that, locally marginalized, radicalized and recruited individuals started being used to execute attacks in their own country (Botha, 2014). The perceived political and socio-economic deprivation and religious inclination only serve to create an environment for nurturing radicalization and pro-terrorism attitudes among Kenyan Muslims. There have been notable measures to curb such factors particularly pinning down sources of funding and banning collaborating organizations in the country (Arts and Justus, 2010).

Social scientists, law enforcement organizations, and intelligence agencies all agree that terrorists are the product of a dynamic process called radicalization. Radicalization is the process of adopting for oneself or inculcating in others a commitment not only to a system of [radical] beliefs but also to their imposition on the rest of society. It is the compulsion to use violence to impose ones beliefs on the rest of society or to punish others for their “evil” actions or beliefs (Jenkins, 2009). This study was undertaken in Mandera triangle, bordering Ethiopia to the North and Somalia to the East and during the period 2013-2018 experienced a myriad of security challenges including attacks, ambushes, and killings and maiming of persons. The study investigated effect of marginalization on security in Mandera County, Kenya.

Statement of the Problem
From 2009, Kenya’s northern border was subject to numerous attacks which spread to other parts of the country, especially in the Mandera triangle. Nearly all of these have been blamed on al-Shabaab based in Somalia. The attacks caused the tragic loss of over 600 lives, destruction of property and a 20% reduction in tourist arrivals to Kenya in 2015 due to travel advisories in their countries. In 2015, earnings from the tourism sector were reported at KES 84.6 billion down from KES 97 billion in 2014. This is the heavy security issue that Kenya has to deal with. Marginalization and its twin sister radicalization of youths and their recruitment for violent and illegal activities is an emerging security concern in Kenya. Criminal gangs, ethnic sects and local militias have been active in Kenya. Youth radicalization in Mandera triangle has led to insecurity resulting in loss of lives, destruction property (including, Houses, killing of livestock, water resources, communication infrastructures) and non-local workers seeking for transfers to other parts of the country. The study therefore, sought to investigate causes of and effects of youth radicalization in Mandera triangle.

Objective of the Study
The Objective of the study was to investigate effect of marginalization on security in Mandera Triangle, Kenya.

Hypotheses
The study tested the following hypothesis:

\[ H_0: \text{Marginalization has no statistically significant effect on security in Mandera Triangle, Kenya} \]

Theoretical Framework
In understanding the causes that motivates individuals into radicalization, it is important first to understand relative deprivation as a theory of political violence. Gurr (2014) explains that instead of an absolute standard of deprivation, a gap between expected and achieved welfare creates collective discontent. This theory also applies to individuals who find their own welfare to be inferior to that of others to whom they compare themselves.

Gurr (2014) argues that relative deprivation is a term used to denote the tension that develops from a discrepancy between the “ought” and the “is” of collective value satisfaction. The concept of relative deprivation dates back to ancient Greece. Aristotle articulated the idea that revolution is driven by a relative sense or feeling of inequality, rather than an absolute measure. For Aristotle, the principal cause of revolution is the aspiration for economic or political equality on the part of the common people who lack it, and the aspiration, Gurr states that perceived discrepancy between value expectations and value capabilities is what leads to discontent, not the millionaire’s absolute economic standing. Gurr (2014) further explains that the primary source of the human capacity for violence appears to be the frustration-aggression mechanism - the anger induced by frustration- is a motivating force that disposes men to aggression, irrespective of its instrumentalities.”
However, Gurr was not the first in his field to propose a link between frustration and aggression. Dollard (2011) and others were the first to propose the theory, postulating that frustration leads men to act aggressively. Accordingly, frustration is caused by relative deprivation, and the resulting aggression is manifested as radicalization. Quantitative studies of radicalization have increased dramatically in the past decade. Many articles in this body of literature sought to explain radicalization as the result of poor economic development and lack of education in a country. However, it soon became clear that this is not the case. Krueger and Malecková argue that eradication of poverty and universal secondary education are unlikely to change these feelings. Indeed, those who are well-off and better-educated may even perceive such feelings more acutely. In fact, terrorists tend to be better-educated and wealthier individuals than average. Angus (2016) also notes that, the emerging picture is that terrorists are men and women in their twenties with some post-secondary training, mostly in technical or engineering education. For example, biographies of Al-Qaeda members recorded by Spalek (2007) reveal that they are generally highly educated, mostly in scientific or technical disciplines. More recent studies of radicalization have focused on individual determinants rather than any interaction effect of economic and social variables.

Dollard (2015) examines whether economic globalization increases or decreases transnational terrorist incidents inside countries. Globalization may be tied closely to relative deprivation, in the sense that greater access to information about people in other countries increases awareness of one’s relative world view. Dollard (2015) hypothesize that increased globalization leads to greater levels of international radicalization because trade makes it easier for terrorists to mobilize and move materials that they eventually use to carry out attacks across borders. Dollard (2015) finding on the connection between education, poverty, and radicalization confirm the core assumption that terrorists tend to be better educated and from wealthier backgrounds.

**Literature Review**

Bururia (2017) defines marginalization as a process by which a group or individual is denied access to important positions and symbols of economic, religious, or political power within any society a marginal group may actually constitute a numerical majority and should perhaps be distinguished from a minority group, which may be small in numbers, but has access to political or economic power. This study suggests that there is a relationship between socioeconomic features of countries and the occurrence radicalism of the youth. Though the experience of minority group injustice has been identified as a factor that arouses and fuels youth radicalism campaigns in numerous qualitative studies of individual countries or individual terrorist movements, it has largely been overlooked in the growing cross-national, time-queries quantitative literature investigating the root causes of youth radicalism (Amin, 2011). Apart from control outcomes in studies focused on democratic rule, political stability, and national demographic composition as prognosticators of youth radicalism (Amin, 2011), a cross national empirical investigation of minority economic status as a cause of youth radicalism has not been analytically undertaken. This is unusual, given the excess study of cross-national empirical factors on the causes of youth radicalism since 2001 and the importance afforded to the individual experience of ethnic, racial or class discrimination as a predictor of aggressive behavior and future violent crime within the sociology, social psychology, and criminology literatures (Bururia, 2017). There is some theoretical rationalization to suspect that a fundamental link exists between marginalized economic discrimination and domestic terrorist activity within countries and qualitative case studies of Northern Ireland and Latin America and research in Western Europe recognize marginalized group experience of discrimination as a cause for minority community radicalization that is misused by extremist movements and terrorist organizations (Bururia, 2017).

The correlation between discrimination and youth radicalism can also work the opposite way. Countries with minority groups that do not face dynamic economic discrimination, or where the issues of the minority discrimination are addressed through favorable policies that equalize the differences between minority and majority populations, validate that they can effectively assimilate minorities into mainstream life. Minority communities in non-discriminatory societies are unlikely to be radicalized or to be estranged from mainstream cultures, hence making the terrorist group mission less prevalent and no 18 terrorist group recruitments taking place. In the qualitative study of counter-youth radicalism responses in Northern Ireland, the Spanish Basque region, Italy against the Red Brigades, Uruguay against the Tupamaros, and Cyprus against EOKA.

Botha (2014) recognizes the poor economic status of certain group’s within the population, in its place of the overall economic climate, as a significant element in stimulating terrorist group enrollment and activities. In analyzing the effectiveness of counter-Youth radicalism tools, Hewitt acknowledges that active economic affirmative action for marginalized groups, for example education, health and housing subsidies in Northern Ireland, may reduce the threat
of youth radicalism. Minority communities that are not distressed are further likely to cooperate with state counter-
youth radicalism officials. The literature on qualitative counter-insurgency recognizes that nurturing a sense of
conventional system legality in the face of insurgent efforts is significant in securing community cooperation with
security efforts (Botha, 2014).

Amin (2011) view was that minority experience of economic discrimination might trigger domestic youth radicalism
. Furthermore if economic discrimination against minorities precipitates domestic youth radicalism by heightening
group infringements and motivating organization, then public policies crafted to enhance the effects of minority
economic discrimination should decrease domestic youth radicalism (Botha, 2014).

The paths toward radicalization among Muslim communities in East Africa vary, but some common themes emerge.
Al Qaeda and Al Shabaab both successfully use the ‘victimization narrative’ to recruit and elicit support,
manipulating perceptions of societal discrimination in countries like Kenya, where many Muslims express a sense of
social, cultural, political, and economic exclusion from the rest of the country. Kenya’s Muslim population is
concentrated largely in Coast and Northeastern Provinces, and in certain Nairobi neighborhoods like Eastleigh.
Social service delivery and infrastructure investments have been historically poor in these areas, in comparison with
other parts of the country. Middle East-based Islamic charities reportedly provided important social services,
including education and health care, before the government closed some of these enterprises as part of its response
to the 1998 embassy bombings and the September 2001 World Trade Center attacks. Boredom, idleness, and thrill-
seeking impulses among youth may also be push factors for extremism, and, when combined with feelings of
marginalization and frustrated expectations stemming from a lack of job opportunities in many East African
countries, make Muslim youth more susceptible to recruitment by groups like Alshabaab. As one anthropologist
argues, “today’s most violent youth radicalism is rooted in rootlessness and restlessness” (Botha, 2014).

Muslims make up an estimated 11 percent of Kenya’s population; large Muslim communities can be found in the
country’s northeast and in the coastal region. Traditionally, Kenya’s Muslims are moderate, with the community
peacefully seeking participation in politics. But ISS pointed to the historical political marginalization of Muslims -
right from negotiations for Kenya’s independence, in which ethnic Somalis, who are overwhelmingly Muslim, were
not represented - as a contributor to the radicalization of young people (Munir, 2014). Although Kenya is a secular
state, it is essentially a Christian country because of the dominant Christian population… There is the perception
that Islam is ‘alien’, despite the fact that it came to Kenya before Christianity,” the report notes. The report also
found that some young Kenyan Muslims have been influenced by radical preaching, which leads them to believe
that wars being fought against Muslims abroad - for example, in Afghanistan and Iraq - are part of “a global
campaign against Islam. According to a 2011 report by the UN Monitoring Group on Somalia and Eritrea, non-
Somali Kenyan nationals constituted the largest and most organized non-Somali group within Al-Shabaab

METHODOLOGY

The philosophical underpinning for the study was pragmatism whose aim is to determine practical solutions to
problems and actual meanings of the results using what works best and use it to understand the research problem.
This paradigm is always concerned with the implication of items and aims at the outcome of the research (Churchill,
2013). A descriptive survey design was used to give a detailed description of the determinants of youth
radicalization and security in Mandera Triangle. The target population consisted of all youth in Mandera County
while the accessible population was the 100 respondents (returnees) that were radicalized and had reformed and
formally surrendered to the security forces. Also 15 key informants were used as the target population. The target
population was obtained from six sub-county namely, Mandera South, Mandera East, Lafey, Mandera North,
Mandera West and Banisa because they were susceptible to security issues.

The sample size included respondents (returnees) who had reformed. Using the accessible population list of 100
returnees as a sampling frame, a sample size of 100 respondents (50% of the target population). Purposeful sampling
targeted respondents (returnees) who were radicalized and have voluntarily reformed and returned to the society.
Snow balling sampling technique was used to locate and identify the respondents (returnees and the key informants).
The selected sample size were distributed proportionately among the six sub-counties of Mandera East, Mandera
South, Mandera West, Banisa, Mandera North and Lafey. Face validity was tested by my supervisors who
scrutinized the questionnaire and discussed the questions to ensure a high degree of face validity in relation to the
expected structure of a questionnaire. To ensure content validity, the researcher will conducted a pilot study to test if
the questions formulated were measuring the set objective (Hayes, 2012). Alpha Coefficient was used to test on the
reliability which is usually used to measure internal consistency. A reliability coefficient of above 0.7 indicated that the instruments are reliable enough to be adopted for the study as indicated by Watheka (2015).

The research instruments used in the study was a close-ended questionnaire. The questionnaires for the returnees had both open-ended and closed-ended questions. The interview schedule was administered to key informants. Pilot study used 10% (10) of the sample size from Isiolo County. Data analysis is a process of examining, categorizing and rearranging the collected data with the purpose of finding a solution to the research. It involves reducing accumulated data to a manageable size, developing summaries, looking for patterns, and applying statistical techniques (Watheka, 2015). To establish the main characteristics of the study variables, descriptive statistics was employed. The main purpose of conducting descriptive statistics was to reduce, summarize data and describe items and constructs. The distribution shape of the variables using skewness and kurtosis was also undertaken in order to find out the deviation from the normality. Thereafter, the data was summarized visually using frequency distributions, percentages, and tables (Hair et al., 2011).

RESULTS
Response Rate
Although the study intended to collect data from 100 respondents, data was successfully collected from 92 respondents. This represents a response rate of 92% and falls within the confines of a large sample size (n ≥30). This response rate deemed acceptable in accordance with recommendations that a response rate above 92% is excellent (Kothari, 2011). This provides a smaller margin of error and good precision (Churchill, 2013).

Profile of Respondents
The demographic profile of the survey which includes gender, age, marital status, employment status, religion, sub-county of origin, average earnings per month, and education level. This information is presented in this section.

Gender of Respondents
When requested to indicate their gender, 100% (92) indicated that they were male. This is as summarized in Table 1.

Table 1: Gender of the Respondents, Source: Survey Data (2018)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>92</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Age of the Respondents
Results indicated that 6.5% of respondents were below 18 years, 52.2% were in age bracket 18-25 years, 31.5% were between 26-30 years old, while 9.8% were above between 31-35 years. This indicated that the majority of the respondents, more than half, were below in the age bracket 18-25. The results are summarized in Table 2.

Table 2: Age of the Respondents, Source: Survey Data (2018)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-25 years</td>
<td>48</td>
<td>52.2</td>
<td>52.2</td>
<td>52.2</td>
</tr>
<tr>
<td>26-30 Years</td>
<td>32</td>
<td>34.7</td>
<td>34.7</td>
<td>86.9</td>
</tr>
<tr>
<td>31-35 Years</td>
<td>12</td>
<td>13.1</td>
<td>13.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>92</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Marital Status of the Respondents
Data obtained indicated that 7.6% of the respondents were single, 84.8% were married, while 7.6% were widowers. The results are presented in Table 3.

Table 3: Marital Status of the Respondents

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>7</td>
<td>7.6</td>
<td>7.6</td>
<td>7.6</td>
</tr>
<tr>
<td>Married</td>
<td>78</td>
<td>84.8</td>
<td>84.8</td>
<td>92.4</td>
</tr>
<tr>
<td>Widowers</td>
<td>7</td>
<td>7.6</td>
<td>7.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>92</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>
Employment Status of the Respondents
As per the employment status of the respondents, data indicated that 12% were in formal employment, 77.2% were unemployed, while 9.8% were engaged in non-formal employment activities. This is an indication that there is widespread unemployment in the Madera triangle that underpins the security challenges experienced in area. The results are presented in Table 4.

Table 4: Employment Status of the Respondents

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal Employment</td>
<td>11</td>
<td>12.0</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Unemployed</td>
<td>72</td>
<td>78.2</td>
<td>78.2</td>
<td>90.2</td>
</tr>
<tr>
<td>Self Employment</td>
<td>9</td>
<td>9.8</td>
<td>9.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>92</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Survey Data (2018)

Monthly Earnings of the Respondents
Results showed that 72.8% of the respondents earned less than Ksh 5000 per month, 14.1% earned between 5,000 and 10,000, 8.7% had earnings the range 10,001 and 20,000, while a paltry 4.3% had earnings above Ksh 20,000. This is an indication of lack of economic empowerment that spurs insecurity in the Mandera triangle. The results are summarized in Table 4.

Table 4: Monthly Earnings of the Respondents

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than Ksh 5000</td>
<td>67</td>
<td>72.8</td>
<td>72.8</td>
<td>72.8</td>
</tr>
<tr>
<td>5000-10,000</td>
<td>13</td>
<td>14.1</td>
<td>14.1</td>
<td>87.0</td>
</tr>
<tr>
<td>10,001-20,000</td>
<td>8</td>
<td>8.7</td>
<td>8.7</td>
<td>95.7</td>
</tr>
<tr>
<td>More than 20,000</td>
<td>4</td>
<td>4.3</td>
<td>4.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>92</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Survey Data (2018)

Highest Education Level of the Respondents
Data on the highest education level attained by the respondents indicated that 7.6% had no formal education, 29.3% had KCPE certificate, 31.5% had KCSE, 13.0% had certificate level of education, and 13.0% were diploma holders. Only 4.0% had degree level of education with none having postgraduate education. The level of illiteracy among the respondents was high, most having attained primary and secondary education. In North Eastern province, literacy level of only 37.7 per cent was recorded in 1999 (Ombati, 2015). This is presented in Table 5.

Table 5: Highest Education Level

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>No formal education</td>
<td>7</td>
<td>7.6</td>
<td>7.6</td>
<td>7.6</td>
</tr>
<tr>
<td>KCPE</td>
<td>27</td>
<td>29.3</td>
<td>29.3</td>
<td>37.0</td>
</tr>
<tr>
<td>KCSE</td>
<td>29</td>
<td>31.5</td>
<td>31.5</td>
<td>68.5</td>
</tr>
<tr>
<td>Certificate</td>
<td>12</td>
<td>13.0</td>
<td>13.0</td>
<td>81.5</td>
</tr>
<tr>
<td>Diploma</td>
<td>12</td>
<td>13.0</td>
<td>13.0</td>
<td>94.6</td>
</tr>
<tr>
<td>Degree</td>
<td>5</td>
<td>5.4</td>
<td>5.4</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>92</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: Survey Data (2018)

Descriptive Statistics of the Study Variables
Descriptive statistics of means, standard errors, and standard deviation were obtained for the variable security and marginalization.

Marginalization
Considering the variable of marginalization, the mean as a measure of central tendency was found to be in the range 2.1522 to 2.9457 for the 10 items measuring the variable. The overall mean for the variable marginalization was found to be 2.5761. On a 5-point likert scale, this meant that the score was average on the aspect of marginalization.
The values of standard deviations for marginalization were in the range 1.09308 to 1.37529 and the overall standard deviation was .87233. The relatively high standard deviation value indicates that the variability in the spread of the scores was high. For standard error of the mean the value was .09095 indicating that the mean values for the items were reliable. Inspection of the scores of each item measuring marginalization indicated that the respondents scored highest in the item ‘I have not been recognized as a stakeholder in development issues’ (M4) which posted a mean value of 2.9457 with a standard deviation of 1.09308. On the other hand, the item ‘I Feel angry, alienated or disenfranchised’ (M9) had the lowest mean of 2.1522 with standard deviation of 1.24860. The marginalization descriptive statistics are presented below.

<table>
<thead>
<tr>
<th>Code</th>
<th>Item</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>I feel not engaged in the daily community activities</td>
<td>2.1957</td>
<td>.13931 1.33622</td>
</tr>
<tr>
<td>M2</td>
<td>I have not been involved in decision making</td>
<td>2.4891</td>
<td>.12698 1.21795</td>
</tr>
<tr>
<td>M3</td>
<td>I have not been empowered to participate in economic development</td>
<td>2.7935</td>
<td>.13444 1.27992</td>
</tr>
<tr>
<td>M4</td>
<td>I have not been recognized as a stakeholder in development issues</td>
<td>2.9457</td>
<td>.11396 1.09308</td>
</tr>
<tr>
<td>M5</td>
<td>I have felt a sense of hopelessness with my status quo</td>
<td>2.9130</td>
<td>.13881 1.33138</td>
</tr>
<tr>
<td>M6</td>
<td>I have no meaningful contribution to economic development</td>
<td>2.9022</td>
<td>.14338 1.37529</td>
</tr>
<tr>
<td>M7</td>
<td>I have no meaningful contribution social development</td>
<td>2.4457</td>
<td>.13682 1.31236</td>
</tr>
<tr>
<td>M8</td>
<td>I have been made to feel not important in the society</td>
<td>2.7283</td>
<td>.13572 1.30176</td>
</tr>
<tr>
<td>M9</td>
<td>I Feel angry, alienated or disenfranchised</td>
<td>2.1522</td>
<td>.13018 1.24860</td>
</tr>
<tr>
<td>M10</td>
<td>I Believe that the current political involvement does not give me the power to effect real change</td>
<td>2.1957</td>
<td>.13931 1.33622</td>
</tr>
</tbody>
</table>

Source: Survey Data (2018)

Security

The descriptive statistics for the items of security indicated that the means were in the range 2.46741 to 2.7391. This gave an overall mean of 2.5823. On a 5-point likert scale, the mean score were above average. The standard deviations were in the range 1.783 to 2.134. The overall standard deviation for security was 1.26385 and it infers that 99.9% of the responses were spread within three standard deviation of the overall mean. The relatively high standard deviation value indicates that the variability in the spread of the scores was low. The standard errors of the mean for the items measuring security were low indicating that the mean values for the items were reliable. Security descriptive statistics are presented in Table 7.

<table>
<thead>
<tr>
<th>Code</th>
<th>Item</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC1</td>
<td>Has had cases of religious violence</td>
<td>2.5543</td>
<td>.14611 1.40144</td>
</tr>
<tr>
<td>SC2</td>
<td>Has reported many cases of political violence</td>
<td>2.5000</td>
<td>.15417 1.47879</td>
</tr>
<tr>
<td>SC3</td>
<td>Has reported cases of violent extremism</td>
<td>2.5761</td>
<td>.15397 1.47681</td>
</tr>
<tr>
<td>SC4</td>
<td>Has had low levels of crime</td>
<td>2.7391</td>
<td>.15212 1.45911</td>
</tr>
<tr>
<td>SC5</td>
<td>Has been experiencing high levels of threat from extremists groups</td>
<td>2.6196</td>
<td>.13371 1.28253</td>
</tr>
<tr>
<td>SC6</td>
<td>Has had several incidences of radicalized groups attacks</td>
<td>2.6196</td>
<td>.14812 1.42074</td>
</tr>
<tr>
<td>SC7</td>
<td>Has been categorized as being prone to militant groups attacks</td>
<td>2.4674</td>
<td>.14454 1.38636</td>
</tr>
</tbody>
</table>

Source: Survey Data (2018)

Test of Regression Assumptions

Normality can be examined by using the values of skewness and kurtosis. While skewness has to do with symmetry, kurtosis indicates the extent to which the data is peak or flat (Tabacknich & Fidell, 2007). All the values of skewness and kurtosis fell in the approximate range -1.00 and +1.00 and it was concluded that the distribution of data for the variables was normal. The results are summarized in Table 8.

Correlation Analysis of Study Variables

Pearson correlation analysis was used to examine the relationship between the variables (Wadgy, 2007). The results are presented in Table 9. All the associated pairs of variables were significant at level 0.01 hence hypothesized
relationships developed were found to be statistically significant at level \( p < 0.01 \). Security challenges correlated with marginalization significantly and negatively \( (r = -0.701, p < .01) \).

### Table 8: Normality Test Results

<table>
<thead>
<tr>
<th></th>
<th>Mean Statistic</th>
<th>Skewness Statistic</th>
<th>Std. Error</th>
<th>Kurtosis Statistic</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marginalization</td>
<td>2.5761</td>
<td>.584</td>
<td>.251</td>
<td>-.548</td>
<td>.498</td>
</tr>
<tr>
<td>Social Cultural Factors</td>
<td>2.3214</td>
<td>1.008</td>
<td>.251</td>
<td>-.476</td>
<td>.498</td>
</tr>
<tr>
<td>Security</td>
<td>2.5823</td>
<td>.770</td>
<td>.251</td>
<td>-1.002</td>
<td>.498</td>
</tr>
</tbody>
</table>

Source: Survey data (2018)

### Table 9: Correlation Coefficients

<table>
<thead>
<tr>
<th></th>
<th>Security</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Security</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Marginalization</td>
<td>-.701**</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

### Regression Results

The study sought to investigate the effect of how determinants of youth radicalization affect security in the Mandera Triangle. The analysis involved investigating the effects of the independent variables (social media use, marginalization, education level, and social cultural factors on security, the direct effects. The set hypothesis \( (H_0) \), stated that marginalization has no significant effect on security in Mandera Triangle, Kenya. Regression results a captured in Table 10 indicated that marginalization had a negative significant effect on security \( (\beta = -.400, p<0.05) \). This meant that marginalization enhances security challenges in the Mandera triangle.

### Table 10: Regression Results

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstd Coeff</th>
<th>Std Coeff</th>
<th>( \beta )</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-.586</td>
<td>.724</td>
<td>-.809</td>
<td>2.664</td>
<td>.009</td>
</tr>
<tr>
<td>Marginalization</td>
<td>-.400</td>
<td>-.150</td>
<td>.276</td>
<td>2.664</td>
<td>.009</td>
</tr>
</tbody>
</table>

### CONCLUSIONS

Most of the radicalized youth are male aged 30-35 years. The main religion is Islam. Some have returned from the radicalized groups and reformed. The youth are radicalized due to economic gains. External factors, such as tensions in the local community, events affecting their country or region of origin, having friends or family who have joined extremist groups, and exposure to narrow points of view and unemployment necessitated the process of youth radicalization. Marginalization is has a significant negative effect on security in the Mandera Triangle. Thus when people feel marginalized, they will be vulnerable to radicalization and thus pose a security threat to the residents.

### RECOMMENDATIONS

Given that the youth feel marginalized, it is incumbent upon the government to have measures in place so as to mainstream the youth into social, political and economic spheres of life. There is need to have a policy framework to address inequality in education in the Mandera triangle so as to increase affordability and accessibility. There is need to have deliberate policy measures to address the issue of marginalization in the Mandera Triangle so as to improve security.

Additionally, to prevent youth radicalization and insecurity in Mandera Triangle and based on the study’s conclusions the following recommendations may be applied:

- The national and county government to increase the security situation by hiring local youth as security officers.
- Encouragement of youth groups’ formation oriented to business establishment. Setting up youth funds, incentives and credit for businesses.
- Increase border patrol and security in the region by increasing the number of security personnel.
- Religious leaders to condemn youth radicalization through appropriate preaching and teachings in the mosque.
REFERENCES

*****
POLITICAL DILEMMA IN THE KENYAN HIGHLANDS 1908-1960

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ABSTRACT

Before the advent of colonization African communities had their own systems of political leadership. These systems were based on legitimate and acceptable principles of governance. Simply, governance by consent. This research opens a discussion on what made these systems functional, acceptable and legitimate by examining political order among precolonial Tigania. The study established the forces behind the precolonial political order among the Tigania of Meru, examined how these forces in-scribed the people into the political system and also examined the immediate reaction of the Tigania people on the realization that colonization by England was unstoppable. The study assumed that the Precolonial Tigania had a political order. Data for this study was collected from Tigania elders who are aged over 85 for they lived Tigania traditions and also interacted with colonialists. The study was guided by the use of social systems theory. The study used descriptive research design. The target population was 1000 elders based on the statistics of Inua Jamii Programme, 2017. A total of 60 elders were purposively sampled and interviewed. The instruments for data collection were interview schedules. Oral data was corroborated with Archival and secondary sources to mitigate the limitations of each source. Thematic approach was utilized in the analysis of the findings. The results of the study indicated that colonization broke the social mechanisms by which people of Tigania were socialized in, to produce a stable political order. The advent of colonization put these mechanisms into jeopardy leaving the political leadership in a dilemma.

Keywords: Precolonial, political leadership, Legitimate, In-scribe, Colonization, Reaction

INTRODUCTION

Background to the Study

Tigania people constitute one of the major subgroups of the Ameru, who are Bantu speakers. They occupy the area around Nyambene hills. According to Fadiman (2012) the Meru-speaking people live on and adjacent to the northeast slope of Mt Kenya. The people of Meru began to migrate from Bwaa in the 17th century after a series of disagreements with their neighbors in Bwaa. The second fragmentation which happened when the Ngaa or Meru arrived at Mbeere saw the Meru divide into five sections with the current Tigania moving northwards towards the heavily forested mountains of Nyambene range with other Meru groups settling in Igoji, Abogeta, Abothuguchi (North Imenti) and Muthambi (Fadiman, 1993: 63-79). Continued fragmentation of the five groups by the Mt Kenya eography resulted in corresponding social fragmentation among the Meru sub tribes which saw various traditions which were similar when the Meru left Bwaa begin to differ after settling around Mt Kenya (ibid). Among the Tigania, factors differentiating families and individuals is the line of descent where the clan is the basic social unit. This is similar to other Meru sub-groups (Laughton, 1944).

A clan among the Tigania is formed by families claiming descent from a common ancestor. The formation of clans in this fashion is classical and was fundamental in the political functionality of this community. According to Mahner (1975) there are many clans among the Tigania but the three major clans are Njaru (white), Ntune (red) and Njiru (black). Since then many more clans have been formed. Conflicts were common and therefore a Kiama/council of ruling elders from of each clan had the responsibility of resolving disputes. The formation of the council was a cultural and a structural factor, a task undertaken through the creation of age-sets. Among the Tigania men from all the families and clans are categorized according to generation sets which are age groups according to when one was circumcised. These age groups command respect and are crucial for decision making and implementation especially among people of the same age group, clan and community. There was a given order in the way community secrets were passed down by retired elders to the younger age groups in order to ensure perpetuation and strict adherence to the ancestral will.

The conquest of lower Eastern that is Embu, Chuka, Tharaka and Meru was done by Edward Butler Horne who was a Briton aged 26 years. The disastrous conquest of Embu in a nine day battle in 1906 made all Meru tribes to surrender and seek advance peace deal with Horne (Mwaniki, 2010; Fadiman, 2012). The Chuka, Muthambi and Mwimbi groups on realizing they were next in the line of conquest and on hearing the plunder that Embu region underwent decided to pioneer an advance peace treaty with Horne because waging war according to the elders was an excise in futility (Fadiman, 2012. 129-133). Other Meru sub ethnic groups followed suit and this way Tigania
people were introduced to colonial rule which would last for an estimated 70 years (Ibid). Horne arrived in Tigania in 1908. According to the respondents he entered through muriri, near Muthara which is the upper part of Tigania. He appointed chiefs/ blanket chiefs himself in total disregard of tradition which stated that men would assume authority by virtue of their age-group, this way the old ones/Nkuru or former warriors were to be expelled by members of age group just below them (Fadiman, 1993: 137). According to Fadiman the traditions at this point began to crumble, he records that demoralization of elders, warriors, women and girls gained root because of Horne’s actions that violated customs. With the authority of the queen, Horne established colonial rule among the Tigania people who henceforth would do things the queen’s way. A way which collided with traditional institutions like the njuri, ruling elder’s council deliberations which was a Kiama that addressed local concerns effectively based on need and consent (Fadiman, 2012; Chweya, 2006: 7). Was it necessary to supplant the traditional Tigania political order? What was the reasoning behind British colonial activities in Tigania society? These early colonial activities in Tigania are a useful starting point in trying to fathom the reaction of people of Tigania on the realization that they had been conquered and would be subjects to white rule for unknown period of time.

**Statement of the Problem**

The imposition of colonial rule on Kenyan communities’ unleashed forces that were said to have far reaching changes in the social, political and economic organization of the colonized. The transition to the post independent period deepened the western legacy on African communities. Many observers and studies depict political processes in Kenya as an abyss of chaos. While this study does not entirely reject such a view, it nevertheless argues that by considering the place of traditional institutions- institutions that predate colonialism, it is possible to establish why colonization was a catastrophe to the precolonial systems of political governance among the Tigania of Meru.

**Purpose of the Study**

The purpose of this study was to establish the reaction of Precolonial Tigania people and their governance system on the realization that colonization by England was there to stay.

**Objectives of the Study**

The study was directed by the following objectives

i. To establish the forces behind the precolonial political order among the precolonial Tigania

ii. To examine the reaction of these forces and the people on the arrival of colonization

**Research Questions**

i. What forces were behind the precolonial political order among the Tigania?

ii. How was the reaction of these forces and the people on the arrival of colonization?

**Significance of the Study**

The study will contribute to knowledge on the political history of the Tigania people. More specifically, the study contributes to the literature on the mechanisms by which colonialism affected African communities with reference to political order (or seeming political disorder) in these communities.

**Scope of the Study**

In terms of time, the study will cover the period beginning 1910-1960. 1910 is the year Tigania people came into contact with colonial rule. On the other hand, 1960 is important because it marks the pre-independence struggle where major reforms were undertaken by KANU and KADU as the major leading parties to allow for the passing of the independence constitution.

**LITERATURE REVIEW**

Pioneer studies of African political organizations provided a glimpse into the nature of African political history in the pre-colonial period. The time period between 1940 and early 1960s, was characterized by a great deal of traditional political arrangements, and many studies on the traditional African societal systems were published. For instance, scholars like Evans Pritchard (1940), Wagner (1956) Schapera (1956) Mair (1962), Tait and Middleton (1968), presented very rich historical background of the societal arrangements within African traditional societies, in terms of socio-economic organizations as well as cultural leaderships. However, these studies were largely anthropological, as they gave descriptions but did not show the processes of change in the political order of various societies. Written records on the Meru pre-colonial history are scanty and the picture is more wanting with regard to literature on political organization. Some of the early writers who documented the Meru history produced
ethnographic descriptions of the Meru customs. The most comprehensive of these were done by Lambert (1947) and Orde-Brown (1925). Lambert, for instance carried out research on a vast geographical area which covered Kikuyu areas of Ndia and Gichugu, Embu and the Meru ethnic subdivisions. One of the major weaknesses of Lambert's study is that he considered these societies as one; yet linguistically and culturally, those groups are different. He did not draw clear distinctions between Meru ethnic sub-divisions. Similarly, he discussed all those groups like Mbeere, Kikuyu and Meru as being the same. This tended to create a false universal cultural whole comprising of different people. This approach makes it difficult to identify and distinguish characteristics specific to Tigania political organization. However, his contribution cannot be ignored. For this study, Lambert's analysis of the age-set systems and 'Kiama' are significant when looking at the political arrangements within different groups and how they emerged and also differed in the course of their historical development. Major Orde Browne (1925) also has researched on some Mt. Kenya Sub-tribes like Mwimbe, Muthambi, Chuka and Embu. In this research the cultural profiles of these communities have been made signifying their extinction.

There are few studies committed specifically to different aspects of Meru political organization. These include Kinyua (1970), Mboroki (1972) and Muthamia (1974). These are unpublished B.A. dissertations. Their work revolves around different aspects of Meru political history and the scope varies from one text to the next. Muthamia's work attempts to show that the Meru evolved political institutions over several years. The treatment of pre-colonial history in Muthamia's dissertation is wide in scope. Only a small portion of his dissertation deals with the pre-colonial period while the remaining larger portion discusses the colonial impact on the Meru as a whole. While this research appreciates Muthamia's work, it will make a contribution on how the Tigania sub tribe reacted to colonial rule given the existing framework of political order which was now under siege. How did the elders council and the njuri which was a kiama of Kiamas react to the new events that traumatized the whole community.

The Njuri did not operate in isolation from other councils. This organization was the highest council of each Meru sub tribe political organization and took different forms among the various sub tribes. The council operates in collaboration with other institutions to make the structural whole. The other major office apart from that of the Kiama included the office of the Muwee. However, among the Tigania the religious office was divide into two, thus it constituted the office of the Muwee and that of the Mukiama. The dual nature of the sovereignty ensured complimentary functioning of the priest and the elder’s council. This ordering of social life by dualistic notions of religious authority and secular power of which these figures were exemplary give assurance of political power which was complimented by religious authority. The active role played by these and other smaller institutions within the various men and women councils are key practices which have evaded the attention of various scholars of Tigania society. Kinyua (1970), Mboroki (1972), and Muthamia (1974) give us a traditional picture of the council of council’s however, their works reflect inadequacies that this study seeks to rectify in terms of defining the relations among all the councils using social systems theory.

Historical studies conducted in Meru have given the political systems of Meru society limited attention with the bulk of the literature discussing the aspect of history under the joint heading of social, economic and political organization. The implication of this is that, social and political functions are absolutely intertwined. While one acknowledges the inter-relationship between several political institutions, it is possible to distinguish specific features which could allow for a focused study of a people's political history.

Focusing on studies that exclusively looked into the descriptions of Meru people traditions, the most detailed accounts are those by Fadiman (1993) and Nyaga (1997). The account by Fadiman tells of Meru history from the oral accounts of the oldest elders from all sub-ethnic groups spanning from migration tales, to their traditions up to the colonial experiences. However, when it comes to processes of change (processes of change in political order), Fadiman’s account is too generalized does not account for the events in particular sub-ethnic groups that make Meru ethnic group. This is an area the current study will, especially, make a contribution since events differed and the level of their effects also varied leading to diversified reactions.

The account by Nyaga narrates various traditions as lived by the Meru peoples. In his literature, Nyaga presents a general history of Meru traditions covering aspects of practices in the social, economic and political organization, for example, Nyaga has discussed the idea of having a ruling council in Meru ethnic group and has also given a brief analysis of their functions. However, he failed to adopt a representative approach in regard to distinguishing the traditions as lived by the various sub tribes of Meru. Both of these accounts discuss the overall aspects of Meru community, while this research appreciates this, it intends to contribute on the specific process of political evolution.
among the Tigania as triggered by colonial forces. The gist of the literature review above is to show that there existed a political order among the precolonial Tigania. This political order was dynamic but various studies have not adopted a representative approach which will be a task undertaken though this research.

**RESEARCH METHODOLOGY**

**Research Design**

The study adopted the use of descriptive research design. This design describes the state of affairs as it is (Kombo & Tromp, 2006). Through this design the study can analyze data either qualitatively through description or quantitatively through figures (ibid). Kathuri and Pals (1993) conclude that descriptive design is scientific and when systematically utilized gives highly reliable results. This design was applied in this study as the researcher intended to collect, analyze and describe how colonialism affected political order among the Tigania of Meru.

**Target population**

The target population for this study were the elders above the age of 85 years. This may not be strict categorization as the informants were principally arrived at through snowballing. For example, where an informant of a younger age benefited in obtaining information relevant to the present research due to some circumstances for example being an offspring of an important informant who has since departed or is indisposed or incapable of being interviewed for whatever reason) such an informant, even though younger will be interviewed. It is expected, though, that such cases of (of younger informants may not be significant in number.

**Sampling Procedure**

The sample for the study was drawn from elders who were purposively sampled. Kombo and Tromp (2006) define sampling as a process of selecting a number of individuals or objects from a population such that the selected group contains elements representative of the characteristics found in the entire group. This minimizes errors, reduces costs and enables the study to fully cover even wide areas over a short period of time.

The study gathered data from individuals who were above 85 years of age. According to the figures of 2016, Inua Jamii Programme, the number of individuals in this age group was estimated to be about 1000 from the whole of the current Tigania. With a confidence level of 95% and a sampling error of 5% the sample size for major subgroup like this is 100 cases (Kathuri and Pals, 1993). Individuals in this subgroup were believed to hold information relevant to the study for they are well versed with the history of Tigania society as they witnessed or were told by their grandparents. The number of interviews was highly dependent on data saturation.

The researcher used two sampling techniques, purposive and snowballing/chain sampling to select various individuals like former MPs, chiefs, retired officers, Njuri leaders and the oldest elders to respond to various questions of the study. Kombo and Tromp (2006) argue that these methods are decisive in getting information rich sources. Due to the varied nature of individuals who the study intended to interview. Kombo and Tromp (2006) suggest that purposive sampling is best suited for such variations. The criteria for choosing the respondents will be gender, education, and experience in local issues, age, clan and position in society. The use of snowballing came against a backdrop where few individuals identified via purposive sampling mentioned new contacts which were spread all over Tigania (ibid).

**Research Instruments**

The study mainly utilized open ended interviews guided by interview schedules for primary data collection.

**Data Collection Procedure**

The study used three types of data that is primary, secondary and archival data. Primary data was collected through oral interviews. The respondents gave first-hand accounts of Tigania past political practices and their experiences of colonial rule. Secondary data was collected from various libraries. These include Chuka University library, KEMU university library, Kenya National library, Meru and Nairobi and private libraries. Online materials provided by Chuka University E-library mostly published journals and magazines were utilized. Archival data was collected from Kenya National Archives. These materials contained records of colonial government on the various aspects sought out by this research.
Data analysis and Presentation

Data for this study will be majorly qualitative sourced from oral interviews and archival sources. Data informing this study will take a historical trajectory thus interpretive analysis and thematic description will be the main modules of analysis. According to (Kombo & Tromp, 2006) interpretive analysis relates one event to another. The event is studied and described within a broader context to add meaning and credibility to the data. Patterns emerging from the data were used to develop themes that addressed study objectives. Themes in this study were related with understanding forces behind the precolonial political order among the precolonial Tigania and how colonialism affected the said order. Corroborated data from the three sources ensured the findings were credible enough to illustrate the political development of the Tigania people since the inception of colonization.

RESULTS AND DISCUSSIONS

Political order among the precolonial Tigania

This discussion will be per the views of the following respondents Ciakwalu Baimunya, Alumina, Joshua Ntoikiyu, Ruth Thurwa and personal analysis from the stories they narrated along the traditional songs they sang. O.I is an acronym for Oral Interview. According to most Tigania informants to the present research, the political order produced a legitimate system of governance that was based on custom and tradition. According to Chweya (2002. 2-3), the systems of governance within the African indigenous governments were based on stable constitutional principles, which were legitimate and produced social order. The political system which the pre-colonial Tigania practiced was based on three key pillars which included, governance by consent, popular control of government and smooth political recruitment and succession. This system was hereditary to all males and women played a crucial role in ensuring successful and smooth transition from one age group to another. Among the Tigania the system governance was through direct representation. That is, all males participated in governance of the community after initiation in an alternating system of ins and outs. The Political system among the precolonial Tigania stemmed from hierarchy based on age. All males were recruited into an age-group after circumcision. The hierarchy of the age grades is shown below according to the generational sets that began in 1924 and will end in the year 2020 (Ntoikiyu, Thurwa, O.I. 2018). The table below shows various stages through a man’s life.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Numerical category</th>
<th>Social Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ichunge</td>
<td>15-30 years</td>
<td>Circumcised. Warriors</td>
</tr>
<tr>
<td>Guantai</td>
<td>31-45 years</td>
<td>Married, junior elders</td>
</tr>
<tr>
<td>Miriti</td>
<td>46—60 years</td>
<td>Senior, ruling elders</td>
</tr>
<tr>
<td>Lubetaa</td>
<td>61-74 years</td>
<td>Retired elders, teachers of community ideals, could join Njuri</td>
</tr>
<tr>
<td>Ratanya</td>
<td>75-90 years</td>
<td>Experts in community history, ritual elders</td>
</tr>
<tr>
<td>Micubu</td>
<td>91-104 years</td>
<td></td>
</tr>
<tr>
<td>Ithalie</td>
<td>105-120 years</td>
<td></td>
</tr>
</tbody>
</table>

This system of political leadership was by virtue of age group which allowed every male to be recruited into the community welfare, tradition and custom after circumcision. Political order and authority therefore was vested in different persons and groups, which is between the spiritual leaders like the Muwee and the elders (Mahner, 1975). From the above grading, it is clear that power switched hands between various age groups after about 15 years though sometimes it could be twelve and others seventeen depending on economic stability of the whole community or catastrophes involved. It should however be noted that the ability of the clans to fill warrior regiments or catastrophes occurring or negative prediction concerning circumcision season always influenced circumcision dates and transition or power handover. After circumcision males became warriors who were then charged with the responsibility of defense and implementation of some decisions. Upon the completion of service as a warriors the men in that age group were allowed to marry and become family heads. The ceremony of transfer of power from one age group to another among the Tigania was called ukuura aaru/demolishing the barrack (Kaunyagi, O.I. 2019) (Mahner, 1975). This implied that the incoming warriors were to build their own camp because the previous warriors marked exit out of power by demolishing their barricade/aaru (Thurwa, O.I. 2019). The military camp for the warriors was always built near the Kiama/ council house. Succession among various age groups was vertical. The older the age group the higher the rank in terms of seniority of leadership role and respect (ibid). Leadership role implied ability to follow precedent in problem solving and innovation. Exceptional leadership was displayed by ability to showcase wisdom in difficult situations or calamities and was not a preserve for anyone.
Becoming a family head meant that this age group entered another cadre of leadership within the community, they became junior elders. This way they could attend meetings to listen into how proceedings of various discussions were done by the ruling elders and the reference of precedent when making decisions. During these meetings, the junior elders were not allowed to speak, it was their turn to learn (Ruth Thurwa, Mongo O.I. 2018, Fadiman, 1993). Up to when they are about 45 years the males were to learn the practices and secrets of the community. This period allowed the most skilled/talented ones among them to emerge as the spokesmen and ritual experts of their age group (Sabina, O.I. 2019). During these 15 years this group was officially out of power as they were expected to sire two or three children before they became the ruling elders. Upon thorough understanding of council proceedings and attaining about 46 years of age, junior elders became the ruling elders and entered community leadership. After about the age of 60, the ruling age group was supposed to retire from active leadership and take lighter duties (Ruth Thurwa, O.I. 2019). Here they become teacher elders who were supposed to perform rituals and also educate the children on norms and practices of the community (Nyaga, 1997, Fadiman, 1993). Rituals that required more expertise were performed by the oldest members of the clan (ibid). According to Mahner (1975: 402) after junior elders graduated to become the ruling elders, a new Muwee associated with that age group also came into the reins of power a view supported by all the interviewees.

Among the precolonial Tigania seven key offices ran parallel to each other to ensure success in the system of governance. The work of this leadership was to ensure peace and perpetuation of the community. The seven offices included the office of the ruling elders, $muwee/Mukiaama, agambii wise men, diviners, aaga/medicine men, ancestors and Nji a which was an invention after the groups had settled in their current locations (Ikiugu, Thurwa, Kaunyangi and Baariu, 2019). The offices of the ruling elders and the muwee were interdependent in all ways while the rest worked with these two on a consultation basis, but all were recognized as crucial by the community for each had a unique role to play but under the supervision of the ruling elders (Ibid). The elders were therefore the denominator for they acted as custodians of customs and procedures and guardians of ancestral will. The system of administration began at family level. All forms of disputes were first handled at family level by family heads. Failure to resolve the conflict would make the family head to ask elders from his clan to meet so as to resolve the matter. Once the elders met and still could not resolve the conflict, wise elders or agambii would be called from various clans by the elders in order to retreat and try to resolve the conflict at hand. Political leadership was there to ensure peaceful coexistence.

What Made the Political System Described Above Succeed in its Leadership Role?
The existing political order among the precolonial Tigania can be said to be an establishment of strict practice and adherence to beliefs, values, custom and tradition. According to Fadiman (1993) the system was divided into three major segments which played a crucial role in enhancing communal unity. The first was a system of legal precedents, administered by elders’ councils, which governed according to traditions passed down by tribal ancestors. The second was a system of beliefs involving the spirits of these ancestors, which were thought to remain in contact with the living to enforce obedience to the traditions. The final system was one of supernatural rituals, used by a class of specialists believed to be in contact with these spirits to regulate conflict within the tribe. In theory each system operated independently. In fact they combined as often as required to guide the society.

The socialization through which all individuals underwent from childhood helped to ensure that the political order followed the three systems for peaceful co-existence. Division of labour, which is economic activities and social activities was also equally shared between the genders and individuals. This brought pride in these defined roles, and greatly minimized social conflict. The institution of age group ordered citizens of this period into a cycle in which one became an accomplished person once one was done with their responsibilities to the family, clan and community (Mongo, O.I. 2018). In theory individuals were organized into collectivities which acted according to norms which produced a value system with desirable system relations. Legal precedents, beliefs, celebrations and rituals were all norms which shaped and dictated individual and group code of conduct and this produced a culture. But how did individuals and collectivities get to learn all these. The system was designed in such a way -that things were done in the process of being “said” i.e. listening and doing what was instructed happened concurrently thus inscribing young members to what was required of them in a practical manner and at an early age. Simply saying and doing happened at the same time. Major and minor events, daily activities and routines in-scribed people into the system relations thus a stable political order (Nyaga, 1997).

Circumcision of men and women, age groups, political recruitment, councils and beliefs inscribed people into a political system that was said to be acceptable to all. Every person got a chance to live and lead. Males though
controlling the political space could not have succeeded without women who were regarded as family guardians and also as the mothers to the community.

Colonization

Edward Butler Horne entered Tigania, through Muriri which is the upper region of the area. He pitched a semi-permanent camp which attracted the attention of the warriors. (Kaunyangi, O.I. 2019). The people of Tigania then thought that Horne was a passing cloud. They had experienced many white people enter Tigania through as traders and Horne must have been one of them. This was according those who had not heard the conquest of Embu and the surrender of some other Meru sub tribes. The warriors from Antuamakia clan which are the clans occupying kianjai section of Tigania made military preparations on how they would counter Horne and his activities. The elders with the advice of a Maasai elder, restrained the warriors for some time but the young men were growing impatient. Horne learned that warrior military preparations were ongoing. He called for the warriors so as to demonstrate to them the danger of his weapons to them (ibid). He requested that they bring a bull. He aimed at the bull from far and a single shot killed the bull instantly. The warriors were amused at the effectiveness of the weapon. Horne began his mission having succeed in instilling fear among the warriors. The elders continued restraining the warriors having realized the futility of fighting him, they did not want more bloodshed to occur for some warriors insisted on challenging Horne but ended up getting killed (Kaunyangi, O.I. 2019).

Colonial conquest of Tigania continued until Horne established a tribunal court at Miathene, which was a colonial divisional headquarters for the whole of Tigania (Kaunyangi, O.I. 2019). A central trade center was established at Mikinduri though the area still hosted other major events among the precolonial Tigania (Simba, O.I. 2018). The activities of Horne were not taken lightly by the elders and other people of Tigania more so electing a chief and Askaris (Kaunyangi, O.I. 2019). Elders began secret meetings to try and fathom the new situation. To accept conquest was to accept defeat. The ideology that Horne would leave after sometime preoccupied the mentality of many who wanted to ease the burden of surrender without a military defeat. To calm the warriors, the elders ensured that communal activities just continued as they were (Kaunyangi, O.I. 2019). Simply they ignored the activities of the colonizer for the first 5 years. Respondents reckon that the said colonial activities were minimal due to the huge territory and many handles that would face Horne in trying to effect colonial leadership. The roads were thin, bushes thick and vast, trees huge and this curtailed transport activities except for use by pack animals only. The delay in effective administration gave many Tigania people the hope that they would maybe be safe from total control (Ibid). The struggle though elicited a psychological crisis among the ruling elders for no concrete conclusions about the situation at hand had been arrived since the arrival of Horne in 1908. The hope of the people was at many times eroded by negative predictions through the reading of omens and diviners dreams which did not show light. According to Mongo (O.I. 2018) the elders sat around a fire, roasted meat and while eating silence could be heard. Many clapped their hands in utter shock that they were facing a crisis they could not resolve. Tigania was their home and any idea that they should migrate was unimaginable (Kaunyangi, O.I. 2019).

Crisis of control had the worst effect among the warriors and the youths. The people they looked up to could not provide leadership this time round. Elders, more so the ruling elders felt like a failed age group. The dilemma at hand seemed to beat all possible logical imperatives. This failure demoralized the young for failure was hitherto unknown. Problems came yes, and solutions were always arrived at. This was no longer a problem but a crisis which silenced many (Kaunyangi, O.I. 2019). From 1908 to 1918 the mystery crisis deepened for there were many unknowns, only by waiting for new colonial activities could fears be confirmed. The psychological torture among the ruling elders and the warriors was exacerbating until 1920 when Kenya was declared a crown land and a protectorate (Mongo, O.I. 2019). Traditions of the people up to this point according to the informants were intact. This can be confirmed by colonial records. DC/MRU/1925.536 reads that, “Since 1920 there have been chaos in Meru community. Circumcision could not proceed because there was shortage of the necessary food supplies. After delaying for four years good harvests were noted in 1924. The abnormal state which has existed for the past 4 years of great numbers of adult men and women being unmarried owing to the long postponement of circumcision has now been remedied. Tigania division continued to suffer partial famine and lack of enough grazing space.”

The confirmation that Kenya was now a crown land accelerated colonial activities in the villages. The elders were now able to comprehend that there were higher authorities than them. The major crisis now lay in planning for the future Tigania generations. Acceptance of colonial subjugation though was not easy (Kaunyangi, O.I. 2019). Njuri which was recognized by colonial authorities as the native uniting force was the body to watch. The njuri defied colonial authorities indirectly. Many laws were passed by the tribunal and njuri was a party to the passing but
implementation was ignored except for laws not affecting the customs directly like burying the dead (Ibid). Simply whatever the colonial authorities passed as law was taken passively and communal life went underground (Fadiman, 1993). The decision of the njuri to defy the new masters was informed by the fears they had concerning the warriors and the youths. They feared for the worst amongst this group. The group that held the future of the community was now at the verge of collapsing. They were becoming unpredictable and unknowable for corruption and moral pollution was creeping in among them due to demoralization (chunkubitu, O.I. 2018).

Colonial authorities began to attack traditional practices like female initiation, disregarded existing hierarchy of political leadership and social ordering (Lyn, 2003). This allowed confusion to creep in the late 1920s for things had begun to change. Demands for taxes in monetary forms, orders that warriors participate in digging which was a role reserved for women, the isolation of the warriors from their defense role and curtailing of traditional dances and drinking which were termed as immoral by the colonial officers worked against traditional practices (Fadiman 1993). The disordering created confusion amongst the young. The respondents reckon that warriors began to drink and indulged women into sex, idleness was creeping. Abortion rates began to alarm the government, population began to reduce. This was the initial problem the elders had to deal with. Hunger became a menace yet it was unknown in Tigania (Thurwa, O.I. 2019). The young men and women left in order to work for Europeans to get cash money to pay taxes, the result was that the labour force left the villages vulnerable of hunger. Kwashiorkor a disease hitherto unknown in Tigania was now common (ibid). Loss of value systems, breaking of institutional norms gained momentum when more colonial administrators asserted more authority through the creation of divisional administration at Mikinduri. The introduction of churches and schools came with a package of new values. This demoralized the warriors and the youths further (Mongo, O.I. 2018). The inability of the previous system to deal with the white intruders saw many locals lose hope in their own system. The crumbling of Tigania system of governance in the light of the new imperial system which seemed unrelenting demoralized the elders too. Colonization was here to stay (Kaunyangi, 2019).

CONCLUSION
Having realized that the colonial bombardment was not ending sooner than imagined, an approach of wait and see was adopted by the njuri. The ruling elders in the various clans decided to fight for the retention of customs deemed crucial for the community. It was now clear that cracks had emerged within the value system and people took different sides. Some vowed to remain loyal to the customs others decided to take on the new Christian values while others were torn between, fighting two sides. It was a dilemma, a battle in the mind. The Mau Mau war rekindled hope for the traditionalists in the period leading to independence. Independence meant going back to our roots for many while others did not know what to expect. The clear thing was that the generational age groups that were expected to help the Tigania community remain strong in the midst of the crisis had been turned into something else. But hope for a remnant was strong (Mongo, O.I. 2018).

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Laughton, W. (1944). *The Meru*


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The distribution of noun phrases in all languages is governed by the binding principles. These binding principles determine the distribution of anaphors, pronouns and R- expressions. The binding theory divides noun phrases into three basic categories anaphors, pronouns and R-expressions. This theory develops three binding principles to explain the distribution of these noun phrases. These are the binding principle A, binding principle B and binding principle C. This study is only limited to the distribution of anaphors. The study adopted a qualitative study research design as it gives detailed descriptions and explanations of the phenomena studied. The researcher generated the data for the study herself using self-introspection and the data was corroborated by ten native speakers who were purposively sampled. The study established that Ki-Imenti conforms to the binding principles. Anaphors are bound in their binding domain, whereby the binding domain is the inflectional phrase or the noun phrase containing the anaphor. This study has made a contribution to the knowledge of the syntax of anaphors in Ki-Imenti and the description of the syntax of Bantu linguistics in general.

Keywords: domain, c-command, anaphors, co-indexing, binding theory

INTRODUCTION

The distribution of noun phrases in all languages is governed by the binding principles. These binding principles determine the distribution of anaphors, pronouns and R- expressions. The binding theory divides noun phrases into three basic categories anaphors, pronouns and R-expressions. Chomsky (1981) in his Binding Theory develops three binding principles to explain the distribution of these noun phrases. These are the binding principle A, binding principle B and binding principle C. Carnie (2006) defines anaphors as noun phrases that obligatorily get their meaning from another noun phrase. They include reflexives (such as themselves, herself, and itself) and reciprocals (each other, one another). The binding principle that governs the distribution of anaphors is called binding principle A. It states that an anaphor must be bound in its binding domain. Carnie (2013) defines a domain as a syntactic unit that is clause-like. Binding requires two conditions to be met. One, the anaphor and the antecedent (a noun phrase that gives meaning to it) must be coindexed and two, the antecedent must c-command the anaphor. The antecedent c-commands the anaphor if every node dominating the antecedent also dominates the anaphor and neither the antecedent nor the anaphor dominate the other. The way two noun phrases are indicated to be co-referential is by means of an index, usually a subscripted letter.

Distribution of Anaphors

Carnie (2006) indicates that anaphors are of two types: reflexives and reciprocals. Anaphors have the property that they cannot be used to refer directly to an entity in the outside world, but rather must be bound by (that is take their reference from) an antecedent elsewhere in the same phrase or sentence. Therefore the two types of anaphors often seek their antecedent close by, in a binding domain that is local. The binding principle that controls the distribution of anaphors is binding principle A which states that anaphors must be bound in their binding domain.

A reflexive and a reciprocal pronoun often cannot seek their antecedent in a superordinate clause. This is because one of the requirements of binding principle A for anaphors is that the anaphor and the antecedent must be in the same clause. Sentences (1a) and (1c) are grammatical because the anaphors are bound in their domain, that is, the anaphors and their antecedents are in the same clause unlike (1b) and (1d) which are ungrammatical because the anaphors are not bound in their domain.

1. (a). Clere thinks that Ruth should value herself,
   (b). *Clere, thinks that Ruth should value herself,
   (c). The teachers asked whether the students like each other,
   (d). *The teachers asked whether the students like each other,
There are structural restrictions on the binding of anaphors by antecedents. The anaphor must be c-commanded by its antecedent. Therefore it follows that the antecedent must be in the subject position to c-command the anaphor. Radford (2009) demonstrates this in (2).

2. (a) The governor may blame himself
    (b) *Supporters of the governor may blame himself

As a third person masculine singular anaphor, himself must be bound by a third person masculine singular antecedent like the governor. However, it would seem from the contrast in (2b) that the antecedent must occupy the right kind of position within the structure in order to bind the anaphor or else the resulting sentence will be ungrammatical. Thus sentence (2a) is grammatical because the anaphor is c-commanded by its antecedent. Sentence (2a) is syntactically represented in a diagram as shown in (3).

(3)  
```
TP
  D  
  The governor
  T  may
  Ø
  V
  blame
  PRN₁
  NP
  l
  himself
```

The relevant bound constituent is the reflexive anaphor himself in (2a), and its antecedent is the governor. The reflexive pronoun himself can be bound by the DP the governor in (2a) because the sister of the DP node is the T-bar node, and the pronoun himself is one of the constituents of the relevant T-bar node: consequently, the DP the governor c-commands the anaphor himself. This follows from the fact that a constituent X c-commands its sister constituent Y and any constituent Z which is contained within Y thus in (2a) the binding condition for anaphors is satisfied. Therefore sentence (2a) is grammatical, with the governor interpreted as the antecedent of himself.

In (2b) the anaphor himself and the antecedent the governor are in the same clause thus the sentence should be predicted to be grammatical. However, it is not. This is because there is another condition of the binding principle A that has not been met: the fact that the antecedent should be in a structural position where it can c-command the anaphor. The governor in the NP supporters of the governor does not c-command himself making the sentence ungrammatical. This is shown in syntactic tree (4).

(4)  
```
TP
  N
  Supporters of
  P
do
  the governor
  T
  may
  V
  blame
  PRN₁
  NP
  l
  himself
```

The DP node containing the governor doesn’t c-command the PRN node containing himself, because the sister of the DP node is the P node of, and himself is clearly not a constituent of the preposition of. There is no other appropriate antecedent for himself within the sentence. Although the NP supporters of the governor c-commands himself, it is not a suitable antecedent because it is a plural expression, and himself requires a singular antecedent. The anaphor himself remains unbound – in violation of the binding condition for anaphors (Radford, 2009). This is the reason why (2b) is ungrammatical.

Theoretical Framework

This study was guided by Binding Theory by Chomsky (1981). According to Chomsky (1981), the distribution of anaphors is determined by Condition A of this theory which states that:

- Anaphors are bound in their binding domain. Therefore an anaphor must have a local (nearby) antecedent. Thus, Timothy, washed himself, obeys Condition A: the antecedent of himself, which is Timothy, is in the same clause with the anaphor. In contrast, *Timothy, asked Sylvia to wash himself* is unacceptable, because the reflexive and its antecedent are in different clauses.
Research Methodology
The researcher sampled sentences containing anaphors and confirmed the grammaticality of these sentences using ten native speakers who were purposively sampled. These were sampled on competence in Ki-Imenti language.

The Binding of Anaphors in Ki-Imenti
The reflexive in Ki-Imenti is bound in its binding domain. This is in accordance with the binding principle A (Chomsky 1981). The reflexive in Ki-Imenti must find an antecedent in its local domain as shown in sentence (5).

Mwitimi sm-past-refl-bought-appl-fv car
Mwitimi, bought himself, a car

In sentence (5) reflexive morpheme –ci- derives its interpretation from the antecedent Mwitimi in the same clause. The reflexive in Ki-Imenti cannot be co-indexed with an antecedent outside its local domain as illustrated in (6).

(6) *Arimũ, be-tikũi-e ați mwana i-ba-ci-endet-e
Teachers₂ sm-believe-fv that child f-sm-refl-fv
The teachers, believe that the child loves himself,

Sentence (6) is wrongly coindexed because the reflexive morpheme –ci- cannot have Arimu as its antecedent because they are not in the same clause. This conforms to the binding principle A which requires anaphors to be bound in their own domain.

Further the reflexive in Ki-Imenti cannot be coindexed with a noun phrase embedded inside the subject noun phrase as shown in (7a).

(7a) *[Mucore wa [Mary],] na-ci-endet-e
Friend₁ of Mary sm-refl-love-fv
{[Mary’s], friend} loves herself,

The appropriate coindexing is as indicated in (7b), where the whole subject noun phrase (Mucore wa Mary) is the antecedent for the reflexive.

(7b) [Mucore wa Mary], na-ci-endet-e
Friend of Mary sm-refl-love-fv
[ Mary’s friend], loves herself,

(7a) is ruled out because the NP “Mary” does not c-command the antecedent.

To bind the reflexive, the antecedent has to be in the subject position as shown in (8a) and if it is not the sentence becomes ungrammatical as shown in (8b).

(8a) John na-ci-endet-e
John sm-refl-love-fv
John loves himself

(8b) *na-ci-endet-e John
Sm-refl-love-fv John
He loves himself John

In 8(b) sentence is ungrammatical because antecedent John is not in a subject position but an extraposed position.

In Ki-Imenti reciprocals must be bound locally as shown in (9)

(9) Aana, i-ba-kũ-rum-an-a
Children₁ f-sm-pres-insult-rec-fv
The children, are insulting each other.

In sentence (9) the reciprocal –an- is bound by the antecedent aana in the same clause through the pronominal affix ba. If the reciprocal does not find an antecedent in the same clause the sentence becomes ungrammatical as illustrated in (10).

(10) *Gatwiri na Koomu, be-tikũi-e ați mwana ba-ka-ũr-an-ũr-a nguho
Gatwiri and Koomu sm-believe-fv that child₁ sm-nsn-wash-rec-appl-fv clothes₁₀
Gatwiri and Koomu, believe that a child will wash clothes for each other.

Sentence (10) is ungrammatical because the reciprocal –an- cannot get its interpretation from the subject Gatwiri and Koomu given that this antecedent is very far from the reciprocal because they are in different clauses.

Further the reciprocal morpheme cannot have a noun phrase embedded in the subject noun phrase as its antecedent as indicated in sentence (11b). The right coindexing is as indicated in (11a) where the whole subject noun phrase is coindexed with the reciprocal.

(11a) {Athinga†iri ba arimu}, i-ba-men-en-e
Supporters of teachers₁ f-sm-hate-rec-fv
The supporters of teachers hate each other.
llomorphs that is selected and affixed to the object constructions. A causative verb therefore, introduces the subject and the direct object (13b). However, the verb while in (13b) is ruled out because the NP does not c-command the reciprocal.

**Binding of Anaphors in Applicative and Causative Constructions.**

Double object constructions in Ki-Imenti can be formed from derived ditransitives known as applicative and causative constructions. The causative and applicatives are multiple object constructions. A causative verb therefore, is the verb that shows a causative situation between two events, the causing and the caused (Kullikov, 1994). Robert (2008) defines causation as a valence increasing operation that adds a causer argument which acts upon a cause to perform an action or change of state of a non-volitional event. The introduced causer is believed to be one responsible for the event occurring. It is a form indicating that someone or something makes someone or something to perform an action or cause a change of state of a non-volitional event. Muriungi (2010) notes two types of causative morphemes in his study of Kittharaka causation. These are the transitive –i- which he calls an internal cause and the –ithi referred to as the synthetic causer. He observes that when the causative –i- is suffixed to the verb, it introduces a causer argument and makes the verb take an object hence transitivizing it. He notes the synthetic causer –ithi- is suffixed to transitives and agentive intransitives thereby introducing a causer.

Mwangi (2001) indicates that there are two causative affixes, the –i- and the –ith- in Gikuyu, Kiembu and Kikamba. In Gikuyu, and Kiembu they are realized in these forms regardless of the phonological structure of the verbs to which they are affixed, but in Kikamba phonological processes affect the realization thus –i- is also realized as –y-, -e-, and –ey- while –ith- is also realized as: -ethy- or -ithy-. In many languages, causation is expressed morphologically by use of affixes in the verb (Mwangi, 2001). The causative is marked by the morpheme –ith- or –i- in Ki-Imenti. The applicative licences a wide range of object roles that include the beneficiary, recipient, maleficiary, goal, instrument, reason and location (Ngonyani, 1998). The applicative is marked by the morpheme –ir- in Ki-Imenti. In Kiswahili the applicative is marked by the morpheme –i- (Marten, 1999). In Chichewa, the applicative affix has two allomorphs: -il- and -el- (Mchombo, 2004). The allomorphs that is selected and affixed to the verb is constrained by rules of vowel harmony. Just like the causative the applicative adds an extra argument to the sentence. The prototypical thematic role of the argument added by applicative is the beneficiary (Mchombo, 2004). The beneficiary is a participant for whose benefit the action expressed by the verb is perfomed.

**Reflexives and Causatives**

In reflexive causative constructions in Ki-Imenti, binding is only possible between the causer and the external argument (24a). The external argument and the object cannot be coindexed (12b).

12. K̄imath̄, a-ra-ci-ũrag- Ṭh-ir-i-e Kar̄i mi
    K̄imath̄ sm-past-refl-kill-coerce-ic-fv Kar̄imi
(a) Kimathi, forced himself, to kill Karimi.
(b) *Kimathi forced Karimi to kill herself

The observation in (12) means that the interpretation of a reflexive causative construction is that the agent forced himself to do a particular action as indicated in (12a). The reflexive marker cannot be interpreted as the object of the verb root as indicated in (12b).

**Reflexives and Applicatives**

In applicative constructions involving the reflexive, binding is possible between the subject and the applied argument as shown in (13a). Binding is also possible between the subject and the direct object (13b). However, binding is not possible between the applied and direct object (13c).

13. K̄imath̄ a-ra-ci-ũrag- Ŭir-ir-e Kar̄i mi
    Kimath̄ sm-past-refl-kill-appl-pfc-fv Kar̄imi
(a) Kimathi, killed Karimi for himself,
(b) Kimathi, killed himself, for Karimi.
(c) *Kimathi killed Karimi, for herself.

In (13a) the interpretation of the reflexive applicative construction is that the subject is the beneficiary of the action of the verb while in (13b) the subject initiated an action upon himself for another person’s benefit. The interpretation in (13c) is not possible, that the subject initiated an action upon another person for that persons benefit.
Reciprocals and Causatives

In reciprocal causative constructions in Ki-imenti, binding is possible between the external argument and the direct object as shown in (14a). The causee and the external argument cannot be coindexed as shown in (14b). Further the causer and the direct object cannot be coindexed (14c).

   Teachers f-sm-pst-fight-coerce-rec-appl-ic-fv parents2
   (a) The teachers caused the parents, to fight each other,
   (b) *The teachers, caused each other, to fight the parents.
   (c) *The teachers, caused the parents to fight them.

In (14) the reciprocal morpheme is interpreted as the object root as indicated in (14a). The reciprocal in (14) cannot be interpreted as the object of the causativised verb stem as indicated in (14b). Therefore reciprocal morpheme is interpreted as the basic object of the verb which refers back to the external argument (causee).

Reciprocals and Applicatives

In applicative constructions, that have reciprocals binding is possible between the subject and the applied argument (15a). It is also possible to coindex the subject and the basic object (15b). The basic object and the applied object cannot be coindexed (15c).

15. Aciari i-ba-ra-og-an-ɨr-e twana
   Parents2 f-sm-tns-tie-rec-appl-fv children2
   (a) The parents, tied the children, for each other,
   (b) The parents, tied each other, because of the children.
   (c) *The parents tied the children, for each other.

From the observation of anaphors and multiple argument involving applicatives and causatives, the binding generalization is that binding is between the closest arguments. Further in reflexive and reciprocal constructions in Ki-imenti, only one of the objects of the causative is involved in the binding process. This is the cause. In applicative constructions on the other hand any of the objects is involved in binding. That is either the basic or the applied verb. This aspect makes Ki-imenti both an asymmetrical and symmetrical object language. In an asymmetrical object language in the context of multiple object constructions like applicatives and causatives only one of the objects can behave like a real object. This is in contrast to symmetrical object languages whereby in multiple object constructions, both objects are given the same status such that any object can be involved in binding process, (Bresnan, 1990).

An anaphor in Ki-imenti must be bound within its binding domain according to binding principle A (Chomsky, 1981). For this to happen first the antecedent must c-command the anaphor. The antecedent c-commands the anaphor if every node dominating the antecedent also dominates the anaphor and neither the antecedent nor the anaphor dominates the other. This is demonstrated in sentence (16) with the syntactic representation in (17).

16. Mucore wa John n-a-ci-end-et-e
   Friend3 of John f-sm-om-love-pfc-fv
   John’s friend loves himself.

17
In diagram (17) the antecedent of the reflexive morpheme –ci- can only be understood to be the whole NP1 phrase *Mucore wa John*. This is because the node that dominates NP1 also dominates the node that has the reflexive. This is the Top P node. This phrase qualifies to be an appropriate antecedent because it c- commands the reflexive according to the binding principle A. However the reflexive in diagram (17) cannot have *John* as its antecedent. This is because *John* does not c- command the reflexive. There are two nodes that dominate *John*, that is the PP and NP1, which do not dominate the reflexive node. Thus binding principle A does not allow *John* to be an appropriate antecedent to the reflexive. In the same way as relexives, a reciprocal must be c- commanded by an antecedent as shown in sentence (18) with the syntactic tree (19).

(18) {Athingatiri ba arimu}; i-ba-men-en-e
Supporters of teachers; f-sm-hate-rec-fv
The supporters of teachers hate each other.

(19)                TopP
        NP1        FocP
        N           Foc
       ba           N
            arimu  PP
              ba  Foc
               i  AgrsP
                 N  Agrs
                  i  VP
                    ba  V'
                      V'  Rec
                        V'  Rec
                          V  Rec
                            e  Rec
                              en  Rec
                                men  Rec
                                  en

The right antecedent for the reciprocal in diagram (41) is the whole phrase *athingatiri ba arimu* in the NP1 node. There is only one node dominating NP1 and that is the TopP. The same node dominates the verbal complex with the reciprocal. Verbal complexes are derived via incorporation that is successive head to head movement (Baker, 1988). Therefore the verb moves from head to head in the structure, picking up reciprocal and the final vowel affix as shown in (19). Thus the antecedent *athingatiri ba arimu* c- commands the verbal complex (VP) containing the reciprocal that is *menene* The word *arimu* in NP2 cannot be an antecedent to the reciprocal. There is an NP1 node dominating it that does not dominate the reciprocal therefore it does not c- command the reciprocal. The sentence cannot have interpretation that it is the teachers who hate each other as shown in (20) with the syntactic tree in (21)

(20) *{Mũthingatiri wa [arimu],} i-ba-men-en-e
Supporters of teachers; f-sm-hate-rec-fv
The supporters of teachers hate each other.

(21)                *TopP
             NP1        FocP
             N           Foc
            wa           N
            arimu  PP
               ba  Foc
                i  AgrsP
                  N  Agrs
                 ba  VP
                  ba  V'
                    V'  Rec
                      V'  Rec
                        V  Rec
                          e  Rec
                            en  Rec
                              men  Rec
                                en
CONCLUSION

Anaphors which include reflexives and reciprocals are governed by the binding principle A. They are bound within their binding domain. Thus they must be c-commanded by their antecedents in the same clause.

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POSITION OF WH-WORDS IN KIPSIGIS WH-QUESTIONS

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ABSTRACT
The wh-parameter determines whether the wh-expression can be fronted or not. Studies on a number of languages among them English, Shona, Kiitharaka and Chinese have revealed that different languages use different ways to form wh-questions. The wh-question behavior in Kipsigis, a Southern Nilotic language, is not yet documented. This paper examines the positions a wh-phrase can occupy in Kipsigis. A descriptive research design was adopted and a structure generation exercise was used to elicit data from ten competent speakers of Kipsigis. Data was analysed within the context of the minimalist program developed by Chomsky. The analysis revealed that Kipsigis wh-phrases can be found in their canonical position, a position termed in-situ. The wh-phrases can also be moved to the front of the matrix clause. This movement is triggered by a strong focus feature manifested by a focus marker which is always attached to the verb. The wh-phrases can undergo partial wh-movement where the wh-phrase moves to a position lower than its relevant position. The study also established that Adjuncts remain in-situ except for the wh-phrase ‘why’ which can be fronted in addition to being questioned in-situ. This study contributes towards the understanding of universal and parametric linguistic features in syntactic theory.

Keywords: Wh-in Situ; Wh-ex Situ; Partial Wh-Movement; Topicalization; Wh-fronting; Kipsigis.

INTRODUCTION
Wh-questions are expressions that contain an interrogative word beginning with wh-like what which, who, where, when, why and how. How is treated as a wh-word because it exhibits the same syntactic behavior as other interrogative words beginning with wh- (Radford, 2009). Different languages form wh-questions in various ways which include full wh-movement, partial wh-movement, intermediate strategy and wh-in-situ.

Typically, English uses full wh-movement to form wh-questions. The wh-words move from their underlying positions to the front of the relevant clause. Consider:
1. Helen took the book. (Object question)
   *Helen took what?
   What did Helen take?
2. She came in the morning. (Adjunct question)
   *She came when?
   When did she come?

To form a wh-subject question, the word order is not inverted as in (3) because the wh-word (who) is the subject of the sentence.
3. James painted the picture. (Subject question)
   Who painted the picture?

English subject questions do not require do-support as in (3). English direct questions with non-subject interrogative phrases on the other hand need do-support as in (1) and (2) above. Indirect questions are characterized by the presence of a wh- interrogative at the beginning of the subordinate clause or headed by ‘if’ or ‘whether’ (Vermaat, 2006). In such constructions, verbs like ‘know’, ‘wonder’ or ‘forget’ can be merged with an embedded question. As Vermatt (2006) illustrates, embedded interrogatives differ from direct questions in that embedded interrogatives have neither do-support nor subject-auxiliary inversion. This is shown in (4):

(4a) John wondered what Mary saw.
(4b) *John wondered what did Mary see.
(4c) *John wondered what had Mary seen

English has wh-in-situ questions (in form of echo questions) where the wh-expression does not get preposed, but remains in the canonical position associated with its grammatical function as in (5):

(5a) She is eating a banana.
(5b) She is eating what?

What here is the direct object complement of eat and since it is a complement it is positioned after the verb eat. According to Radford (2009), English wh-in-situ questions are used as echo questions.
There are instances where questions contain more than one interrogative wh-expression. In such constructions, only one wh-phrase moves. English allows movement of one wh-expression where there is more than one wh-expression in the clause. Multiple wh-questions in English are only possible in wh-in-situ and syntactic constructions whose preposed item is ‘who’. Consider:

(6a) Who do you think will say what?
(6b) What who do you think will say?

Some languages have the wh-words remaining in-situ, a position where we find the corresponding non-wh phrase. Mandarin Chinese, Shona and Kitharaka are some of the languages that have the wh-words appearing in-situ.

Typically, Mandarin Chinese uses in-situ strategy to form wh-questions

(7) Huàngróng xuānxìnxīn [cpGuójìngmǎile] shēnme?

Huangrong believe Guojing bought what
‘What does Huangrong believe Guojing bought?’ (Cheng 2009: 770 (9))

According to Zents (2016) the wh-phrases in Shona remain in-situ.

(8a) V-aka-teng-er-a Θ-ani-O-rokwe? (wh-in situ)
2. SM-TM-buy-APPL-FV 1a-who 5-dress
‘Who (m) did they buy a dress (for)?’/ ‘They bought who (m) a dress?’

Other than remaining in-situ, Shona wh-phrases can also undergo full wh-movement and partial wh-movement as in (8b) and (8c).

(8b) Ndi-Θ-aniwa-v-aka-teng-er-a O-rokwe? (Full wh-movement)
NI-1a-who 1a.NSE-2.SM-TA-buy-APPL-FV 5-dress
‘Who (m) did they buy a dress (for)?’/ ‘It’s who that they bought a dress (for)?’

(8c) W-aï-fung-a [cpkutindi-Θ-aniwa-v-aka-teng-er-a (partial wh-movement)
2SG.SM-TA-think-FV that NI-1a-who 1a.NSE-2.SM-TA-buy-APPL-FV
‘Who (m) did you think they bought a dress (for)?’/ ‘They thought that it’s who that they bought a dress (for)?’

Gichuka, an SVO language, uses full wh-movement, partial wh-movement, wh-in-situ and intermediate strategy to form wh-questions (Mutegi, 2014). In wh-in-situ, the wh-word remains in its canonical position as in (9a). In (9b), the wh-word mbih has been moved to the initial position. In intermediate wh-movement, the wh-phrase moves to a position immediately after the subject as in (9c). Partial wh-movement on the other hand is wh-movement in which the wh-phrase undergoes movement, but to a position lower than its relevant position. The scope position itself is occupied by a distinct wh-phrase. In (9d), the wh-word nuu has been displaced but does not move into the matrix clause. This is shown in:

(9a) Kairitu karugire mbi? (Wh-in-situ)

Girl cooked what
‘What did the girl cook?’

(9b) Ni mbi kairitu karugire? (Full wh-movement)

FOC-what girl cooked?
‘What did the girl cook?’

(9c) Kairitu nimbi karugire? (Intermediate wh-movement)

Girl FOC-what cooked?
‘What did the girl cook?’

(9d) John etikitie nuu mwende augire niarugir e iring? (Partial wh-movement)

John believes FOC-who Mwende said cooked food
‘Who does John believe Mwende said cooked the food?’

In Kitharaka (which is also a Bantu language spoken in Kenya) the subject, object and adjunct questions allow movement of the wh-phrase to Spec CP of the matrix sentence. This movement of the wh-phrase is accompanied by a focus marker which in this case is a particle /li/ or /ili/ (Muriungi, 2003). Apart from full wh-movement represented in (10a) there are other strategies of forming wh-questions, namely: wh-in-situ (10b), partial wh-movement (10c and 10d) and intermediate strategy where the wh-phrase appears immediately after the subject (12e) Muriungi (2005). The bracketed items show the base position occupied by the wh-phrase.

(10a) N-uuJohn a-ring-e <u> (Full wh-movement)

FOC-who John SM-beat-PERF-FV
‘Who did John beat?’

(10b) John a-ring-e (g)uu(wh-in situ)

John SM-beat-PERF-FV who
‘Who did John beat?’
(10c) G-ug-ir-e atin-uu John a-ring-ir-e <uu> (partial wh-movement)
    2nd SG-say-PERF-FV that FOC-who John SM-beat-PERF-FV
    ‘Who did you say that John beat?’

(10d) John a-ug-ir-e atikaarigaka, i-mpi Maria a-ka-nenk-e-er-e
    John SM-say-PERF-FV that girl this F-what SM-OM-give-APPL-PERF-FV
    ‘What did John say that this girl, Maria gave to her?’

(10e) John n-uaa-ring-ir-e <uu> (intermediate strategy)
    John F-who SP-beat-PERF-FV
    ‘Who did John beat?’

In Tugen wh-words remain in-situ and are checked covertly at Logical Form (LF) (Jerono, 2012). The wh-elements are positioned immediately after the verb (11a) or sentence finally (11b). The CP position is not created because the subject which is a wh-element remains in-situ at SPEC/VP.

(11a) ø -weénd-i ánó láákw-éé?
    3SG-go-IMP where child-SG/DEF
    ‘Where is the child going?’

(11b) Kà -o- áál-ø Kí-mórú káláámí-t ngíró?
    PST-3SG-buy-3OB M-moru pen-SG/DEF which
    ‘Which pen did Kimoru buy?’

Nandi allows no wh-movement but has in -situ questioning of both subjects and objects Creider (1989). The wh-question behavior in Kipsigis is not yet documented. The study therefore investigated and documented the positions a wh-word can occupy in Kipsigis wh-questions.

THEORETICAL FRAMEWORK
The study was informed by the principles and parameters theory which recognizes that languages are acquired in much the same way, but vary systematically. The bare phrase structure theory, which was developed with the development of the minimalist programme, was used in analyzing the data. The theory advocates for bottom up derivation of structure and is against inclusion of non-branching projections in syntactic representation.

MATERIALS AND METHODS
This work is qualitative as it deals with words, phrases and sentences. The research design is descriptive as it describes the positions in which wh-words are found. The study involved Kipsigis native speakers. The population for the study was the various categories of sentences containing wh-questions. Purposive sampling was used to identify competent respondents who had to have completed form four level of education for them to understand what was required. Data was elicited through the use of a structure generation exercise which was administered to ten competent speakers of Kipsigis. Native speaker intuition was then used to judge the grammaticality and acceptability of the responses. Data was analysed in tree diagrams using the bare phrase structure.

RESULTS AND DISCUSSION
Kipsigis is a subgroup of the Kalenjin language which is a Nilotic language spoken in the western highlands of the Rift Valley. Kipsigis is spoken by roughly two million people (Lewis et al. 2016). It is a verb initial language with VSO/VOS word order. The VOS word order is a result of the object shifting to the left so that it intervenes between the verb and the subject. The verb always comes first while the subject and object can trade places:

12. Katyaar Kibet mpirit
    Kicked Kibet the ball
    ‘Kibet kicked the ball’

13. Katyaar mpirit Kibet
    Kicked the ball Kibet
    ‘Kibet kicked the ball’

Subject Wh-questions
The subject wh-questions are formed by the wh-phrases who, what, whose and whom. These are: ng’oo, nee, apng’oolpong’oool and ng’ooin Kipsigis respectively. In Kipsigis there is a possibility of having two positions termed in-situ because of the VSO/VOS word order alternation. When the wh-phrase comes after the verb, it creates VSO word order as in (14a). When the wh-phrase comes sentence-finally it creates a VOS word order as in (14b). In (14b), the wh-phrase ‘ng’oo’ appears after the verb ‘koip’.

14a) Koip ng’oo kilamit nyuun? (VSO)

Proceedings of the 6th International Research Conference  Page 510 of 702
Took **who** pen mine
‘Who took my pen?’

(14b) Koip kilamit nyuun **ng’oo**? (VOS)
Took pen mine **who**?
‘Who took my pen?’

The wh-phrase can also be moved to the front of the sentence. This movement is accompanied by a focus marker ‘ne’ which is attached to the verb.

(14c) **Ng’oo** ne-koip kilamit nyuun?
**Who** F-took pen mine?
‘Who took my pen?’

Movement of the wh-phrase without addition of a focus marker results in ungrammaticality as in;

(14d) * **Ng’oo** koip kilamit nyuun?
**Who** took pen mine?
‘Who took my pen?’

**Whose** is another phrase representing the subject wh-questions. Consider:

(15) Konyo ng’etapkamitap John amut.
‘John’s brother came yesterday’

The sentence in (15) can be questioned in the following ways:

(16a) Konyo ng’etapkamit apa**ng’oo** amut? (In-situ)
‘Whose brother came yesterday?’

(16b) Ng’etapkamit apa**ng’oo** ne-konyoamut (ex-situ)
‘Whose brother came yesterday?’

The construction in (16b) demonstrates the ex-situ strategy because movement has occurred so that the wh-phrase apa**ng’oo** (*whose*) now comes before the verb nekonyo(*came*). The construction also conforms to the fact that when movement occurs, a focus marker must be attached to the verb. In this way, Kipsigis behaves like Gichuka (Mutegi, 2014) and Kitharaka (Muriungi, 2003) where movement of the wh-phrase is accompanied by a focus marker. In this case, the focus marker ‘ne’ is attached to the verb ‘konyo’. The construction in (15) can be questioned in the form:

(16c) Ne-konyo amut ko ng’etapkamit apa**ng’oo**?
‘The person that came yesterday is whose brother?’

In (16c), topicalization has been employed in asking the question ‘whose brother?’ The topic of the sentence is ‘ne-konyoamut’ which is equivalent to ‘the person that came yesterday’. It forms the subject of the sentence. From the construction it is evident that topicalization is an instance of focusing because of the focus particle ‘ne’ which is attached to the verb konyo. It is also true to say that topicalization is an instance of clefting. The construction in (16c) is a pseudo-cleft construction whereby the subject (*the person that came yesterday*) is a nominalized relative clause and the wh-phrase (*whose brother*) is the predicate.

In a complex sentence, the facts are essentially the same as those of simple sentences. Consider:

(17) Kole Tom kamut Kipkoech lakweet
Said Tom took Kipkoech the child
‘Tom said Kipkoech took the child’

The subject of the complex sentence can be questioned in the following ways;

(18a) Kole Tom kamut ng’oo lakweet? (In-situ: wh-phrase appearing after the verb)
Said Tom took **who** the child?
‘Who(m) did Tom say took the child?’

(18b) Kole Tom kamut lakweet ng’oo? (In-situ: the wh-phrase coming sentence finally)
Said Tom took child **who**?
‘Whom did Tom say (that) took the child?’

(18c) Ng’oo ne-kole Tom kamut lakweet? (Ex-situ: Focusing)
‘Whom did Tom say (that) took the child?’

(18d) Kole Tom ng’oo ne-kamut lakweet? (Partial wh-movement)
Said Tom **who** F-took the child?
‘Who(m) did Tom say (that) took the child?’

(18e) Ne-kole Tom kamut lakweet ko ng’oo? (Topicalization)
The person Tom said took the child is **who**?
‘Who is the person Tom said took the child?
In (18a) and (18b) the wh-phrase occupies the in-situ position. In (18a), the wh-phrase appears after the verb in the embedded clause, while in (18b) the wh-phrase comes sentence finally. (18c) on the other hand is an instance of wh-movement because the wh-phrase has been moved to the left periphery and there is a focus marker attached to the verb. On the other hand (18d) displays partial wh-movement. Partial wh-movement is wh-movement in which the wh-phrase undergoes movement but to a position lower than its relevant position (Saddy, 1991). In (18d), the wh-phrase ng’oomov es to a structurally lower position other than the matrix clause. (18e) is a pseudo-cleft construction where the wh-phrase is the predicate and the subject is ‘The person Tom said took the child’. It is an instance of topicalization where the particle ‘ko’ is used. Pseudo-cleft constructions are also used to form wh-questions in Polynesian languages (Potsdam and Polinsky, 2011).

Object Wh-Questions
Consider:

(19a) Kaam John kimnyeet (VSO)
   Ate John ugali
   ‘John ate ugali’
(19b) Kaam kimnyeet John (VOS)
   Ate ugali John
   ‘John ate ugali.’

In (19a) and (19b), the object of the sentence is kimnyeet(ugali). The object can be questioned in the following ways:

(20a) Kaam John nee? (In-situ: the wh-phrase coming sentence finally)
   Ate John what?
   ‘What did John eat?’
(20b) Kaam nee John? (In-situ: the wh-phrase coming after the verb)
   Ate what John?
   ‘What did John eat?’
(20c) Nee ne-kaam John? (Ex-situ)
   What eat John?
   ‘What did John eat?’

The constructions in (20a) and (20b) indicate the use of the in-situ strategy where the wh-phrase appears sentence finally and after the verb respectively. With the in-situ strategy, there is no focus marker. In (20c), there is movement of the wh-phrase ‘nee’ to the left periphery and there is the focus marker ‘ne’ which is attached to the verb ‘kaam’. This therefore is an instance of ex-situ strategy. Wh-movement without the focus marker yields ungrammaticality as in (20d):

(20d) *Nee kaam John?
   What ate John?
   ‘What did John eat?’

In a complex sentence, the object wh-phrase can be questioned in-situ as in (23a):

(22a) Kele kiialde ngoriet aionon?
   You said you sold dress which?
   ‘Which dress did you say you sold?’

The wh-phrase ‘aionon’ (which) comes sentence-finally, indicating the in-situ strategy. Furthermore, there is no focus marker.

The wh-phrase can also be moved from its base position to a position lower than the matrix clause. This is where the wh-phrase appears in the embedded clause. (22b) is an instance of partial wh-movement because the wh-phrase has left its base position but has not moved to the front of the matrix clause.

(22b) Kele aionon ngoriet ne-kiialde?
   You said which dress you sold?
   ‘Which dress did you say you sold?’

The constructions in (22c) and (22d) demonstrate the ex-situ strategy because the wh-phrases are moved to the front of the matrix clause.

(22c) Ngor aionon ne-kele kiialde?
   Dress which you said you sold?
   ‘Which dress did you say you sold?’
In (22c), the wh-phrase ‘ainon’ (which) is a post modifier of ‘ngoriet’ (dress). In (22d), ‘ngoriet’ is the complement of the wh-phrase ‘ainon’. We can therefore say when the wh-phrase moves, it drags along its complement through the process called pied piping.

(22d) Ainon ngoriet nekele kiialde?
   ‘Which dress did you say you sold?’

Topicalization can also be used in object wh-questions as in the construction in (22e):

(22e) Ngoriet nekele kiialde ko ainon?
   Dress that you said you sold is which one?
   ‘The dress that you said you sold is which one?’

The subject of sentence (22e) is ‘ngoriet nekele kiialde’ (dress that you said you sold) and the predicate is ‘ainon’ (which one). Topicalization in Kipsigis involves the use of the particle ‘ko’ to link the subject to the predicate.

Adjunct Wh-Questions

Adjunct wh-questions answer the questions how, when, where and why. These are ano, au, ano and kalyaan/amunee respectively. Kipsigis is a tonal language in the sense that tone is used to differentiate lexical items. Yip (2002) says a language with tone is one which an indication of pitch enters into the lexical realization of at least some morphemes. According to Toweett (1975), there are four main tones in Kipsigis: low tone, high tone, high falling tone and low-rising tone (which is rare). A lexeme such as the adjunct ‘ano’ has two meanings: ‘ano’ (where) which is said with a high tone and ‘ano’ (how) which is said with a low tone.

How

Consider:

(23) Kaamis Chepng’eno mutyo
   Ate Chepng’eno slowly
   ‘Chepng’eno ate slowly.’

The wh-expression how can be questioned in the following way;

(24a) Kaamisyoito ano Chepng’eno?
   Ate how Chepng’eno
   ‘How did Chepng’eno eat?’

The answer to (24a) above would be mutyo (slowly). The adjunct wh-phrase how cannot be questioned ex-situ as this would yield ungrammaticality as seen in (24b):

(24b) *Ano kaamis Chepng’eno?
   ‘How did Chepng’eno eat?’

In a complex sentence the adjunct wh-phrase ‘au’ (when) can be questioned in situ. Consider:

(27a) Kale Cherono inome tiemutik karon
   Said Cherono begin the exam tomorrow
   ‘Cherono said (that) the exam will begin tomorrow’

The adjunct wh-phrase au (when) can come after the verb in the embedded clause as in (27b):
(27b) Kale Cherono inome au tiemutik?
   Said Cherono FUT-begin when the exam?
   ‘When did Cherono say the exam will begin?’
The adjunct wh-phrase au (when) can come sentence finally as in (27c);
(27c) Kale Cherono inome tiemutik au?
   Said Cherono FUT-begin the exam when?
   ‘When did Cherono say the exam will begin?’

Where
The adjunct wh-phrase ‘ano’ (where) can also be questioned in-situ. Consider (28);
(28) Kale John kawa oinet Peter.
   Said John go river Peter.
   ‘John said (that) Peter went to the river.’
The adjunct wh-phrase ‘ano’ (where) can come after the verb in the embedded clause as in (29a);
(29a) Kale John kawa ano Peter?
   Said John go where Peter?
   ‘Where did John say Peter went?’
The adjunct wh-phrase ‘ano’ (where) can come sentence finally as in (29b);
(29b) Kale John kawa Peter ano?
   Said John go Peter where?
   ‘Where did John say Peter went?’
Like the adjunct wh-phrases how and when, the wh-adjunct phrase where cannot be questioned ex-situ as this will
yield ungrammaticality as seen in (29c):
(29c) * Ano kale John kawa Peter
    Where said John went Peter
    ‘Where did John say Peter went?’
The observation made here is that there is no focus marker in the formation of the wh-question, implying that
movement does not occur but the wh-phrase remains in-situ.

Why
The wh-phrases used to ask the question why in Kipsigis are ‘kalyaan’ and ‘amunee’. Consider:
(30a) Kanyo John kokachelewan amun kameto bussit.
   Came John late because he was left by the bus.
   ‘John came late because the bus left him’
The adjunct wh-phrase ‘why’ (amunee) can be questioned in-situ as in (30b);
(30b) Kanyo John kokachelewan amunee?
   Came John late why?
   ‘Why did John come late?’
The adjunct wh-phrase why can also come at the beginning of the question as in (30c) and (30d);
(30c) Kalyaan asikonyo John kokachelewan?
   Why came John late?
   ‘Why did John come late?’
(30d) Amunee asikonyo John kokachelewan?
   Why came John late?
   ‘Why did John come late?’
The wh-phrase ‘why’ can be questioned in-situ as in (30b) above. It can also appear at the beginning of the sentence
as in (30c) and (30d). However, the instance where the wh-phrase ‘why’ appears at the front of the sentence cannot
be termed an instance of focusing as with the case of wh-movement because there is no focus marker. This is herein
referred as wh-fronting.

Multiple Wh-Questions
Multiple questions occur in Kipsigis whereby two wh-phrases can remain in-situ. This is unlike the case in English
where one wh-expression can be found in situ while the other is preposed. In English, ‘who’ is the only wh-
expression that can be preposed. Kipsigis being verb initial has the verb coming first followed by the interrogative
words. Consider:
(31) Kaal ng’oo nee
    Bought who what
    ‘Who bought what?’
(32) Kayai ng’oo nee
Do who what
‘What did who do?’
(33) Ipwote ile wendi ng’oo ano
You think go who where
‘Who do you think will go where?’

The interrogative words ng’oo (who), nee (what) and ano (where) are positioned after the verb indicating that they remain in-situ. One of the wh-phrases can also be moved to the left periphery which in this case is the ex-situ position. In the movement of the wh-phrase, a focus marker ‘ne’ must be attached to the verb as in (34):

(34a) Ng’oo nee kakeer nee?
‘Who saw what?’
(34b) Nee ne-kaal ng’oo?
What bought who?
‘Who bought what?’

From the examples in (34), the wh-phrases ng’oo (who) and nee (what) can be preposed to yield a grammatical structure. An attempt to move the two wh-phrases results in ungrammaticality as in (35):

(35) *Ng’oo nee kakeer?
‘Who saw what?’

The adjunct interrogatives why, how and when cannot be moved to the left periphery but they remain in-situ.

(36) Kawentito ng’oo ano?
Walked who how?
‘Who walked how?’
(37) Kanyo ng’oo amunee?
Came who why?
‘Who came why?’
(38) Kanyo ng’oo au?
Came who when?
‘Who came when?’

In (36), (37) and (38) it is possible to move the wh-phrase ng’oo (who) to the left periphery but movement of the wh-phrases amunee (why), ano (how) and au (when) is not possible.

Indirect Questions
Indirect questions in Kipsigis are characterized by the interrogative word coming after the verb in the subordinate clause or sentence finally. Consider:

(39) Kakwong’ John kole kakeer nee Mary (Interrogative word coming after the verb)
Wondered John saw what Mary
‘John wondered what Mary saw’
(40) Akwong’e ale kogawa ano (Interrogative word coming sentence finally)
I wonder she had gone where
‘I wonder where she had gone to’
(41) Katepenan kole kaal nee (Interrogative word appearing sentence finally)
She asked me I bought what
‘She asked me what I had bought’

In (39), the interrogative word ‘nee’ comes after the verb in the subordinate clause, whereas in (40) and (41) the interrogative words ‘ano’ and ‘nee’ respectively are positioned sentence finally. These three instances demonstrate the wh-in-situ positions because the wh-phrase comes after the verb and sentence finally. The construction in (41) can also appear in the form presented in (42):

(42) Katepenan kiit ne-kaal
‘She asked me what I had bought’

In (42) movement must have occurred because the wh-phrase ‘nee’ which has been replaced by the phrase ‘kiit’ has moved from the sentence final position to a position preceding the embedded clause what I had bought. There is also a focus marker (ne) which is attached to the verb ‘kaal’.

Structural Representation of Kipsigis Wh-questions
According to Chomsky (1993) the basic minimalist program sentence structure is as follows;

Proceedings of the 6th International Research Conference
The above structure is built in a bottom up process that involves the combination of lexical and morphological features through the process of select and merge in the lexicon. Morphological features like tense and agreement are selected and merged with the verb and the verb selects and merges with other constituents like noun phrases in the building up of the sentence structure. In SVO languages like English, the verb moves to AGRS to check agreement features whilst the subject moves to SPEC /AGRSP to check for nominative case. In that case the subject heads the sentence. The structure therefore does not cater for verb initial languages with VSO/VOS word order (Jerono, 2012). She therefore designs a way in which such languages can be accommodated.

Adopted from Jerono (2012) Figure 2. The minimalist sentence structure for verb initial languages
In the above structure the verb moves from the VP then to AGRO’ to check for agreement object features then to AGRS’ to check for agreement subject features and finally to TNS to check for tense features. The subject moves from SPEC/VP to SPEC/AGRSP to check for nominative case features. The object moves from the VP to SPEC/AGROP for accusative case checking. This sentence structure has been adopted in the structural analysis of Kipsigis wh-questions since Kipsigis is a verb initial language.

**Wh-in situ**

In this strategy, the wh-word does not move. Instead, the wh-words remain in the position normal for subjects, objects and adjuncts.

**Wh-ex-situ**

Wh ex-situ occurs when the wh-word is moved to specifier position of the matrix sentence. In figure 4, the wh-element ng’oo moves from SPEC/AGRSP to SPEC/FOCP position to check for focus features. This is supported by the claim put forth by Sabel (2009) that wh-movement is triggered by a strong [+focus] feature in a functional head (Foc). This focus feature in Kipsigis is manifested morphologically by a focus marker ‘ne’.

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*Figure 3. Subject wh-question*

In this structure, the subject wh-element *ng‘oo* is base generated at specifier of VP then moves to SPEC/AGRSP position.
Partial wh-movement.
Partial wh-movement occurs when the wh-phrase leaves its base position but does not move to the matrix clause. It is an instance of movement and therefore, in Kipsigis, a focus marker must be attached. Both subjects and objects display partial wh-movement.
CONCLUSION
In conclusion, the subject and object wh-words can be found in-situ; after the verb or sentence finally. They can also be found at the front of the matrix clause, a position termed ex-situ. Adjuncts are found in-situ except for the adjunct wh-phrase ‘why’ which can also be fronted. In multiple questions, two wh-words can be found in-situ while on the other hand; one wh-word can be moved to the front of the interrogative sentence. In indirect questions the wh-words
come after the verb in the subordinate clause or sentence finally. They can also be moved in a construction where the verb asked is merged with an embedded question.

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INTRODUCTION

Background to the Study

Translation is defined in a number of ways. According to Newmark (1988), it is an art or craft which is concerned with replacing written message in one language by the same message in another language, which involves the process of encoding the meaning and forms in the target language (TL) after the translator has decoded or interpreted the meaning and forms of the source language (SL). Kelly (2000) defines translation as the skill of understanding and interpreting the source text and rendering it in the target language by using the register, the background knowledge and other language resources to meet the intended purpose. The translation of the Bible demands high skills and translators who have linguistic knowledge, social, cultural and communicative knowledge of the message of the source text, (Coulson, 2000). The Bible translation does not only involve transfer of linguistic items from one language to another but also the transfer of style, emotions and impressions of the original text into the target language. This indicates that the translator needs to have adequate knowledge on both the source and the target language.

The origin of the church in East Africa is associated with the Christian missionaries who arrived at the coast in the mid-19th century. They were the first to make attempts to translate the Holy Scriptures into African languages, (Majola 1999). He states that Kiswahili developed as a written language in Lamu, Mombasa and Zanzibar during the time of Islamic trade and settlement before the coming of Christianity, but the language was not versed enough as possible in the target text. However, the process is hampered by non-equivalence, which occurs when a lexical item or an expression in the source language lacks an equivalent item to translate it into the target language. A descriptive research design was used to obtain information from a sampled population. The Bible is divided into two sections; the Old and the New Testament. It is further categorized into seven groups. Purposive sampling was used to select one book from each category and one chapter from each book to form the sample for the study. Data was collected through careful study of the English Revised Standard Version Bible to identify types of non-equivalences and the Kĩkamba Bible to analyse how non-equivalence is handled. The study established two types of non-equivalences; non-equivalence at lexica level and above word level. The study reveals that non-equivalence is difficult to handle at lexical level mostly due to culture-specific words. Above the word level, translation is hampered by the use of figurative language in the source text. The study recommends that the translator needs a good background on the culture of the two languages and the metaphorical language use in the Bible. It is hoped that the research will be a contribution to applied linguistics in the area of translation, specifically on non-equivalence.

Keywords: translation, non-equivalence, source text, target text, the Bible and Kĩkamba.

ABSTRACT

This paper examines types of non-equivalences in the Kĩkamba Bible translation. Translation involves the rendering of a source text message into the target text so as to ensure that the surface meaning of the two is approximately similar and the structures of the source language are preserved as closely as possible in the target text. However, the process is hampered by non-equivalence, which occurs when a lexical item or an expression in the source language lacks an equivalent item to translate it into the target language. A descriptive research design was used to obtain information from a sampled population. The Bible is divided into two sections; the Old and the New Testament. It is further categorized into seven groups. Purposive sampling was used to select one book from each category and one chapter from each book to form the sample for the study. Data was collected through careful study of the English Revised Standard Version Bible to identify types of non-equivalences and the Kĩkamba Bible to analyse how non-equivalence is handled. The study established two types of non-equivalences; non-equivalence at lexica level and above word level. The study reveals that non-equivalence is difficult to handle at lexical level mostly due to culture-specific words. Above the word level, translation is hampered by the use of figurative language in the source text. The study recommends that the translator needs a good background on the culture of the two languages and the metaphorical language use in the Bible. It is hoped that the research will be a contribution to applied linguistics in the area of translation, specifically on non-equivalence.
cultural and traditional differences. A number of problems are encountered in trying to define a theory of translation; the process is more complicated due to the fact that translating depends on a theory of language that includes all classes of texts, audience and circumstances of use. Krapf was the pioneer in translating the scriptures into Kikamba which was the second oldest translation of scriptures in Kenyan languages after Kiswahili. The first translation was the gospel according to St. Mark by Krapf in 1850. Hoffman, Pfitzinge and Ernest Brutzer of the Leipzig mission translated the gospel according to St. Luke in 1898, the book of the Acts of the Apostles in 1904 and the gospel according to St. Matthew 1909. In these books the Kikamba used was rather difficult for the native speaker to understand because it was inconsistent. A team of translators led by George W. Rhoad retranslated the gospel according to St. Mark in 1915, the gospel according to St. John 1916 and the book of Daniel in 1935. They were assisted by Aaron Kasyoki and Jeremiah Kyeva who played the role of native informants, (Majola, 1999). Later in 1956 the Kikamba Bible in a consistent Kikamba language was completed by a team of the African Inland Missionaries (A I M) assisted by the nationals and published as ‘Maandiko Matheu Ma Ngai Metewa Mbivilia Nimo Útiano wa Tena na Mweũ’. (Holy Scripture of God Called the Bible is the Old and the New Covenant). It was published by the British Foreign Bible Society, (B F B S), (Waruta, 1975).

Translation of the Bible was as a result of a lot of cooperation and collaboration on the part of the Christian missionaries. Majola (1999) states that the input of the native speakers was kept at a minimum which possibly explains the reason why the socio-linguistic and in particular the dialectal situation of Õkambani was not taken into account for example other dialect speakers were ignored and preference was given to Masakũ speakers. Problems of unnaturalness, lack of clarity or even ungrammaticality, in the 1956 Kikamba Bible are not only due to the literal approach adopted by the translators but also reflects the translator’s linguistic incompetence as a non-native speaker.

A recent Kikamba Bible version which used the standardized Kikamba was translated by a team of translators and published by the Bible Society of Kenya in 2011. A later edition was done by Mbiti who translated the New Testament directly from Greek and was launched in Kitui in 2015. He asserted that he did this edition single handedly due to the challenges he used to face while using the former edition. The Kikamba Bible version 2011 is more readable by the native speakers since it was translated by a team and therefore, reducing subjectivity.

One major problem in translating the Bible is the culture since all languages reflect culture of which they are part of. Culture is complex, while language consists of only verbal and non-verbal symbols; culture includes all kinds of beliefs (Nida, 1964). The subject material of the Bible covers a wide range of cultural situations. Languages possess different syntactic and morphological features that pose many translation difficulties resulting from lack of equivalents at morphological, lexical and syntactic levels. This results to linguistic and cultural non-equivalence. In the religious culture the problems are often concerned with terms that are religious-specific for example the names of the deity which leads to cultural or situational non-equivalence. Language is part of the society’s culture and the problems experienced are due to the special characteristics of the languages involved in the translation.

The problems of equivalence and adaptation between languages are greatest in the lexical items. The area of meaning of a word in one language is never completely identical with the area of meaning of a similar word (Ciampa, 2011). More problems are experienced in combination of words with specialized meanings. The translator needs knowledge of the actual usage of the item in that language. Apart from the cultural issues, languages are spoken with variations that result from geographical, social, education, gender and age among other factors. Kikamba has varieties such as Machakos and Kitui dialects that are spoken in Machakos and Makueni counties respectively, and a translator needs to use the standardized dialect; one used in written documents such as in literature books and in the Kikamba dictionary consistently to avoid confusion.

Kikamba is spoken with different variations largely due to geographical reasons. Maândũ (1980) distinguished four dialects; the Machakos dialect, the Makueni dialect, the Kitui North dialect and Kitui Central dialect. The dialects are named after the area they are spoken. According to him, Machakos dialect also known as Kimasakũ dialect is the one used in important written works like the Kikamba literature for example story books such as Ngotho (1963) and Kimili (2013) and also in instructional materials for lower primary classes. This study on types of non-equivalence used the standardized dialect.

Difficulties in translating are majorly posed by the concept of non-equivalence, where the TT is in short of a word or an expression that is used in the ST to convey the message. This is a problem that is evident in all the levels starting from the word level up to the textual level. For example, at word level non-equivalence may originate from culture...
bound words, at grammatical level they may occur where a grammatical aspect such as gender, number or tense does not exist in the target language. It is also evident in the textual level in terms of cohesion and coherence. Apart from grammatical meaning in a text there is also pragmatic meaning which calls for pragmatic equivalence (Baker, 1992). The translator needs to work out what is written (word conceptual meaning) and also what is implied in order to arrive at a quality translation. This paper discusses the types of non-equivalence in Kikamba Bible at lexical/word and above the word level.

The role of the translator is to encode meaning and forms of the source language into the target language. Equivalence is aimed at so that the texts can be compared in terms of meaning. Equivalence in this context is defined as the similarity between the ST and the TT at word or above the word level. The translator faces different challenges in trying to achieve the equivalence in all these levels. Proponents of the equivalence-based theory such as Toury (1995) define equivalence as the relationship between source text (ST) and target text (TT) that allows the TT to be considered as the translation of the ST. This means that the two texts can be compared in terms of meaning. The researcher used the Revised Standard Version Bible (RSV, 2008) as a working source text and the Kikamba Bible (2011) to determine cases of non-equivalence and how they are handled in the process of translation. The RSV (2008) Bible was used because the team that translated the Kikamba Bible (2011) mainly used it as main source text. The researcher also made reference to RSV (2016.) and KJV among others.

**Equivalence and Non-equivalence**

For the translated text to be considered as the translation of the original there must be equivalence. The role of the translator is to replace the language of the ST with the language of the TT, (Brisset, 2000) and the implicit focus in all translation definition is upon the concept of equivalence. According to Nida (1964) translation can be defined as reproducing in the receptor language the closest natural equivalent of the source language message first in terms of meaning and secondly in terms of style. In the Bible translation the emphasis is given on the meaning since the Bible is not written for entertainment but to communicate to the receptor audience.

The lack of equivalence is what is defined as non-equivalence. Equivalence can be achieved in a number of ways. For example Kollar (1989) notes, referential or denotative equivalence in which the SL and TL words supposedly refer to the same thing in the real world and connotative equivalence, where the SL and TL words trigger the same or similar associates in the minds of the native speakers in the two languages. He further suggested text-normative equivalence where the SL and TL words are used in the same or similar contexts in their respective language and also pragmatic equivalence also referred to as dynamic equivalence by Nida (1964) in which the SL and TL words have the same effect in their respective languages. He also defined formal equivalence where SL and TL words have similar orthographic or phonological features. Toury (1995), postulates that in comparative analysis of the study of ST and TT one should discuss the degree of translation equivalence in the two texts. Catford (1965) identifies the terms formal correspondence and textual equivalence while Baker (1992) extends the concept of equivalence to cover similarity in ST and TT devices in the respective texts. She uses the term textual equivalence to refer to both formal correspondence and textual equivalence.

The main goal of translation is to achieve equivalent effect or dynamic equivalence. The principle of equivalent effect introduced by Nida and Taber (1982) refers to equivalence in the literal meaning of words and equivalent in the association or emotions that words bring in the mind of the reader. The translator needs to come up with good plans (strategies) to achieve this effect. This paper explores the types of non-equivalence and also determines the translation strategies used to handle them.

**METHODOLOGY**

The study was guided by the principles of descriptive research design. A descriptive research design falls under qualitative research approach. The researcher used the qualitative research approach which seeks to investigate the natural setting and the results are presented in form of descriptive essays and not in statistics, (Dingwall, et al; 1998). The Bible has 66 books and is divided into two sections the Old Testament and New Testament. The Old Testament has 39 books and the New Testament has 27 books. The books are further divided into other categories. For the purpose of this study the researcher adopted a religious classification by the Revised Standard Version Bible (Preface, 2008) which put the Bible books into seven categories; Pentateuch, Historical books, Poetical books, Prophetic books, Gospel, The early church, and the Epistles. The researcher selected one book from each category which included: Genesis, Judges, Song of Solomon, Isaiah, Mathew, Acts of the Apostle and Hebrews. The
The researcher further purposively sampled the first chapter of each book for the research except the book of Mathew and Hebrew in which the last chapter was sampled. A total of seven chapters formed the sample for the study.

The process involved reading the selected chapters from each book intensively using the Revised Standard Version (2008) to explore the types of non-equivalences using the Equivalence theory proposed by Nida (1964). The verses that reflected cases of non-equivalence were highlighted and recorded. The texts were categorized according to the type of non-equivalence. Equivalence as reviewed by Baker (1992) can appear at word, grammatical, textual, and pragmatic levels. The non-equivalence in this paper was analyzed at lexical/word level and above the word level. The process also involved reading of the Kikamba Bible (2011) to determine whether non-equivalence was successfully handled or not leading to successful transfer or unsuccessful.

DISCUSSION
The data analysis involves identification and explanation of non-equivalence in translating the Bible into Kikamba. The researcher was also engaged in evaluating the translation strategies to determine whether the message of the source text was successfully transferred in the TT or not. The source language is English and the target language is Kikamba. The researcher categorized non-equivalence in this study into two broad categories, that is, lexical/word level non-equivalence and above word level non-equivalence. The non-equivalence above the word level is discussed under figurative use of language. Non-equivalences identified are presented in the table below. The successful transfer is used in this case to refer to the translation of the full message or the meaning of the ST to the TT while unsuccessful transfer refers to partial translation (or mistranslation in some cases) of the ST message or meaning in the TT. These two broad categories on the types of non-equivalences identified in the Kikamba Bible translation are discussed under lexical/word and above the word level.

<table>
<thead>
<tr>
<th>Type of non-equivalence</th>
<th>Number of identified texts</th>
<th>Successful transfer</th>
<th>Unsuccessful transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lexical/word</td>
<td>41</td>
<td>16</td>
<td>25</td>
</tr>
<tr>
<td>Figurative language</td>
<td>17</td>
<td>6</td>
<td>11</td>
</tr>
</tbody>
</table>

Lexical/word Level Non-equivalence
Baker (1992) defines a word as the smallest unit of language which is expected to possess individual meaning. He argues that in translation everything would be easier if there were a one-to-one relationship between words and meaning in the source and the target language. Five types of non-equivalence at word/lexical level were identified; culture-specific words, words that are lexicalized in the target language but do not share the same semantic field or meaning (differ in sense), words whose concept exist in the TL but do not have a one-word equivalent, words with two senses in the context of the source text and the use of archaic terms in the source language.

Culture-Specific Words
The identified words were: heaven, scarlet, crimson, silver, angel, prince, sepulchre, tomb, chariots, vineyard, gold, oak, myrrh, and henna. Out of the fourteen words identified from the sampled texts only five were successfully transferred in the TT, to achieve the goal of translating, while the rest of the words (nine) were not correctly translated into the TT. Each word is analyzed and the strategy used to translate it is identified to determine the success or lack of it in rendering the meaning in the TT. For example the word ‘heaven’ in Genesis 1:1 is a concept that is lexicalized in the Christian dialect which is associated with Hebrew culture. The Akamba god did not create ‘heaven’. In Genesis 1:1 the word ‘heaven’ is substituted with ‘cloud’ which resulted to ambiguity since the word refers to both the ‘clouds’ and ‘heaven’. It is also used in Isaiah 1:2, and Acts 1:11 in which it is translated as matuni, (clouds). The receptor reader can however interpret the word correctly from the context. This substitution through cultural filtering strategy is successful since the ambiguity can be sorted out from the context. In Isaiah 1:18, the words scarlet and crimson are used in two different similes to highlight on the intensity of the sins that are committed by the Israelites, the writer uses colors for comparison. Scarlet is a word that is not lexicalized in Kikamba and is not included in the Kikamba dictionary Mwau (2006), and therefore it is the red color that exists in the TT language, using the expression ‘ndune müno’ (excessively red) achieves the goal of translation. The lexical item ‘crimson’ is substituted by ‘nthakame’ which means blood which is also red in color. Substitution through cultural filtering achieves the goal of translation.
The concept ‘silver’ Isaiah 1:22 is rendered through naturalization. The translator only changed the spelling but retained a similar sound of the SL pronunciation in the TL. ‘Silver’ represents wealth since money is made of silver and among the Akamba coins are referred to as ‘sílĩva’. It is also used in Isaiah 1:22 and translated in the same way achieving the goal of translation. The word ‘angel’ is reflected in Mathew 28:2 translated as ‘malaĩka’. This word is borrowed from Kiswahili and achieves the goal of translation since it is a loan word that is commonly used and accepted in the standard Kikamba, (Mwau, 2006).

The concept ‘gold’ which is used in the book of Song of Solomon 1:11 does not exist in Kikamba and therefore the translator used the technique of borrowing in order to relay it in the TT. The word ‘thaavu’ is borrowed from Kiswahili, the strategy of naturalization was used after borrowing to make the concept fit in the TT. This achieves the goal of translating ‘thaavu’ is treated as a valuable commodity in Kikamba just as gold. The leadership vocabulary ‘princes’ as used in Isaiah 1:23 is not lexicalized in Kikamba since the society’s leadership is not organized and ruled through royal families. ‘Princes’ are sons in a royal family who may not be leaders or kings and therefore the use of ‘atongoi’ (leaders) to substitute it does not transfer the meaning of the concept thus the message is not fully conveyed. In Mathew 28:1 and Mathew 28: 8 the words ‘sepulchre’ and ‘tomb’ are used respectively and both are not lexicalized in Kikamba because people are buried in graves among the Akamba. The words are translated as ‘mũũnda wa mĩsavivi’ (graves) through cultural filtering strategy which does not meet the goal of translating since the two concepts are different.

The word ‘Hail’ in Mathew 1:9 is a loan word from Hebrew, it was interpreted and translated as ‘müũwo niwethiwe enenyu’ (peace be with you) achieving the semantic meaning but the implicature was not transferred to the TT. The word ‘chariots’ used in Song of Solomon 1: 9 is a culture specific term that is not lexicalized in Kikamba and the translator used cultural adaptation and substituted it with what is commonly found among the targeted community, ‘makasya’ (carts). The concepts are different semantically and therefore the intended message is not rendered correctly in the TT. The concept ‘vineyard’ as used in Song of Solomon 1: 6, 14, Isaiah 1:8, and in all of them the concept is translated as ‘mũũnda wa mĩsavivi’ (garden of grapes). The descriptive strategy defines what it is, although, the target reader may not readily comprehend the care given to a vineyard or even the importance or value of the graves in the original (Hebrew) culture from which the image is drawn. The culture filtering strategy therefore does not fully transfer the meaning of the ST into the TT.

A number of trees that grow in the environment or among the community from which the Bible was written caused some translation problems in this category. For example the use of oak, myrrh and henna. The ‘oak’ tree does not exist among the targeted readers and is translated as ‘myalonĩ’ as seen in Isaiah 1: 29, which makes it difficult to comprehend the meaning in the context, because the word is not common in the lexis and it is not included in the Kikamba dictionary (Mwau, 2006). The ‘myrrh’ which also does not grow in Õkambani, was translated through explicitation and borrowing as reflected in Song of Solomon 1:13. The borrowing strategy from Kiswahili of the concept ‘manemane’ is not successful in transferring the concept. The use of the ‘henna’ tree in Song of Solomon 1:14 which also does not grow in Õkambani resulted to unsuccessful translation since the concept ‘ina’ is not lexicalized properly in the TT language. The culture-specific words named objects or concepts that are not found among the targeted audience and the concepts used to translate them were either borrowed or domesticated to fit in the culture. Near equivalents for example for colors were used and achieved the goal of translation while the use cultural filtering in the majority of the cases did not achieve the goal of translating.

**Words Lexicalized in the Target Language but Differ in Sense**

Seven words were identified in this category which include: governor, city, springs, upper room, white ropes, wine and Sabbath. None of these words were rendered correctly in the TT. These words are discussed in the following texts. The words ‘governor’ and ‘city’ were not successfully rendered in the TT as illustrated in Mathew 28:14 and Isaiah 1:8, 21, 26. Governor is translated as ‘ngavana’ changing the spellings but retaining a close English pronunciation, a strategy referred to as naturalization. This kind of leadership position did not exist in Õkambani until 2010 when a new constitution was introduced. The Governor’s power in the ST may not be comparable to that of the governor in the TT but the introduction of the County government under the leadership of the governor is a contribution towards understanding the term. The terms are not used in the same context in both the TT and the ST language, this naturalization strategy did not fully transfer the concept in the ST. The word ‘city’ is substituted with the word ‘village’ through cultural filtering which does not achieve the goal of translation.
Since they do not share the same semantic meaning, some words in this category had an element of ambiguity in the TT, that is, the word would represent two meanings in the TT, for instance the use of ‘springs’ in Judges 1:15, the expression ‘springs of water’ was translated as ‘ithima’ which means ‘wells’ according to Mwau (2006). The two words are different in meaning and they also have different connotation meaning in the Bible (Douglas and Tenny, 1987). Another example of a concept that exists in the target language but has a different sense, is ‘upper room’ as used in the book of Acts 1:13. It is rendered as ‘flat’. The use of the cultural filtering and literal translation did not fully translate the concept in the TT. The translation of ‘white ropes’ in the book of Acts 1:10 resulted to ambiguity in the TT since it was rendered as ‘white clothes’. The concept exists in Kĩkamba but it is not used in the same sense and context of use is not the same as used in the source text language. The word ‘sabath’ is used in the Bible to refer to the day the Jews set aside to worship as indicated in Mosaic laws (Douglas and Tenney, 1987). It is used in Mathew 28:1, and rendered in the target text through naturalization, as ‘savato’. The translator in this case does not achieve the goal of translation since among the target audience it refers to Saturday worship. The people in the targeted community worshipped in different days and refers to the days differently.

The word ‘wine’ used in Song of Solomon 1:4 is lexicalized in the TT language but the two-share different semantic fields. In the Bible ‘wine’ has a connotation meaning which is not easy to translate in the TT. The translator borrowed a term from Kiswahili, ‘ndĩwai’ which is closely related to the meaning in ST language but it is a distance word in the TT language. The borrowing strategy was not successful in this case. The translation of words that do not share the same semantic fields or words that showed non-equivalence at the sense level posed challenges to the translators leading to partial transfer of the meaning/message of the ST into the TT.

**Words Without a one-word equivalent**

The third category of non-equivalence at the lexical level is of words whose concept exists in the TL but do not have a one-word equivalent. The researcher identified eleven words in this category; camp, inhabitants, fragrant, fatherless, widow, lambs, spy, brethren, thumbs, toes and mare. All the words except ‘mare’, ‘fatherless’ and ‘brethren’ were rendered successfully in the TT, as discussed in the following texts. The word ‘camp’ in Hebrews 13:11, 13 is translated as a place where people were settled. The Akamba people who form the majority of the targeted readers do not live in camps and therefore there is no one-word equivalent of the term but the descriptive approach successfully transferred the meaning of the ST to the TT. The descriptive strategy to translate the word ‘inhabitants’ as used in Acts 1:19 and Judges 1:27 successfully renders the message of the ST into the TT. It is also reflected in the use of the word fragrant in Song of Solomon 1: 3, 11 in which the word is described making it clear to the reader of the TT.

The concept ‘fatherless’ is lexicalized in the target language but there is no one word equivalent to refer to it. The translator used addition and the general term ‘ndĩwa’ which accommodates children without a father or/and mother as reflected in Isaiah 1:17 and thus it is not successful. The word ‘widow’ in the same verse was successfully translated through explicitation and description strategies as ‘mũndũ mũka ndĩwa’ (a woman whose husband died). The concept ‘lambs’ in Isaiah 1:11, was successfully rendered into the TT through descriptive strategy as ‘tũtena twa malondũ’ (the young ones of a sheep) and ‘spy’ in Judges 1:23 is elaborated as ‘andĩ kwa kimbithi’ (people in secret) who were send to find out how the people of Bethel lived. In this elaboration the message of the ST is communicated in the TT. There are cases where the concepts in this category needed some expansion, for example, the use of ‘thumb’ and ‘toes’ in Judges 1:6 which were also described successfully in the TT as ‘syaa ila nene sya moko’ (the big fingers of the hands) and ‘syaa ila nene sya maũũ’ (the big toes of the feet) respectively.

The word ‘brethren’ as used in the Bible in Mathew 28:10 refers to both men and women - people belonging to a given faith or fellowship, (Douglas and Tenny, 1987) but is rendered as ‘ana-a asa’ (step brothers) which distorts the intended meaning of the ST since it excludes women in the TT. The word ‘mare’ is substituted with the general word (superordinate) ‘mbalasi’ (horse) which includes both the female and the male horse as seen in Song of Solomon 1:9. The translation is not successful since it lacks equivalence as far as sense is concerned. The lexical items in this category as displayed in the discussions were rendered successfully in the target text using the descriptive equivalent strategy except three concepts, that is ‘fatherless’, ‘brethren’ and ‘mare.’

**Words with Two Senses in the Source Text Context**

The forth category composed of words that had two meanings or senses in the source text context and thus resulted to a problem of deciding on the sense to transfer to the TT. In this study it is referred to as contextual ambiguity. Six
words were identified in this category: sanctuary, maiden, chambers, couch, hospitality and stranger. None of them was rendered correctly in the TT.

The term ‘sanctuary’ in Hebrews 13:11 was rendered as ‘vandũ vatheu mũno’ (clean/holy place) through description and generalization. The meaning here does not just refer to a place and thus it leads to mistranslation. The word ‘maiden’ in Song of Solomon 1:3 was translated as ‘eĩũ’ (girls) which is unsuccessful since a ‘maiden’ in the Bible is specifically used to refer to an elderly married or unmarried woman who is a virgin in this specific context (Douglas and Tenney, 1987). The word ‘chambers’ may refer to a private room or a bed room as used in Song of Solomon 1:4 but through cultural filtering it is rendered as ‘tũsumbanĩ twa nthĩnĩ’ (small inside houses) which does not communicate the meaning of the source language. In the Song of Solomon 1:7 the word ‘flock’ which is a superordinate word to include large number of animals has been translated to mean ‘ndĩthya ya mbũi na malondu’ (sheep and goats) only in the TT but it also includes big animals like cows. The ‘flock’ or the ‘sheep’ in the Bible connotatively refers to the people who have accepted God to be their shepherd (Douglas and Tenney, 1987) but when the goats are included the specification leads to mistranslation. The word ‘couch’ used in the book of Song of Solomon 1:12 would best be described as a comfortable sofa or luxurious seat, but it was substituted with the word ‘kĩtanda’ (bed) which is commonly used among the targeted readers and thus unsuccessful in rendering the message of the ST into the TT.

In the book of Hebrew 13:2 the word ‘hospitality’ was translated as ‘mũĩthokya’ (welcoming) which is a general word but ‘hospitality’ in this context means to welcome with some positive concern/caution. Kĩkamba is limited in terms of synonyms. The two words are related but are different in meaning. The word ‘strangers’ was translated as ‘aeni’ (visitors) which implies guests. A stranger would imply someone who is unfamiliar to the host or a foreigner in this context, and showing hospitality to such is not the norm in target community, this led to mistranslation.

Archaic words in the Source Language
The last category was non-equivalence due to odd or old-fashioned terms in the ST. Only two concepts were identified in this category and they were successfully rendered in the TT. These were the words ‘raiment’ and ‘ass.’ The word ‘raiment’ used in Mathew 28:3 is an archaic term for clothes and therefore the translator used the modern term ‘ngũa’ (clothes) to domesticate it through cultural filtering, achieving the goal of translation. The word ‘ass’ in Isaiah 1:3 is an old-fashioned term, out of vocabulary but it is translated as ‘ĩng’oi’ (donkey) which is the modern word used in describing the concept referred to. The substitution through cultural filtering strategy is successful in both cases. The following table can be used to summarize equivalence at the lexical/word level.

<table>
<thead>
<tr>
<th>Type of non-equivalence</th>
<th>Number of items identified</th>
<th>Number of successful transfer</th>
<th>Number of unsuccessful transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>14</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>B</td>
<td>7</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>C</td>
<td>11</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>D</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>E</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

The A, B, C, D and E used in the table represent the following:
A – Culture-specific words
B – Words lexicalized in the target language but differ in sense
C – Words without one-word equivalence
D – Words with two senses in the source text context
E – Archaic words in the source language

From this discussion it can be concluded that words that share different semantic fields and words with two meanings in the ST context were the most difficult to translate. This differences are caused by the fact that the STL and TTL belong to different cultures. Culture-specific words also posed a challenge but the translator tried to domesticate them to the TT with some little success. Words which did not have a one-word equivalent (whose concept exist in the TT) were rendered in the TT using the descriptive equivalent strategy which was quite successful except in a few cases.
Non-Equivalence above the Word Level
Non-equivalence above the word may be due to figurative use of language or the grammatical system of the language. This paper concentrated on the figurative use of the language.

Figurative use of Language
Non-equivalence was witnessed in cases where language was used in a figurative manner. Culler (1976:21) argues that ‘languages are not nomenclatures and the concepts of one language may differ radically from those of another, since each language articulates or organizes the world differently and languages do not simply name categories; they articulate their own’. The figures of style such as idioms, metaphors and similes along with other morphological, syntactic and lexical components create a certain stylistic quality and distorting it in the TT can lead to mistranslation. The translator has to strive to get systemic equivalents (Kvetko, 2009). In this paper the researcher concentrated on the use of metaphors and similes.

Table 47: Types of non-equivalence at the Figurative use of Language

<table>
<thead>
<tr>
<th>Type of Language use</th>
<th>Figurative Language use</th>
<th>Number of items identified</th>
<th>Successful Transfer</th>
<th>Unsuccessful Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metaphors</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Similes</td>
<td>12</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

It is evident from the data that the figurative use of language caused challenges to the translator, each case is discussed separately in the following subtopics.

Metaphors
Non-equivalence at the level of the metaphor is experienced because metaphors express comparison in one way or another, (Lycan, 2000). Davison (1978) and Searle (1979) argue that a metaphor does not have the anomalous meaning but it is a form or a way of indirect communication which means that the translator should interpret it first. The metaphor in the TT will therefore be the translator’s version of the expression in the ST. If the metaphor is misinterpreted by the translator then the target audience will get the wrong meaning. The texts are identified as non-equivalence (NE) in the analysis.

An example of a metaphor is demonstrated in Song of Solomon 1:13-14 in the following text;
NE: 1
ST: My beloved is to me a bag of myrrh that is between my breasts.
TT: Mwendwe wakwa kwakwa nĩ ta kamũvuko ka mauta me múuke múseo matewa manemane, kailĩĩlwe katĩ wa nondo syakwa.
B/T: My love to me is like a bag of good smell called manemane placed in between my breast.
In Song of Solomon 1:13 the metaphor was translated through the use of a simile using the unit change strategy and literal approach to retain the implied meaning but ‘myrrh’ is omitted and other additions are made. The challenge is that the lexical word myrrh is not lexicalized in Kĩkamba. The tree does not grow in Ũkambanĩ and therefore difficult to interpret the metaphor because the image of the tree is expected to create a mental picture in the mind of the receptor language reader. This mental picture is replaced with oil with a good smell. A descriptive approach has been used to quantify the term with some additional information. Reduction strategy was also used to reduce the metaphor to a simile. Clarity is still lacking because the word ‘manemane’ is borrowed from Kiswahili and is not lexicalized in Kĩkamba. Although the basic semantic implied meaning that the speaker adores the beloved is transferred to the TT, the comparison which renders the intensity of adoration is lost and thus the transfer is considered unsuccessful.
The metaphor in Song of Solomon 1:14 is also not fully transferred in the TT due to challenges of the image ‘henna’ which is not lexicalized in Kĩkamba.

NE: 2
ST: My beloved is to me a cluster of henna blossom in the vineyards of En-gedi.
TT: mwendwe wakwa kwakwa nĩ ta Malaa me múuke múseo má múũ wa kwĩyanakavya wĩtawa ina me múũndanĩ wa mĩsavivũ wa Eni-ngeti
B/T: My love to me is like flowers with good smell of tree of making oneself beautiful called ina in the garden of grapes of En-gedi.
In verse Isaiah 1:14 the speaker compares the beloved with ‘henna’ which is a word borrowed from Arabic which is used to make dye that is used to color hair or tattoos (Oxford Dictionary, 2010). This is therefore a loan word in
English and does not have an equivalent in Kĩkamba. The translator reduced the metaphor to a simile to translate it into the receptor language, the tree was transliterated using different letters but retaining the sound it had in the source language, (ina) and also by adding information to include the fact that the tree is used for beautifying oneself. The words ‘cluster’ and ‘blossoms’ are not rendered in the TT. Reducing the metaphor into a simile results to reducing its ‘force’ among the TT audience. The other challenge was the word ‘vineyard’ which was translated as ‘garden of grapes’ but a vineyard has the element of trees that are grown for beauty or for ornamental purposes, a place for outdoor activities (Oxford Dictionary, 2010) which fits well in this context. The care given to the ‘vineyard’ is not communicated in the TT. The image creates a different picture to receptors of the TT from the one it created in the minds of the receptors of the ST which is a crucial principle in dynamic equivalence (Nida and Taber, 1982). So in this case the content is not fully transferred in the TT. The use of ‘anointing oils’ in Song of Solomon 1:3 resulted to a case of non-equivalence since in the target domain the intensity of the meaning of the expression is not realized since there is no oil that is used for anointing and people are actually not anointed or honored using oil.  

NE: 3
ST: your anointing oils are fragrant
TT: mauta maku menyunga nesa.
B/T: your oil is smelling nicely.

The words ‘cluster’ and ‘blossoms’ are not rendered in the TT. Reducing the metaphor into a simile results to reducing its ‘force’ among the TT audience. The other challenge was the word ‘vineyard’ which was translated as ‘garden of grapes’ but a vineyard has the element of trees that are grown for beauty or for ornamental purposes, a place for outdoor activities (Oxford Dictionary, 2010) which fits well in this context. The care given to the ‘vineyard’ is not communicated in the TT. The image creates a different picture to receptors of the TT from the one it created in the minds of the receptors of the ST which is a crucial principle in dynamic equivalence (Nida and Taber, 1982). So in this case the content is not fully transferred in the TT. The use of ‘anointing oils’ in Song of Solomon 1:3 resulted to a case of non-equivalence since in the target domain the intensity of the meaning of the expression is not realized since there is no oil that is used for anointing and people are actually not anointed or honored using oil.  

NE: 4
ST: your name is oil poured out;
TT: na īsyĩtwa yangu nī ta mauta me māuke māsēo monosye,
B/T: and your name is like oil with good smell poured,

The translator used a simile to translate the metaphor literally. The two have the same idea but a metaphor is more intense in terms of meaning than a simile which is an open comparison. According to Blumenberg, (1960) some theologians and philosophers of religion believe that the nature of a religious truth is such that it can only be conveyed metaphorically, and therefore there is need for the translator to come up with appropriate principles for interpreting religious texts in the source language metaphorically and not literally or word for word in order to transfer the same meaning and effect into the TT.

Due to non-equivalence of the specific images used in the metaphors the translator’s challenge was how to create the same images in the TT, for example in Song of Solomon 1:15.

NE: 5
ST: your eyes are doves.
TT: metho maku nī maau ta ma īvū.
B/T: your eyes are peaceful like the ones for a dove.

The metaphor is reduced to a simile. The image is reduced to just one quality of a dove that of being humble. The implicature in the metaphor in the ST is substituted by an explicature in the TT. This narrows the meaning that is implied in the target language.

From the discussion it can be concluded that metaphors are quite difficult to translate. The translator may partially transfer the message of the ST to the TT but the intensity or the ‘punch’ of the message and the ‘touch’ is lost in the process of translation.

Similes
According to Pilrainen (2007) a simile is a figure of speech used in language in general both in formal and informal, it is a direct comparison that uses a comparison marker. Similes are used in the Bible to communicate similarity vividly. For example in the book of Isaiah 1:8 a simile is used as illustrated below;

NE: 6
ST: And the daughter of Zion is left like a booth in a vineyard,
TT: Ndũa ya Saioni itițwe īlīy ta, kivanda ki mūndanĩ wa mĩsavivũ
B/T: The village of ‘Saioni’ is left looking like, a section/place in the garden of grapes
The simile has been translated using a simile in which the image ‘daughter’ has been replaced with a ‘village’ which is implied in the ST but not explicitly brought out. The expression ‘the daughters of Zion’ according to the translator represents the location which is compared with portion (booth in the ST) of a garden with grapes (vineyard in the ST). By changing the image to adapt to the TT the translator distorted the meaning of a ‘booth’ and the ‘vineyard’. In terms of size the booth is made to be small and the vineyard which is translated as a ‘garden’ is more valuable than just a garden. The ‘daughter of Zion’ is narrowed down to a place which is one possible interpretation and thus reducing the implicature.

The second simile was translated literally in the TT. The image ‘a lodge’ is substituted with ‘a small house in the garden’.

NE: 7
ST: And the daughter of Zion is left like a lodge in a cucumber field,
TT: Ndũa ya Saioni ititiwe ñiyi ta, ta kasumba ke miũndanĩ wa mongũ
B/T: village of Saioni is left looking like, like a small house in the garden of butter nuts.
Cucumber is grown in Ũkambanĩ and therefore has been literally translated. The attachment that religious culture has with cucumbers seems to be special, a highly regarded food among the Hebrews from whose culture the Bible draws its relevance. This can be referred in the Bible during their journey to Egypt, they cried to Moses when they were faced with famine and remembered the cucumbers that they were eating in Egypt as seen in the book of Numbers 11. The targeted audience is majorly the Akamba people who also have a special attachment towards ‘cucumber’ as witnessed in their folklore, for examples in riddles and stories. Similes are either literal or non-literal (Bredin, 1998) and therefore the literal translation meets the goal of translation.

The third simile was literally translated word-for-word and the message of the source text was relayed in the target text as illustrated below:

NE: 8
ST: And the daughter of Zion is left like a besieged city.
TT: Ndũa ya Saioni ititiwe ñiyi, ta ndũa ithyũlũlũkĩtwe nĩ amaitha.
B/T: village of ‘Saioni’ is left looking like village surrounded by enemies.
The ‘city’ is domesticated as ‘village’. The core message, the idea that it is surrounded by the enemies whether a city or a village is conveyed.

A simile has a vehicle and a topic. The vehicle is the entity to which the topic is compared accompanied by a comparison marker and the similarity features are the properties shared by the topic and the vehicle. (Fromilhague, 1995). The markers result to different syntactic requirements as seen in Isaiah 1:9 where the nouns of the places are used implicitly. For the translator to convey the equivalent content there is need for a translation strategy.

NE: 9
ST: we should have been like Sodom, and become like Gomor’rah
TT: twĩthĩwa twathelile ta ndũa ya Sondomu na ta ndũa ya Ngomolo
B/T: we would be finished like the village of Sodom, And like the village of Gomor’rah
In the simile the source text author claims that if a few of the people in this context were not spared then their end would have been like that of Sodom and Gomor’rah. The end of Sodom and Gomor’rah is implied and the reader can only connect the simile with the story in the Bible where both were utterly destroyed because the people who lived in them were continually sinning against God. These images created a gap because the translator did not make use of amplification strategy for clarity or foot note. The literal translation therefore remains a mystery until the receptor audience draws the comparison of the Bible story in Genesis chapter 18.

Non-equivalence is also enhanced by the fact that similes serve different purposes, for example, they establish a link with the reader’s general knowledge (Gutt, 2000). The readers targeted by the TT do not share the same general knowledge. This knowledge makes it easier to understand and readers also use it to reveal and interpret abstract or unfamiliar concepts by using the concepts in the context that are known to them for example in Isaiah 1:18, a number of similes have been used and in each case the reader needs general knowledge to understand the similes.

NE: 10
ST: though your sins are like scarlet, they shall be as white as snow
TT: ona vala nai syenyu mĩ nũde mĩnĩ, mũkathe’ a mwĩluũw’e mwĩ eũ ta iĩa
B/T: although your sins are very red you will be made white like Snow
In the first simile the image ‘scarlet’ has been substituted with red color and added the adverb of degree (very), the word is relevant and it is used to help the reader create an image of how badly these people have sinned against God by using the color. The scarlet color is contrasted with the white color in this context. A simile helps the reader to interpret the abstract or unknown concept from the concrete or the known concept (Fromilhague, 1995). The color ‘scarlet’ was a challenge to the translator in Kĩkamba because it is not lexicalized in Kikamba. The image in the other part of the simile is literally translated. ‘Snow’ is not common in the community of the targeted audience but it is not a distance term and comparing it white with it enhances interpretation. The simile is also abstract in Kikamba in that sins are compared with color but the fact that red color is associated with evil in the targeted community makes it less abstract, making the message comprehensible.

In the second one sin is compared with crimson, which is also an abstract idea.

NE: 11
ST: though they are red like crimson, they shall become like wool
TT: o na vala nĩ ndune ta nthakame, mũkeẽw’a ta wia wa ilondu.
B/T: even though they are red like blood you will be made white like the wool of sheep.

In this simile the word ‘crimson’ was substituted with ‘red as blood’ and in other part of the same simile the white color is compared with wool. Sheep in Ũkambanĩ is not generally white they are not ideally kept for wool since they are a local breed that is purposely for meat. This led to ambiguity in the TT and loss of the concrete object used in the ST.

Some similes used images of real or concrete objects that did not readily exist in TT, as illustrated in Isaiah 1:30 the ‘oak’ tree is not commonly grown in Ũkambanĩ or its value is not known in the targeted community. Its value and nature contribute to its meaning in the context and the comparison in the simile.

NE: 12
ST: For you shall be like oak whose leaf withers
TT: Nikwĩthĩwa mũkeethĩwa mũlỹĩ ta mũlỹũ wa mwalonĩ ũvovetye matũ
B/T: for you will be like a tree of mwalonĩ with withered leaves.

In this text the ‘city of Zion’ is liken to the ‘oak’ which is a tree known for its hard wood and typically grown in England and America according to the Oxford Dictionary (2010). The leaves of the ‘oak’ in this simile are said to wither, and this happens when a tree is not blossoming. The name used to translate the oak tree is uncommon among the Akamba community and does not even exist in the Kikamba dictionary (Mwau, 2006). The comparison is not clear leading to unsuccessful translation. The second simile in Isaiah 1:30 was fully rendered using a simile.

NE: 13
ST: For you shall be like a garden without water
TT: mũlỹĩ ta mũũnda ute kĩw’ũ
B/T: you shall be like a garden without water.

In this second simile ‘Zion’ is liken to garden that does not have water which can be interpreted as unproductive garden since water is an essential component for a garden to look green and produce. The translator literally translated the simile as it was to the target text through the use of word for word strategy. Since the image is clear the translator has achieved the goal of translating.

Similes are used in a specific structure and form especially in poetic literature. Since languages have different structures of expressing meaning, the structural equivalence is a challenge in translating similes that appear to be tied to the form. In the Song of Solomon 1:5 two similes are used which are structured parallel to each other.

NE: 14
ST: am comely like the tents of Kedar,
TT: nĩ mũmbe nesa ta maecena ma Ketali
B/T: am created beautiful like tents of Ketali

The image in the simile is a ‘tent made of kedar’ which is an abstract concept or place in the mind of the targeted audience and thus the message of the ST is not clearly rendered in the TT. The translator used naturalization to translate the image - Kedar, which did not make the image concrete but the core message that the beloved is beautiful is communicated but the intensity of the beauty is not relayed in the TT and the comparison is not clear.

The other simile used ‘curtains of Solomon’ as the image to show how beautifully the daughters of Zion are created. The reader can only comprehend the meaning of the image by relating it to the story of King Solomon in the Bible.
ST: am comely like the curtains of Solomon
TT: nĩ mĩmbe nesa ta vasia ila syĩ kwa Solomon
B/T: am beautiful like the curtains that are there at Solomon’s

The message would be made easier to comprehend by providing some communication cues in the TT. The fact that, similes also have aesthetic function, that is, to talk about something in a creative way, poses a challenge of equivalence in the TT. They generally communicate concisely and efficiently, (Fromilhague, 1995). The aesthetic is coupled with the formatting of the similes in a text. This formatting is changed in the TT and thus the aesthetic function is either not realized or realized in a different way.

The figurative use of language at the simile level caused challenges to the translator because some of the images used to unearth the meaning of the abstract terms were not lexicalized in Kĩkamba. Some that were lexicalized did not have the same extended or connotation meaning as in the ST and hence did not have the element of the same equivalent effect for both the ST audience and TT audience. Of the identified twelve similes, six were rendered successfully in the target text while six were not.

CONCLUSION
The study concludes that cultural issues in the lexical items caused challenges in the translation. For example words that share different senses and words with two meanings in the ST context were the most difficult to translate. Words which did not have a one-word equivalent but the concepts exist in the target language were easily rendered successfully in the TT using the descriptive equivalent strategy. The researcher also concludes that the aesthetic beauty in the figurative use of the language is untranslatable. The metaphors and similes in the source text have a different effect in the target text. The form/structure that adds to the meaning and the aesthetic function is lost in translating figurative language. The study therefore concludes that translation of non-equivalence texts is possible but the source text is ‘devoured’ and a ‘hybrid’ text is created which carries the message of the original text but in its own version.

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INFORMATION LITERACY (IL) SKILLS OF SECONDARY SCHOOL STUDENTS: A REVIEW

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ABSTRACT
Information literacy (IL) skills provide impetus for growth at all levels of human endeavour and forms the problems facing many students at all levels of education. Further, IL skills are not used for academic research only but are also applied in the students’ inquiries related to their daily activities. The methodology adopted for this review was use of secondary data from researchers on IL in secondary schools. This paper is on extant literature on IL skills of students in secondary schools. Specifically, the review focuses on studies covering IL in secondary schools under the following IL themes: IL standards of libraries; libraries information programmes; availability and ease of use of information in the libraries; information seeking strategies used by students; challenges in the use of information resources in school libraries. The paper highlights studies by various researchers focusing on the shortcomings of IL in secondary schools. It attempts to identify appropriate recommendations on the shortcomings for effective IL. The review sheds light on challenges of IL in secondary school libraries and identifies the points of intervention, and the magnitude of the effort required to attain excellence in school libraries. The paper further observes the existing gap in studies so far conducted in IL at secondary school level.

Keywords: information literacy, secondary school library, library user instruction, information resources, information personnel, library users

INTRODUCTION
Information literacy (IL) is a commonly used phrase in many fields and particularly, in the library science field. Paul Zurowski first introduced IL in 1974 when a proposal was submitted to the National Commission on Libraries and Information Science (NCLIS) by the President of the Information Industry Association and indicated that information literates are those trained individuals in application of information resources to their work (Dorudolu, 2016). According to International Federation of Library Associations and Institutions (IFLA, 2006) IL is the ability to ascertain when information is needed, carrying out a particular task, cost-effectively searching for information, organizing or reorganizing sources of information, interpreting, analyzing and retrieving essential information and observing the ethical use of information sources. Further, Bothma (2011) defined IL as a set of abilities enabling one to have the knowhow of when information is needful, the ability to find, establish and use the information found. Accordingly, Scott (2012) defined IL as the ability to find, assess and use information efficiently, effectively and ethically in answering an information need which can be anything from determination of a fair price for a used or new product or writing a research paper.

IL concept has been distinguished from other concepts of literacy like computer, network, digital, information technology and media literacies although they all have a relationship (IFLA, 2006). According to UNESCO (2004) IL has all activities which deal with teaching and learning in regard to the whole range of information sources and formats. UNESCO (2004) further noted that being information literate, a person must be equipped with the why, when and how to apply all IL tools and develop the ability to think decisively about the information they provide. IL is the remedy for endorsing ability to solve problems and mostly those coming with the use of modern facilities channel towards accessibility of information (Scottish Information Literacy Project, 2013).

Kuhlthau (2004) observes that information seekers are overwhelmed by the magnitude of information at their disposal from different sources. Determining when available information is sufficient is a major cause of anxiety and uncertainty experienced by information seekers; therefore the knowledge of IL remains the panacea to this predicament. In the opinion of Fourie and Krauss (2010), IL skills and Internet searching are vital preconditions for meeting information needs. The potential of IL as an instructive tool in education has been well established by academic research. It is important for teachers and students to find and efficiently use information in whatever format regardless of the location. If this is the case, teachers and students must be taught how knowledge is structured and organised by librarians who are experts in the organisation and retrieval of information and who are in the best position to guide others. (Dorudolu, 2019).

Sasikal and Dhanraju (2011) contend that “in a world where an infinite amount of information is available, individuals need to develop a greater understanding of information sources, and need abilities to acquire, evaluate,
use and communicate information”. The authors further explain that individuals who are information literate will be critical in accessing different sources of information, evaluate, analyze and use it in an ethical manner.

Durodolu (2019) indicate that in view of the importance of IL to learning, Purcell and Barrell (2014) suggest that teachers should play an important role in ensuring that students are equipped to use information conscientiously. Teachers should acquire a wide-ranging and all-inclusive knowledge of IL to direct their own knowledge creation activities that will positively influence the abilities of their future students. Students need to develop IL skills in schools so as to be responsible users of information and dynamic elements of a skilled workforce, for lifelong learning and digital citizenship, acquiring this skill will become an uphill task without the support of equally information competent teachers (McKeever & Reilly 2017).

According to Guskin (2007), IL instruction has reformed and advanced to integrate technology and become more student driven, targeting students in several phases of their academic careers from primary, secondary and higher education. Okon et al. (2014) indicated that in the current era of information society, students are supposed to have the knowhow on the use of the library, retrieve any required information using the available tools and carry out research work with minimal assistance. Consequently, students are confronted with innumerable information options and should make a decision which resources to use to acquire the information, establish its authenticity, validity and usability (American Library Association [ALA], 2000). Regrettably, this has not been the situation as many students are deficient of the necessary skills and knowhow in the use of the library and the existing tools in the retrieval of information (Okon et al., 2014). Being able to retrieve, assess and use information is a requirement for lasting learning and an essential responsibility for the students (Adeleke & Emeahara, 2016).

IL skills are used for both research in academics and application in the inquiries by people linked to their daily happenings (Chingono et al., 2015). The skills required for one to become information literate call for an understanding for the information need, available resources, how the information can be found, the need for the evaluation of the results, working or exploiting of the results, communicating or sharing and management of the findings (Okon, et al., 2014; Venera, 2017). Information literate people have learned the knowhow of learning and since they have knowledge of organization of the information, finds the information and uses it such that others can learn from them (Eisenberg et al, 2004).

Malliari et al. (2014) indicated that students that are information literate are independent learners with the knowledge of their information needs and aggressively involve themselves in the sphere of ideas. Furthermore, they show boldness in their capability in solving problems, are knowledgeable on the significance of information, management of technology tools to ease retrieval of information and are effective in communication. They are comfortable operating in circumstances either with multiple or no answers and they are holders of high values for their work leading to creation of products of high quality. Further, they are flexible, adaptable to variations and are able to operate individually and in groups, whether information comes from a poster, film, computer, government official, conversations, books or any number of other probable sources (Okon et al., 2014).

IL is a sought-after ability that empowers people to locate, arrange and evaluate information for better quality of decision-making and problem-solving (Zinn, Stilwell & Hoskins (2016). The authors also considered it a life skill and therefore desirable for all. In the opinion of Majid, Chang and Foo (2016) the lack of the necessary skills to search, locate, process, evaluate, and use information, is associated with certain information-related problems like poor quality information, information overload, difficulty in locating the necessary information, and deficiencies in skills to assist in avoiding using misinformation (Durodolu, 2019)

Management of school libraries’ affairs needs employment of sufficient and competent professional librarians to be able to yield the preferred results. Successful and well-organized management of school libraries is achievable through appropriate management of workers, funds, accessibility to information resources via endorsement of IL on all programs (Tiwari, 2013). This paper examines the extant literature on IL in secondary schools and highlights findings on the shortcomings and identifies gaps in the studies.

LITERATURE REVIEW

Information Literacy Library Standards
Ahmad (2011) did a survey of senior secondary school libraries in Jammu and Kashmir, India. Data was collected using a survey questionnaire where a total of 201 school libraries from 10 administrative districts purposively
selected were the respondents. Findings indicated that the available library facilities in the senior secondary’s library are not satisfactory. The fundamentals like appropriate physical facilities, sufficient collections, manpower that is professional, appropriate organization and basic services are missing thus not fulfilling minimum library standards.

Akanya (2012) did a study on school library development and use by staff and students of secondary schools in Federal Capital Territory (FCT) Abuja, Nigeria. The study adopted descriptive survey research and data collected using questionnaires, oral interviews for the library workers and direct observation. Sample size was 252 respondents composed of 90 head teachers/teachers, 12 library staff and 150 students. Findings showed that libraries are insufficiently used in schools and challenges like poor financing, obsolete collections, unqualified personnel and space are facing the school libraries. Lim (2011) studied the changing role of school resource libraries in secondary schools in Singapore and the importance of implementing required standards, focusing on the issues, challenges and opportunities. A historical survey was conducted which analyzed data that was published on the connections of libraries and librarianship, standards of school library, education and reforms of schools in Singapore. Findings revealed that it is important for the standards to be occasionally revised regarding professional staff, collection advancement, facilities, ICT infrastructure and programs in the school library.

McAlbert et al. (2015) studied availability of school libraries and their standards in selected secondary schools in Owerri West Local Government area of Imo State. The study used descriptive survey research method and data collected using structured questionnaires. Findings showed that the schools had centrally located libraries with books and library condition was in good shape. Nevertheless, the staff advancement and the minimum standards were not in agreement with what is put in place by the ALA and the SLA. Moreover, pupils-book ratio, books quality, magazines, electricity, ICT, financing, journals and reference materials had not met the library standards.

**Information Programmes in the Libraries**

Assessment of services and programs of a school library is an important facet of advancement of a school library (AASL, 2014). Assessment provides accountability since it assists in the determination of whether services and programs of a school library are fulfilling the needs of the school society. Assessment is supposed to add to the continuing changes of the services and programs of a school library by affecting the thinking of the stakeholders on the school library and increasing their aid for the school library. Choosing an assessment procedure is dependent on the needs of the school society and the library’s developmental phase (AASL, 2011).

Baro et al. (2013) studied information literacy programmes in university libraries in Nigeria, the UK and the US. Data was collected using an online questionnaire. Results showed that University libraries in the UK and US were providing IL training programmes in all the areas evaluated in comparison to those in Nigeria. There were also variations between university libraries in UK, US and Nigeria in IL training delivery methods. Nevertheless, obstacles like absence of facilities, misunderstanding of IL, nonchalant attitude towards attending IL meetings by the students and low acceptance of the online method were ascertained as factors that militated against the efforts of librarians when encouraging and offering IL training programmes in the university libraries in Nigeria while obstacles like unavailability of time allocated for IL skills teaching, tendency by the students to be uninterested and bored and misunderstanding of what IL is were identified by the libraries studied in the UK and US. To have efficient IL training programmes, there is need for university authorities in countries that are developing to see the need for provision of the essential facilities like computers with stable Internet access in the university libraries, consistent power supplies and IT trainings on librarians.

Maredi (2016) investigated the programmes and services offered by the various library facilities in public high schools in Limpopo province. The study adopted a quantitative research design but mixed it with data collection methods that were qualitative. Questionnaires were self-administered to the principals or teacher-librarians with interview schedules collecting data from the education officials where face-to-face interviews were conducted. Results indicated that very few schools offered library services and programmes since most schools lacked functional libraries. There is therefore need for formulation, approval and implementation of a school library policy which should have clearly defined library programmes and services by the national Department of Basic Education.

**Availability and Ease of Use of Information in the Libraries**

Benard and Dulle (2014) carried out a study to establish the access and use of school library information resources by secondary schools students in Morogoro Municipality, Tanzania where five schools in advanced level were purposefully selected. A sample size of 150 respondents was selected where simple random sampling was used to
sample 30 respondents from each school. Quantitative and qualitative data was collected and a case study research design was adopted. Documentary review, personal observations, questionnaires and interviews were the data collection tools. SPSS and content analysis were used to quantitative and qualitative data respectively. Results indicated that books and novels are the commonly used library information sources and the key challenges in the use of school library were unavailability of current and modern reading materials, limited reading hours and sitting facilities. Fakomogbon et al. (2012) examined the school library resources in public secondary schools in Ilorin Metropolis with a focus on school libraries facilities and furniture, print and non-print resources and human resources available in the library. The study adopted descriptive survey and the sample comprised of 38 school libraries from public secondary schools. Librarians in charge were the target respondents and checklist was the data collection tool. Data was analyzed using percentages, frequencies and counts. Findings indicated that most of existing facilities and furniture to use the library resources did not meet the needed standard. Also, print and non-print resources were inadequate although most of existing resources were of good quality.

Owate and Okpa (2013) investigated the availability and use of school library resources by secondary school students. Target population consisted of eight secondary schools in Rivers State, Nigeria chosen based on their performance in external examinations and geographical locales. Data was collected using questionnaires administered to teachers and students. Results showed that services in the school library were either missing or unavailable in the schools. Moreover, no school met the set standards for secondary school libraries. Where there were spaces in the library, there was poor organization of the few available materials thus ineffective library and information service delivery.

**Information Seeking Strategies used by Students**

Fidel (1999) analyzed Web searching behavior for homework assignments of high school students through field observations in class and at the terminal with students thinking aloud, and through interviews with various participants, including the teacher and librarian. Students did focused searching and used landmarks and assumed that one can always start a new search and ask for help. The difficulties and problems they encountered highlight the need for training and for a system design based on user seeking and searching behavior. Chung & Neuman, 2007 studied the activities and strategies that 11th grade students with high academic abilities used during their information seeking and use to complete class projects in a Persuasive Speech class. The study took place in a suburban high school in Maryland and used data collected from observations, individual interviews, and documents students produced for their projects. The research suggests that high school honors students in an information-rich environment are especially confident with learning tasks requiring an exploratory mode of learning. Julien & Barker (2009) examined the relationship between curricula in secondary-level science classrooms, which support development of information literacy skills, and actual student skills. Many students are unable to demonstrate sophisticated information searching and critical evaluation skills. The findings demonstrated a similar lack of skills. There is pressure to “teach to examinations” and focus on substantive content rather than on information literacy skills and information literacy skills deficits among teachers themselves. There are gaps in students' information literacy skills an indicator that schools must assume a larger responsibility for information literacy instruction.

**Use of Information Resources in Libraries**

Adeyemi (2009) did a study on the school library and students’ learning outcomes in secondary schools in Ekiti State, Nigeria. The study was a descriptive survey and composed of all the 170 secondary schools in the State. A sample of 120 schools was selected through stratified random sampling. The sampled schools had 3640 teachers where 560 respondents composed of 120 principals and 440 teachers were selected for the study. Data collection instrument was an inventory which requested for information among other things on the level of development of school libraries in the State and students’ learning outcomes in the schools. Data analysis was done using percentages Person Product Moment correlation and t-test. Results showed that poor quality of school library resources, shortage of existing reading and research materials were challenges facing students in school libraries.

Arua and Chinaka (2011) did a research on the use of library resources by staff and students of secondary schools which was restrained to seven secondary schools in Umuahia North Local Government Area of Abia State. Four were from Ibeku clan and three from Ohuhu clan which were randomly selected. Only students from JSS 2 and SS 2 were involved. The students were selected since they were fairly aged to respond and interpret questions with little challenge and also since this group of students comprised most of those who make use of the school library resources hence could give valuable information for the study. Data was collected using questionnaire given out by
the researchers themselves. Results denoted that inadequate latest and modern information materials, poor library orientation and accommodation and restrained library hours were difficulties affecting usage of school libraries.

Findings and Recommendations
From the findings in the above studies the following is a summary of the findings and suggested recommendations:

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<tr>
<th>Findings</th>
<th>Recommendations</th>
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<tr>
<td>Lack of appropriate physical facilities</td>
<td>Libraries should endeavour to acquire up to standard physical facilities</td>
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<td>Insufficient and poor quality collections</td>
<td>The library management should develop collection development policy</td>
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<tr>
<td>Lack of appropriate organization and basic services</td>
<td>The libraries should employ professionally qualified personnel</td>
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<td>Lack of professional manpower</td>
<td>The libraries should employ professionally qualified personnel</td>
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<tr>
<td>Libraries are insufficiently used in schools</td>
<td>The libraries should develop Library User instruction policy and introduce IL classes during the first semester</td>
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<td>Challenges like poor financing, obsolete collections and space</td>
<td>Management should support the libraries by supporting library budget</td>
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<td>Misunderstanding of IL and negative attitude towards attending IL meetings by the students</td>
<td>The libraries should develop Library User instruction policy and introduce IL classes during the first semester</td>
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<td>Most schools lacked functional libraries.</td>
<td>There should be clear government policy on establishment of school libraries</td>
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<td>Services in the school library were either missing or unavailable in the schools.</td>
<td>Library staff to undergo PR training</td>
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<td>Poor public interactions in the library kept off users and other probable IL collaborators.</td>
<td>There should be clear government policy on establishment of school libraries</td>
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<tr>
<td>No leadership of IL partnership</td>
<td>There should be clear government policy on establishment of school libraries</td>
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<td>Poor planning of IL programs</td>
<td>The libraries should develop Library User instruction policy and introduce IL classes during the first semester</td>
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<td>Hesitancy to obtain or share knowledge on IL by both the trainers and trainees.</td>
<td>Library management to increase library use hours</td>
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<td>Limited reading hours</td>
<td>The libraries should develop Library User instruction policy and introduce IL classes during the first semester</td>
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<tr>
<td>Preference of quick Google search but not using e-sources.</td>
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<tr>
<td>Lack of IL skills</td>
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Gap Identified
From the above reviewed literature on IL in secondary schools there appears a big deficit of studies on IL in secondary schools in Kenya. It is therefore necessary to conduct a study in an attempt to fill this gap.

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ABSTRACT
The study of spatial and temporal integration of periodic markets in Tharaka-Nithi County, Kenya was conducted between December, 2017 and April, 2018. The main objective of the study was to determine the distribution and integration of periodic markets in Tharaka-Nithi County. Descriptive cross-sectional research design was used in this study. The target population was 365,330 and the sample size was 384 respondents Stratified random sampling technique was used to select the study sample. Respondents who include traders and buyers in each periodic market were determined and a sample of each market proportionately obtained. Data used in this study was obtained from topographical maps, questionnaires archival records and information provided by market masters and fee collectors. The location and coordinates of markets were attained by use of a GPS (Germin-6 model). Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 22. Distribution of markets analyzed using the nearest neighbor method yielded a Z score value of 10.183 indicating that distribution of the periodic markets was regular. Spatio-integration of periodic markets was tested using Pearson product-moment correlation coefficients. The study established that there was a positive correlation between the number of markets and market days (r= 0.294; P >0.05). Results of this study indicate that the distribution of periodic markets in Tharaka-Nithi County is inconsistent with the rapid growth of population. Distribution of the periodic markets has resulted to unequal distribution of commodities. This study will help to the County government and policy makers to decide suitable areas for establishment of new markets as well as periodicity. To enhance the contribution of periodic markets in promoting food security, the study recommends both institutional and infrastructural interventions that include improving the layout and quality of physical facilities in the market and road improvement and the construction of new feeder roads. Good rural transport network will ensure efficient flow of goods especially from surplus regions to deficit regions.

Keywords: Spatial, Temporal, Integration, Periodic Markets, Distribution

INTRODUCTION
Periodic market places perform three basic functions with respect to physical produce and manufactured commodities. These include; the importation of goods to the local region and their retail distribution, the bulking and the export of goods from the local region and, the exchange of goods within the local region especially between different agro-ecological zones producing different products. The sharp increase in commodity prices constitutes an important opportunity as well as a challenge for natural-resource abundant economies like Kenya (Kyaka, 1998). The degree to which Kenyan producers can profit from this opportunity depends, firstly, on how integrated domestic markets are with world markets. In other words, on how closely domestic prices move with world prices. Secondly, on how integrated the different country markets are with each other (Gatobu, 2010).

Weak integration implies weak domestic supply responses to higher commodity prices. A non-integrated market is “blind”. Producers that are not able to “see” what is highly appreciated in world markets and what is not, are unable to make the best possible decision, which leads to an inefficient outcome. It is estimated that over 60% of Kenya’s population living on the best agricultural land are isolated from the market and hence from the fundamental economic activity of the country (Tharaka Nithi County First Integrated Development plan, 2017). The percentage is even higher in Arid and Semi-Arid Lands because of their relative poor accessibility and lower comparative productivity. Such people do not have a chance of participating in the marketing process. The development and growth prospects of these areas and their contribution towards total national development can be tapped and maximized by allowing them to have access to a ready marketing opportunity. The outcome of market integration will generate net welfare gains for the society; however, different groups may either gain or lose.

It is important to understand the degree of integration within Kenya, given its peculiar geographical characteristics, understanding what are the factors that explain why some counties are strongly spatially integrated, while others are weakly, or not integrated at all is. Surprisingly, the analysis of determinants of market integration has generally been neglected in the literature, and not much is known about it. In addition, and to the best of my knowledge, there has been no systematic analysis of the determinants of food commodity price differentials especially the rural markets in Kenya which are built on a periodic market system. More often than not citizens lack proper marketing knowledge.
This shortcoming has given the middle men and other scrupulous businessmen an opportunity to exploit the poor by accessing the markets on their behalf. To develop a thriving market economy in Kenya, internal trading patterns should be considered. As aspired, for Kenya to achieve vision 2030 the contributions of rural periodic markets are critical to achieve this goal. With the development of periodic markets, the vast majority of the rural population participates in the development process and therefore brings maximum development benefits to the country. Increased production of locally produced agricultural goods, large quantities of this produce should be marketed locally and regionally therefore creating a chance for all market participants to benefit (Nyirenda, 2016).

Although it is true that periodic markets play a critical role in the spatio-temporal articulation of economic exchange and social activities, the changing role for both rural and urban environments as well as different groups of population should be evaluated in the context of the general stage of development of a particular region. Markets which are basically interrelated with different geographical aspect perform their functions deeply involved with the behavioral approach of different market mechanisms, growth and its process depending upon the nature and services from hinterland (Wambugu,1995). These markets provide for exchange not only the required goods and services but also integrate the socio-cultural and economic aspect of the people in that market area. In any country a market place is an important place for commodity exchange. Market places are important and fundamental focal points of economic and social life. A considerably large proportion of the population living in a given region may be cut-off from the markets hence denying them the opportunity of participating in the market exchange process both locally and nationally.

Spatial market distribution pattern over the geographic space is more important than their absolute number. It is this pattern of distribution which when clustered and concentrated in a few places produces unequal access opportunities for marketing within a region. To facilitate growth of the small market and trade centers and in order to equally benefit the agricultural sector and other productive activities, the government should see to it that it concentrates on providing the badly needed infrastructure. This in turn ensures the development of a prosperous agricultural-market economy (Susan, Wambugu & Calvine, 2018). As long as the majority of the rural population has no access to markets no meaningful development can be expected to take place. Areas where markets meet frequently and roads are passable, markets operate effectively for both producers and consumers. Periodic markets should be thoroughly understood because they are an important component of the total exchange mechanism in the rural areas of the third world countries. The bulk of in the rural economy majority of less developed countries is primary dependent on periodic market exchange systems. These markets play a fundamental role of supplying inputs into the small-scale farming and informal manufacturing sectors and at the same time are an important location for sales of produce and purchase of low-order goods and services.

Statement of the Problem
Majority of people in the study area depend on rain-fed agriculture. Despite increased agricultural production, people in Tharaka Nithi County have continued to encounter difficulties in accessing food. This has been attributed to the fact that the upper region of the county receives more rain and thus there is surplus production. The lower zone of Tharaka South and Tharaka North are semi-arid and most often than not the areas experience incidents of food deficits. The scenario has been that areas of surplus have remained with food while people in areas of deficits have continued to have limited supply of commodities. This point raises the question whether periodic markets amply serve the region efficiently. The scope of the problem is presented in the following questions; are the periodic marketing system in Tharaka Nithi County well integrated? If so, what are spatio-temporal characteristics that enable this? If not what are the limiting factors?

Study Objectives
To map the spatial and temporal distribution of periodic markets in Tharaka Nithi County.
To determine the spatial and temporal integration of the periodic markets in Tharaka Nithi County.

METHODOLOGY
Study Area
The study was carried out in Tharaka Nithi County, Kenya. The County is divided into four sub-counties namely Meru south, Maara, Igambang’ombe and Tharaka. The county covers an area of 2610 Km² with a population of 365,330 according to 2009 census. It lies between 00°07 and 00°26 south and between longitudes 37°19’ and 37°46’ East (Tharaka Nithi County First Integrated Development Plan, 2017). Tharaka Nithi County is one of the 47 counties in Kenya. It borders the county of Embu to the South and South west, Meru to the North and North East.
Kirinyaga and Nyeri to the West and Kitui to the East and South East. Embu and Meru counties are predominantly agricultural counties while Kitui county is predominantly pastoral county. The location of Tharaka Nithi County is depicted in Figure 1.

Figure 1: Map of Tharaka Nithi County Source: Foundation atlas 1st edn, 2017

Tharaka-Nithi County comprises of a multiplicity of physical and topographical factors which interact to produce average weather conditions. These factors include altitude, latitude, vegetation cover, prevailing winds and nearness to a large water body (Jaetzold, 2007). The highest point in the county is at 5,200m in Chuka Igambang’ombe and Maara while the lowest point is at 600m above the sea level in Tharaka East. The topography of Chuka Igambang’ombe and Maara constituencies is influenced by volcanic activities of Mt. Kenya where major of the rivers originate. Temperatures in the highlands range from between 14°C to 30°C while that of the lowland areas range between 22°C to 36°C. The county has a bi-modal rainfall pattern with long rains falling during the months of April to June and short rains in October to December. The rainfall ranges from an average of 2200mm in Chuka forest while in Tharaka it is an average of 500mm. The high altitude areas experience reliable rainfall while middle areas of the county receive moderate rainfall. The low regions of the county receive low, unreliable and poorly distributed rainfall. The climate of the highland regions is favorable for the growth of tea, coffee, maize, beans and a variety of other food crops. However, there are unusual climatic variations arising from climatic change (Tharaka Nithi County First Integrated Development Plan, 2017).

The county has two distinct broad climatic conditions of wet and dry. This gives the county an advantage of producing a diversity of crops and livestock. The county is also favoured as an agricultural products piloting zone. Irrigation agriculture is virtually unexploited and has huge potential. The County is rich in forests that are of the montane type and found in the Mt. Kenya forest, Kiera hills and Muunguni hills. The Kiera hills and Muunguni form part of the Nyambene complex. Other gazette forests are Ntugi and Kijege. There are also a number of un gazetted forests such Mutaranga, Mutijwa, Maatha, Tunnyai, Nkarini, Kiagu, Gikingo, Muugi, Mariene, Kuiguni and Nyamantu Hills (Tharaka Nithi County First Integrated Development Plan, 2017). The county is well endowed with several permanent rivers: Thuuci, Ruguti, Naka, Tungu, Nithi, South and North Maara plus lower Kathiita, Mutonga, Kithinu, Ura, Thingithu, Thananu, Thangatha and Kuuru. These rivers, which create great potential for farming and power generation, are tributaries of River Tana which drains into the Indian Ocean. The County has considerable ground water resources, springs and streams, earth and sand dams, rain water and rock catchments. There are a numbers of wetlands in the lower altitude areas (Tharaka Nithi County First Integrated Development Plan, 2017). Tharaka Nithi County has two main ecological zones. The upper zone comprises of Maara and Chuka Igambang’ombe which receive reliable rainfall for agriculture. The lower zone covers Tharaka and receives less rainfall suitable for livestock production. Poor farming methods, soil erosion and charcoal burning have left the land...
The sloping areas have received uncontrolled soil erosion which has resulted in deep gullies in Tharaka. The drainage consists of streams and rivers that drain into the Indian Ocean through River Tana (Tharaka Nithi County First Integrated Development Plan, 2017). The choice of Tharaka Nithi as a study area was paramount because it had several agro-ecological zones and this gave a face of many regions in Kenya within a small geographical area. This then meant that the information gained here can be generalized.

**Study Population**
The total population of Tharaka Nithi County was 306,443 people in 1999 population and housing census and 365,330 in 2009 showing an increase of 19% over the 10 year period and an intercensal growth rate of 1.9% per annum. The demographic characteristics of the county are diverse depending on factors such as the agro-ecological zoning and urban influence among others. Given that these parameters vary in magnitude, both innate and acquired population characteristics such as population size, density, distribution structure, education and income have significant variations (Tharaka Nithi County First Integrated Development Plan, 2017).

<table>
<thead>
<tr>
<th>Constituency</th>
<th>2009 Density (Km²)</th>
<th>2012 Density (Km²)</th>
<th>2015 Density (Km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tharaka</td>
<td>130,098</td>
<td>137,316</td>
<td>144,935</td>
</tr>
<tr>
<td>Chuka</td>
<td>128,107</td>
<td>135,215</td>
<td>142,717</td>
</tr>
<tr>
<td>Maara</td>
<td>107,125</td>
<td>113,069</td>
<td>119,342</td>
</tr>
<tr>
<td>Totals</td>
<td>365,330</td>
<td>385,600</td>
<td>406,995</td>
</tr>
</tbody>
</table>

Source: KNBS, Population and Housing Census, 2009

The highest population density is observed in Maara followed by Chuka and finally Tharaka. These patterns are explained partly by the favorable or unfavorable climatic conditions in the relevant constituencies. The areas with high population densities have relatively high agricultural potential as the climatic conditions and soils are suitable for agriculture. People have therefore settled in these areas and the land has been extensively sub-divided.

**Selection Criteria**
The markets that were considered for the study were markets which were authorized by the county government, ministry of Trade, Industry and cooperative development and had designated market places and official market days. Traders and buyers who operate in these markets were considered eligible for participation in the study. Markets that had no official designated market places and not recognized by the county government were no considered eligible for this study. The study also disregarded all the other days other than official marketing days in a market week. Markets goers who do not participate in trade were also disregarded in this study. Data used in this study was based on a research conducted between December 2017 and February 2018 in Tharaka The aspect of spatio-temporal distribution of periodic markets and the rate of integration of market integration were assessed.

**Analytical Techniques**

**Analysis of Spatial-Temporal Distribution of Periodic Markets.**
In order to get statistical measure of the pattern of distribution of the market places the nearest neighbor technique was used as described by (Getis and Boots, 1978) a measure of spatial component helped to determine the location of markets, and indicates whether the market places are more clustered or uniform. The nearest neighbor co-efficient is represented by the formula.

\[
R = \frac{D_{obs}}{D_{ran}} - \frac{D_{obs}}{1 \div (2\sqrt{N/A})}
\]

Where

- \(D_{obs}\) = the observed mean is the nearest distance between the market places.
- \(D_{ran}\) = the expected mean nearest neighbor distance between the market places. Assuming a random distribution in accordance with a Poisson probability function.
- \(N\) = the number of market places in the study region.
- \(A\) = the area of study region
To calculate Rn it is necessary to measure the distance between each market place and the nearest neighbor the divide by the total number of measured pairs.

Rn is given by

\[ R_n = \frac{D_{obs}}{D_{ran}} \]

Where Dran is the mean distance to be expected from the similar number of points distributed in the same area. The importance of nearest neighbor is that it provides a test for non-randomness and allows a continuous scale, comparisons to be made of two or more spatial distributions. The value of the index ranges from 0 to 2.15 However, Rn is just a numerical descriptive statistical index of the spatial form of a pattern. An index to show how close to uniform the distribution of periodic markets is and the statistical evidence that it is not most unlikely that such a pattern arose from the pure chance should be computed. This is standardized using a Z-score.

\[ Z = \frac{(D_{obs} - D_{ran})}{\delta D_{ran}} \]

\[ \delta D_{ran} = 0.26136 \times (\sqrt{N(N/A)}) \]

where;

Z = normal standard variate to the nearest neighbor statistic, Rn.
δDran = the standard error for the expected mean distance between the market places assuming a random distribution.

Weakness of Rn index is that it does not distinguish between a single and a multi clustered pattern. Rn also averages sub-patterns which may exist within the area and hide contrasting patterns which cancel each other out. The choice of a second nearest neighbor is possible and may produce different results.

Analysis of Spatio-Integration of Periodic Markets

Pearson product-moment correlation coefficients were used to analyze the spatio-integration of periodic markets. Market days and the number of markets were correlated. This enabled the researcher to meaningfully describe the rate of integration of market and evaluate their efficiency in food distribution.

RESULTS AND DISCUSSION

Spatio-Temporal Distribution of Periodic Markets in Tharaka-Nithi County

The first objective of the study was to map spatio-temporal distribution of periodic markets in Tharaka - Nithi County. To achieve this objective a survey was carried out to locate the periodic markets (Figure 1.2)

![Figure 2 Periodic markets in the county](Source: Tharaka Nithi Integrated Plan, (2017))
Tharaka Nithi has a total of 19 urban centers majority of which have designated periodic markets. Out of 19 markets 11 are located in the upper zone of the county and the rest are sparsely distributed in the lower zone. This distribution can be attributed to high population in upper zone as compared lower zones thereby necessitating the need for more markets in the upper zone. Distance between respective markets, their location and elevation were determined using topographical maps and GPS.

Table 2: Elevation and Co-ordinates of Periodic Markets in Tharaka-Nithi County

<table>
<thead>
<tr>
<th>Markets</th>
<th>Elevation</th>
<th>Southings</th>
<th>Easting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaanwa</td>
<td>1109m</td>
<td>00°19.308’</td>
<td>03°43.149’</td>
</tr>
<tr>
<td>Kathwana</td>
<td>726m</td>
<td>00°19.918’</td>
<td>03°52.102’</td>
</tr>
<tr>
<td>Chiakariga</td>
<td>803m</td>
<td>00°16.11’</td>
<td>03°55.484’</td>
</tr>
<tr>
<td>Marimanti</td>
<td>593m</td>
<td>00°10.512’</td>
<td>03°50.227’</td>
</tr>
<tr>
<td>Tunyai</td>
<td>898m</td>
<td>00°09.32’</td>
<td>03°49.10’</td>
</tr>
<tr>
<td>Magutuni</td>
<td>1121m</td>
<td>00°13.03’</td>
<td>03°44.093’</td>
</tr>
<tr>
<td>Keeria</td>
<td>1381m</td>
<td>00°12.824’</td>
<td>03°39.404’</td>
</tr>
<tr>
<td>Polepole</td>
<td>1410m</td>
<td>00°13.780’</td>
<td>03°38.895’</td>
</tr>
<tr>
<td>Itugururu</td>
<td>1153m</td>
<td>00°25.047’</td>
<td>03°42.586’</td>
</tr>
<tr>
<td>Kibugua</td>
<td>1183m</td>
<td>00°22.151’</td>
<td>03°37.194’</td>
</tr>
<tr>
<td>Nkondi</td>
<td>540m</td>
<td>00°04.996’</td>
<td>03°55.384’</td>
</tr>
<tr>
<td>Chuka</td>
<td>1402m</td>
<td>00°19.33’</td>
<td>03°54.167’</td>
</tr>
<tr>
<td>Mukothima</td>
<td>532m</td>
<td>00°01.120’</td>
<td>03°57.090’</td>
</tr>
<tr>
<td>Cheera</td>
<td>1320m</td>
<td>00°22.314’</td>
<td>03°38.236’</td>
</tr>
<tr>
<td>Kaare</td>
<td>1110m</td>
<td>00°06.52’</td>
<td>03°47.49’</td>
</tr>
<tr>
<td>Kathangacini</td>
<td>500m</td>
<td>00°05.089’</td>
<td>03°13.111’</td>
</tr>
<tr>
<td>ShauriYako</td>
<td>511m</td>
<td>00°06.125’</td>
<td>03°15.236’</td>
</tr>
<tr>
<td>Kibung’a</td>
<td>980m</td>
<td>00°04.34’</td>
<td>03°55.06’</td>
</tr>
<tr>
<td>Gatunga</td>
<td>600m</td>
<td>00°10.630’</td>
<td>03°50.677’</td>
</tr>
</tbody>
</table>

Source: Field work (2018)

A measure of spatio-temporal distribution is useful in determining whether the market places are clustered or uniform. Spatio-temporal distribution of periodic markets in Tharaka Nithi County was determined using data on the number of markets as shown in Table 2 and the nearest distance between the markets was worked out. Nearest neighbor hypothesis was used to test the hypothesis that “periodic markets in Tharaka Nithi County are not uniformly distributed.

\[ \sum NNI = 247.3 \]
\[ N = 19 \]
\[ (NNI)_{s} = 13.0158 \text{ (Dobs)} \]
\[ \text{Area} = 2610 \text{Km}^2 \]
\[ \text{Dran} = 5.8602 \]
\[ Rn = 2.140 \]

Theoretically, the nearest neighbor statistic varies from 0.00 complete aggregations of market places through 1.00 random distributions of market places to 2.140 regular arrangements of markets in a hexagonal pattern (Wambugu, 1995). The computation tends to suggest that there is disparity in the distribution of periodic markets. An Rn of 2.140 suggests a regular distribution of periodic markets. The regular distribution of these markets could be affected by the distribution of the population and surpluses in production and other economic factors. The above computation...
an Rn of 2.140 may be meaningless unless it is standardized using the Z-score. The Rn is used to check if the observed pattern has arisen from pure chance. The Z-score is computed as shown:

\[ Z = \frac{(D_{\text{obs}} - D_{\text{ran}})}{\delta D_{\text{ran}}} \]

Where

\[ \delta D_{\text{ran}} = \frac{0.26136}{\sqrt{N(N/A)}} \]

\[ Z = \frac{(D_{\text{obs}} - D_{\text{ran}})}{\delta D_{\text{ran}}} \]

The computed value is \( Z = 10.183 \). The computed value is large and therefore we reject the null hypothesis and conclude that the distribution of periodic markets is regular. This is due to the nature of population distribution.

### Table 3 Periodic Markets and their Distances to the Nearest Neighbour

<table>
<thead>
<tr>
<th>Market</th>
<th>Nearest Neighbour</th>
<th>Distance In Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuka</td>
<td>Kibugua</td>
<td>6</td>
</tr>
<tr>
<td>Kibugua</td>
<td>Itugururu</td>
<td>11</td>
</tr>
<tr>
<td>Chuka</td>
<td>Kaanwa</td>
<td>8.9</td>
</tr>
<tr>
<td>Cheera</td>
<td>Chuka</td>
<td>10</td>
</tr>
<tr>
<td>Kaanwa</td>
<td>Kathwana</td>
<td>22.4</td>
</tr>
<tr>
<td>Kathwana</td>
<td>Chiakariga</td>
<td>12</td>
</tr>
<tr>
<td>Keeria</td>
<td>Polepole</td>
<td>3</td>
</tr>
<tr>
<td>Magutuni</td>
<td>Keeria</td>
<td>10</td>
</tr>
<tr>
<td>Kaare</td>
<td>Magutuni</td>
<td>10</td>
</tr>
<tr>
<td>Kathwana</td>
<td>Tunyai</td>
<td>21</td>
</tr>
<tr>
<td>Marimanti</td>
<td>Kibung’a</td>
<td>10</td>
</tr>
<tr>
<td>Nkondi</td>
<td>Marimanti</td>
<td>15</td>
</tr>
<tr>
<td>Marimanti</td>
<td>Gatunga</td>
<td>10</td>
</tr>
<tr>
<td>Mukothima</td>
<td>Marimanti</td>
<td>22</td>
</tr>
<tr>
<td>Marimanti</td>
<td>Shauriyako</td>
<td>10</td>
</tr>
<tr>
<td>Kathwana</td>
<td>Marimanti</td>
<td>30</td>
</tr>
<tr>
<td>Itugururu</td>
<td>Cheera</td>
<td>8</td>
</tr>
<tr>
<td>Cheera</td>
<td>Kaanwa</td>
<td>10</td>
</tr>
<tr>
<td>Polepole</td>
<td>Chuka</td>
<td>18</td>
</tr>
</tbody>
</table>

Source: Field work (2018)

**Spatio-temporal Integration of Periodic Markets**

The second objective of this study was to examine the spatio-temporal integration of periodic markets. Data on the number of markets and respective market days is shown in Table 1.3. Periodic market days need to be scheduled in such a way that a single market excursion enables a trader to visit as many markets as possible (Berry, 1967). This is possible if each day of the marketing week a market is assigned. The temporal spacing of markets should be in such a way that maximum flow of goods and services let traders move to most markets as they can get large number of buyers. Lado (1990) periodic markets are supposed to be arranged in such a way that they are both are spatially and temporally integrated so as to enhance the long term areal demand in order to avoid competition of several markets operating the same day.

The system of periodicity provides an adjustment to the agricultural system only one marketing day in a seven-day-week means six rest days or days of other agricultural activity and rural folk get sufficient time for relaxation as well as for preparation for the next visit to the market. The frequency of occurrence of these markets varies widely, so that meeting occurs at a given place every second, third or nth day where n rarely is greater than three. In order to perform these special functions the markets are held at predetermined specific sites according to set of temporal schedules on every second, third or nth day where rarely is greater than seven. The periodic markets studied in the Uttar Dinajpur District have specific market days, where the dominant economic function is bulking and distribution of farm produce and local food processing products. So from the point of view of functional organization, periodic markets are one of the most important characteristics of the functioning of the marketplace sub-organizations.

During field study it was very much critical to judge which factors are responsible for the occurrence and persistence of the periodicity regime. Otherwise, these market sites are deserted during the workweek. The
frequency of market meetings varies from market to market. 35.9% of the markets meet weekly, 61.2% meet twice weekly, 2.4% meet three times weekly. It has been investigated that weekly markets are more dominant and simultaneously the mean attendance in weekly market places is larger than those of the bi-weekly market places. On the basis of the above inference it has been investigated that weekly markets serve a wider area because the availability of a variety of goods and services that encourage the client to visit maximum range. As a result threshold surpasses the limit of services in market places. Later on the periodicity of market places also is an expression of the combined consequence of socio-ethnic views.

Table 4 Periodic Markets Marketing Days

<table>
<thead>
<tr>
<th>Periodic Market</th>
<th>Market Day</th>
<th>Periodic Market</th>
<th>Market Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaanwa</td>
<td>Monday and Thursday</td>
<td>Nkondi</td>
<td>Tuesday</td>
</tr>
<tr>
<td>Chiakariga</td>
<td>Monday</td>
<td>Mukothima</td>
<td>Friday</td>
</tr>
<tr>
<td>Magutuni</td>
<td>Wednesday and Saturday</td>
<td>ShauriYako</td>
<td>Saturday</td>
</tr>
<tr>
<td>Kaare</td>
<td>Monday and Thursday</td>
<td>Kathangacini</td>
<td>Wednesday</td>
</tr>
<tr>
<td>Kathwana</td>
<td>Wednesday and Saturday</td>
<td>Cheera</td>
<td>Sunday</td>
</tr>
<tr>
<td>Itugururu</td>
<td>Wednesday</td>
<td>Kibugua</td>
<td>Saturday</td>
</tr>
<tr>
<td>Tunyai</td>
<td>Friday</td>
<td>Chuka</td>
<td>Tuesday and Friday</td>
</tr>
<tr>
<td>Gatunga</td>
<td>Wednesday</td>
<td>Keria</td>
<td>Tuesday and Friday</td>
</tr>
<tr>
<td>Kibunga</td>
<td>Sunday</td>
<td>Polepole</td>
<td>Sunday</td>
</tr>
</tbody>
</table>

Source: Researcher (2018)

Temporal Distribution of Periodic Markets in Tharaka Nithi

After examining the spatial and temporal distribution patterns, they are analyzed together to establish how well they are integrated in the market system. After analysis of separate components of spatial and temporal distribution in the county together, the complex relationship between spatial location and temporal periodicity indicates the relationship of how the marketing systems are integrated.

Highly integrated marketing systems have inverse relationships between spatial and temporal while poorly integrated markets have direct relationship. This relationship indicates the efficiency of the market network. The higher the degree of spatio-temporal integration the higher the efficiency of the marketing network. Many factors determine which centers are to be designated as market centers. Factors like population density and accessibility also play a significant role. As shown in the table 1.4 and figure 1.3 Friday is the most popular marketing day with a temporal distribution of 5 days. Monday, Tuesday and Thursday have a temporal distribution of 3 while Saturday, and Wednesday have a temporal distribution of 5.

Percentage of Market days per Sub-County in Tharaka Nithi County

Figure 3 Temporal Distribution of Periodic Markets in Tharaka Nithi
The percentage distribution of market and marketing opportunities the sub-counties are as follows Meru-South sub-county accounts for 32% of total marketing opportunities in the sub-county Maara sub-county is the second largest with a total of 28% of total marketing opportunities. Tharaka North and Tharaka-South have 16% and 24% respectively of the total distribution. This high percentage of marketing opportunities in Meru-South sub-county can be attributed to the high population density in the sub-county. The low percentages of marketing opportunities in Tharaka-North and Tharaka-South were due to the sparse population in these areas.

**Pearson Correlation of Market with Marketing Days**
A positive correlation value of positive (r=0.294; P>0.05), indicate that there is no significant relationship between spatial distances and temporal separation of periodic markets. Fagerlund and Smith (1970) revealed that relationships existing between spatial locational patterns and temporal periodicity of different markets have a degree of determining their spatio-temporal integration. The economic role of periodic markets has a major influence on the spatial organization of market places in a region. The economic roles of these markets transcend beyond the need for a localized neighborhood exchange process. Therefore, the development of periodic markets in Tharaka Nithi County has been largely because of facilitating interregional trade. Spatial mobility of traders gave rise to market sites being strategically located and thus resulting to maximum spatio-temporal integration. It can therefore be concluded that the physical spacing of periodic markets whose trading days are separated by different lengths of time do display a certain degree of order.

**CONCLUSION**
It is evident that there is disparity in distribution of periodic markets in Tharaka Nithi County. This study established that Meru south sub-county had the most markets at 32%, Maara 28%, Tharaka South 24% and Tharaka North at 16%. This study therefore recommends that the county should consider putting up new markets in areas where market participants have to walk long distances to access services and sell off their produce. This is evident in Tharaka South and Tharaka North. Markets like Kathangacini and shauri yako are located at the furthest end of the county. The high cost of transport affects the prices and availability of commodities Therefore establishment and expansion of periodic markets should follow considerable planning. This is because their establishment should be followed by social urban and economic developments like setting up of an administration, education and health facilities. The planning implications of this, is that, the success of periodic market is an indicator for potential establishment of a successful rural service center. On the spatial temporal integration of the periodic markets in Tharaka Nithi county it was noted that areas with better road networks necessarily exhibited better market integration because of the important role played by the accessibility in the process of integrating markets.

Incorporating more market days in the marketing calendar especially in pockets of high population density is very paramount. This will increase more opportunities to the traders and ease congestion during market days. Improvements in the overall efficiency of periodic markets can be achieved in the presence of comprehensive local pricing policy that recognizes production realities of the economy. The study also established that very few markets have permanent structures and therefore priority should be given to these areas that lack basic infrastructural facilities. The county should consider organizing local and international trade exhibitions for effective networking to promote cross border trade. The county should put up industries that would help in value addition to the agriculture products to enhance better incomes. The residents of this county should embrace new farming technologies in order to increase more goods for sale hence diversify sources of income with appropriate infrastructure, the County has the capacity for value addition of its livestock and crop produce. A primary target for value added products would be markets in other parts of Kenya and beyond. For example, drier zones produce very high quality honey which can be processed, branded and marketed locally and internationally to support the region’s economy.

**REFERENCES**


Tharaka Nithi County first integrated development plan, 2017


ABSTRACT
Climate change in Kenya and other East African countries is expected to manifest itself in shifts in seasons and increased frequencies of extreme weather and climate events, such as droughts, heavy rainfall and associated flooding. As climate continues to change, seasonal forecasts are becoming even more crucial as one way of informing farmers of short-term weather dynamics, impending seasons of below or above-normal rainfall and extreme rainfall events. Kenyan government has invested considerable resources into the development of understanding and technologies to meet the expected demands of its citizens for improved climate forecasts. Regrettably, many of the benefits of these investments have not yet been realized. This paper examines satisfaction levels of seasonal climate forecasts among smallholder farmers of Masinga Sub County in Machakos County. In this study a total of 274 respondents were involved. A cross-sectional survey research design was used. Various methods were employed in data collection among them structured questionnaires, oral interviews with key informants, focus group discussion and direct observation. The collected data was analyzed using both descriptive and inferential statistics. Results indicated that, 61% were very unsatisfied with seasonal climate forecasts. Inaccuracy of forecasts (98%) was a key factor affecting adoption of seasonal climate forecast. Over 80% of the respondents felt that climate forecasts cover a wide area making it difficult for them to relate the climate reports to their specific local areas. Seasonal climate forecast given by the relevant institutions are coarse thus providing little or no detail on the local characteristics of a season, and do not reflect the localized pattern of rainfall. Therefore, based on the major findings of this research it is recommended that, climate forecasts should be downscaled into regional level and should be location specific to increase utility.

Keywords: Seasonal Climate Forecast, Smallholder farmers, Satisfaction Levels, Utilization, Perception

INTRODUCTION
Much of the weather and climate information available for Africa comes from global data sets (e.g. CMIP5) and projects with broad geographical coverage. In addition, national meteorological and hydrological agencies play an important role in generating and disseminating climate information within African countries (Singh, Urquhart, Osbahr, & Dorward 2016). While the capacities of different national agencies vary across Africa, typically, they collect and maintain observational data, and provide weather and climate forecasts to communities, private sector, companies, and government departments. Regional hubs, including the Intergovernmental Authority on Development Climate Prediction and Applications Centre (ICPAC), the Agro meteorology, Hydrology, Meteorology (AGRHYMET) Regional Centre, and the Southern African Development Community Climate Services Centre (SADC-CSC), provide additional support and coordination across countries. ICPAC disseminates early warning climate hazard information to Eastern African countries while AGRHYMET provides information on food security and environmental issues for countries in the Economic Commission of West African States (ECOWAS). Traore, Kouressy, Vaskmann Tabo, Maikano, Traoré, & Cooper (2014) noted that because of an increased occurrence of climate extremes throughout West Africa, AGRHYMET has developed additional services, including climate change impact assessments for agriculture and water resources.

The SADC-CSC provides climatic information to Southern and Central African countries, covering operational services for climate monitoring, predicting extremes and hydro meteorological products. The regional centers have a particularly significant role in providing seasonal forecasts at the regional scale, through the Southern Africa Regional Climate Outlook Forum, PRevisions Saisonnieres en Afrique de l’Ouest for West Africa and the Greater Horn of Africa Regional Climate Outlook Forum (Patt, Ogallo, & Hellmuth, 2007). They create networking opportunities for users of climate information to engage with climate scientists. For example, ICPAC have enhanced collaborations with sector-specific users through pilot projects to develop new tools for supporting the use of weather and climate information in agriculture and food security, livestock, health, water resources, hydropower risk management and environment management.

The regional centers also support improving human resource capacity in regional climate modelling, prediction and application. Long-term climate projections are increasingly being produced through international projects such as...
Recent advances in climate modelling have resulted in increased ability to predict rainfall in many parts of the world with a lead time ranging from a few days to a few months, by using dynamical forecasts or statistical methods (Njau, 2010). Seasonal rainfall forecasts are particularly suited for rain fed farming systems, which constitute the main source of livelihood for African rural households (Klopper, Vogel, & Landman, 2006). Empirical studies among African farmers have shown that climate forecasts can help farmers reduce their vulnerability to drought and climate extremes, while also allowing them to maximize opportunities when favourable rainfall conditions are predicted (Roncoli, Jost, Kirshen, Sanon, Ingram, Woodin, Somé, & Ouattara, 2009).

This assessment of potential and opportunities has ignited scientific and institutional processes to develop and disseminate climate forecasts in Africa. In the late 1990s, a series of regional Climate Outlook Forums (COFs) was launched to produce seasonal rainfall forecasts for different parts of Africa (Patt, Ogallo, & Helmith, 2007). In West Africa, the COF known as the Prévisions Saisonnieres pour l’Afrique de l’Ouest (PRESAO) is held each year in May, prior to the onset of the rainy season. Recent climate-related disasters, including severe droughts and destructive flooding, as well as growing evidence of climate change (Salack, & Muller, 2011) have given new impetus to the application of climate predictive information for risk management which led the World Meteorological Organization (WMO) to establish a Global Framework for Climate Services (WMO, 2013).

Less progress has been made in assessments of the extent and impact of forecast use, particularly among vulnerable populations, such as smallholder farmers in Africa (Meza, Hansen, & Osgood, 2008). Where evaluations have been conducted, they have been carried out using theoretical models (Hansen, & Osgood, 2008) or by monitoring actual dissemination of forecasts to farmers and then evaluating how farmers use the forecasts and the impacts of any changes in management practices based on the forecast (Patt et al., 2005).

Seasonal climate forecasting can increase preparedness and lead to better social, economic and environmental outcomes within agricultural production systems. The production of rain fed crops in semi-arid tropics exhibits large variation in response to the variability in seasonal rainfall. There are several farm-level decisions such as the choice of cropping pattern, whether to invest in fertilizers, pesticides, the choice of the period for planting, plant population density for which the appropriate choice (associated with maximum production or minimum risk) depends upon the nature of the rainfall variability or the prediction of climatic variables for a specific year.

Scientific forecasts are formulated on a much larger scale and presented in a way that is unfamiliar to farmers. This makes it difficult to get farmers to use climate outlooks generated by ICPAC and the Kenya Meteorological Department (Strachan, 2008). If climatic and weather events can be predicted to a degree that makes it possible to respond effectively in the agricultural sector, then this would potentially have a major impact on worldwide food security. Farmers would be better prepared for climatic anomalies and thus less vulnerable. However, there is a considerable gap between the information needed by small-scale farmers and that provided by the meteorological services. Seasonal climate forecasts, attractive, as they may seem, have significant theoretical problems relating to the testability of predictions. A weather forecast is useful only if it is sufficiently skillful, timely and relevant to actions the recipient can take to make it possible to improve outcomes (Stern & Easterling, 1999).

Studies have revealed that household farmers of Masinga Sub County in Machakos County always experience difficulties in accessing, interpreting and applying forecasts for their own benefit. Information such as the onset and ending of the rains, and the possibility and timing of drought, would be useful to the community, and would enhance the decisions farmers make on the basis of the near-normal, below-normal or above-normal rainfall categories. Despite advances in computing and satellite technologies and improvements in various atmospheric model’s scientists use to predict weather there are still significant uncertainties in weather forecasts (Michalakes, Dudhia, Gill, Henderson, & Klemp, 2004). The widening incompatibility of climate forecasts as viewed against the needs of the farmers in agriculture coupled with the erosion of the integrity of these climate forecasts provided the rationality of this study to evaluate the satisfaction levels of seasonal climate forecasts among smallholder farmers of Masinga Sub County in Machakos County.
METHODOLOGY

Scope of the Study

Drought in Masinga Sub County is not a new phenomenon. The Sub County is located in the semi-arid environment, which is characterized by changes in climate that usually results in a deficiency in available moisture below levels that are normally expected. The study mainly addressed satisfaction of seasonal climate forecasts. Seasonal forecasts in this study referred to the information received from KMD. The study was carried out in four locations of Masinga Sub County namely, Masinga central location, Katulye location, Musumaa location and Musingini Location. Rainfall patterns in this study was considered as the most critical elements that farmers need to be informed about. The study was limited to household farmers who are found in Masinga Sub County, which is a semi-arid land, found in Machakos County. Primary data was collected from randomly selected farmers using structured questionnaires. This location was chosen because despite weather and climate forecasts made available to the farmers in Arid and Semi-Arid areas they are still vulnerable to drought and climate extremes. There is thus uncertainty on whether farmers in these arid and semi-arid lands receive these forecasts.

There are several categories and types of climate information products and services which include daily weather forecasts; dekadal agro-meteorological bulletins; monthly climate outlooks; seasonal climate outlooks; climate alerts; observed climate impacts; and tailored information for users (farmers) including various types of climate mean maps on different parameters. Seasonal climate outlooks are products that are given out to the farmers and public during the three rainfall seasons, the March to May (MAM), June to August (JJA), and October to December (OND). The forecasts have been very crucial in the detection of the evolution of any significant anomalies that could impact negatively on the socio-economic activities of the country.

Rainfall is the most important climatic element in Sub-Saharan Africa (SSA). Essentially, rainfall controls agriculture, which is the mainstay of SSA economies and the predominant source of rural livelihoods. Agricultural production is dependent on rainfall performance. However, rainfall exhibits varying characteristics resulting in ‘near normal,’ ‘above normal’ or ‘below normal’ rainfall. For instance, Masinga Sub County has an average OND rainfall of 511 mm (KMD, 2017). For KMD, the term ‘below normal’ rainfall refers to rainfall below the mean, ‘near normal,’ rainfall refers to almost normal rainfall to the mean or average rainfall and ‘above normal’ rainfall refers to rainfall above the mean. This is because KMD gives rainfall forecasts in probabilities.

Study Area

Masinga Sub County is an arid and semi-arid region in the Eastern part of the larger Machakos County of Kenya. The sub county experiences a bimodal Rainfall pattern with annual rainfall averaging between 500 - 700mm per year (GOK, 2008). The short rain season occurs in March-May while long rains are received in the October/December period. Generally, rains in Masinga Sub County are erratic. Temperatures range between 29°C - 36°C, though at certain periods they can rise to as high as 40°C (ibid). Food crops cultivated in the area are millet, sorghum, maize, pigeon peas, green grams and cowpeas. Cash crops are hardly cultivated but if done, they comprise cotton, sunflower and castor.

The Sub County is divided into four administrative locations, namely, Masinga central location, Musumaa Location, Musingini Location, and Katulye Location. Masinga Sub County covers an area of 213 square kilometers and comprises of a total population of 7241 persons (3240 males and 4001 females). It is comprised of 1978 households of which 954 are farm families (Ministry of Agriculture & Livestock [MoA&L] Office, Masinga District, 2011). The study area was chosen for the study because it has salient characteristics of ASAL areas. Climate forecasts is one of challenges of concern in such areas.

Sample Size and Procedure

The study utilized two data sets; household survey and seasonal climate forecasts from KMD.. Households were drawn from across the four main sub locations namely Katulye, Musingini, Musuma and Masinga sub locations. A systematic random sampling procedure was employed. This approach was chosen because it ensured an equal probability of inclusion of each unit in the population than simple random sampling (Nassiuma and Mwangi, 2004). Seasonal climate forecast for OND 2016 was downloaded from the KMD website. The forecasts were used to aid in evaluation of household’s accuracy and satisfaction level on utilization of forecasts.
Data Collection Procedures
Different methods were used to collect both qualitative and quantitative data. Primary data was collected from randomly selected farmers in the area through questionnaires. A questionnaire containing both structured and unstructured questions was administered on the selected farmers in the four locations, namely, Masinga central Location, Katulye location, Musumaa location and Musingini location. Secondary data on climate forecasting and population were collected from reports, bulletins and documents from regional, county and local extension, CBOs and National meteorological service. Seasonal climate forecasts were collected from KMD website (www.kemeo.go.ke). Information such as climate forecasting data, spatial distribution of forecasts and population were collected as secondary data.

Data Analysis
Data from the questionnaire survey was organized and prepared for analysis using Statistical Package for Social Science (SPSS) version 21. SPSS database capturing all elements of the questionnaire was created. All data collected was cleaned and screened to eliminate errors using CsPro software. Eliminating errors ensured that subsequent analysis will not be affected. Responses were coded and arranged thematically using SPSS. Tables and figures were developed for graphical representation and visual comparison. Frequencies and percentages were used to characterize the demographic data, farmer’s knowledge on the availability of climate forecasting data and its utilization.

RESULTS AND DISCUSSION
Types of Forecast Being Used
The study focused on establishing the specific types of forecast that farmers in this region used. Figure 1 illustrates the distribution of types of forecast being used by the farmers.

<table>
<thead>
<tr>
<th>Type of Forecast Being Used</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>None of the above</td>
<td>2%</td>
</tr>
<tr>
<td>Seasonal climate forecasts and Indigenous forecasts</td>
<td>54%</td>
</tr>
<tr>
<td>Indigenous forecasts</td>
<td>34%</td>
</tr>
<tr>
<td>Seasonal climate forecasts</td>
<td>10%</td>
</tr>
</tbody>
</table>

Figure 1: Type of Forecast being used

As shown in Figure 1, a combination of both seasonal climate forecast and indigenous forecasts were being used by 54% of respondents. Those who used indigenous forecasts alone were 34%, those who used seasonal climate forecasts were 10% while 2% did not report any of the above types of forecasts. Combining indigenous and modern seasonal forecasting is one of the ways of dealing with challenges faced in the development, communication and use of seasonal forecasts. Many farmers already make use of indigenous forecasts for their farm level decision-making and may only need certain information to complement what they already know.

It is therefore important that forecasters target existing gaps if they are to add value to communities working on the ground. Participatory approaches offer opportunities through which indigenous and modern approaches to seasonal climate forecasting can be harmonized and user needs integrated. Indeed, participatory dissemination of climate forecasts has shown positive impacts on farmers’ response but as Roncoli et al. (2009) observed, focusing exclusively on how climate forecasts affect yield misses out on the contextual interaction that shapes how farmers understand and use climate forecasts. It is also worth noting that participatory processes are not necessarily equitable.
and all inclusive. O’Bien and Vogel (2003), caution against over reliance on official networks for forecast dissemination, as they may lead to intentional or unintentional exclusion of some groups from receiving information. This strengthens the case for using informal systems (local/indigenous) of dissemination even where formal institutions seem to be working well.

Cumulatively 88% of the respondents used indigenous forecasts. A study in Kenya by Speranza et al. (2010), which investigated farmers’ use of indigenous knowledge of climate forecasts and the adaptation to climate change and variability in semi-arid areas of the East African country, found that farmers possess knowledge on the use of local indicators in predicting climate particularly rainfall. The study further established that the farmers believe in and rely on the efficacy of indigenous forecasts as the basic knowledge system within which they interpret climate forecasts and make decisions pertaining to their agricultural practices.

Majority of the respondents (58%) indicated that they had used scientific climate forecasts for more than five years while 28% have used scientific forecasts for less than five years. This shows that forecasts have been in use for quite some time by the farmers (Figure 2).

### Figure 2: Duration of using Forecasts

<table>
<thead>
<tr>
<th>Duration</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 years</td>
<td>28%</td>
</tr>
<tr>
<td>Over 5 years</td>
<td>58%</td>
</tr>
<tr>
<td>Last 5 years</td>
<td>14%</td>
</tr>
</tbody>
</table>

**Level of Satisfaction of Scientific Forecasts**

In regard to the level of satisfaction, most of the respondents were very unsatisfied with the forecasts used. This was observed in a total of 167 respondents representing 61%. Those who were moderately satisfied were 23%, those who were very satisfied were 5% while 11% did not know their level of satisfaction. (Figure 3). A chi square test were conducted to find out whether there exist any association between satisfaction levels and utilization of scientific forecasts (Table 1).

### Table 1. Relationship between Level of Satisfaction and Utilization of Scientific Forecasts

<table>
<thead>
<tr>
<th>Chi square tests</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi Square</td>
<td>20.778</td>
<td>4</td>
<td>.000</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>16.848</td>
<td>4</td>
<td>.001</td>
</tr>
<tr>
<td>Linear -by -linear Association</td>
<td>4.445</td>
<td>1</td>
<td>.002</td>
</tr>
<tr>
<td>N of valid cases</td>
<td>274</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
From the results, majority of the respondents were not satisfied with climate forecasts because of shortcomings accompanying the forecasts, such as difficult and technical language, although they reported forecasts as important in averting agricultural risks. Roncoli et al. (2009) argued that quality of the information is the level of confidence placed in it by the receiver, and affects acceptance and use. Thus, until KMD down scales forecasts at a reduced geographical scale as a way of improving accuracy it is unlikely that farmers will believe and use climate forecast. Cases of farmers rating climate forecasts useful and not using it are common and concurs with the findings of Mwinamo (2001). Results from chi-square showed that, there is a significant relationship between satisfaction levels and utilization of scientific forecasts. A p-value of .000 is observed which is less than the level of significance \( \alpha=0.05 \). This therefore implies that if smallholder farmers are not satisfied with scientific forecasts, they are not likely to use forecasts again.

**Use of Climate Forecast in Farm Level Decision Making**

It is evident that most of the respondents followed usual seasons in making decisions to plant. A total of 115 respondents representing 42% noted that they followed usual seasons to make planting decisions. Those who used traditional forecasts were 28%, those who waited for rains were 10%, and those who followed their neighbors’ decisions were 10% while those who made decisions to plant after receiving forecasts were 10% (Figure 4). It was thus observed that there was laxity in using scientific climate forecast information in making decisions to plant among most of the respondents. According to FitzGerald (1994), people make decisions in the light of what is perceived and not what actually is. Farmers who do not believe in climate forecast attribute it to inaccuracy, a fact that could emanate from errors due to generating forecasts of large geographical area coverage. According to Lemos et al. (2002), farmers’ inability to respond to climate forecasts (irrespective of quality and precision) leaves them vulnerable to climate variability.

![Figure 4: Time of making Decisions](image)

Majority of the respondents were able to access various dissemination channels thus indicating that there is potential for reliable and timely information to reach households in time in order to positively influence agricultural decision-making at the farm household level. However, this potential remains largely untapped because as currently packaged and delivered, climate information does not cater to the needs of smallholder farmers. Benefits from such high access to dissemination channels can only be realized if the forecast is turned into information to support operational decision, especially minimizing risks associated with variability and uncertainty. If farmers could receive and anticipate advance information about climate for the upcoming growing season and of this information could be delivered in a timely, accurate and reliable manner through widely available media with extended interaction between farmers and researchers then farmers would be able to use such information make better management decisions that would reduce their losses, minimize the use of costly farm inputs and as a result, maximize yield.

**Utilization of Indigenous Climate Forecasts**

Despite quite a number of respondents claiming to receive the scientific forecasts they do not put it to use. From the results, 74% of the respondents concurred that they used indigenous methods of climate forecasting while 26% did not use indigenous methods of climate forecasting (Figure 5). This means most of the respondents had preference
for traditional forecasts in farm level decision making. This concurs with Onyango et al. (2014) who noted that the use of indigenous methods of climate forecasting was a major practice among the small-scale farmers. Some of the indigenous methods of climate forecasting used include stars and moon observation, croaking of frogs, flowering of plants, wind direction, appearance of certain clouds, bird’s movement, animal behavior, bees’ movement and honey production and some sounds made by insects. These results confirm findings by Egeru (2012) that the traditional climate forecasting practices of using moon characteristics, tree phenology and particular animal behavior patterns are still being utilized. Farmers should be educated on the benefits of climate forecasts and how to use them. Farmers using own knowledge to determine rainfall on set to plant are most likely dependent on traditional rainfall indicators (Ngugi, 2001; DMCN, 2004). Traditional forecasts and indicators can predict onset but not distribution and cessation of rainfall.

![Figure 5: Utilization of Indigenous Climate Forecasts](image)

Although climate forecasts are received through the radio, lack of skill in interpretation and application of these forecasts becomes a hurdle as this requires meteorological and Agricultural Extension officers. Therefore, people need simple and easy language to apply agro-meteorological products, which are not readily available. Hence these residents are then left with no choice but to use their indigenous climate forecasts as decision making tools in planning their livelihoods. This concurs with Shoko and Shoko (2011) who pointed out that while farmers did not have the scientific climate forecasts in time, they had an idea about the expected season by observing traditional climate indicators.

**Perception of Indigenous Knowledge and Scientific Climate Forecasts**

Most of the respondents held the opinion that scientific climate forecasts were not reliable. This was represented by 48% of the respondents against 5% who felt that indigenous climate forecasts were not reliable. 38% of the respondents felt that indigenous forecasts were sometimes reliable while 26% felt that scientific climate forecasts were sometimes reliable. 43% of the respondents felt that indigenous forecasts were always reliable against 14% who held the opinion that scientific climate forecasts were always reliable. An almost equal number of 14% and 12% respondents felt that they did not understand traditional weather forecasts and scientific climate forecasts respectively (Figure 6). Small-scale farmers’ perception on the forecasts greatly determines the response they put to it. The biggest challenge in the use of scientific forecast is the fact that farmers view it as unreliable and always untimely. Patt and Gwata (2002) have argued that access and use of climate forecast remain the greatest challenge to climate scientists. Many a time climate forecast have suffered a credibility problem and people have shown mistrust for it (Hobbs, 1980) an attitude that comes from the previous forecasts being perceived as inaccurate, as a result, users end up ignoring the forecast.
In the study area, seasonal forecast was regarded not only as important but also necessary for any meaningful
decisions to be made in terms of agricultural productivity. This means that timely access to this information is vital
to all farmers’ therefore, there is need for well-developed mechanisms of dissemination to enhance its usability by
the farmers. Both indigenous forecasts and scientific forecast are evident in the study area. While scientific forecast
uses the known methodology of study of sea surfaces temperatures, wind patterns and past weather events to predict
the state of the atmosphere, indigenous forecasts is given in line with experience of living in close contact with the
environment and nature. Scientific forecasts are disseminated in a formal way. There are hierarchical channels of
dissemination, which makes the forecasts not to reach farmers on time for them to make timely decisions.
Indigenous forecasts on the other hand are disseminated in an informal way thereby available and accessible to
farmers. There is need therefore to ensure scientific forecasts are readily available when required by the users.

Understanding of Climate Forecast Terms
Climate forecast information comes in different forms and sometimes, it uses terms that some people find
challenging to comprehend or differentiate. This was to find out how well the respondents were conversant with
several climate forecast terms. The findings are shown on Table 2

<table>
<thead>
<tr>
<th>Table 2: Respondents’ Understanding of Climate Forecast Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forecast term</td>
</tr>
<tr>
<td>Explanation</td>
</tr>
<tr>
<td>Extremely High rainfall</td>
</tr>
<tr>
<td>High rainfall</td>
</tr>
<tr>
<td>Moderate rainfall</td>
</tr>
<tr>
<td>Low rainfall</td>
</tr>
<tr>
<td>Don’t know</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

From Table 2, it was noted that most of the respondents were not well versed with definitions and explanation of the
climate forecast terms they were presented with. From the results 36% respondents did not know the explanation for
below normal rainfall, 38% respondents did not know the explanation for near normal rainfall while 42% did not
know the explanation for above normal rainfall. Only 21% respondents knew the explanation of the term below
normal rainfall, citing it to be low rainfall. Another 21% of the respondents cited near normal rainfall to be moderate
rainfall while a total of 32% respondents noted that the term above normal rainfall denoted either high rainfall or
extremely high rainfall. Therefore, it was observed that most of the respondents were not conversant with climate
forecast terms and that in case they were presented with climate forecast information that bore these terms, it would
be difficult for them to make the right and appropriate sense out of the information on their own. This concurs with Oduor et al. (2002) who observed that the current nature of scientific forecast terminologies of near normal, above normal and below normal may not assist much a small-scale farmer who has limited resources to cope with the eventualities of extreme weather events. The jargons used in the communication of seasonal climate forecast are a stalemate to the end users of the information. This has highly compromised the use of such forecasts for any meaningful farm decisions in the area. Gigerenzer and Hoffrage (1995) also pointed out that, the communication of uncertainty constitutes a related problem of quality. Forecasts are presented in the language of probabilities, but are often not perceived as such. Probabilistic information is difficult to assimilate because people do not think probabilistically nor do they interpret probabilities easily (Gigerenzer & Hoffrage, 1995, cited by Stern and Easterling, 1999). From a purely technical or statistical perspective, an unlikely event, one with a low probability of occurrence, can in fact occur. But for farmers and policy makers to use forecast information as a risk-reducing tool, they must have an appropriate understanding of the meaning of a probabilistic forecast (Gigerenzer & Hoffrage, 1995), thus this is lacking.

CONCLUSION AND RECOMMENDATION

The study found that smallholder farmers of Masinga Sub County in Machakos County majorly rely on both indigenous and scientific climate forecasts. Both scientific and indigenous climate forecasts can therefore be harmonized to incorporate consumer needs in order to reap positive impacts of the forecasts. There is a mismatch between the information that is useful to farmers and what is actually provided for public consumption. Majority of the respondents were very unsatisfied with the scientific forecasts. This has resulted to forecasts not used by vulnerable groups because information does not specifically target these vulnerable groups. This has been due to poor availability of information and therefore a barrier to ease of access to the information. The forecast information is often not tailored to suit target farmers in content and delivery style, therefore not able to access it even if it was availed to them. Seasonal climate forecasts are crucial for the provision of early warning information and, if used by farmers, can enable them to adjust their planting seasons and farming calendar. If the communication of forecasts is not improved, most farmers will continue to ignore them and the resources invested in their improvement will have been wasted.

It was also observed that majority of the respondents were not satisfied with scientific climate forecasts because of shortcomings accompanying the forecasts. Combination of both seasonal climate forecast and indigenous forecasts were being used by the majority of respondents. It is therefore, recommended that, combining indigenous and modern seasonal forecasting should be one of the ways of dealing with challenges faced in the development, communication and use of seasonal forecasts. This will increase utility of the forecasts and the targeted respondents will be satisfied.

REFERENCES


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ABSTRACT
Urban agriculture has become a common practice among men and women in Kenya. It contributes significantly to household food security. The objective of the study was to establish gender roles in urban agriculture, this study was informed by the Cultural Lag and Situational Approach theories. The study population was 425 people. The accessible population was men and women (household heads) who practice urban agriculture, Officers from Kakamega County Ministry of Agriculture and police and chief from the national government. A sample size of 217 was used based on the size estimation table by Krejcie and Morgan. Simple random and purposive sampling methods were used to analyze data collected using questionnaires, interview schedules, observation and focus group discussion. Secondary data was sourced from books, reports and journals. Quantitative data were analyzed using percentages and Chi-square while qualitative data was analyzed using narratives and themes. This study concluded that there are significant gender differences in urban agricultural productivity practices, seen in both crop farming and crop cultivation these are explicit in division of labor in both crop cultivation and livestock keeping which are male dominated. Gender roles have a significant effect on effect with an associated p-value of 0.000. The access to the factors of agricultural production and the decision-making practices are equally exhibit gender differences at p-value of 0.000. Women should be empowered regarding decisions on urban agriculture. This study also recommends that the government and ministry of agriculture to be involved in the prospects of urban agriculture. There is need to explore various policy mechanisms including joint titling modalities, land leasing, land law reforms, state-managed land allocation and reform programs to improve access to inputs like land which fundamental role in agricultural productivity and act as security. This study is significant to policymakers for it provide information relevant to the policy governing urban agriculture. The finding of this study also informs urban planners on proper urban planning that integrates agriculture as an integral component in urban development. The findings and analysis of gender roles in urban agriculture contributes to the knowledge of gender studies and urban agriculture.

Keywords: Gender, Urban, Agriculture, women, men and roles

INTRODUCTION
Background to the Study
The history of urban agriculture in Kenya dates back to 1899 when railway workers, mainly from India started the practice in the mainland towns. The Indian urban farmers sold the surplus produce to European settlers. During the colonial era, the African population in the urban centers was highly restricted. At the same time, the colonial regime strictly enforced planning regulations that prohibited urban agriculture in certain places e.g. roadsides and public open places (Mireri, 2002). Urban agriculture witnessed rapid growth despite restrictive urban planning and management regulations.

Gender plays a significant role in urban agriculture whereby empirical evidence from Botswana and Zimbabwe shows that it is used to fulfill household needs as well as for social and economic empowerment (Hovorka et al., 2009). This is widely corroborated by previous studies (Ishani et al., 2002: Hovorka (2006). With the persistent growth of urban agriculture, there is need to investigate gender roles, in the effort to attain sustainable food production in urban centers. Urban agriculture is more pronounced among poor urban households who spend more than 60% of their income on food alone (Masvaure, 2013).

In Kenya, both genders are involved in urban agriculture(Karanja, 2013). Women in developing countries are important players in agricultural development. Their participation in urban agriculture, however, is scantily addressed. This study documented gender and urban agriculture in Kakamega town since gender dynamics are central to the form, function, organization and structure of urban agriculture.

Statement of the Problem
Urban agriculture has become a common practice among men and women in Kenya and there is evidence that the rise in agriculture has a significant contribution to food security. Although the number of people practicing urban agriculture is on the increase, the gender dimensions are yet to be adequately analyzed. Previous studies conducted
on urban agriculture mainly focused on development, livelihoods, ecosystem health, food security and challenges, leaving a gap on gender dimensions.

LITERATURE REVIEW

Studies conducted on urban farming revealed that urban agriculture is gender-based. Some urban men and women are involved in urban agriculture, while they are not a homogeneous group. Mougeot (2000) includes both genders in urban agriculture stating that the majority of men and women who practice urban agriculture are low-income men and women who grow food primarily for households consumption on small plots of lands that they do not own and have little if any, support or protection. Urban agriculture contributes to overall community health. The benefits of food production transcend the physical, mental and emotional health of the individual to leave lasting change on others and on the physical and social space of the community (Shoemaker & Kiehl, 2002; Littman, 1996; Brogan & James, 1980). Urban agriculture is a lifetime activity, and its health advantages span generations of urban agricultural practitioners (Armstrong, 2000; Herbach 1998; Hynes, 1996).

Bellows et al. (2004) found that men and women in North America reported one of the reasons that they grew food was to share with friends, families, Neighbours, and/or needy members of their community. In this way, urban agriculture was empowering its participants by bringing people together, building community, and improving neighborhoods. Many studies have looked into social engagement, and have found that it is positively correlated with personal attention to health care and wellness (Bellows et al., 2004). Several studies illustrated that urban agriculture is not only a 'pleasant' or 'subsidiary' practice in the developing world (Rakodi, 1985; Sanyal, 1985, 1986; Rogerson, 1993), rather, it has been shown to be "a critical part of developing more productive and viable urban habitats" (Wade, 1986; Rogerson, 1993:21). Urban agriculture has traditionally been promoted for its potential to improve the socio-economic situation of the poor, however, there are additional benefits "that may ultimately be the most significant in shaping a positive future for Third World cities" (Wade, 1986; Rogerson, 1993). This is in reference to the deep, psychological impact of successful community-based efforts at food production (Wade, 1987; Rogerson, 1993).

The literature reviewed revealed a number of salient issues: firstly, that the culturally prescribed gender division of labour in urban agriculture does not accord completely with what men and women urban farmers do in practice (Buechler & Devi, 2012). A number of studies have been conducted on urban agriculture in Kenya without providing a nexus of gender involvement as well as their relevance in the practice (Muvunzi, 2015; Mireri 2013; Kamwele et al., 2014; Mugalavai, 2008 & Mwangi, 2015) in Kibera, Kisumu, Eldoret and Nairobi Counties respectively. The gist of the current study is gender and urban agriculture which has not been widely studied.

METHODOLOGY

Descriptive research design was suitable for this study. It was geared towards finding out the extent to which the role of gender influences urban agriculture in Kakamega town. (Mugenda & Mugenda, 2003). The total population for the study was 425 comprising of gender urban agricultural practitioners in Kakamega town (KCIDP, 2013); these population categories were sampled for the study because they are important players of urban agriculture within the study sample. This study used simple random sampling technique. Krejcie and Morgan (1970) was used to determine sample size with a confidence level of 95% and a margin error of 5%. The total study population of urban agricultural practitioners in Kakamega town according to KCIDP (2013) is 405 households, 296 women (73%), and 109 men (27%) of the study population.

According to Krejcie and Morgan (1970), sample size for 405 populations is 217. The main data collection instruments for this study were questionnaires and interview guides. The tools for data collection were based on the objectives of the study. The questionnaire was submitted to other researchers for cross-checking and also to assess if the contents were valid. Content validity tested whether the test covers a representative sample of the domain to be measured in the study. The test-retest approach which is preferred by most researchers was employed. The reliability of the research instruments was determined during the pilot study period. Frankel and Wallen (2003) recommend a reliability of $\alpha = 0.7$. Statistical Package for Social Sciences (SPSS version 22) was used to analyze the obtained information based on objectives.

RESULTS AND DISCUSSIONS

Gender Demographic Characteristics

The gender demographic characteristics were investigated and the results were indicated in table 1.
Table 1. Demographic Characteristics of Gender

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Frequency (%)</th>
<th>P-value</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (%)</td>
<td>40 (18.5%)</td>
<td>P=0.000</td>
<td>217</td>
</tr>
<tr>
<td>Females (%)</td>
<td>177 (81.5%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-24</td>
<td>59 (27.1%)</td>
<td>P=0.000</td>
<td>217</td>
</tr>
<tr>
<td>25-35 years</td>
<td>93 (43%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36-45 years</td>
<td>30 (14%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>46-55 years</td>
<td>24 (11.2%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>56 years +</td>
<td>10 (4.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>134 (61.7%)</td>
<td>P=0.000</td>
<td>217</td>
</tr>
<tr>
<td>Widow</td>
<td>20 (9.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not married</td>
<td>63 (29%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest level of education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>80 (36.8%)</td>
<td>P=0.746</td>
<td>217</td>
</tr>
<tr>
<td>Secondary</td>
<td>70 (32.1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td>67 (31.1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source of income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>47 (21.7%)</td>
<td>P=0.000</td>
<td>217</td>
</tr>
<tr>
<td>Unemployed</td>
<td>49 (22.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business</td>
<td>121 (55.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of residence in county</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 years and below</td>
<td>61 (28.3%)</td>
<td>P=0.101</td>
<td>217</td>
</tr>
<tr>
<td>6-10 years</td>
<td>67 (31.1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-15 years</td>
<td>33 (15.1%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above 16 years</td>
<td>55 (25.5%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the findings, most of the respondents were females (81.5%), with a significant difference in the representation of both genders in the study (p-value=0.000).

Gender differences in Urban Agriculture Practices

The study established both livestock keeping, and crop cultivation was primarily done by women, at 64%, while both male and female involvement was at 18.5%. The involvement of the male gender alone in both livestock keeping and crop cultivation was 17.5%.

![Figure 1: Gender differences in Urban Agriculture Practices](image)

Except in instances of harvesting, transport to the market and keeping of savings from produce where there was almost equal involvement of males and females, the male gender dominated most of the activities. More than half of the respondents agree land preparation and cultivation (56%), buying of seeds for planting (55%) and marketing of produce (62%) was done by men.
The findings of this study on exploring the gender differences in income benefits from agricultural produce established that the male gender were the main beneficiaries from the income generated, especially the income from labour (56%) and the income from livestock products (47.5%). There were no significant differences on beneficiaries relative to the income from the sale of vegetables.
Relative to gender differences in access to agricultural productivity inputs, it was revealed that there were significant differences in access to the different inputs among the two genders. Men had relatively greater access to information (50%), labour (61%), access to credit and loans (56%) and access to land (70%). Women mostly had access to information (27%) followed by access to credit and loans (24%), labour (22%) and they had least access to land which is probably related to the culture influence and land ownership structures within the study area. Joint involvement of men and women was mostly seen in access to information (23%) and access to credit (24%).

![Figure 5: Gender differences in Access to Productivity Inputs](image)

Male domination was largely characterized by decisions surrounding when to harvest (55%), what farming inputs to buy (51%), what part of produce will be sold (50%), where to plant (46.5%) and which plants to grow (46.5%). Notably, there are no decisions that were significantly women dominated although they were mostly involved in the hiring of labour (35%) and the kind of crops supposed to be grown (34%).

**Challenges facing Male and Female Involvement in Urban Agriculture**

This study found that inadequacy of capital was the most commonly cited challenge experienced among the urban farmers (30%) followed by pests and diseases (15.5%). Other main challenges experienced included inadequate seeds and fertilizers (12%), unfavorable weather conditions (12%), limited access to adequate extension services (12%), insecurity (9.5%) and lack of affordable land (9.5%) although these were experienced at lower magnitude.

**Table 2. Other Challenges Experienced in Urban Agriculture**

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty in irrigation during dry season</td>
<td>44</td>
<td>20.28</td>
</tr>
<tr>
<td>Pests and diseases</td>
<td>42</td>
<td>19.58</td>
</tr>
<tr>
<td>Unpredictable weather conditions</td>
<td>39</td>
<td>18.18</td>
</tr>
<tr>
<td>Poor transport</td>
<td>17</td>
<td>7.69</td>
</tr>
<tr>
<td>Theft of inputs and/or produce</td>
<td>12</td>
<td>5.59</td>
</tr>
<tr>
<td>Shortage of labour</td>
<td>12</td>
<td>5.59</td>
</tr>
<tr>
<td>Unproductive soil</td>
<td>8</td>
<td>3.50</td>
</tr>
<tr>
<td>Lack of support from the county government</td>
<td>8</td>
<td>3.50</td>
</tr>
<tr>
<td>Alternating food prices</td>
<td>4</td>
<td>2.80</td>
</tr>
<tr>
<td>Unfavourable government policies</td>
<td>4</td>
<td>2.80</td>
</tr>
<tr>
<td>Irrelevant education from the media</td>
<td>6</td>
<td>2.10</td>
</tr>
<tr>
<td>Competition from other farmers</td>
<td>6</td>
<td>2.10</td>
</tr>
<tr>
<td>Lack of training on agriculture by experts</td>
<td>3</td>
<td>1.40</td>
</tr>
<tr>
<td>Poor storage facilities</td>
<td>3</td>
<td>1.40</td>
</tr>
<tr>
<td>Unemployment</td>
<td>3</td>
<td>1.40</td>
</tr>
<tr>
<td>Lack of a ready market</td>
<td>2</td>
<td>0.70</td>
</tr>
<tr>
<td>Shortage of land</td>
<td>2</td>
<td>0.70</td>
</tr>
<tr>
<td>Inadequate of capital</td>
<td>2</td>
<td>0.70</td>
</tr>
</tbody>
</table>
4.6. Inferential Analysis

Table 3. Chi-Square Test on Factors affecting Gender Roles on the Urban Agriculture

<table>
<thead>
<tr>
<th>Factors Motivating gender roles</th>
<th>Person Chi-Square</th>
<th>P-value</th>
<th>Significance Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of land</td>
<td>116.503</td>
<td>0.000</td>
<td>0.05</td>
</tr>
<tr>
<td>In search of food</td>
<td>39.490</td>
<td>0.000</td>
<td>0.05</td>
</tr>
<tr>
<td>Availability of Market</td>
<td>174.507</td>
<td>0.000</td>
<td>0.05</td>
</tr>
<tr>
<td>Favorable climate</td>
<td>26.281</td>
<td>0.000</td>
<td>0.05</td>
</tr>
<tr>
<td>Credit and loans availability</td>
<td>195.644</td>
<td>0.000</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Probability value obtained was 0.000 which less than significance value of 0.05. The finding of the study therefore implies that all factors considered had significant relationship with the gender role on the urban agriculture.

Table 4. Chi-Square test on the extent to which Gender roles affect the Urban Agriculture in Kakamega Town

<table>
<thead>
<tr>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Sig. (2-Exact sided)</th>
<th>Sig. (2-Exact sided)</th>
<th>Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>36.275</td>
<td>1</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

No of Valid Cases 217

0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.16.

The chi-square value obtained is 36.275 at a probability value of 0.000. The number of valid cases is given as 217, which indicates the sample size considered in this study. Since the probability value of 0.000 is less than the significance value of 0.05.

CONCLUSIONS

Women were mostly involved in transportation of agricultural produce, keeping of savings. Harvesting was a joint activity collectively done by both males and females in equal measure. Findings from this study further reveal that gender is an important construct that defines access to the factors of agricultural production. The access to land, access to information, labor, credit and loan facilities was much more commonly realized among men than women. Marginally, women were mostly involved on decision making for hiring of labor and what crops to be grown.

RECOMMENDATIONS

There is need to exploit the gender gaps, with government interventions paying attention to the gaps in resources and opportunities that exist between the two groups even during farmer sensitization. For instance, when women are empowered regarding decisions on what to plant and what inputs to apply they will improve their productivity. While it is assumed of urban settings to probably have greater access to agricultural extension services, this study establishes not essentially so hence the need for government and ministry of agriculture involvement in the prospects of urban agriculture.

SUGGESTION FOR FURTHER RESEARCH

Establish the relationship between labor market discrimination and the observed gender gap in agricultural productivity. Investigate intra-household resource allocation and decision making in agricultural households.

REFERENCES


*****
ASSESSMENT ON RISK FACTORS THAT INFLUENCE GAMBLING AMONG YOUTH IN PUBLIC UNIVERSITIES IN KENYA

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ABSTRACT
In Kenya gambling has taken over the country by a storm as most people especially the younger generation getting entirely consumed into it. Kenyan youth at 70% has been established be involved in gambling and there is research evidence suggesting that gambling problem will increase further in the near future. This study sort to establish the factors that leads to gambling among university students. The study employed descriptive research design. The target population for the study was 102 respondents, with 100 students from the public universities and 2 university students Counselors. The study employed descriptive research design and data was collected using questionnaires. Research on the motivation for gambling among youth in colleges and universities suggests that these students are motivated to get involved in gambling for a number of reasons which includes to win money, for personal excitement, for their enjoyment, boredrelive and for socialization reasons To understand the difference on how problem gamblers and non-problem gamblers differ it is important to identify the motivating factors for gambling among the college and university students. The study identified several motivating factors for gambling among university students at the undergraduate level, these include: winning money, for enjoyment, to get excitement, to gain the social experiences, to pass/occupy time, testing their luck and chasing win/loses. Money (42.7% of respondents) have been reported to be the most frequent motivation, followed by getting fun/enjoyment at (23%), (11.2%) for socialization, (7.3) for excitement seeking, occupying time at (3.9%), and for boredom relieve at 2.8%. This study recommends incorporation of lessons in universities on gambling and its adverse effects, development of various policies by the higher learning institutions to control gambling among the university students.

Keywords: public universities, gambling, factors influencing gambling.

BACKGROUND INFORMATION
Gambling is described as the act of risking or wagering things of value on the possible outcome of an event whose probability of winning or losing is uncertain and or based on chance (Korn & Shaeffer, 1999). It is also a form of behavioral addiction that has been established to pose adverse negative consequences to the individual players social relations, personal behavior, physical and mental health of the gambler (Chimezie, 2015). In addition, gambling problematic engagement is also considered to be a psychological disorder that is described by individuals persistent and its problematic engagement is considered a psychological disorder that is characterized by persistent and recurring maladaptive behaviors leading to the damage of one’s occupation, gamblers employment, family relations and social interest, financial losses/problems, and equally can lead to legal problems and also can lead to adverse effects on medical and psychiatric co-morbidity of the gambler (Alegeria, Bernardi, & Blanco, 2010).

Due to this adverse negative consequences, research has been undertaken to establish the prevalence of gambling disorder. However bulk of these studies to date have mainly focused on the adult general population with very little focuses given to the problem gambling among the youthful population (Wiebe, 2002). Chimezie (2015) established in her research that younger people including the university students are a higher risky group for the development of gambling. Equally, high frequency of gambling engagement and disorder have been established to exist among different university students group, largely in countries with higher income (Mubarak, & Blanksby, 2013)

University students in Kenya seem to encounter several problems due to gambling, for example a student at Kabiang University in Kenya committed suicide after losing a bet, and other students have dropped out of college after using their fee money to bet Koross, R. (2016). There are also cases whereby university students have engaged in heavy drinking and abuse of drugs after winning thousands of money in their bets. Koross, R. (2016). Therefore the problem of student’s involvement in gambling should not be ignored since it results to adverse effects to the individual student and the community and society as a whole and equally it has become a nationwide concern in Kenya. This study therefore will examine the Factors that influence gambling, prevalence of gambling and the general consequences of gambling among the youth in the Public Universities.
Purpose and Objective of the Study
The purpose of this study was to assess gambling among youth in public Universities. The objectives of the study were to: determine the prevalence of gambling among youth in public universities, and assess the risk factors for gambling among youth in public universities.

LITERATURE REVIEW
Factors That Influence Gambling Among Youth in the Public Universities
Research on the motivation for gambling among youth in colleges and universities suggests that these students are motivated to get involved in gambling for a number of reasons which includes to win money, for personal excitement, for their enjoyment, boredom relive and for socialization reasons (Lee, Chae, Lee, & Kim, 2007; Neighbors, Lostutter, Cronce, & Larimer, 2002; Shead et al., 2012). To understand the difference on how problem gamblers and non-problem gamblers differ it is important to identify the motivating factors for gambling among the college and university students (Neighbors et al., 2002). At northwestern US University, a study on gambling among 184 college students at the undergraduate level identified 16 motivating factors for gambling, these include: winning money, for enjoyment, to get excitement, to gain the social experiences, to pass/occupy time, testing their luck and chasing win/loses. Money (42.7% of respondents) have been reported to be the most frequent motivation, followed by getting fun/enjoyment at (23%), (11.2%) for socialization, (7.3) for excitement seeking, occupying time at (3.9%), and for boredom relive at (2.8%; Neighbors et al., 2002).

Another study conducted among Korean college students further narrowed down the 16 motivating factors earlier identified by Neighbors and colleagues to only five factors that motivates gambling they include: 1) for excitement purposes, 2) for socialization, 3) for avoidance, 4) for monetary gains, and 5) for their amusement (Lee et al., 2007). Gambling for excitement is described as gambling to get excitement or personal arousal; gambling for socialization is described as gambling in order to interact with one’s family and or friends, or with new people; gambling for avoidance is described as gambling for the avoidance of stressful experiences, anxiety, and also to reduce depression, gambling for monetary gains is described as gambling to win money; and gambling for amusement is described as gambling for personal enjoyment (Lee et al., 2007; Neighbors et al., 2002). Motives for internet gambling among college students has been reported to be similar for the non-Internet gambling. For instance, a study conducted at UCLA on Internet gambling among college students established that more than one-half of all the respondents in the study showed that they involved in gambling for fun (53%) and/or for boredom relive (56.1%) (Shead et al., 2012). (Cooper, Russell, Skinner, & Windle, 1992; Frankenberger, 2004; Patrick, Lee, & Larimer, 2011). Indicates that motives for gambling may be similar to the various motives for engaging one’s self in other risky behaviors. Various researches conducted on other risk behaviors among college students such as; alcohol and drug use, having unprotected sex, reckless and risky driving, has shown common motives with gambling such as for enjoyment, for socialization and for coping purposes (Frankenberger, 2004; Patrick, Lee, & Larimer, 2011).

A study on Internet gaming addiction established that coping with various undesirable negative emotions, stressful conditions, fear and escape among the respondents formed the main motives for Internet gaming (Kuss & Griffiths, 2012). Another study by Cooper and colleagues (1992) who conducted one of the first studies employing random sampling of households in New York, established three main factors that motivates gambling to drink alcohol: for avoidance, for socialization, and for amusement. Lee and colleagues (2007) Using these motivations as part of their study, they found similar results about college students gambling. In Another study four motives were identified for alcohol usage among college students these include: for enhancement, for socialization, for coping purposes, and also for conformity. Personal enhancement and or enjoyment was established to be the most substantial motive that was associated with the alcohol use among the college students (Patrick et al., 2011). Comparatively, a another study on marijuana use among the college students established that coping motives (i.e. helping with depression feelings) and for the enhancement motives (that is the condition of enjoying the feeling /for fun) were attributed to marijuana use (Simons, Gaher, Correia, Hansen, & Christopher, 2005). These factors i.e. for Coping, for socialization, and for amusement/enhancement purposes are important areas on the research on motives both for gambling and various other risk behaviors among the youthful population (Cooper et al., 1992; Frankenberger, 2004; Lee et al., 2007; Neighbors et al., 2002; Patrick et al., 2011; Shead et al., 2012).

The field of gambling have seen enormous growth especially over the last two decades, nevertheless, there is scarcity of research studies on the reasons associated with problem gambling (Johansson, Grant, Kim, Odlaug & Gotestam, 2009). Despite the fact that there is a growing body of literature on risk factors for gambling, there is no consensus on these risk factors and to what extent does each influence gambling and gambling disorder (Shead,
Derevensky & Gupta, 2010). It is of great importance to study the various risk factors influencing gambling among youth since it has been established that severe gambling disorders in late adolescent stem from gambling problems in childhood (Griffiths, 1990). For better understanding and clarifying of gambling phenomenon in general population it is important to get understanding and better conceptualization of the various factors that contributes to attainment and development of gambling problems among youthful population (Shead et al. 2010).

RESEARCH DESIGN AND METHODOLOGY
Descriptive research design was used. Questionnaires and the DSM-V Pathological Gambling Diagnostic Form was used to collect the data. A sample of 100 university students and 2 university students’ counselors were randomly selected and given the questionnaires to fill. The questionnaires sought information on the risk factors for gambling among university students.

DISCUSSION OF THE FINDINGS
The data was cleaned, analyzed and presented on tables, graphs showing the frequencies and the percentages.

Prevalence of Gambling
Table 1 indicates that there is a high prevalence of gambling among university students. Majority of the students 50 (50%) indicated that they bet at least once a week, while 28 (28%) indicated that they bet at least once a fortnight and 12 (12%) at least once a month and 7 (7%) at least once in the past three months. This agrees with the findings of Corina Ly (2010) who established in his study that almost 60% of university students are regular gamblers.

Table 1. Frequency and prevalence of gambling among university students in relation to number of times they place bets

<table>
<thead>
<tr>
<th>Number of times of placing bets</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>At least once a week</td>
<td>50%</td>
</tr>
<tr>
<td>At least once a fortnight</td>
<td>28%</td>
</tr>
<tr>
<td>At least once a month</td>
<td>12%</td>
</tr>
<tr>
<td>At least once in the past three months</td>
<td>7%</td>
</tr>
</tbody>
</table>

Prevalence of Gambling among university students in relation to age

<table>
<thead>
<tr>
<th>Age bracket</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-29</td>
<td>70%</td>
</tr>
<tr>
<td>30-35</td>
<td>30%</td>
</tr>
</tbody>
</table>

Prevalence of Gambling among university students in relation to gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>61%</td>
</tr>
<tr>
<td>Female</td>
<td>39%</td>
</tr>
</tbody>
</table>

Motivating/ Risk Factors for Gambling
Money was reported to be the most frequent motivation with 42.7% of respondents, getting fun/enjoyment at (23%), (11.2%) for socialization, (7.3) for excitement seeking, occupying time at (3.9%), and for boredom relive at 2.8%

Table 4.

<table>
<thead>
<tr>
<th>Risk/ Motivating Factor</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money</td>
<td>42.7%</td>
</tr>
<tr>
<td>Getting Fun/Enjoyment</td>
<td>23%</td>
</tr>
<tr>
<td>Socialization</td>
<td>11.2%</td>
</tr>
<tr>
<td>Excitement Seeking</td>
<td>7.3%</td>
</tr>
<tr>
<td>Occupying Time</td>
<td>3.9%</td>
</tr>
<tr>
<td>Boredom Relive</td>
<td>2.8%</td>
</tr>
</tbody>
</table>

CONCLUSION
Most youth at the university are motivated to gamble to win money. At least over 50% of youths at the university participates in gambling.
RECOMMENDATION
Incorporation of lessons in the universities on gambling and its adverse effects in the universities. Development of various policies by the higher learning institutions and the government to control gambling among the university students. Sensitization of all stakeholders on adverse effects of gambling among youth in the universities.

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LEVELS OF MARITAL SATISFACTION IN MERU COUNTY, KENYA

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ABSTRACT

Marital satisfaction, which is a multidimensional concept affected by several factors, is one of the concepts used for assessing stability in a marriage. There is a decline in marital stability as manifested by increase in divorces in Meru County. Marital satisfaction is a major contributor to life satisfaction yet the status of marital satisfaction in Meru County had not been clearly established. The objective of this study is to establish differences in levels of marital satisfaction in among married people in Meru County. The study adopted a descriptive survey research methodology. The target population of the study was 474,263 married people in Meru County from whom a sample of 384 respondents was drawn using Multi-stage sampling. Data was collected from married people using questionnaires and Focus Group Discussions. Interview schedules were used to collect data from sexuality educators and marriage counsellors. The instruments’ validity was checked by faculty members and other experts in the field of study. The reliability of the instruments was done using split-half method. Data obtained was analysed with the help of Statistical Package for Social Science for both descriptive and inferential statistics. Qualitative data was sorted into themes for discussions and conclusions were drawn. Findings revealed that highest level of schooling was significant in explaining differences in the influence of sources and age of delivery of knowledge on human sexuality and marital satisfaction. The study is likely to benefit Counseling Psychologist, sexologists, family therapists, sex therapists, parents, married couples, religious leaders and educationists. The findings of this study are expected to open gaps for further research.

Keywords: Marital Satisfaction, Intimacy, Passion, Commitment

INTRODUCTION

A satisfactory marital relationship is healthy and desirable, but studies indicate that marital satisfaction cannot be easily achieved (Holman, 2002). Marital satisfaction is the perceived quality of interaction between couples that affects how couples feel about themselves, their spouses and their marriages in a subjective, situational and relatively constant manner. Marital satisfaction and success is the goal of every person who enters in marriage (Nympha & Guda 2015). The harmony, which leads to satisfaction in marriage partly, depends on the way in which the complementarities, needs and mutual support between the sexes are lived out (LaHaye, 2005). Levels of happiness with the relationship between couples, their feelings about their own marriages, their perspective and perceptions about marriage in general determine the level of marital satisfaction. A study by Cobb and Sullivan (2016) established that couples with high levels of marital satisfaction have lower stress levels, higher levels of life happiness and higher level of marital endurance to cope with adverse living conditions. Karney and Crown (2007) concurred that the most apparent negative behaviours that reduce marital satisfaction are blaming each other, constant criticism of one another and putting unnecessary pressure on each other.

Love plays a significant role in maintaining a close interpersonal relationship between the spouses that are necessary for a satisfactory marital relationship. (Nympha & Guda, 2015) Sternberg (1986) presented a Triangular Theory of love whose elements are intimacy, passion and commitment. The presence of intimacy, passion and commitment leads to consummate love in marriage (Sternberg, 1986). Consummate love is necessary to achieve marital satisfaction. If there is incongruity among the three components of consummate love in a marriage there is likely to be less satisfaction or no satisfaction (Tung, 2007). Where the three pillars of love combine into the perfect blend of intimacy passion and commitment; consummate love arises, (Kail & Cavanaugh, 2010).

There has been a decline in marital satisfaction in Meru County as manifested by increase in marital violence, an upsurge in cases relating to custody and maintenance of children and increase in divorce cases (Meru County Law, 2016). Data from Kenya Bureau of Statistics indicate that there were a total of 567,990 divorced and separated people in Kenya as per the 2009 population census. Among these, Meru reported a total of 31,606. This was the third highest number of divorces and separation after Nairobi and Kiambu County which are cosmopolitan counties. Within the county analysis, Meru County was leading in divorces with 2.4% divorced people accounting for the highest percentage of divorces in Kenya. These statistics point a challenge in marriages in Meru County. These studies have not established the levels of satisfaction in marriages in Meru County yet the level of satisfaction in

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marriages determine the level of stability in marriage. The study therefore sought to establish the status of satisfaction in marriages in Meru County.

**Objective of the Study**
To establish differences in marital satisfaction among married people in Meru County

**Location of the Study**
The study was conducted in Meru County, Meru County of Kenya. Meru County was preferred as the location for this research because the county had experienced an upsurge in domestic violence and increase in cases relating to maintenance of children (Meru Law Courts, 2016). The county was also leading in rates of divorces and separation as per the 2009 population census (Kenya National Bureau of Statistics, 2017).

**RESEARCH DESIGN**
This study adopted a descriptive research design.

**Population of the Study**
The target population was 474,263 married people in Meru County as at the 2009 population census (Kenya National Bureau of Statistics, 2017). These married people are distributed into various age groups because the Meru people operate an age-group system. The age groups are determined by the time when a man was circumcised. Women adopt their husbands’ age groups (Nyaga, 1997). At the time of this study, there were six age groups. These age groups were Michubu, Ratanya, Lubetaa, Miriti, Guantai and Gichunge.

**Sampling Procedures and Sample Size**
According to Krejcie and Morgan (1970) a sample of 384 subjects was adequate to represent a population of 474,263. The 384 respondents were sampled using stratified random sampling.

**Research Instruments**
A set of questionnaires, interview schedules and focus group discussions (FDGs) were used to collect information for the study.

**Data Collection Procedures**
Data was then collected from the respondents with the help of research assistants. Responses from interview schedules and focus group discussions were written down and also recorded using audio recorders.

**Data Analysis**
Questionnaires were checked for completeness, data was cleaned, to check for any anomalies. Data was then coded by classifying the responses then keyed into Statistical Package for Social Science (SPSS) version 22. Quantitative data was then analysed using means, One-Sample Kolmogorov-Smirnov Test and Kruskall Wallis Test.

**PRELIMINARY RESULTS**
There were 371 respondents, out of whom 294 responded to the questionnaires, 43 participated in the FDGs and 34 were interviewed.

**Sex of the Respondents**
Out of the 43 respondents who participated in the FDGs, 46.5% were male while 53.4% were female. 50% of male and female respondents were interviewed. There were 48.6% were male respondents and 51.4% female respondents to the questionnaires.

**Age Group of the Respondents**
Among the male respondents 21.7%, 21.7%, 21.0%, 18.9% and 16.8% were from the Gichunge, Mburung’a, Mung’atia and Lubetaa and Ratanya age groups. Among the female respondents, 21.9%, 21.9%, 20.5%, 19.9% and 15.9% were from the Gichunge, Mburung’a, Mung’atia, Lubetaa and Ratanya age groups respectively.

**Level of Formal Education of the Respondents**
Among the male respondents (32.9%), 27.3%, 18.9%, 11.2%, and 8.4% and 1.4% of the male respondents had secondary, primary, diploma, bachelor’s degree and postgraduate qualifications as their level of formal education.
Among the female respondents, 34.4%, 31.1%, 15.2%, 11.3% and 2.0% indicated that they had secondary, primary, bachelor’s degree and postgraduate qualifications respectively. The remaining 1.4% of male respondents and 6.0% of female respondents did not have any formal education.

**Religious Affiliation of the Respondents**
Most of the male respondents (53.1%) were Catholics while the most of the female respondents (57.6%) were also Catholics. The remaining 39.9%, 3.5%, 2.1% and 1.4% male respondents indicated that they were protestants, did not belong to any religious affiliation, Muslims and belonged to other religious affiliations respectively.

**Rite of Initiation of the Respondents**
Majority of the male respondents (75.5%) and most of the female respondents (45.0%) had undergone the traditional rite of initiation. The remaining 25.5% male respondents had undergone the modern rite of initiation while the remaining 43.1% female respondents had not undergone any rite of initiation while 11.1% of the female respondents had undergone the modern rite of initiation.

**Duration in Marriage of the Respondents**
Most of the male respondents (32.2%) and most of the female respondents (27.8%) had been married for more than 20 years. The remaining 29.4%, 18.2%, 13.3% and 7.0% male respondents had been in marriage for 1-5 years, 6-10 years, 16-20 years and 11-15 years respectively. Among the remaining female respondents, 23.8%, 17.2%, 17.2% and 13.9% had been married for 6-10 years, 1-5 years, 11-15 years and 16-20 years.

**Differences in Marital Satisfaction among Married People in Meru County**
One-Sample Kolmogorov-Smirnov Test was done to determine differences in intimacy, passion and commitment and marital satisfaction among married people in Meru County. Findings provided evidence to conclude that there were statistically significant differences in intimacy ($p<0.001$), passion ($p<0.001$), commitment ($p<0.001$) and marital satisfaction ($p<0.001$) among married people in Meru County. A Median test was used to determine the levels of satisfaction in marriage in Meru County. Respondents reported that their marriages were intimate ($\text{Mdn}=1.150$), passionate ($\text{Mdn}=1.125$) and there was commitment ($\text{Mdn}=1.257$) (Table 8). This led to the study to conclude that married people in Meru County were satisfied in their marriages.

**Differences in Marital Satisfaction Based on Sex**
Medians were used to establish the levels of marital satisfaction in Meru County based on sex. Males and females reported same levels of intimacy ($\text{Mdn}=1.176$). Males reported more commitment in their marriages than females (Male $\text{Mdn}=1.301$, Female $\text{Mdn}=1.279$), Mann Whitney U test was done to establish if there were differences in levels of marital satisfaction based on sex. Results did not provide sufficient evidence to conclude that there were statistically significant differences in intimacy ($\chi^2=0.081$, $p=0.776$), commitment ($\chi^2=0.500$, $p=0.480$), passion ($\chi^2=0.034$, $p=0.85$) and marital satisfaction ($\chi^2=0.009$, $p=0.923$) in marriages in Meru County.

**Differences in Marital Satisfaction among Married People based on Age Groups in Meru County**
A median test was used to determine the status of intimacy, passion and commitment in marriages based on age group. Results indicated that respondents who had not attained any formal schooling reported highest levels of intimacy in their marriages ($\text{Mdn}=0.845$) in the marital satisfaction scale. Respondent who had secondary school, Diploma and Postgraduate qualifications as their reported the lowest levels of intimacy in their marriages ($\text{Mdn}=1.176$) in the marital satisfaction scale. Respondents who had no formal schooling also reported the highest levels of commitment in their marriages ($\text{Mdn}=0.903$). Those who had secondary school and post graduate qualifications as their Level of Formal Education reported lowest levels of commitment in their marriages ($\text{Mdn}=1.204$). Respondents who had no formal education had highest level of passion in their marriages while those who had primary level of education reported lowest level of passion in their marriages. Kruskal Wallis test was done to determine whether there were significant differences in intimacy, passion, commitment and marital satisfaction based on ones Level of Formal Education. Results provided evidence to conclude that there were significant difference in intimacy ($\chi^2=14.007$, $p=0.0176$) and passion ($\chi^2=18.578$, $p=0.002$ and marital satisfaction ($\chi^2=11.836$, $p=0.037$) based on ones level of schooling.
Comparison of Marital Satisfaction among Married People with Different Levels of Formal Education in Meru County
A median test was done to establish state of intimacy, commitment and passion. Results indicated that respondents who had not attained any formal schooling reported highest levels of intimacy in their marriages ($Mdn=0.845$) in the marital satisfaction scale. Respondent who had secondary school, Diploma and Postgraduate qualifications as their reported the lowest levels of intimacy in their marriages ($Mdn=1.176$) in the marital satisfaction scale. Respondents who had no formal schooling also reported the highest levels of commitment in their marriages ($Mdn=0.903$). Those who had secondary school and post graduate qualifications as their Level of Formal Education reported lowest levels of commitment in their marriages ($Mdn=1.204$). Respondents who had no formal education had highest level of passion in their marriages while those who had primary level of education reported lowest level of passion in their marriages. Kruskal Wallis test was done to determine whether there were significant differences in intimacy, passion, commitment and marital satisfaction based on ones Level of Formal Education. Results provided evidence to conclude that there were significant difference in intimacy ($\chi^2 = 14.007, p = 0.0176$) and passion ($\chi^2 = 18.578, p = 0.002$) and marital satisfaction ($\chi^2 = 11.836, p = 0.037$) based on one level of schooling.

Differences in Intimacy, Commitment, Passion and Marital Satisfaction among Married People in Meru County of based on Religious Affiliations
A median test was used to determine the state of intimacy, passion and commitment in marriages in Meru County based on religious affiliations. Protestants reported highest levels of intimacy in their marriages ($Mdn=1.146$) while Muslims reported the lowest levels of intimacy in their marriages ($Mdn=1.342$). Protestants and Catholics reported equal and highest levels of commitment in their marriages ($Mdn=1.491$ and $Mdn=1.416$) while those with no religious affiliations reported the lowest levels of commitment in their marriages ($Mdn=1.311$). Protestants also reported highest levels of passion in their marriages while Muslims ($Mdn=1.2041$) reported lowest levels of passion in marriages ($Mdn=1.146$). Kruskal Wallis test was conducted to establish if there were differences in intimacy, commitment, passion and marital satisfaction among married people in Meru County based on religious affiliations. Results from Kruskal Wallis test provided evidence to conclude that there were statistically significant differences in intimacy ($\chi^2 = 15.959, p = 0.003$), Commitment ($\chi^2 = 21.226, p<0.001$), passion ($\chi^2 = 18.772, p = 0.001$) and marital satisfaction ($\chi^2=25.119, p<0.001$).

Differences in Marital Satisfaction among Married People in Meru County based on Rite of Initiation
A median test was used to determine the state of intimacy, passion and commitment in marriages in Meru County based on rite of initiation. Respondents who had undergone traditional rite of initiation reported highest levels of intimacy in their marriages ($Mdn=1.146$). They were followed by those who had undergone the Modern rite of passage who reported equal level of intimacy in their marriages with those who had not gone through any rite of initiation ($Mdn=1.204$). Respondents who had undergone traditional rite of initiation also reported the highest levels of commitment in their marriages ($Mdn=1.114$). They were followed by those who had undergone modern rite of passage ($Mdn=1.176$) and lastly those who had not gone any rite of passage ($Mdn=1.204$). Respondents who had undergone the traditional rite of passage also reported the highest levels of passion in their marriage ($Mdn=1.204$). They were compared to those who had not undergone any rite initiation ($Mdn=1.342$) and lastly those who had undergone the modern rite of passage ($Mdn=1.36$). Kruskal Wallis test was used to establish if there were statistically significant differences in intimacy, passion, commitment and marital satisfaction among married in Meru County based on the rite of initiation. Results provided evidence of statistically significant difference in intimacy ($\chi^2=23.608, p=0.001$), passion, ($\chi^2=12.310, p=0.002$) commitment ($\chi^2=16.867, p=0.001$) and marital satisfaction ($\chi^2=26.150, p=0.001$) when responses from people of different rites of initiation were compared.

Differences in Marital Satisfaction among Married People in Meru County based on Duration in Marriage
A medians test was done to find out the status of satisfaction in marriages based on the duration in marriages. (Results showed that Respondents who had been married for 1-5 years and over 20 years reported highest levels of intimacy in their marriages while those who had been married for 11-15 years ($Mdn=1.279$) reported lowest levels of intimacy in their marriages. Respondent who had been married for over 20 years reported the highest levels of commitment in their marriages ($Mdn=1.0414$) while those who had been married for 11-15 years reported the lowest levels of commitment in their marriages ($Mdn=1.204$).Respondents who had been married for 1-5 years reported the highest levels of passion in their marriages ($Mdn=1.176$) while those who had been married for 16-20 years ($Mdn=1.378$) reported lowest levels of passion in their marriages. Kruskal Wallis Test was used to establish if there was any significant differences in intimacy, passion, commitment and marital satisfaction among married in Meru County based on the period in marriage. Findings provided evidence of statistically significant differences in
intimacy ($x^2=15.095, p=0.008$), commitment ($x^2=18.782, p=0.001$), passion ($x^2=35.531, p<0.001$) and marital satisfaction ($x^2=20.947, p<0.001$) when married people of different lengths of stay in marriage were compared.

**Discussion on Differences in Level of Marital Satisfaction among Married People in Meru County**

This study established that marriages within Meru County were generally satisfactory and young people were in marriages. These findings contradicted findings Tumuti et-al, (2012) who argued that young people were afraid of getting into marriage and that the institution of marriage is dying. The findings nonetheless agreed with Cherlin, (2004) and Coontz, (2005) who asserted that institution of marriage is not dying but is being transformed by contemporary conditions in the world.

Respondents of the Ratanya age group which was the oldest age group reported higher levels of intimacy and commitment in their marriages that those of the other age groups. Ratanya and Lubetaa (which were the two oldest age groups) had the lowest score for passion while respondents of the Gichunge age group (the youngest age group) reported highest levels of passion than respondents of the other age groups. These findings agree with conclusions by Sumter et al. (2013) that older adults above the age of 50 years reported lower levels of passion and intimacy than those aged between 18-20 years but similar levels of commitment compared to young (18–30 years) and middle adults (30–50 years).

Gichunge age group are the immediate followers of the Mburung’a age group yet there were statistically significant differences in their levels of passion and marital satisfaction. Ratanya and Lubetaa age group are also immediately following each other yet there are statistically significant differences in intimacy. These findings tally with the findings from the FDGs and interviews that the respondents of the Lubetaa and Guantai Age Group have challenges in their marriages. The Ratanya Age Group was the group that was circumcised immediately after the “Ngaitana” revolt. The Guantai age group are generally the children of the Lubetaa age group. This is the group that was circumcised immediately after the community started accepting the “modern” rite of initiation and a large part of the Meru Community stopped the female circumcision. These findings agree with Murah (2006) that traditional structures as well as rituals of initiation into adulthood functioned as sources of sexuality Education that focused on fulfilling marital relationship, and were widespread in the initiation rates rapidly lost ground in many sections of the community. The school system does not allow girls and boys to undergo initiation period. Where the rites have withered away, young girls and boys do not receive any systematic education (Umotho, 2015). Just like the rest of Africa Communities, in Meru, it was and still is a taboo for most parents to discuss many issues related to sexuality with their children. With urbanization and capitalism, the uncles, aunts and grandparents are not available anymore to teach sexuality education (Kithinji, 2013). The Formal School System does not emphasize on teaching Sexuality education (Marah, 2006). This means that the differences in marital satisfaction might be due to change in sexuality knowledge brought about by changes in initiation,

These findings showed that school has an effect on intimacy, passion and commitment in marriages because there is a consistency in that those who had not attained any formal schooling seemed to enjoy more intimacy, passion and commitment in their marriages. This agrees with the findings from the FDGs and Interviews that marital relationships of those who had no formal schooling were guided the culture and the traditions of the Ameru. For example unlike those who have formal schooling who have conflicts with their spouses over side relationships and polygamy, most of the respondents who had no formal schooling did not have problems with their spouses relationships. People with no formal education also did not have many influences from outside the Meru community. They have very little or no exposer to technology hence no influence from the conventional and social media hence their expectations from their spouses is as stipulated by Meru Traditional education.

Media is explicit in referring to sex and eroticism (Melgosa, 2001). A lot of information, which seldom takes into account the quality and authenticity of sexuality education content which is now easily available in literature, press, radio, television and Internet as a means of keeping customers’ attention (Melgolsa, 2001). This often leads to unrealistic expectation in marriages that lead to lower levels of passion. This is asserted by Crosby (1996) that the idealistic expectation of bliss created by the emphasis of passionate love could lead to a considerable amount of misery, disappointment and disillusionment in a marital relationship leading to dissatisfaction in marriages.

The findings showed that religion was significant in explaining differences in marital satisfaction in Meru County. Protestants were the most intimate, committed and passionate in their marriages. This may be due to the fact that Protestants are more open to issues of sexuality than Catholics and Muslims. The findings showed that those without
religious affiliation reported lowest levels of commitment and intimacy and marital satisfaction in marriages. This may be due to the fact that lack of faith in God causes an individual to lose his peace and integrity and this will lead to weakness and is the origin of many controversies in life that lead to dissatisfaction (Fatemeh et al., 2013). It can therefore be concluded that religion influences satisfaction in marriages as differences were seen in intimacy, passion, commitment and marital satisfaction based on religious affiliations.

It is evident that married people who had undergone the traditional rite of passage reported more intimacy, commitment and passion in marriages than the rest of the groups. This can be concluded that this was due to the practicability in the nature of sexuality education taught to the initiates during their time in seclusion. Findings from the FDGs and oral interviews indicated that the knowledge that was taught to the initiates who underwent traditional rite of passage was focused on sustaining a strong and health marital bonds. The sexuality knowledge taught, set boundaries for both spouses which were not to be crossed (Nyaga, 2007). This therefore ensured harmony that led to satisfaction in marriages.

Respondents who had been married for the shortest period (1-5 years) and those who had been married for the longest period (over 20 years) reported highest levels of intimacy. Those who had been married for the longest period were ranked highest in commitment in marriages while those who had been married for the shortest period were ranked highest in their passion in marriages. These findings agree with the studies that indicate that there are higher levels of intimacy at the early stages of marriages but tend to decline as the marriages progresses but improves again after the empty nest syndrome sets in (Sara, Oliver & John, 2018).

Commitment in marriage improved as the marriage progressed. Respondents from the FDGs reported that this is because as they lived together as married couples, they were able to understand and accept each others’ weaknesses. Passion is highest in marriages during the early years of marriage and reduces as the marriages progress. This was confirmed by responses from FDGs because the younger couples were reporting more passion in their marriages while the older couples were more concerned with commitment and stability in their marriages. The findings tally with Tung (2007); Lauer and Lauer, (2007) that passion component of love needs to be natured in marriage (Tung, 2007). If it is not properly natured, it fades within six to 36 months of a new relationship (Lauer & Lauer, 2007).

Conspicuous differences in intimacy, commitment, passion and marital satisfactions were noted when people who had been married for 11-15 years were compared to other groups. The study sought to confirm these findings from the FDGs and Interviews. Responses from the FDGs indicated that during this period parents are struggling with financial challenges because they have to raise school fees for most of the children hence, they have no time to attend to the needs of their spouses fully. They also reported that at this age each of the spouse was focused on self-development. This means that there was more social independence than interdependence in marriages which led to differences in all the sub constructs of marital satisfaction. Social interdependence helps improve commitment in a marital relationship because partners to perform ‘pro-relationship acts’ that is things that are good for the relationship. When one partner performs ‘Pro-relationship acts’ and the other partner perceives the ‘pro-relationship acts’ the relationship is enhanced. The partners’ willingness to depend on the relationship increases the feeling of commitment to the relationship (Lauer and Lauer, 2007).

CONCLUSION
The study established that marriages in Meru County were satisfactory. It was also established that married people of the oldest age group were most intimate and committed to their marriages while those of the youngest age groups were more passionate in their marriages Sub-constructs of religious affiliation, rite of initiation and length of stay in marriage were significant in explaining differences in intimacy, passion, commitment and marital satisfaction among married people in Meru County. Sub-constructs of age group and Level of Formal Education were also significant in explaining differences in intimacy, passion and marital satisfaction among married people in Meru County. However, the sub constructs of age group and Level of Formal Education could not explain differences in commitment among married people in Meru County. The sub-construct of sex was not significant in explaining differences in marital satisfaction in Meru County of Kenya.

REFERENCES


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LINGUISTIC STRATEGIES FOR PERSUASION IN THE DISCOURSE OF KENYAN COMMERCIAL BANKS TELEVISION ADVERTISEMENTS

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ABSTRACT
Advertising has become part of everyday experience which one cannot escape from. With the recent development in the field of communication technology and the opening of new media channels, such as the internet, it has gained even more access into our lives and minds. The present study tries to analyze a collection of banks advertisements in a Kenyan socio-cultural context with the aim of examining linguistic strategies for persuasion in Kenyan commercial banks adverts. The study mainly focuses on the use of language in banks advertisements and strategies employed by advertisers to manipulate and influence their customers. The analysis is based on Fairclough’s three-dimensional framework. The focus is on consumer advertising, which is directed towards the promotion of some banks products or services to the general public. In doing so, it draws on various linguistic strategies particularly grammatical, lexical and semantic. In this connection, adverts from the Kenyan televisions and their analyses are provided; with a view to clarify some linguistic categories that are presented in English, Kiswahili and vernacular. They also bring out the fact that advertising texts construct meaning through interaction with other types of discourse. The study, aims at exposing the basic elements of language of the most influential and inescapable discourse of the advertising.

Keywords: advertising texts, banks, critical discourse analysis, linguistic strategies, persuasion

INTRODUCTION
Language is the ability to acquire and use complex systems of communication, particularly the human ability to do so, and a language is any specific example of such a system. The scientific study of language is called linguistics. The use of language is deeply entrenched in human culture. Therefore, in addition to its strictly communicative uses, language also has many social and cultural uses, such as signifying group identity, social stratification, as well as social grooming and entertainment. Advertising is a ubiquitous form of language that affects our lives on a daily basis and its main aim is to persuade. While most of the population is aware of this fact, less is known about the specific means by which this effect is achieved. This study focuses on analyzing Kenya commercial banks advertisements and attempts to look into the means that advertising uses to achieve its persuasive effect.

From a literary point of view, advertising is a rich and multifaceted genre. Its language has grown to incorporate and combine various styles and types of texts from various areas of life. The resulting interference of styles and mixing of registers and discourses makes advertising possible to classify stylistically. Cook (2001) points out that advertisements inform, persuade, remind, influence and perhaps change opinions, emotions and attitudes. It has its special language that focuses on the addressees’ attention with the aim to influence them positively. Advertisements use fictions, word play, compressed story-telling, stylized acting, photography, cartoons, puns and rhythms in ways which are often memorable, enjoyable and amusing. The words and details of advertisements often come to people’s minds more readily than those of novels and poems and plays, and they are often recalled with more laughter and enthusiasm (cook, 2001). Being aware of these needs of an advert, advertisers use various linguistic strategies to make their messages sound more attractive, personal and interactive to their audience. Advert producers deliberately use language that easily manipulates the target audience they wish to reach. This explains why advertising language is referred to as loaded language; this is for the purposes of making it relevant in meeting the intended objective.

The aforementioned assertions provide a fertile ground for a critical discourse analysis. Cda is defined as a multi-disciplinary, problem-oriented approach in investigating the enactment of power abuse, dominance and inequality that is present in text and talk and thus in its stand, try to understand and resist social imbalance (Dijk, 2003). Through cda, it is possible to examine the strategies of manipulation and persuasive power that are often implicitly and carefully used in advertisements. Cda follows a critical approach to social matters in its endeavors to make open and clear power relationships which are frequently hidden. It targets to derive results which are of practical relevance to the social, cultural, political and even economic contexts (Fairclough & Wodak, 1997). These arguments reveal the relevance of cda in the investigation of language of advertisements.
In Kenya advertising is found almost everywhere due to the competitive nature of market in the country hence it becomes a part of everyday life. It can be seen not only in media such as television, radio, newspapers, magazines but also on billboards, in means of transportation or in public places (maina, 2012). However, given this ubiquity, most people do not realize that advertising is a form of discourse by the means of language that would consciously or unconsciously influence people’s behaviours and thoughts in their daily lives. The use of wordplay, puns, rhymes, pictures, colours, music and other elements in advertising somehow has its own role in order to catch people’s attention towards it. According to el-daly (2011) advertising is any form of public announcement intended to direct people’s attention to the availability, qualities and/or cost of specific commodities or services. Hence advertising is very critical in shaping values and customs in a particular society.

Mwaura (2010) said banks are either locally or foreign owned. Kenya has 44 banks; 31 are locally owned and 13 are foreign owned. The locally owned financial institutions comprise three banks with significant shareholding by the government of Kenya and state corporations, housing finance which is a mortgage finance and 27 commercial banks. There are 2 representative offices of foreign banks and five deposit-taking micro-finance institutions (dtms). Banks in Kenya are formed with the main objective of making profit through financial intermediation (Mwaura, 2010). Consequently, they do conduct promotions for their services which they render through adverts in popular Kenyan tv stations. Kenya has several television stations that broadcast in English and Kiswahili. Citizen tv, k24, NTV, KTN tv and KBC tv are the biggest tv stations in Kenya in terms of coverage and number of viewers. Kenya audience research foundation (KARF) provides a report on the most viewed tv stations in Kenya.

Objective of the Study
The study analyzed linguistic strategies in the discourse of Kenyan commercial banks television advertisements.

Research Design
This study utilized a qualitative research design. The focus on text is the most important feature of qualitative research design. The “text” that qualitative researchers analyze is most often transcripts of interviews or notes from participant observation sessions, but text can also refer to pictures or other images that the researcher examines (Gibbs, 2002). Qualitative data researchers seek to describe their textual data in ways that capture the setting or people who produced this text on their own terms rather than in terms of predefined measures and hypotheses. What this means is that qualitative data analysis tends to be inductive—the analyst identifies important categories in the data, as well as patterns and relationships, through a process of discovery (gibbs, 2002). It is crucial to note that such studies that span across several disciplines such as linguistics, sociology and literary theory employ different methods to achieve diverse goals. In advertisements, studies involving the analysis of language use have employed a variety of methods for data collection and analysis. No method is outrightly recommended for sampling procedures.

Data Analysis and Interpretation
The present study adopted fairclough’s (1989 & 1992) approach to cda. This approach holds that discourse is manifest at two levels, namely, the macro and micro levels. At the macro level of discourse are social concepts like social order, power, dominance and inequality. These social realities are abstract and they find expression at the micro level of discourse which deals with linguistic concepts like grammar, speech acts, style and rhetoric (van dijk, 2001). Thus the discourse analyst’s aim under this theory is revealing how linguistic micro discourse structures reproduce, challenge or perpetuate social macro discourse realities. The present study collected kenyan banks tv adverts, and their analysis helped to study how the macro concepts of dominance and control were evidenced in the day to day verbal interaction in adverts. Fairclough (1992) approaches the analysis of verbal interaction from three dimensions. The first, discourse-as-text, is concerned with choices interlocutors make about vocabulary, grammar and cohesive devices. Description, concerned with the analysis of text, is the linguistic description of the language text in terms of linguistic devices and concepts mainly by making use of systemic function grammar.

Data analysis
Crystal, (2004) mentions a few levels of analysis which are highly important for a detailed linguistic analysis of a text. Each level represents one area of linguistics such as lexicology or phonetics and phonology. These levels were utilized in the data analysis. The results are discussed below.

Analysis of Linguistic Strategies
The adverts under investigation are analysed according to linguistic strategies. It seeks to explain and discuss various strategies which are highly important for a detailed analysis of a text. Each strategy represents one area of
linguistics such as grammatical, lexical and semantic. On the basis of these areas different aspects of analysis can be distinguished: use of ellipsis, imperatives, rhetorical questions, use of pronouns and use of interjections. Use of directives which is concerned with the meaning of language in discourse, that is, when it is used in an appropriate context to achieve particular aims, is also mentioned. Semantics too, which is the study of formal meanings as they are encoded in the language of texts is highlighted.

**Grammatical Strategy**
The main aim of grammatical strategy is to analyse the internal structure of the units called sentences in a language, and the way these function in sequences (Crystal, 2004). It focuses on syntax; it means the length of sentences, clauses and tenses used in sentences. The high degree of informality of the sample advertisements is also signaled by the choice of grammatical structures typically associated with spoken language. Various grammatical aspects are here analyzed:

**Use of Ellipsis**
The majority of the verbal messages in the corpus do not consist of fixed and neatly arranged sentences but of a large number of “chunks”, i.e. loosely coordinated clusters of elliptical structures typical of spoken language. There are instances of elliptical structures are in table 4.1

<table>
<thead>
<tr>
<th>Table 4.1. Ellipsis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advert</td>
</tr>
<tr>
<td>Adv. 10</td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td>Adv. 17</td>
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<tr>
<td>Adv. 15</td>
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<tr>
<td></td>
</tr>
<tr>
<td>Adv. 4</td>
</tr>
<tr>
<td>Adv. 17</td>
</tr>
</tbody>
</table>

Advert 10 presents incomplete structures which could be completed with the following suggested clauses:
*When you open a cubby account… you get a free banker’s cheque every term,*
*After opening a cubby account you get…one free standing order every year*
*You also get a … free cubby bank to make saving fun*
*On opening a cubby account you get a free…. Education insurance policy,*
*A cubby account enables you to….teach your child to invest now for a better future.*

The italics suggest what the advertiser means rather than saying or writing it clearly. The producers are aware that people get attracted to free services hence the word “free” made to stand out through capitalization and bolding in advert 10. Secondly, services mentioned here are critical in a child’s life like a banker’s cheque that is required every term to ease payment of school fees. This is an indirect reference to persuasion in the advert. On the same note the last utterance “teach your child to invest now for a better future” bears a prediction that is conditional. It is also urgent due to the use of the adverb of time “now”. The readers and hearers of this advert are expected to act swiftly in response to this advert so that their children could have a better future. It also suggests that without making this step they run the risk of their children living a miserable future life. This advert is set in the context of the contrast in between choosing to go for a cubby account for one’s child which according to the advert it is equivalent to a better life for your child. On the other hand, failing to do so has undesirable consequences.

In the expression “you could start by making her a customer first” which is in advert 17, the message is put through in parts. Instead it could possibly have been written like this “you could start by (opening an account for her and) making her a customer first” this is an indirect indication of the importance of opening an account with the banking institution in question. Thereafter one is eligible to benefiting from the services rendered as opposed to one who has not opened an account for they are ineligible to such services. Such gradation of meaning, renders the process of decoding less demanding on the part of the reader. Ellipsis is defined as “a sentence where, for reasons of economy, emphasis on style, a part of the structure has been omitted, which is recoverable from a scrutiny of the context”
Ellipsis has been used in the spoken language of this advert for the reasons of economy of words and creating a sense of informality.

In other instances of ellipsis, the subject and the auxiliary verb are left out, for instance in advert 15 the utterance “traveling upcountry? Remember you can bank hapo tu kwa jirani”. This statement could have been written this way “(are you) traveling upcountry? (you need to) remember you can bank hapo tu kwa jirani”. The use of ellipsis here renders the communication more interactive since the viewer has to participate actively supplying the missing elements in order to interpret the message. The expected answer to this utterance is yes which is immediately followed by further instructions.

Due to the use of ellipsis one can conclude that sentences in banks tv adverts are short and scanty. They are of simple and declarative type. The tenses used are mainly in present tense. There are also future tenses where suggestions or recommendations are given on the benefits of going for the product. In addition most of the sentences in the discourse are active sentences though there are a few cases of passive voice used in these advertisements.

Another type of strategy to simulate conversational style and is closely related to ellipsis is the use of disjunctive syntax, that is, sentences without verbs or subjects. These sentences consist of one or two grammatical items only. For instance in advert 4 the statement “kenya’s biggest n best loyalty programme” captures the attention of the viewers as well as that of the listener since both are targeted by giving a piece of writing that is swift and straightforward. The statement could probably have included this subject and verb (“we introduce….). The intention of the advert producer is to communicate convincingly and this explains the use of superlatives “biggest n best”. Generally people get attracted to anything that is described by such superlatives hence enabling the advertisers to tap from already influenced minds. Similarly, advert 4 bears this statement “awesome rewards” which as afore mentioned attracts the attention of the listener through its precision. It could have included a subject and verb and probably read like this: (we bring…..). The use of the adjective “awesome” that describes the noun “rewards” is deliberately used to create an image of something that is superb and incredible. The use of the entire phrase is done in such a way that it succeeds in mesmerizing the reader and consequently deciding to go for the service.

There is use of the utterance “no fundraising, no wedding committees, no wedding complications” from advert 17 that is strategically put to provide a solution to problems of young people who are intending to get married. The statement could probably have included a subject and a verb to read this way: “there is no fundraising, there are no wedding committees, there are no wedding complications”. The context of this advert is that of a young couple that is portrayed as being in a steady relationship. Thus this combination of a ready solution to one’s problems and the young couple is perfect and meant to move other young people to going for the same service from the institution in question. This explains the use of precise statement since it is intentionally meant to attract young people.

**Rhetorical Questions**

In the advertisements there are also questions posed to the viewers to create a personal relationship by simulating informal conversation with the viewers to engage them rather than merely conveying information of the product. These are referred to as rhetorical questions. They do not require an answer, they only persuade the viewer to think the way advertisers are thinking. Therefore if there is any answer given it is obvious in agreement with the expectation of the advert producer. For instance advert 6 in this study contains these questions:

‘unataka nini? Kusomesha mtoto , kujenga nyumba ama ni kwenda holiday?’

(what do you want? To educate your child, build a house or to go for a holiday?).

These rhetorical questions provoke one’s thought system. The example in advert 6 presupposes the existence of a problem that is weighing the target person down. To some extent one would rightly conclude that advertisers create a problems and then give a solution very fast. This is the case in this advert and the kind of rhetorical question employed. Similarly advert 15 bears a rhetorical question that one would readily give the answer in the affirmative. The question is “traveling upcountry?” And what follows is further instructions on what to do after the obvious answer is given. Hence the statement “remember you can bank hapo tu kwa jirani”. The use of rhetorical question creates a sense of closeness that enables the advert producers gain trust from target population. In addition, the use of these questions enables the advertisers to establish a closer relationship with the viewers. Such informality can signify equality between advertisers and readers. It creates mutual understanding regarding the message in the text.
Use of Pronouns
The use of pronouns in advertisements is deliberate and helps create a friendly atmosphere to persuade the audience. Hence advertisements that seem to talk with friends bring the readers closer. In the banks advertisements in this study, it was found that the most common pronouns used are “you”, “your”, “we” and “i”.

The use of first and second person pronoun seems to indicate that the advertiser is making promises that are sincere and honest. The use of personal pronouns establishes a certain type of relationship between the advertisers and the readers (smith, 2004). For example, the pronoun “we” is regarded as authoritative and implies power while “you” reflects a personal engagement as the reader is addressed directly. In addition, the use of “our” reflects a certain “us” versus “them” feel to it. Here “us” represents those that are already members of the institution whereas “them” are those that are yet to join. The “them” are being challenged to join the institution so that they can be included in the “our”.

Examples of pronouns in the banks advertisements in this study are shown in Table 4.3

<table>
<thead>
<tr>
<th>Advert</th>
<th>Utterance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adv.2</td>
<td>You are like may be one day i get my own house i don’t have to continue paying rent.</td>
</tr>
<tr>
<td>Adv.15</td>
<td>We are you</td>
</tr>
<tr>
<td>Adv.8</td>
<td>Your listening, caring partner</td>
</tr>
<tr>
<td>Adv.20</td>
<td>I had a lot of interest in cars. So i thought i could turn this into a profitable business.</td>
</tr>
<tr>
<td>Adv.20</td>
<td>I don’t actually think i would be where i am without stanbic bank</td>
</tr>
</tbody>
</table>

Similarly, there is the use of direct address that seeks to address the viewers and readers directly using the second person pronoun and possessive pronoun ‘your’. As aforementioned, the use of personal pronouns in the advertisements is for both ideological and practical reasons. The second-person pronoun and possessive personal pronoun that is ‘you’ and ‘your’ are both largely used. For instance in advert 17 “submit and you await your payment confirmation” seek to address the audience directly and personally. The use of these pronouns in this advertisement help create a friendly atmosphere to persuade the audience. When people are addressed individually rather than as part of mass audience it is considered highly valued. More examples are in Table 4.4:

<table>
<thead>
<tr>
<th>Advert</th>
<th>Utterance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adv.3</td>
<td>Apply today at your co-operative bank branch.</td>
</tr>
<tr>
<td>Adv.13</td>
<td>Co-operative bank we are you.</td>
</tr>
<tr>
<td>Adv.6</td>
<td>Family bank with you for life.</td>
</tr>
<tr>
<td>Adv.11</td>
<td>Equity bank your listening, caring partner.</td>
</tr>
<tr>
<td>Adv.17</td>
<td>Submit and you await your payment confirmation.</td>
</tr>
<tr>
<td>Adv.17</td>
<td>You can pay your bills like dstv, water, zuku, electricity.</td>
</tr>
<tr>
<td>Adv.19</td>
<td>Consolidated bank growing with you.</td>
</tr>
<tr>
<td></td>
<td>Sometimes talking to the right people can help you make your dreams come true.</td>
</tr>
</tbody>
</table>

The use of personal pronouns make the adverts seem as though directly addressing the viewer, making it more personal and more likely for the reader to respond. In advert 3 “apply today at your co-operative bank branch” exemplifies this direct address to viewer that further expects them to respond. This shifts the responsibility of the issue to the reader that is, specifically, what you is going to do about it. It makes the reader think about their personal responsibility. The use of second person pronouns contributes significantly to the process of synthetic personalization within all types of mass media. Manifestations of synthetic personalization can be found in the banks adverts. For instance advert 19 bears this statement “sometimes talking to the right people can help you make your dreams come true.” The use of “you” and “your” in this statement does not refer to any specific individual, instead is addresses everyone. Deictic expressions such as personal and possessive pronouns are often used in this category since they enhance the interactive potential of the advertising message. These devices of synthetic personalization shorten the distance, getting the reader and viewer involved as well as establish a more personal relationship between the advertisers and the reader. Consequently, the reader may get the impression of being treated as an individual rather than an anonymous member of a mass, which can make him/her more susceptible to persuasion.

Use of Striking Phrases
Kenya commercial banks television advertisements use words, phrases and sentences both written and spoken to illustrate the action in the discourses. Words generally construct the slogans, messages and songs and blend in with
other modes of communication to construct the narrative processes that tell the story in advertisements. Striking phrases and sentences include slogans, advertisement claims and promises. They are an ideal site from which to observe the constructive function of linguistic labeling and categorization. For example in table 4.5:

<table>
<thead>
<tr>
<th>Table 4.5. Banks’ slogans</th>
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</thead>
<tbody>
<tr>
<td>Advert</td>
</tr>
<tr>
<td>Adv.3</td>
</tr>
<tr>
<td>Adv. 4</td>
</tr>
<tr>
<td>Adv.5 and 6</td>
</tr>
<tr>
<td>Adv. 16</td>
</tr>
<tr>
<td>Adv. 17 and 20</td>
</tr>
<tr>
<td>Adv.19</td>
</tr>
</tbody>
</table>

There is a lot of competition among commercial banks in Kenya and in the midst of such great competition, the producers want to demonstrate the uniqueness of their products. They want to differentiate it from the rest. They try to find new techniques of advertisement. They also try to make the advertisement texts more attractive and more unexpected. They must catch the attention of the audience and then identify the product. Advert producers create uncommon, surprising, interesting texts with catchy slogans or phrases. The reader or viewer must give it some thought and the result of it is manipulation. For instance, advert 3 there is the slogan ‘we are you’ indicating that the institution is part and parcel of the viewer. In advert 4 there is ‘making the difference’ that indirectly supposes that the institution in question can make all the difference in the viewer’s life. In addition, advert 5 has the slogan ‘with you for life’ which can be understood to indicate the institution accompanies the viewer for life purposes and can also mean forever. Then in advert 15 the slogan says ‘here for good’, which can be taken to mean that the institution is there to stay and for the good of the viewer. Advert 17 has the slogan ‘moving forward’ which can be interpreted to mean that the institution is set to propel the viewer forward. It is crucial to note that all these slogans or striking phrases are set in the context of a particular advert that is not only interesting but also with the intention of persuading the viewer to go for the product.

Use of Interjections
Interjections which are a characteristic of spoken language are used in the adverts under investigation. Interjection is a word or a phrase with no particular grammatical relation to a sentence, often an expression of emotion. In the adverts they play the role of arousing the emotions of the audience. For example:

<table>
<thead>
<tr>
<th>Table 4.6. Interjections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advert</td>
</tr>
<tr>
<td>Adv.2</td>
</tr>
<tr>
<td>Adv.3</td>
</tr>
<tr>
<td>Adv.4</td>
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<tr>
<td>Adv.17</td>
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</table>

In advert 2, the words ‘yeah! That’s nice’ are used to contextualize the authentic aspect of the advert and also to arouse the emotions of the viewer. Advert 3 exploits the use of ‘mmmm…’ by one of the advert participants who is portrayed as being less interested in what he is being told concerning a loan facility in the bank. However, he later gets interested and goes for it. The essence of the advert is that the viewer is expected to act just like this participant who first hesitates but later accepts. In addition, advert 17 largely exploits interjections like ‘wow!’ ‘that’s great!’ and aah! Ooh! That extensively appeal to the viewer’s emotions. These interjections are set in the background of a hilarious advert that takes a viewer through the institution’s inner operations. The advert is made to look glamorous and interesting in order to persuade and manipulate the viewer. The use of these interjections take the verbal message closer to the patterns of informal speech and therefore creates the impression of authenticity, immediateness and intimacy which enhance the persuasive potential of the message depicted in the advert. They act like a vehicle that carries the message of the advert closer home.
**Use of Simple Sentences**

Short and simple phrases and sentences in the present tense can be found in adverts. Here, the standard typographic rules are often broken since some sentences lack the punctuation marks at the end. Compound and complex sentences are avoided in order to ease communication of the message in the text. For example in advert 14: “it’s very simple, all you need to do is transfer your salary or take an investment or insurance solution.” “from today to 7th January to qualify. And your holiday could just be on us. Call us on 0203293900 or visit our website for more information.

Standard chartered…………here for good”

Advert 17:
“all you have to do is dial *208# and follow instructions.

So here, you can access our internet banking, you can do multiple bill payment, you can do instant account transfers and can also do tax payment. Let’s say for example, you are paying your rent; login into your account, enter the details of your landlord, enter the amount, submit and you await your payment confirmation. It’s that simple.”

The fact that the message is put through gradually through speech and writing, renders the transmission more effective since such gradual presentation of information is less demanding for the addressee’s perception. The use of simple sentences is evident in adverts for economical purposes.

The use of simple sentences is evident in the sampled adverts. Since simple sentences basically start with pronouns like “it is” and “that is” there is a great deal use of them for emphasis and also to economise on words in the adverts. These kind of sentences thrive in spoken language which the current study capitalizes on.

<table>
<thead>
<tr>
<th>Table 4.7. Simple sentences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advert</td>
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<tr>
<td>Advert 17</td>
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<tr>
<td>Advert 13</td>
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<tr>
<td>Advert 17</td>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Advert 14</td>
</tr>
</tbody>
</table>

In advert 17 the expressions ‘it’s that easy, it’s amazing, that’s so sweet and that’s quite impressive’ singles out the attribute of the product being advertised in order to successfully capture the viewer’s attention. The utterance is aptly put and delivered.

**Lexical Strategy**

This strategy deals with vocabulary on basis of morphology and lexicology. It checks the origin of the words, their structure, composition, abbreviations, phrasal words, using words in various types of collocations and idioms etc.

**Branding**

The emphasis on a lexical item is the most direct form of lexical cohesion (halliday, 1994). Moreover, jefkin (1994) states that, the repetition of the name of the organization and the brand name throughout the text is one of the main rules of copywriting in advertising. In this way, lexical cohesion transcends its cohesive role as textual linker and assumes a role in the ideational function of language, re-shaping and re-conceptualizing meaning and experience and leads to the national promotion of products. Now, let us consider the sample data from the view point of lexical cohesion. Example from advert 4, advert 16 and advert 20 shows the use of repetition.

advert 4:
Bank officer: hello how can i help you?
Customer 1: i would like to sign for kcb mobile banking and internet banking please.
Bank officer: certainly…… Sir……
Customer 1: i would also want a kcb credit card……
Bank officer: okay

Advert 16:
i started saving with msingi savings account with k rep.
k rep bank is not only my bank of choice, but also it’s been trustworthy partner
k rep bank getting closer to you

Advert 20:
Frank: we can import trucks, vans, i have also recently started doing spare parts and am quite happy with where i am now with stanbic bank, but we are still looking for other challenges, having stanbic bank as my partner, am quite looking forward to the next few years with stanbic bank.

From these examples the name of the institution is repeated. In the lexical patterning, this plays an even greater and more salient role in promoting the product nationally, perhaps because its promotional nature is harder for the reader to recognize hence calling for a repetition to stress it. In addition, the emphasis on the institution assists in singling out the various services and products that can be exclusively offered by the organization.

Use of Colloquial Expressions
Concerning vocabulary used in the sample adverts, basic vocabulary, informal and colloquial expressions prevail. However, in a great deal of the advertisements in this study (especially in adverts that have dialogue and a narrator) great stylistic differences can be found within one sentence, since both formal and informal expressions are merged.

Table 4.10. Colloquial expressions

<table>
<thead>
<tr>
<th>Advert</th>
<th>Utterances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adv.5</td>
<td>Family bank pesa pap agent watakusort ‘pap’</td>
</tr>
<tr>
<td>Adv.2</td>
<td>It always seemed beyond reach for me and my hubby</td>
</tr>
<tr>
<td>Adv.6</td>
<td>Itakuwaje! Tajirika na mamilioni na family bank ndio useme ishakuwa</td>
</tr>
<tr>
<td></td>
<td>(how will it be? Get rich with millions with family bank then you will say it has been)</td>
</tr>
<tr>
<td>Adv.6</td>
<td>Kwa kila thao tano unaweka kwa akaunti yako.</td>
</tr>
<tr>
<td></td>
<td>(in every five thousand you deposit in your account)</td>
</tr>
<tr>
<td>Adv.15</td>
<td>Get smart, get the bizwise sme business loan from co-op bank of kenya</td>
</tr>
</tbody>
</table>

Whereas the informal, basic vocabulary is used to create closeness between the advertisers and the reader, the formal, sophisticated expressions and specialized terminology are used in order to enhance the credibility and uniqueness of the advertised product. In the above illustration the following are colloquial words: ‘watakusort pap, pesa pap, (this indicates how efficient the bank in question is in offering assistance to its customers) hubby (husband), itakuwaje (what will happen?) And thao’ (one thousand kenya shillings). Colloquialism is a characteristic of informal language that highly promotes verbal interaction. ‘watakusort pap’ is a colloquial expression used by family bank to create a close link between the institution and its customers, then persuading them. This can be crudely interpreted to mean one can be assisted very fast. ‘itakuwaje’ is a rhetorical expression which can be interpreted to mean ‘what do you think will happen?’. On the other hand, the phrases ‘family bank’ and ‘co-op bank of kenya’ are formal expressions and are merged with the above colloquial words to deliver a very important message then giving rise to thematic unity.

Also the high occurrence of colloquialisms and slang expressions in the banks adverts that is used in 11 out of 20 adverts, is typical of informal speech and suggests that the level of informality of the banks adverts is high. For example, ‘una…tulia eeee,watakusort, hubby’. These expressions are widely used in everyday speech. They connote informality, friendliness and chattiness and they are used for the sake of creating closeness between the advertisers and the readers and establishing a friendly relationship on equal status. This solidarity strategy renders the communication more interactive getting the reader more emotionally involved in the process of persuasion.

In adv.10, for example, there are instances of figurative language in the meanings of the colloquialism in the headline ‘kcb cub account’ and the name of the product, i.e.the “cubby” account. In this advertisement the interpretation of the verbal message is suggested by the visual depicting the attractive dancing cub enjoying the played music, the image in the logo and the texts on the advert which acclaims “building your future starts here” tells it all. In this connection, it is important to state that the visual component plays a salient role in the process of encoding and decoding the written and verbal messages since in spite of the fact that banks adverts lack grammatical cohesion, the visual cohesion enables the reader to decode the meaning of the verbal messages. Therefore in this case, one is able to decode the meaning of the text as the opening of an account for children.

Proceedings of the 6th International Research Conference
The strategies of code mixing and switching are related to colloquialism and in this study they portrayed as exhuming instances of persuasion. Since advertisers are always looking for new and original slogans and catchy phrases, they have also adopted code mixing and switching techniques, especially in highly bilingual contexts like Kenya. The important condition is that consumers have at least a basic knowledge of second language to be able to notice a mixture and, thus, appreciate the code-mixed advertisement. The strategy of mixing codes in advertisements does not function only in bilingual communities. Foreign words penetrating languages can be traced in all the areas of life, including advertising. According to Ardila (2005), code mixing and switching is the alternation of two languages in a single utterance. He describes the difference between code switching and code mixing affirming that whereas code switching occurs when the speaker switches to the second language and continues using it, code mixing is mixing of words (Ardila, 2005).

Regarding the banks adverts, code mixing and switching are prevalent in nine out of twenty adverts. It is imperative to note that the kind of code mixing and switching that is found in adverts has some elements of colloquialism. As noted earlier, this kind of narration promotes informality that is geared into creating a rapport between advertisers and viewers. Examples of code mixing and switching on Table 4.10.

### Table 4.11. Code mixing and switching

<table>
<thead>
<tr>
<th>Advert</th>
<th>Utterances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adv.6</td>
<td>'unaweza shinda pesa pap tajirika leo na family bank’</td>
</tr>
<tr>
<td>Adv.15</td>
<td>Remember you can bank hapo tu kwa jirani.</td>
</tr>
<tr>
<td>Adv.6</td>
<td>‘kujenga nyumba ama ni kwenda holiday?’</td>
</tr>
<tr>
<td>Adv.5</td>
<td>‘ndioo, tembelea family bank pesa pap agent aliye karibu nave’ When we walked in. Asante.</td>
</tr>
<tr>
<td>Adv.17</td>
<td>Hellen: karibu sana. Chama biashara account</td>
</tr>
<tr>
<td>Adv.16</td>
<td>Tunaamini ni wakati wako</td>
</tr>
<tr>
<td>Adv.18</td>
<td>Nyendagia mboga na matunda na ndi mumemba.</td>
</tr>
<tr>
<td>Adv.11</td>
<td>Mpombaa mabisa na ndi member.</td>
</tr>
<tr>
<td>Adv.3</td>
<td>Kcb simba account</td>
</tr>
</tbody>
</table>

These illustrations show examples of code mixing and switching that exploit local dialect, English and Kiswahili which are both official languages in Kenya but advertisers make use of their mixture to create a casual atmosphere. Advert 6 presents this example of code mixing and colloquialism “unaweza shinda pesa pap tajirika leo na family bank” (you can win money very fast with family bank get rich today with family bank). Advert 15 has an example of code mixing “remember you can bank hapo tu kwa jirani”. (………just there at your neighbour’s). Advert 6 bears another example of code mixing “kujenga nyumba ama ni kwenda holiday?” (building a house or going on holiday). Advert 5 has a combination of code mixing and colloquialism “ndioo, tembelea family bank pesa pap agent aliye karibu nave” (yes, visit a family bank money very fast agent that is near you). Advert 18 has an example of code switching where the advert participant switches to pure Kiswahili “tunaamini ni wakati wako” (we believe it is your opportune time). This diverse use of languages promote closeness between the advertisers and their target audience which enhances quick persuasion. In addition, there is a special kind of code switching in advert 11, where the participants in the advert borrow from their local languages. This advertising strategy is highly persuasive because it appeals to potential customers in their local dialects. This argument is exemplified in advert 11 “nyendagia mboga na matunda na ndi mumemba.” (Kikuyu) the translation of this is (i sell vegetables and fruits in a grocery and am a member). Another example is in Kikamba dialect “mpombaa mabisa na ndi memba.” The translation is (i am a carver and am a member). Choice of words and language to use in an advertisement is crucial because it determines the amount of attention it gathers.

**CONCLUSIONS AND RECOMMENDATIONS**

These findings confirm the vocabulary and grammatical structures in this study that display different aspects of linguistic strategies. These strategies are manifested in different aspects of language use. It is clearly brought out that the language of advertising has a unique formality and different levels of sophistication. This stylistic imbalance enhances the persuasive potential of the advertising messages since the use of informal features enable the advertisers to shorten the distance, establish a close social contact with the reader and facilitate involvement. There is also the use of formal features in advertising discourse to create the impression of credibility and trustworthiness with regard to the advertising body. Since the language of advertising has impact on the language of ordinary
communication, it reduces thoughts to formulas, phrases, music, slogans, soundtracks etc. Accordingly, one must be aware of the subtexts that tv adverts generate because when the human mind is aware of the hidden codes in texts, it will be better able to fend off the undesirable effects that advertising texts may cause.

REFERENCES
CONSUMERS’ USAGE OF COMMERCIAL WEBSITES ADVERTISING IN KENYA

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ABSTRACT
Commercial websites are a form of internet advertising which is formed by companies as an advertising tool hosting many forms of online advertisement to promote products and services. Researchers and practitioners have equally agreed on the abilities of a commercial website as an advertising instrument that offers unlimited potential and benefits. This study sought to investigate consumers’ usage of commercial websites advertising in Kenya. The study employed descriptive research design. Stratified purposive sampling was used to sample Kenyan 384 commercial websites users with a from a target population of one million users in Nairobi. A pilot study was carried in Thika town to establish reliability and validity of the research instruments. The researcher used Cronbach Alpha coefficient to test the reliability of the instruments. A reliability coefficient of 0.985 was obtained from the questionnaires. Descriptive statistics was used to evaluate collected data using categories based on research objectives using Statistical Package for Social Sciences (SPSS) version 17.0. The research established that the strongest reason users have for visiting commercial websites is to share media such as pictures, videos, music and blogs. Six categories of reasons for using commercial websites were identified as socialization, information seeking, convenience, entertainment, relaxation and passing time. The study recommends that commercial websites should include social share and follow buttons to encourage social interactions from online buyers to ensure business sites take full advantage of the ever increasing social media traffic in Kenya and that commercial websites should work on mobile phone optimization because of increased Smartphone usage in Kenya.

Keywords: Website, Advertising, Use

INTRODUCTION
Background to the Study
Internet connectivity and its fast growing usage has formed commercial websites; a new platform for international business providing new opportunities for advertising and selling products and services online with the channel becoming, more accessible, more user-friendly, and less expensive (Schepers & Wetzels, 2007). The web is innovative; thus presenting a new paradigm shift in the way business is conducted online and is routinely incorporated into contemporary marketing practice (Lebo, 2003). Web was expected to have a vast potential in both communication and e-marketing. Modern society has become information-oriented and is changing from traditional mass coverage media towards interactivity, a collection of computer mediated technologies and profitmaking interfaces which are internet represented (Stafford & Stafford, 1998).

The need to advertise online to buyers and to sustain e-markets calls for an understanding why clients elect to use websites has great significance in the e-commerce business model (Eighmey & McCord, 1998). Therefore online business models need to embrace understanding of consumers’ usage of commercial websites (Bellman, & Johnson, 2000). Specific familiarity of consumers’ needs in accessing commercial websites will offer online commerce with the capacity to best and cost-effectively serve their clients in addition to progressing theoretical expansion (Stafford & Stafford, 2001). Berthon (1996) found that establishing existence of businesses and services on website is relatively cheaper with the advantage of targeting a more sophisticated and segmented audience. These characteristics turn websites into ‘virtual marketplaces’ where interactive tools facilitate firms with online existence to form and also reinforce relations with potential clients (Kotler & Keller, 2013). Web pages have turned into an innovative medium that use posters, banners and other types of online advertisements competing for clients’ responsiveness. Commercial websites supplement traditional communication media channels namely print, radio, television, indoor and outdoor advertising that advertisers have been using for the past century (Lebo, 2003).

Sellers are gradually adopting websites to promote goods and services; internet sellers function exclusively online, though others own online shops as an additional physical shops (Kotler & Keller, 2013). According to Nielsen’s Report (2009), over 95 % of online consumers in in USA and Europe have previously experienced web advertising. Business websites are significant piece of a company’s communication plan. Allen, Kania, and Yaeckel (2001) found that websites that don’t retail products or services to their clients directly are also instrumental tools in information dissemination, therefore increasing awareness of a business, a service or a brand.
Dholakia and Rego (1998) found that websites are established as business outfits and despite comprising many formats of online advertisements of products, they are also considered as advertisements about the company and more importantly, these webpages act as evolutionary and navigation paths to homepages for the company.

Benefits of having commercial websites consist of a superior corporate image, improved consumer services, market enlargements/growth, discounts, in addition getting different opportunities. It enables companies to accomplish virtual transactions and improved customer service. Organizations that lack business websites generates a perception that they are not strategically positioned to compete for clients with similar industries (Sterne, 1996). As customers are now showered with more options of online shopping locations, an understanding of their online behaviour will become vital to businesspersons, developers of online advertising sites and markets. Hence, this becoming a requirement and upward task of enticing buyers to support and consume online market offerings. (Lebo, 2003).

**Statement of the Problem**

Although Websites have been identified as key marketing tools and channels that offer great potential and benefits in advertising of products and services, studies on usage of commercial websites advertising in Kenya remains scanty because previous studies focused on traditional media and general internet usage. This research addresses this gap by analyzing usage of commercial websites in Kenya.

**LITERATURE REVIEW**

Scholars have observed the need to investigate the consumers’ understandings and perceptions toward profitmaking websites particularly the notion involving usage of these sites as an advertising medium (Dholakia & Rego, 1998). Eighmey (1997) having used a collection of consumers’ satisfaction statements as an evaluation to appraise commercial sites found users’ perceptions of commercial websites as guided by three elements namely; information positioned in an entertaining context; logical organizational of ideas relating to objectives of the site; and accomplished strategies.

Although much consideration is given to concerns of a commercial website as a shopping location, this study found that a commercial website is fundamentally an information providing medium used to convey precise, useful information to a specific consumer so that the visitor acquires new facts or understands a subject better specifically on support information, guidance, products and services, fix and repair, directions and instructions. The findings suggests that an improved understanding of the basic usage and specific characteristics of commercial websites in Kenya can lead to improved websites design prompting more informative commercial sites.

Grounded on the conclusions of conventional media, Eighmey and McCord (1998) examined consumers’ usage of business sites. They were concerned with the usage and gratifications perspective and examined the clients experience related to these sites. Their study indicated that information involvement, personal status and entertainment value are three key motivating reasons for visiting commercial websites. Although current literature suggested that clienteles would possibly have social usage of commercial websites, social opportunities of websites usage had not so far been described and evaluated. From the experimental data generated by this study, social media usage is attained when social networking sites makes it possible to share and link with family, friends, co-workers, associates and also strangers, building up a linkage of networks in order to keep in touch, share daily experiences, interests and preferences, opinions, photos and videos.

Online transactions can occur over a range of platforms away from the Internet, for example on private networks such as electronic funds transmissions and direct response television and telephone; but apart from these setups, without commercial websites usage no ecommerce can take place since a website is the medium over which much of business to customer selling takes place (Eighmey, 1997; Novak, Hoffman, & Yung, 2000; Eighmey & McCord, 1998). Therefore this study examines reasons why consumers decide to use a commercial website with focus on consumer motivations to use commercial websites, a subject that is related to the justification that commercial websites usage is a link in the virtual purchasing process. Dholakia and Rego’s (1998) study tried to categorize the types of marketing information contained on moneymaking sites. Their study findings specified that majority of profitable sites were small in size and that many of business organizations used internet in the late 1990s for traditional advertising objectives. They concluded that messages contained in these webpages was not attracting visitors to the sites.
Jones (2007) research examined businesses' webpages of 1996 and 1997 and compared them with those of 2006. The survey established that web design of business homepages was similar in 2006 unlike 1996 and 1997, and noted an improvement in normalization of the 2006 business sites homepages length, presence, location and speed of the search engine. This study also explored more on advertising content placements on a webpage, and found that viewability on home page and inside pages of commercial websites about products and services are affected by ad clutter as it reduces noticeability and advertisement’s impact because each advertisement competes for consumer’s attention. Thus, this research investigates usage obtained from business sites as the most essential platform of virtual advertising, usage of this innovative avenue in a marketing framework, the motives that push consumers to go online and how these clients relate with advertising messages and amongst themselves on business websites.

**Users’ Motives of Using Commercial Websites Advertising**

According to Katz, Blumler and Gurevitch (1974), the consumers use mass communication media, with the inclusions of websites, to fulfill their intentions or reasons for a certain media use leading to gratification or dissatisfaction. Korgaonkar and Wolin (1999) have argued that, a commercial website has the ability to content compared to traditional media. Korgaonkar and Wolin (1999) subdivided online consumers’ motives into seven elements namely; economic motivations, social escapism, information motivation, confidentiality in monetary transactions, interactive control inspirations, non-solicited and socialization privacy motivations. Since it is individual users who control the communication process on any medium by virtue of their authority to allow access, this study considered investigation of motives of websites usage as way of providing the understanding of the definite motives that lead consumers to online markets.

The Internet is debatably the most flexible channel of communication in history. Its advent has only reinforced the “conjectural strength” of the uses and gratifications theory “by agreeing it to motivate dynamic research into thriving communications channels” (Ruggeiro, 2000). Initial studies on Internet mainly concentrated on its overall use. Charney (1996) examined the websites use amongst institutions of higher education students. The outcome showed that website is used, for entertainment, getting information, diversion and communications. In his research on analysis of Internet communication acknowledged communication, information and interaction as the three motivational features for using the Internet. Eighemey and McChord (1998) examined the consumers of commercial sites and recognized individual relevance, information contribution and entertainment values as the main reasons for surfing through business sites.

Mondi, and Rafi (2008) practically applied Uses and Gratification Expectation to examine the effects of e-learning materials on student’s apparent e-learning experience. The study established that there are substantial affiliations between uses of the learners and their e-learning involvements. Luo (2002) analyzed the influences of information, irritation, and entertainment, on numerous online users’ activities such as attitude towards a website, website usage. The finding of this research indicated that persons with precise intentions for media use and choices are inspired by specific self–defined usage.

Miller (1996) clarifies that online activities are principally driven by pursuing motives through interaction with the combinations of entertainment and escape and are process-oriented fulfillments and investigation. There are different significant reasons for the use of communication media as there exists media consumers. The basic requirements, social individual backgrounds, situations, such as interests, experience, and education can affect individuals thinking on their requirements from the media and the ones that fully meets their necessities. Therefore this study postulates that users are aware and can name their motivations and satisfactions for use of diverse media.

Bonds and Raacke (2010) concluded that persons who specially make use social networks for instance Facebook, twitter and MySpace to satisfy the needs for information, relationship and connecting with others users. Chen (2011) similarly established that individuals mostly use Twitter to satisfy their necessity to connect with to others through Twitter features such as following other users on the same. Hanson and Haridakis (2010) research established the causes for high YouTube usage by students was mainly entertainment, information-seeking, interpersonal expression motives that are suggestive of instrumental motivations and friendship reasons that indicate a ritualized motive. The participants of this study indicated sharing media, such as pictures, videos, music, and blogs as the strongest motive for visiting commercial websites which is indicative of instrumental and ritualized motives.

Hanson and Haridakis (2010) elaborates, persons use social platforms, such as YouTube, so as to fulfill their instrumental desires of convenient information-seeking, political evaluation, self-expression, entertaining arousal,
and also for ritualistic need of gaining companionship. As identified by this study, the social utility and convenient information-seeking motives associated with You Tube drive users to take part in diverse online undertakings such as discussions, chats, sharing of pictures, and videos, search for more information on political parties, policies and political candidates.

In terms of health information, Antheunis (2013) established that in Netherlands, healthcare professionals in gynecology and obstetrics use shared media platforms such as LinkedIn, Twitter, Facebook, and blogs to fulfill influential requirements of growing healthcare related doctor-patient communication, knowledge, marketing, efficiency, or communication with colleagues. Also, they established that patients also make use of Facebook, Hyves and Twitter, to satisfy their desires of growing health-related reasons such as social support, knowledge, doctor-patient communications, advice and self-care. This implies doctor, patients and other stakeholders in matters of health have specific health-related information seeking motives leading to YouTube as a source of gathering health information.

Rubin (1984) categorized motivations for use of social media into two scopes namely; ritualized motives and instrumental motives. Instrumental motives are objective oriented and active media usage for instance, search for information from the media, while ritualized motives indicates a less inactive media usage and purposive, for example using internet as a platform used to passing time. This study identified socialization, information seeking, convenience and entertainment as instrumental motives while ritualized motives were relaxation and passing time. The table below elaborates the interrelationships between media needs, uses and gratifications.

<table>
<thead>
<tr>
<th>Ritualized (diversionary)</th>
<th>Instrumental (utilitarian) media wants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media requirements</td>
<td>Uses and gratification</td>
</tr>
<tr>
<td>Ritualized</td>
<td>Entertainment, escape and companionship.</td>
</tr>
<tr>
<td>Instrumental</td>
<td>Information updates</td>
</tr>
</tbody>
</table>

Table 2.1: Relationships between Media wants/Needs and Usage and Gratification

In Table 2.3, ritualized media requirements are interrelated with the usage and satisfactions of entertainment, escape and companionship. Instrumental communication media is required to match the usage and satisfactions in relation to messages. Content and process satisfaction ought to be practical on web. For instance, consumers of certain sites can be driven by their need to access a specific-website info content. Online clients are interested through process-gratification which consists of random surfing and online site navigation.

McQuail (1998) acknowledged reasons for mass media use among them; personal identity, integration, entertainment and social interaction. This study examined the fundamental inspirations and concerns consumers who described using online websites in learning about online shopping of products and services. Therefore understanding the potential motives for web use in this study was a way to gain knowledge on commercial websites advertising which will allow online advertisers to aim audiences and modify the website contents more successfully.

RESEARCH METHODOLOGY

Research Design
This research adopted a descriptive study design in identifying and analyzing the usage of business sites advertising in Kenya. This method helped the researcher in gathering of raw data, describing, organizing, and presenting the collected facts. The research design was thus appropriate as it allowed the researcher to analyze the uses of business websites advertising in Kenya.

Location
This study was conducted in Nairobi. The location was purposely selected because Nairobi is Kenya's principal multi-cultural town with four million people. According to Junior World mark Encyclopedia of World Cities (2000) Nairobi is a business and cultural center for East Africa. Nairobi was ideal location for this research because of its well-developed communication infrastructure; electricity supply and fibre optic cable internet connectivity. According to Kenya Communication Authority Report of 2017, the city also has the highest number of internet (4G) users with 85% of all Facebook users in Kenya residing in Nairobi. Kenya’s leading online stores such as Jumia,
OLX and Kiliman are physically located in Nairobi. The city is the commercial Centre of the country offering business opportunities in agricultural products, furniture, cars, banking, transport, electronic goods (radio, TV and other appliances), computers, mobile phones, clothing, hospitality and tourism among others. According to 2017, Kenya communication Authority, the high adoption of smartphones in Kenya has improved internet penetration with the highest internet traffic coming from mobile phones with 68% of all phones sold by Jumia in 2017 taking place in Nairobi, thus becoming the most suitable location for this study.

**Target Population**
According to Communication Authority of Kenya (2017) Telecommunications Report, Nairobi Central Business District has one million internet users. This population comprised male and female Kenyan citizens, current web users and residents of Nairobi.

**Sampling Procedure and Sample Size**
This study used stratified purposeful sampling. Patton (2001) defines stratified purposeful sampling as samples within samples and recommends that decided samples can be stratified or nested by picking specific units or cases that differ in accordance to a fundamental dimension. A sample of 384 respondents from a population of One Million websites users was arrived at by the researcher according to Krejcie and Morgan (1970), method on determination of study sample size.

**RESULTS AND DISCUSSION**

**Response Rate**
Three hundred and eighty four (384) questionnaires were administered to consumers of commercial websites advertising messages in Nairobi City and all returned, with the response frequency of 100%. The researcher used hand delivery method to distribute the questionnaires to the respondents which can be credited for high return percentage. This is in line to Kombo and Tromp (2006) who argues that hand delivered questionnaires achieve a higher response rate than mailed questionnaires.

**Demographics Characteristics of the Respondents**
The responses were obtained from 384 respondents. The sample was spread out based on gender, age and the level of education. These demographic characteristics of the sample were significant for the understanding of commercial websites advertising, access and usage.

**Gender of Respondents**
The sample consisted of 224 male respondents or 58 percent of the total sample and 160 female respondents or 42 percent as illustrated in figure 4 below.

![Pie Chart](image)

**Figure 2: Percentage Distribution of Gender of the participants**

The information on figure 4 shows the distribution of the subjects by gender in the usage of commercial websites advertising messages. Out of 384 respondents 224 (58%) were males and the remaining 160 (42%) were females. This information indicates that there is a significant gender inequality in commercial websites usage in Kenya with more men using commercial websites than women. This gender inequality is not reflected in commercial websites usage only but also in other demographics such as education, politics, business, property ownership and workforce because Kenya is a patriarchal society (Chege & Sifuna, 2006).
Age of Respondents
An item was included in the tool that sought the age in years of the subjects, information obtained is presented in the table as shown below.

Table 4.3 Respondents’ in Age Years

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 18</td>
<td>41</td>
<td>10</td>
</tr>
<tr>
<td>18-30</td>
<td>134</td>
<td>35</td>
</tr>
<tr>
<td>35-40</td>
<td>172</td>
<td>45</td>
</tr>
<tr>
<td>41-50</td>
<td>23</td>
<td>6</td>
</tr>
<tr>
<td>51 and above</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Self, 2018

The information in the table above illustrates that most of the subjects aged between 35-40 years were 172 (45%) while only 14 (4%) were above 51 years. The respondents who were below 18 years had a frequency of 41 (10%) and while the age category 18-30 years had a frequency of 23 (35%). The respondents who were 41-50 years had a frequency of 23(6%).

The findings of this study indicated five different age categories of Kenyans users of commercial websites. Majority of Kenyans who visit commercial websites are young adults aged between 35-40 years, while the age group that least visits business websites comprise of senior citizens above 51 years. The second highest users of commercial websites consist of the youth at aged between 18-30 years. The teenagers below the age of 18 years are second least users of commercial sites. Kenya’s population aged between 41-50 and 51 and above, have been late adopters of technology compared to the younger generation. This explains their low percentages as consumers of commercial websites advertising (Wanjoga, 2002).

Highest Educational Level of the Participants
Subject’s level of education was between primary and university education. Eight (2%) respondents were of primary education while 88 (23%), were of secondary education. Majority of the respondents representing 161 (42%) and 119 (31%) were of university and diploma education respectively. Those respondents with other forms of education were 8 (2%) which included certificate courses and Kenya Accountants and Secretaries National Examinational Board training. The figure below show percentage distribution of respondent’s highest educational level.

![Figure 3: Percentage Distribution of Respondent’s Highest Level of Education](image_url)
The analysis above suggests that most of the participants were literate with 96% having education above primary level, thus they could be able to understand how commercial websites transact the business of advertising, their motives, uses and gratifications. The percentage of respondents with university and diploma education combined was 72%. This high percentage from the two groups may be as a result of many factors such as need for information and better economic status associated with higher education. (Chege & Sifuna, 2006)

General Websites Usage

Respondents’ Internet Skills

Subjects were requested to evaluate their internet skills. From the analysis of the data obtained majority of the respondents 182 (47%) had good skills, 90 (24%) medium, followed by excellent internet skills with 53 (14%), 39 (10%) had acceptable skills, and 20 (5%) had weak skills. The table below presents their responses.

Table 4.4 Respondents’ Internet Skills

<table>
<thead>
<tr>
<th>Skill</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Acceptable</td>
<td>39</td>
<td>10</td>
</tr>
<tr>
<td>Medium</td>
<td>90</td>
<td>24</td>
</tr>
<tr>
<td>Good</td>
<td>182</td>
<td>47</td>
</tr>
<tr>
<td>Excellent</td>
<td>53</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The analysis of data above indicate that majority of Kenya’s commercial websites users had strategic skills that enabled them to effectively visit business websites and could understand the content of advertising messages displayed in them. Van Dijk (2005) describes effective internet expertise as the ability to manipulate computer and system for specific objectives.

Frequency of Browsing in a Week

Respondents were requested to indicate the number of times they browsed commercial in a week. The Analysis of frequency on browsing in a week by the respondents is presented in Figures 6 below.

Figure 4: Frequency of Browsing in a Week

The analysis of data above reveals that out of 384 respondents, 54 (14%) browse 1-5 times in a week, 92 (24%) respondents browse 5-10 times in a week while the majority 238 (62%) browses more than 10 times in a week. These findings show that more Kenyans like to use internet on weekly basis which is a strong indicator that the majority access commercial websites more than ten times in a week. Those who had high education levels (Degree and Diploma) and young adults (18-30 and 31-40) had a higher weekly volume of use, compared to younger internet users and the aged.
Names of Commercial Websites Most Visited by the Respondents
Respondents were asked to list names of commercial websites they most visited. The analysis of the data obtained provided ten (10) names of commercial websites most visited by the subjects as presented in the table below.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Name of the website</th>
<th>Respondents</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>YouTube</td>
<td>62</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>Facebook</td>
<td>51</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>Jumia</td>
<td>46</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>OLX</td>
<td>41</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>Twitter</td>
<td>38</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>Sportpesa</td>
<td>37</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>Instagram</td>
<td>33</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>WhatsApp</td>
<td>29</td>
<td>7</td>
</tr>
<tr>
<td>9</td>
<td>Google</td>
<td>26</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>Kilimall</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>384</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

YouTube.com was the most visited website by 62 (16%) of the respondents for music and videos. This study concurs with Haridakis and Hanson (2008), research which shows that YouTube was the most preferred site by 91% users for sharing ideas and emotions via videos for personal motives such as affection, inclusion, and control which can influence social means. The second most visited site was Facebook by 51(14%) of the respondents, Jumia.co.ke was third with 46 (13%) and Olxkenya.co.ke an online marketplace that provides a platform for peer-to-peer selling with 41 (12%) of the respondents was fourth. Twitter was fifth with 38 (10%), Sportpesa.com was sixth with 37 (9%) followed by Instagram with 33 (8%), WhatsApp on web messenger visited by 29 (7%), Google Kenya ninth with 26 (6%) and Kilimall another online marketplace at position 10 visited by 21 (5%) of the respondents.

These findings reveals that the Kenyans have embraced e-commerce hence are trading online more often with 60% paying attention to ads on commercial websites. (See pp.48). It also discloses that people are turning to websites as their preferred mode for a fast and convenient way to purchase products and services without having to visit an actual store. Many marketers are now taking this opportunity to reach Kenyans on social media platforms such as Facebook, Twitter also WhatsApp via profile pages.

Ruggiero (2000), anticipated that the Internet usage will result to innovativeness, leading to changes in media consumers’ social, roles, and personal habits. It is evident from the statistics above that his prediction was right because social interaction among family, professional contacts and friends has reformed from traditional media to an online entity because of the growing acceptance of social sites in Kenya e.g., Facebook, Instagram, Whatssap, Snapchat, and Twitter as shown in Table 4.4.2 above.

According to Internet Users Statistics for Africa (2018), Facebook is the biggest social media platform in Kenya with approximately 7 Million active users, and growing, each day. The findings of this study show that given its reach and uptake, apart from Facebook being a major communication tool, it is a big opportunity for marketing of brands through placement of advertisements. Companies can develop and showcase their products through Facebook Pages, build their communities and also run digital advertising campaigns.

These virtual sites cater for a certain population therefore establishing a community many internet users cannot find outside a website setting and can vary from professional networking sites, friend-networking sites, romantic dating
sites, soccer clubs and even websites that encourage political parties, coalitions and presidential candidates. The findings above are particularly important for advertisers hoping to use a website as a key marketing channel targeting potential clients in order to present a compelling website advertising proposition to reach Kenyans online.

**Reasons for Using Commercial Websites**

A total of 31 use statements were presented to the respondents. The participants were then instructed to indicate the reasons that best explain why they use commercial websites. Using the Likert-scale the responses were based on the following statements; strongly disagreed, disagreed, neutral, agreed and strongly agreed. The table below shows ten (10) reasons for using commercial websites computed from strongly agree responses.

**Table 4.1.2 Summary of Respondents Reasons for Using Commercial Websites and Usage Categories**

<table>
<thead>
<tr>
<th>S/N</th>
<th>Commercial websites uses and categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Socialization</td>
</tr>
<tr>
<td></td>
<td>Helps me share media, such as videos, pictures, blogs and music.</td>
</tr>
<tr>
<td>2</td>
<td>Information</td>
</tr>
<tr>
<td></td>
<td>To keep up with what’s going on</td>
</tr>
<tr>
<td></td>
<td>Helps get free information</td>
</tr>
<tr>
<td></td>
<td>Helps learn how to use products and services</td>
</tr>
<tr>
<td></td>
<td>Good way to conduct research</td>
</tr>
<tr>
<td></td>
<td>Helps learn about things unknown</td>
</tr>
<tr>
<td>3</td>
<td>Convenience</td>
</tr>
<tr>
<td></td>
<td>Convenient to use</td>
</tr>
<tr>
<td></td>
<td>Can use anytime anywhere</td>
</tr>
<tr>
<td></td>
<td>Easy to do shopping</td>
</tr>
<tr>
<td>4</td>
<td>Entertainment</td>
</tr>
<tr>
<td></td>
<td>It is entertaining</td>
</tr>
<tr>
<td></td>
<td>It’s enjoyable</td>
</tr>
<tr>
<td>5</td>
<td>Relaxation</td>
</tr>
<tr>
<td></td>
<td>It’s relaxing</td>
</tr>
<tr>
<td>6</td>
<td>Passing time</td>
</tr>
<tr>
<td></td>
<td>Helps me pass time</td>
</tr>
<tr>
<td></td>
<td>It is a habit</td>
</tr>
</tbody>
</table>

The findings of this study as shown in Tables 4.5 and 4.5.1 indicate the respondents’ strongest reason for visiting commercial websites was in order ‘to share media such as pictures, videos, music and blogs’ with a frequency of 143 (37.2 of the total respondents. This reason of visiting websites was categorized under socialization.

The second reason identified by 140 (36.5%) of the respondents; was ‘to keep with what’s going on’ falls under the category of information seeking. Other reasons under information seeking were numbers, (3) ‘to get information for free’ with 133 (34.6%), (4) ‘to learn to use products and services’ with 125 (32.6%), (8). ‘It’s a good way to research’ with 117 (30.5%) of the respondents and reason number nine (9) ‘to learn about unknown things’ had a frequency of 115 (29.9%). The fifth reason ‘It’s convenient to use’ had a frequency of 122 (31.8%), (7) ‘I can use it anytime anywhere’ had 119 (31.0%) and (10) ‘It’s an easy way to do shopping’ had 113 (29.4%), are reasons under the category of convenience. The sixth most popular reason of visiting commercial websites was ‘to seek entertainment’ with a frequency of 121(31.5%)

The findings of this research differ from Dobos and Dominick's (1988) survey on gratification factors obtained from all media and Stafford & Stafford's findings in their (1998) exploratory study of usage and gratifications of the Internet. They found that respondents used the internet mostly for information purposes. In addition to informational motives; participants responded that the Internet was a research source for business, academics and product or service information.

This research identified six categories of reasons for using commercial websites. The first category was socialization. In this category the study participants indicated that they use commercial websites to share media such as pictures, videos, music and blogs. In this motive, respondents reported the importance of websites in maintaining
close or distant social networks that a person has. This research also found that the search companionship on websites is also a motivator to go online. This explains why despite majority of the respondents referring to sexual and dating sites as immoral and addictive a few still visited them.

This study identified YouTube, Facebook, Twitter, Instagram, and WhatsApp as sites for sharing opinions and emotions via media, pictures, videos, music and blogs, in order to fulfil social utility motive in maintaining close or distant social interactions that a person has. The second category was information seeking. Respondents agreed that they use commercial websites to keep with what’s going on, to get information for free, was a better approach to study about goods and services, it was a good way to conduct study and to learn about unknown things. The third category was convenience with respondents agreeing that commercial websites are convenient to use, could be used anytime anywhere and was an easy way to do shopping. The fourth category was entertainment. The study subjects found commercial websites use enjoyable and entertaining.

This research also identified two other categories of reasons for visiting websites namely relaxation and passing time with 12% and 10% respectively. Respondents gave reasons for visiting websites for relaxation as an emotional relief uplifting their mood and diverting their attention away from stress and hassles in their life. They would pass time when bored, had nothing better to do, because websites would give them something to do, and that it was a habit.

CONCLUSIONS
The aim of this research is to examine usage of business web advertising Kenya and also the relationships between these elements. The findings of this study conclude that the interrelation of the usage web advertising lead to a better understanding of online advertising limitations and advantages obtained from shared computer-linked communication.

This study found the concept of commercial websites advertising closely associated to interactivity, which is defined as responsiveness of the medium (Rafaeli, 1988). This study has found that interactivity of the Web enhance socialization in social websites for instance, Facebook, Instagram or Twitter and interactions between clients and advertisers.

This investigation also identified and analyzed six categories of reasons for using commercial websites namely; socialization, information seeking, convenience, entertainment, relaxation and to pass time. This study also identified and analyzed the challenges faced by commercial websites users namely: slow loading, clutter, high costs, fraud, identity theft, complexity of use and also analyzed reasons why consumers avoid certain commercial websites namely; immorality, addiction, risk (loss of money), manipulative and poor advertisements.

This research contributes to growing of commercial websites advertising literature in various ways. The study provides useful strategies and recommendations for companies hoping to promote their products and services on line and also for reputable businesses already undertaking e-commerce.

RECOMMENDATIONS
The study recommends that commercial websites should include social share and follow buttons to encourage social interactions from of online buyers to ensure business sites take full advantage of the ever increasing social media traffic in Kenya and that commercial websites should work on mobile phone optimization because of increased Smartphone usage in Kenya. This study is also of the recommendation that websites should be kept consistent in order to improve readability company webmasters must ensure websites are safe from vulnerabilities.

SUGGESTIONS FOR FURTHER RESEARCH
Due to continuous changes in communication technologies, new grounds are emerging for scholars to focus on processes, policy and regulations. It is necessary to examine individual usage and fulfillsments of respective commercial sites and attitudes toward understanding cross-cultural variations in online customer’s behaviour.

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ABSTRACT
The instability of family structure has become an increasingly salient part of people’s lives in Kenya. Lack of stable parenting coupled with strained relationships between parents and other family members as a result changing gender role have impacted negatively on family cohesion. This study investigated to investigate effects of family transitions on gender roles among the Chuka community. The objectives of the study were: to determine the changing family transition on gender roles among Chuka community in Meru south district, Tharaka Nithi county, and to determine the effects of changing family transitions on household responsibilities among Chuka community in Meru south district, Tharaka Nithi county. The study was guided by social structural theory. This study utilized the descriptive survey research design and the target population was 140 subjects comprising of 98 household heads in Magumoni division, 30 Church leaders, 6 women group leaders and 6 Chiefs. A total of 5 church leaders, 6 location chiefs, 6 women leaders and 98 households participated in this study. Questionnaires were used as the instruments of collecting data from all the respondents. A pilot study revealed a reliability coefficient of 0.7047 with the household head questionnaire, 0.7014 with chief’s questionnaire, 0.7020 for both church leaders and women leader’s questionnaire. The study concluded that the change in traditional family gender roles heavily impacts on gender household responsibilities and ultimately the cohesiveness of the family household. The study recommends counseling and other intervention programmes such as to mitigate the negative outcomes arising from the changes in the traditional family gender roles. Other recommendations included implementing gender parity in education, promotion of healthy living, avoidance of reckless sexual behavior, rejecting traditional beliefs like FGM, encouraging monogamy, involving more stakeholders such as the church and holding seminars to create awareness of the outcomes of irresponsible sexual behavior or drug abuse.

INTRODUCTION
The family is a basic unit of social structure, the exact definition of which can vary greatly from time to time and from culture to culture. How a society defines family as a primary group, and the functions it asks families to perform, are by no means constant. The LO diverse data coming from ethnography, history, law and social statistics, establish that the human family as an institution and not a biological fact founded on the natural relationship of consanguinity (Forbes, 2005). Chick and Meleis (1986) define family transition as passage from one life phase, condition, or status to another. Further, Chick et al. argue that transition refers to both the process and the outcome of complex person-environment interactions. This may involve more than one person and is embedded in the context and the situation. Family transitions represent connections between people and their changing environment.

Gender roles in Western societies have been changing rapidly in recent years, with the changes created both by evolutionary changes in society, including economic shifts which have altered the way people work and indeed which people work as more and more women enter the workforce, and by perhaps pressure brought to make changes because of the perception that the traditional social structure was inequitable (Cohany & Sok, 2007). In Africa, the traditional gender roles vary from culture to another and might vary in the same culture as time goes by. There are expectations and roles, which are expected to be met by the proper gender in certain cultures; for example, men in a traditional culture are expected to be able to find work and be the main source of income for the household. Women on other hand are expected to know about the housework.

In Meru South District in Kenya, traditional gender roles to still exists to some extent, but some of them have changed over time; for example, women can help men in providing some of the households as well as men can help women in the household and looking after children to some extent as well. The negative effect is when men think that they should do only what men had done in the past and nothing else; in addition, women have no place in men's work and that the women's place is inside the house. Women on the other hand think that men should help women in the housework; in addition, women should be able to work outside of the house on equal footing with men. The roles on gender household responsibilities determine the cohesiveness of the family. Those who believe that particular behaviors and attitudes are innate to each gender are more likely to subscribe to traditional concepts. The attitudes that men and women hold towards appropriate gender roles have a significant influence on many aspects of
marital and family dynamics. The attitude helps to perpetuate gender household differentiated opportunities in education, politics, religion, employment and other areas.

**Statement of the Problem**

Family transitions represent connections between people and their changing environment. Little is known at present about how family transitions are influenced by social trends and historical forces and how these changes are influencing changes in perceived gender roles within the institution of the family in Kenya. When a family is in transition, interactions among family members and subsystems within the family facilitate or impede the process of family cohesion. Family transitions are accompanied by a wide range of changes in family gender roles with women bearing the greatest blunt. Women in Meru South District typically spend much more time in the house than men as they perform their reproductive and household roles. This imbalance has implications on poor rural women, especially as the structure of the family unit is changing and female-headed households are on the increase in this area. The effect of such structural changes have on family have received little attention in research. It is against this background that this study was conducted to investigate effect of family transitions on gender roles among Chuka community in Meru South District.

**Objectives**

The following objectives guided the study:

i) To determine the changing family transition on gender roles among Chuka community in Meru South District, Tharaka Nithi county.

ii) To determine the effects of changing family transitions on household responsibilities among Chuka community in Meru South District, Tharaka Nithi county.

**Theoretical Framework**

This study draws on social structural theory by Eagly and Wood (1999), which expands role theory to address the differentiation of power between men and women. Eagly and Wood (1999) developed social structural theory to challenge evolutionary theories of gender differences. The theory posits that the roles people occupy whether due to individual choice, sociocultural pressures, or biological potentials lead them to develop psychological qualities and, in turn, behaviors to fit those roles. Parenthood is more salient for women’s self-conceptions than for men’s and men tend to perceive fathering as something they “do,” whereas women generally experience mothering as something they “are”. Parenthood is also salient for men, although not as salient as the worker role. The role of economic provider for men is supported by society through opportunities for work and higher pay, thus leading men to be more committed to the provider role than to the parental role. The degree of developmental change taking place following the birth of a child depends on how much the individual invests in the parental role. For individuals for whom the parental role is more salient than other roles, developmental change is expected to be more dramatic than for individuals for whom the parental role is less salient. As noted above, parenthood is more central for a woman’s self-concept than for a man’s self-concept and women perceive more change than men following the first-time transition to parenthood. The salience tenets of this theory make it useful in guiding this study. It is conceptualized that family transitions are responsible for changes in perceived gender roles as men and women adopt new roles as a result of modern changes in lifestyles.

**Conceptual Framework**

The conceptual framework of the study is shown in Figure 1.

![Conceptual Framework Diagram]

Fig. 1. Effect of family transition on gender roles

The independent variable is family transitions, which is indicated by household duties, headship of the family, land ownership and family budget. Gender is the dependent variable and is denoted by cooking, child-care roles,
washing of utensils, serving of food and tiding of the house and compound. This study sought to determine the effects of family transition on gender roles in modern society.

METHODOLOGY
In this study, descriptive survey design was adopted. The study was carried out in Magumoni Division in Meru South District. Magumoni Division was selected out of three divisions that make up Meru South district because it has more indigenous population than the other two. The target population for this study was 140 comprising of 98 household heads in Magumoni division, 30 Church leaders, 6 women group leaders and 6 Chiefs. Thus 10 mainline church leaders, 6 location chiefs, 6 women group leaders and 98 households heads were purposively selected for the study making a sample size of 120. The study employed two types of data collection instruments: a questionnaire and an interview schedule. The questionnaire was used to collect data from the church leaders, location chiefs and women leaders. The interview schedule was used to conduct interviews for 98 households. The data was collected by administering questionnaires to the mainline church leaders, locational chiefs, and women leaders and to the households. The researcher introduced himself to the respondents and gave the questionnaires in person. He gave the guidelines on how to respond to the questionnaires and gave assurance of confidentiality. The researcher collected the filled questionnaires as soon as they were complete. The data were coded and analyzed using the Statistical Package for Social Sciences (SPSS 11.5) which yielded descriptive statistics such as frequency tables, pie charts and bar graphs.

FINDINGS
Changing family transitions on gender roles among Chuka community in Meru south district
Designated duties for males and females
Information shown on Table indicates that only fifty percent 5 (50%) of the chiefs said that among the Chuka community duties are not designated for males and females and 1 household respondent did to comment. However, most of the respondents 97 (97%) of households, 6 (100%) of women leaders, 6 (100%) of church leaders and 3 (50%) of chiefs indicated that the duties are designated according to gender. The women explained the state of affairs as arising due to the fact that males are believed to be stronger and tradition bestows upon them the role of being heads of families. Therefore, some duties especially those requiring a lot of effort are designated for males while light duties are designated for females.

Table 1: Designated duties for males and females

<table>
<thead>
<tr>
<th>Designated duties for males and females</th>
<th>Households</th>
<th>Chiefs</th>
<th>Women leaders</th>
<th>Church leaders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>%</td>
<td>Frequency</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>97</td>
<td>97</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>98</td>
<td>100</td>
<td>6</td>
<td>100</td>
</tr>
</tbody>
</table>

The church leaders indicate that traditional male household responsibilities includes providing security, building family house (i.e. providing shelter), organizing the family, providing basic needs, paying dowry, dividing family property and making decision on behalf of the family. For them, traditional female household responsibilities include serving males, showing respect, maintaining hygiene, doing laundry work, handling kitchen work and nurturing children. These leaders observed that male traditional dominated family roles include cultivation, settling disputes, construction, dowry issues, providing security, among others. Some of the female traditional dominated family roles include child bearing, grinding, cooking, laundry work, kitchen work and babysitting. This concurs with Duncan, Edwards, Reynolds, & Alldred (2003) who argued that women are still more likely to perform household labor than men and, in practice, the division of work and household labor is still gender differentiated. This is so because if males do the female roles, they are termed inferior and outcast and the vise versa.

Women leaders identified a number of traditional family gender duties performed by males to include providing security, fathering children, providing education, among others. They identified traditional family gender duties performed by women to include cooking, washing clothes and child care. According to the households’ respondents, male household duties include disciplining family members, safeguarding the homestead, keeping records and...
organizing the family. The female household duties include taking care of children, childbearing, cleaning and cultivating land. Some of the family gender dominated male roles in the households include maintaining cash crop, construction and overall discipline, while family gender dominated female roles in the household include preparing meals, washing and ironing. This agrees with Rogers & Amato, (2000), who argued that although division of household labor has become more equal over time in that men’s contribution to housework has increased and women’s contribution has decreased. Half of the women leaders’ respondents 5 (50%) said the male is given more attention in education while the other half 3 (50%) said both the male and female. This is because children are gifts from God (Fig. 2)

![Fig. 2. Who is given more attention in education? – Women leaders](image)

All the church leaders 6 (100%) were unanimous that leadership positions in the church are held by males. Explanations for this state of affairs include the fact that the church does not recommend women for senior jobs in the church, the church constitution is gender biased, females tend to shy off from leadership i.e. refer themselves as weaker sex and traditional believes that men should lead in public sections. The main gender challenges church leaders encounter in their leadership, include gender bias in leadership, homosexuality, infidelity, HIV/AIDS and males denied conjugal rights. The strategies that are used to deal with these include group counseling, seminars, group therapies, support groups and family life counseling.

**Traditional family gender roles and gender household responsibilities**

The study’s findings indicate that traditionally it was the male who owns land and title deeds. All the church leaders 6 (100%) said traditionally the male owns land and has possession of title deeds. The males were expected to be community leaders and thus owners of the land. Most of the chiefs 5 (83.3%) indicated that the female should be the one to prepare and serve meals in a traditional family, while 1 (16.7%) said both can prepare and serve meals. Aulette (1994) supports this claim and argues that in the nuclear family, the wife/mother typically assumes the expressive family role which means she does the housework, cares for the children, and ensures that the relational and emotional needs of those within the family are met.

![Fig. 3. Who should prepare and serve meals in a traditional family?-chiefs](image)
It emerged from the study that most household respondents 55 (56.1%) were of the opinion that it is the male who determines the household budget, 13 (13.3%) said the household budget is determined by the female and 30 (30.6%) said it is determined by the breadwinner (Fig. 4).

Fig. 4. Who determines household budget? -household

The findings indicate that traditional household male barriers, include society’s expectation that males are supposed to maintain security in the household, valuing of polygamy, age difference, inability to maintain and sustain a family, uncircumcised limited from mixing with the circumcised, the initiated males cannot stay in their parent’s house, some hard tasks are left to male, female oriented duties like cooking and grinding, if one impregnates a girl he was forced to take dowry, lack of finances, inability to select the marriage partners of their own. The other male barriers include societal discouragement of a male marrying a girl from another community, divorce and separation, many sexual partners, sexual crimes e.g. rape, homosexuality and drug abuse. The research revealed that though men are benefiting from patriarchal structures, a majority is caught in a paradoxical and frustrating situation where the male roles are being seriously undermined. On the one hand, men are the acknowledged heads of the households, and they have the formal authority. On the other, lack of employment or low/insufficient income prevents men from fulfilling their expected roles as men, husbands, and in particular as providers of the needs of wife, children and other dependants. In this process, many men have become figure heads of household.

Some of the ways of dealing with traditional male barriers, include encouraging monogamy so as to maintain family cohesion and for the man to be answerable to a single family setup, being free to marry regardless of ethnic group or culture, holding seminars on change from tradition, sensitizing the public on the roles that are expected to be played by either gender to make them more responsible and productive, changing law that discriminates and that allow males to sell family property without consulting females, involving clan members so as to avoid intermarriages, building separate houses for female children to avoid interactions of male parents with their daughters and initiating male children at an early age so as to make their future decisions as early as they can.

Women leaders indicated that some of the traditional female role barriers, include females being forced to early marriages due to poverty, exalted to child labour so as to feed their younger siblings, being taught household chores while still young, lack of powers to give ideas and decisions, lack of self-esteem, traditional practices such as FGM, isolation of females who get pregnant before marriage, particular foodstuffs being restricted to females, style of dressing e.g. wearing trousers, poor education, early pregnancies and abortion.

According to church leaders, ways of dealing with traditional female barriers include, encouraging females to pursue higher education to overcome outdated traditional practices and restrictions, parents advising their daughters on ways of handling family matters before marriage to reduce family gender conflicts, readdressing historical imbalances to allow women to access to title deeds, males also participating in household chores and seeking guidance from church leaders.

The households’ respondents identified modern male gender barriers that they experience in their households to include, irresponsible drinking, poor clothing, severe punishment for males who impregnate girls especially those who are uninitiated, domestic violence, shake hands with in-law, male who are financially unstable feel unwanted and the possibility for a female to leave her husband for another man.
They identified female gender barriers to include polyandry, restriction on wearing trousers, being dismissed from the husband’s land or being humiliated by in-laws after the death of a spouse, females being forced to leave their children behind in case of a divorce, females being denied access to land use and ownership, household duties such as cooking and fetching firewood or water being left to females, females being burdened with the household chores, males being given the mandate to give orders to females and head the family, polygamy and early marriages.

**Effects of changing family transitions on household responsibilities among Chuka community in Meru south district, Tharaka Nithi county**

All the church leaders 6 (100%) said that the duties designated for males and females are changing. Ladden, (1990) noted that traditional men and women roles in the family have changed due to demographic, social and economic changes. The church leaders cited some of the changing men household responsibilities including property ownership, security and dowry issues, nurturing children, among others. They also noted that female household responsibilities have been changing especially when it comes to laundry work, kitchen duties, nurturing of children, among others.

According to most of the church leaders 5 (83.3%) the breadwinner is the one who determines the family budget in the changing family, while 1 (16.7%) said it is both. In addition, most of the church leaders 5 (83.3%) opposed that both the males and females enjoy equal education attention with only 1 (16.7%) saying females enjoy more education attention in the changing society.

Majority of the chiefs 5 (83.3%) said that the breadwinner is the head of family in changing society, while 1 (16.7%) said both the male and female can be the head of the family in contemporary times. This is in line with Neil, (2003).

Neil argued that all over the world, family life changed shape as we altered the way we live and work in families.

![Fig. 5. Head of family in changing society -chiefs](image)

All the chiefs 6 (100%) said that both the male and female can prepare and serve meals in changing family. Only 1 (16.7%) said that the breadwinner in the changing family is the male. All the church leaders 6 (100%) and most of the chiefs 5 (83.3%) said both the male and female can be breadwinners.

<table>
<thead>
<tr>
<th>Breadwinner in changing family</th>
<th>Church leaders</th>
<th>Chiefs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>%</td>
</tr>
<tr>
<td>Male</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Female</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Both</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>100</td>
</tr>
</tbody>
</table>

Most of the chiefs 5 (83.3%) said that the breadwinner is the decision maker in changing society, while 1 (16.7%) chief said both the male and the female can be decision makers in changing society.
The chiefs 6 (100%) were unanimous that both the male and the female are given equal attention when it comes to education in the changing family. Most of the church leaders 4 (66.7%) said that the male has been given more attention in education than the female, 1 (16.7%) said it is the female that has been given preference in education matters and 1 (16.7%) said that both the male and the female has had equal opportunity (Fig. 7).

The church leaders 6 (100%) were unanimous that both the male and the female own livestock in the changing family. Most of the church leaders 5 (83.3%) said that it is the breadwinner, who determines the family budget in the changing family and 1 (16.7%) said that the family budget is determined by both the male and the female in a household.
CONCLUSION
The findings demonstrate that traditional family gender roles (i.e. household duties, family headship and control of family budget) have been changing over time among Chuka community in Meru South District, thereby impacting on the cohesiveness of the family. Based on the findings of the study, the following conclusions are drawn:

i) With regard to objective one of the study, the study found that traditional gender roles existed among the Chuka community and that family transitions have made men and women in Magumoni division to adapt to new gender roles with most women taking to undertake the role of breadwinner in the family as most men were preoccupied with alcohol abuse and engagement in petty trade.

ii) The traditional family gender roles are no longer effective in Chuka community despite the fact that people in this community are bound by strong patriarchal family system organizations with most of the responsibilities vested to men. This however seems to have changed with emergence of female headed families that makes women to have more responsibilities in terms of child rearing than men. This trend has impacted negatively on family cohesion.

iii) From the findings, the study concludes that the change in traditional family gender roles heavily impacts on gender household responsibilities and ultimately the cohesiveness of the family household.

RECOMMENDATIONS
The study’s findings indicate that to mitigate the negative impacts on gender household responsibilities and ultimately the cohesiveness of the family household arising from the changes in the traditional family gender roles, counseling and other intervention programmes will have to be put in place. Other recommendations include implementing gender parity in education, promotion of healthy living, avoidance of reckless sexual behavior, rejecting traditional beliefs like FGM, encouraging monogamy, involving more stakeholders such as the church and holding seminars to create awareness of the outcomes of irresponsible sexual behavior or drug abuse.

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A REVIEW OF LITERATURE ON HIGHER EDUCATION AS A TOOL FOR INNOVATION

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ABSTRACT
Education has been identified and adopted as a tool for sustainable development by many countries under the title ‘Education for Sustainable Development’ a concept that guides learners to develop creativity by encouraging them to gain new knowledge and skills as well as demonstrate change in their values, attitudes and behaviors’ consequently contributing to sustainable development. Higher education, as the level of education charged with the responsibility of preparing individuals to change the world through application of knowledge, skills and professionalism plays a vital role in nurturing these competencies. It is therefore necessary to assess what role the Higher education sector plays to efficiently and effectively achieve this end. This paper has been developed through a review of 10 empirical journals focusing mainly on higher education and innovation. The sources of the data used include JSTOR, Taylor and Francis Group, Emerald Insight, TOJET, JHEA/RESA, Springer, and OECD. The research results indicate that Higher education institutions face challenges in funding, quality assurance and knowledge sharing. Because innovative behavior not natural, higher education institutions mostly encourage it through a rewarding system. Funding for programmes and activities has to be increased. Leaders in institutions have to advocate for the implementation of quality assurance programmes that are in place. Knowledge sharing for both junior and senior scholars has to be encouraged and nurtured. The review has also established that research on higher education in Kenya and Africa in general is still at its infancy. These findings could be used to forecast, explain and improve the mannerisms of higher education structures and procedures to create an innovative environment that encourages and nurtures innovative behaviour among staff and students.

Keywords: Higher education, Innovative behavior

INTRODUCTION
The United Nations (UN) and its member countries are all seeking to develop communities sustainably. The seventeen Sustainable Development goals (SDG) have been developed to act as a guide to help achieve this end. The sustainable development goal 4 ‘Quality education for all’ seeks to ensure that all people have access to quality education. Education for sustainable development is a concept that is quickly gaining global cognisance. It is designed to help learners to have a change in knowledge, skills, values and attitudes that will contribute to sustainable development (“What is Education for Sustainable Development?,” 2016). The 1st UN decade of Education for Sustainable Development was delivered between 2005 and 2014. The aim of the initiative was to integrate the principles, values and practices of sustainable development into all aspects of education and learning; through mobilizing the educational resources of the world to help create a more sustainable future. Target 4.4 of SDG 4 purposes to substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship by 2030. Further, target 8.6 of SDG 8 aims to substantially reduce the proportion of youth not in employment, education or training by 2020(“Education Sustainable Development Knowledge Platform,” n.d.). Consequently higher education has an indispensible role if these targets are to be met; Producing graduates who have requisite skills for the job market.

Higher Education
In the last half of the 20th century, there has been a major shift from economic growth led by mass production industry based on the established technology to knowledge-based growth in which hard and soft innovation (“creation of knowledge”) has a higher economic value. Owing to the fast pace of change, research and higher learning are essential components of socio-economic, cultural and environmentally sustainable development of both individuals and communities (“world declaration on higher education for the Twenty-First Century: Vision and action,” n.d.). Higher education is the third level after primary and secondary education. It is taught in a period of three to four years in an environment involving advanced research aimed at preparing the learners to qualify to work in a professional field thus increasing the earning potential (“What higher education is,” 2015). The correct definition of the role of higher education depends on the ability to correctly balance the objectives of quality and pertinence. Furthermore, such a balance will, in turn, depend on reaffirmation of the intellectual and educational missions of higher education. (The role of higher education in society, n.d.)
Higher education has three functions: education, research and helping the community. The institutions prepare people to engage in research through educating them, while research makes the education process better and more fruitful. So, it can be argued that research and education are two sides of a coin. Many universities have a western background including those in Africa and Asia. The less they are designed in a way that they are deeply rooted in the society in which they belong because they existed in various forms long before they were established by colonialists in those places (The role of higher education in society, n.d.)

Article 10 of the Missions and Functions of Higher Education as provided by UNESCO states that, Education personnel and learners play a major role in higher education. The article recommends the creation and implementation of clear policies concerning teachers in higher education who now focus on teaching students how to learn and how to take initiative, rather than just passing knowledge and information. The article goes further to state that ‘Adequate provision should be made for research and for updating and improving pedagogical skills, through appropriate staff development programmes, encouraging constant innovation in curriculum, teaching and learning methods, and ensuring appropriate professional and financial status, and for excellence in research and teaching, reflecting the corresponding provisions of the recommendation concerning the Status of Higher-Education Teaching Personnel approved by the General Conference of UNESCO in November 1997’ (‘World declaration on higher education for the twenty-first century: vision and action,’ n.d.).

In 1994, the World Bank released a report where Psacharopoulos and his colleagues claimed that in Africa, primary and secondary education was of much more value than higher education. As a result, funding for higher education from both local governments and international well-wishers considerably dropped. Tefera (2013) claims that this trend has continued, making it difficult for Africa’s Institutions of higher learning to cope with emerging issues. Tefera (2013) further posits that, while there has been a growing demand for education in Africa, especially with the introduction of self-sponsored programs, universities have not been able to grow their infrastructure at the same rate. This has resulted to several over populated and under equipped African Universities. Shortage of teachers, classrooms and other learning facilities make learning and creativity difficult to achieve.

New Partnership for Africas Development (NEPAD) aims to return to the former glory African higher education facilities and standards, promote specialized research, and create more African centres of technology. This is in a bid to reduce brain drain and achieve brain gain. By so doing NEPAD hopes to use education for national development, which is in line with the sustainable development objective of education for development. In their research, Blom et al. (2016) found that Higher education in Kenya has continued to grow over the years. Some of the growth can be attributed to the establishment of private institutions of higher learning, while the other can be attributed to the flexibility of programmes being offered by the institutions. The research findings further indicated that 28% of employers interviewed have a difficult time getting fresh graduates with requisite abilities for the job. This is of major concern considering the financial and time investments bade by the students and guardians.

**Innovation**

In order to define the term innovation, UNESCO borrows from OECD and Eurostat (2005), Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, §146, 148, to define the term as ‘Implementation of a new or significantly improved product (good or service), or process, or a new marketing method, or a new organizational method. The minimum requirement for an innovation is that the product, process, marketing method or organizational method must be new (or significantly improved in the case of product or process) to the firm’ (‘Innovation,’ 2017). Al-Husseini & Elbeltagi, (2018) match this definition by identifying two types of innovation in the higher education context and defining them as follows. 1) Product innovation: defined as accepting, developing and implementing new products such as research projects, courses, new teaching resources and materials, and curricula Development 2) process innovation: defined as developing and using new technology, good financial management and the continuous improvement of skills. In the definitions of both UNESCO and Al-Husseini & Elbeltagi, (2018), adopting new ways of doing things or coming up with new things that will solve current issues is the way to go. Based on this premise Innovation is an indispensable concept and aspect of our life, if we are to achieve sustainable development.

Roffeii, Yusop, & Kamarulzaman, (2018) posit that innovative behaviour is the desire to change intellectually, in order to enhance innovation. Coakes and Smith (2007) as quoted in (Xerri, Brunetto, & Shacklock, n.d.), argue that innovative behaviour can be supported by innovation champions i.e (i) people who have a natural ability to innovate and (ii) those who are experts in their field. However, the innovation process only ends there if the new knowledge
is not shared outside that social network. Based on this premise, innovative behaviour is not always natural, but has to be nurtured through social networks. It is therefore important for higher education as a network to consider ways of nurturing such behaviour and sustaining it. The World Declaration for the Twenty-First Century in its priority actions 1(L) states that students have the right to organize themselves autonomously. This is closely linked to the findings of (Roffeei, et al 2018) who found that students who were allowed autonomy were more likely to engage in innovative behaviour as long as communication was properly done. Yuan, Zhang, Wang, & Li, (2018a) posit that the quality of a student is manifested in their entrepreneurial and innovative capacity. This closely matches Al-Husseini & Elbeltagi, (2018) description of innovation. Based on this, we can then propose that the work of innovation champions then is to guide people in achieving innovative behaviour.

Education for Sustainable Development is becoming a major issue of discussion in the international arena, bringing even more prominence to the indispensable role of education in achieving sustainable development. (“Education .. Sustainable Development Knowledge Platform,” n.d.). Education has to be holistic; taking a forefront in transforming the knowledge and attitudes of communities so that they can achieve sustainable development. Higher education being the sector charged with the responsibility of preparing individuals to transform the world through application of skill and professionalism, needs to be abreast not only with challenges facing the world today, but also new ways of doing things. Makhtar Diop, in his speech delivered in Peking University-China in November 2017, notes that new innovations are not the only way of solving challenges rather, innovations can be adopted or systems adapted to existing innovations from other areas in order to solve current issues (Diop, 2017). As such, there is need to invest not only in the human resource required for this challenge, but also the infrastructure to support the efforts. Further because of high population in the university caused by over demand and under supply of the services of the higher education institution, it is paramount that these institutions focus on providing what is ready and friendly for the market (Blom et al., 2016).

METHODOLOGY
This paper has been crafted after a review of 10 empirical journals focusing mainly on higher education and innovation. Concept papers and pure literature review papers were not considered in crafting this paper. The sources of the data were online journals including JSTOR, Taylor and Francis Group, Emerald Insight, TOJET, JHEA/RESA, Springer, and OECD. The objective of the review was to determine the role of higher education as a tool for innovation. In order to meet this objective, there was a selection criterion for the journals to be used. First, all the journals that were used were those offering empirical analysis. Second, the review focused on those journals that were focusing on innovation in higher education. Third, the paper under review had to have been published in the last ten years, and lastly the source journal had to be reputable. In order to generate the review report, I searched keys terms including innovation, higher education and role of (higher education in innovation). My focus was on the broader topics of either innovation or higher education. In each paper I focused on the background, objectives, interesting claims, and striking findings presented there in. I would then craft areas I felt needed further research. In presenting this paper, the background paints the general picture of the state of both innovation and higher education. The emerging themes presented in the reviewed papers are presented under the section of findings and discussion.

FINDINGS AND DISCUSSION
Funding
Psacharopoulos (1985), an influential economist at the World Bank, and his colleagues (1994), erroneously concluded that the rate of return on higher education in Africa is much less than the lower education sub-sector, that is, primary and high school sectors. Teferra (2013) posits that As a result of this report, funding in higher education took a nose dive and the situation remains largely the same to date. Many institutions in higher education remain financially stifled even as the student population continues to grow in unprecedented numbers. Further Teferra(2013) in his study titled ‘Funding Higher Education in Africa: State, Trends and Perspectives’ revealed that Institutions of higher learning in Sub-Saharan Africa were poorly funded by the government. He further states that institutions have had to find ways to supplement the funding that they receive from the government, and other well wishers. Some of the activities used to increase the income level include admitting self-sponsored students. Though these programmes bring in a lot of money, the level of development in institutions remains largely disabled and growing at a very sluggish rate. In fact Tefarra(2013) exclaims that most institutions are still using facilities that they had long before the student population. The fact that funding does not match student enrolment and population is striking because education is now considered an indispensable asset for sustainable development by nations all over the world (“The Role of Higher Education in the Changing World of Work.” n.d.) Why then are governments in Sub-Saharan Africa still not warming up to the idea of funding education more, for a better future? This study by
Teferra (2013) was conducted in Public Universities in Kenya, Uganda, Tanzania, Ethiopia, Madagascar, Zambia, Malawi. The study further found that the number of students enrolling is on a steady increase, but the funding was constant if not declining. For, example, MOEs (2005) in Oboko (2013) found that in Uganda, government funding for tertiary education has been declining over the years. This can be confirmed by the fact that 2004/05, higher education received only about 10 per cent of the total education budget, or USh 619.93 billion. In Zambia, the situation has remained almost the same from 2009 to 2011 mainly due to the position of the kwacha against other major currencies. According to Mpfu, Chimhenga and Mafa (2013), higher education in Zimbabwe has remained under-funded as the government struggles. Teferra(2013) further posits that, from 1985 to 1989, 17 % of the World Bank’s worldwide education-sector spending was on higher education. However, from 1995 to 1999, the proportion allotted to higher education declined to just 7 %. Teferra(2013) also alluded to the fact that many public universities are looking for new avenues to get funding. Consequently, they are charging higher tuition fees and allowing self-sponsored students to enrol.

Marshall, (2016) in his paper ‘Technological innovation of higher education in New Zealand: a wicked problem?’ explores the structures and systems of the New Zealand higher education sector using the concept of a “wicked problem” (Rittel 1972; Rittel and Webber 1973) to understand the complexity and interconnections that are perhaps preventing innovation and the shift to models of education that can scale while maintaining quality and reducing costs. In this paper, he connotes that, An analysis by the New Zealand Ministry of Education looking at the earning outcomes of students completing tertiary education prior to the recession and over the five subsequent years, found that students with bachelor’s degrees were employed to a higher proportion than those with lower-level qualifications, and that median earnings had a premium of nearly 20% over the national median earnings in the first year, rising to 53% over the five years studied. New Zealand higher education institutions are substantially dependent upon public funds (68% of higher education spending, compared with 45% for Australia, 38% for the United States and 30% for the United Kingdom; OECD 2012, table B3.2b, 259). The accreditation system and management associated with this dependence constrains the autonomy of existing institutions (Thorens 2006), and act as barriers to the entry of new providers. It is also interesting that the government has placed so many measures to prevent all from accessing tertiary education, requiring institutions to negotiate ‘investment plans’ with a government agency. Failure to meet the required regulations can lead to reduced funding or no funding at all.

Comparing the findings of the study by Marshall, (2016) and those of Teferra (2013) the difference in University enrolment and funding procedures and practices between developed and developing countries is astounding. While in New Zealand the criteria for admission into higher education is stringent with the government creating space for only about 25% of the population (Marshal, 2016), admission in African countries requires only for the candidate to meet minimum qualification for a course and they can enrol as a privately sponsored student. In addition, the government partially sponsors several qualified students each year (Teferra, 2013). Due to this aspect, there is a significant difference in the number of students enrolled, as well as the pressure placed on the infrastructure. Unlike the African Universities which depend on a fluctuating national budget (Teferra, 2013), the government of New Zealand has placed a criteria, which uses four measures: course completion, qualification completion, progression to tertiary study, and retention in study for further qualifications. Failure to perform above minimum thresholds for these indicators for all students, and for students in key government policy target groups, results in significant financial penalties, and in some cases complete removal of government funding from the institutions. As a result these institutions are always under pressure to deliver unlike in African university where the criterion is not clear. A different study by Al-Husseini and Elbeltagi (2018), indicates that the availability of funding in higher education institutions encourages and facilitates the process of knowledge sharing among staff. The study also implies that adequate funding tends to reduce the occurrence of brain drain as academicians and researchers move to other countries to seek greener pastures.

Innovation and Innovation Culture
Roffeei, Yusop, & Kamarulzaman, (2018) in their study of Determinants of Innovation Culture amongst Higher Education Students based their study on the premise that many studies focusing on innovation were found in the management field, and rarely do they focus on innovation in higher education. Innovative ways of teaching would challenge the traditional ways of learning and teaching, which would potentially determine the innovation culture among students. Roffeei et al., (2018) further, connote that in order to have developed an innovative culture, there must be values, norms, beliefs, and basic assumptions shared among members of the institution (students, faculty members/academics, support staff, administrators, and board members). He further describes innovative behaviour as desire to change intellectually in order to enhance innovation. In the course of this study, Roffeiei et al.,
A striking finding in the study by Roffeii et al., (2018) is that Climate for Innovation does not influence Innovation Behaviour. Even though the institution under study has infrastructure to support innovation, the availability of infrastructure did not influence the innovative culture and behaviour of the students. This research focused on the physical climate i.e the infrastructure. Sevillano-García & Vázquez-Cano (2015) conducted a research titled ‘The Impact of Digital Mobile Devices in Higher Education’ in which they sort to examine the acceptance incidence and use of digital mobile devices among students in the European Education Area. They pos it that digital devices (tablets and smart phones) are potentially beneficial in the development of university education. However, the discussions about using digital mobile devices are sporadic and inconsistent. In addition, the lack of quality professional development, staff that are sceptical about the use of digital devices in course development, and generally cultures that are unsupportive of mobile devices as a learning technology, make it challenging to in cooperate them into the University learning process.

Knowledge Sharing
Al-Husseini and Elbeltagi (2018) in their research on the ‘The Role Of Knowledge Sharing In Enhancing Innovation: A Comparative Study Of Public And Private Higher Education Institutions In Iraq’, posits that although previous studies have looked at the relationship between knowledge management and innovation, few touch on knowledge sharing processes, and the impact they have on the teaching staff’s product and process innovation within developing countries. According to this study, Knowledge sharing is defined as a two-dimensional process, with members of staff sharing and exchanging their tacit and explicit knowledge, with daily interaction creating new knowledge through the process of knowledge exchange, donation and collection. Knowledge donating as described by (Von krogh et al., 2012 as quoted by Al-Husseini & Elbeltagi, 2018) refers to the owner of knowledge, and includes listening, talking to others, and providing them with information so as to help them develop their self-knowledge and solve problems more quickly; while knowledge collecting involves getting information from colleagues through observing, listening and practicing the information shared to you.

Al-Husseini & Elbeltagi, (2018) define Product innovation within higher education as accepting, developing and implementing new products such as research projects, courses, new teaching resources and materials, and curricula Development while Process innovation within higher education is defined as developing and using new technology, good financial management, and the continuous improvement of skills. For effective knowledge sharing and donation to take place in both process and product innovation, communication is a key element. This echoes the findings Roffeii et al., (2018), which indicate that that good communication and less strenuous communication
processes are positively related to innovation culture. Further for innovation champions to be effective proper channels should be created to support effective knowledge sharing. Therefore, effective knowledge sharing processes that lead to innovation can only be achieved with good communication practices. Based on the definitions of knowledge sharing and those of product and process innovation, it appears the two share a chicken-egg relationship and none of the two concepts should be undermined. These studies indicate that knowledge sharing practice may benefit from institutional factors such as reward systems, helping the organisations to access tacit knowledge embedded in the minds of the organisational members, and convert it into explicit knowledge (Wang & Wang, 2012) as quoted by Al-Husseini & Elbeltagi, (2018), through the donating and collecting of knowledge for the enhancement of product and process innovation. Under reward systems, employees are not only more likely to exchange their knowledge and experiences, but also they seek different approaches to work. These sentiments are echoed in the findings of Roffeet et al., (2018), who in a different study found that warm interpersonal relations between members support and encourage teamwork. In addition to this, the presence of adequate infrastructure, provision of rewards and recognition, good work nature, availability of support from friends and lecturer may contribute help in establishing a positive innovation culture.

**Leadership**

In a different study on Transformational Leadership and Innovation: A Comparison Study Between Iraq’s Public and Private Higher Education, Al-Husseini & Elbeltagi (2016) connote that only a few studies have investigated the impact of Transformational Leadership on product and process innovation of teaching staff, and the differences in leadership styles may be different in the two sectors due to their organisational and cultural environments. These sentiments are supported by the findings of Yahyagil (2004) quoted in Al-Husseini & Elbeltagi, (2016) from a previous study indicating that supportive culture, or the provision of managerial support to the organisation members is indispensable. Being able to freely share all the resources and knowledge with others through teamwork and collaboration, together with having warm interrelation among members, help in creating the right environment for innovative supporting activities.

Al-Husseini & Elbeltagi (2016) established that the majority of leaders in the public Higher Education Institutions(HEIs) indicated that MOHESR provides a good climate that supports Knowledge Sharing, such as funding research scholarships for postgraduate students (Master’s and PhDs) and their supervisors to study outside Iraq for six months. In contrast, in the private sector, there is a lack of support from the leaders. It appears that leaders in this sector tell teaching staff what is expected of them, but do not show them how to meet those expectations. I find it rather interesting to connote that the good climate supporting knowledge Sharing is not necessary for the golden key to innovation because as established by Roffeiet al., (2018) in a different there is no relationship between good climate for innovation and innovative behaviour. Surprisingly, the findings of this study by Al-Husseini & Elbeltagi (2016) indicate that the public HEIs budget for aspects such as training programmes, research projects, development of academic staff, scholarships and incentive systems. As a result, the staffs are more ready and willing to participate in process and product innovation. Private universities however do not have funding for these activities and as a result the leadership finds itself in a place where they need to convince the staff to participate in innovation without funding. The researchers’ state that a possible reason for this kind of trend is the fact that public universities tend to focus at the long-term, while private university look at the short term in terms. Al-Husseini & Elbeltagi, (2016), indicates that in order to have global reach, the education system in Iraq needs unique leaders. I find this striking because the word unique is very vague. What characteristics is the researcher looking at to qualify a leader as unique? Also, leaders everywhere need to keep sharpening their skills and networking with other like minded individuals, in order to propel organizations to the heights they desire. Even though public universities have funding for staff development, this research does not mention any funding for leadership development. Private universities have no kitty either. What I found striking in this study was the fact that the university under study was working towards building the international competitiveness of the students, as well as building an innovation and entrepreneurial culture through rewarding students and staff in the ‘Innovation and entrepreneurial context’. However concept of the innovation and entrepreneurship education had not been sufficiently integrated with the professional skill curriculum. It is interesting to note that equipping the teachers with requisite skill has not been done despite the university focusing to improve itself for the last six years.

**Monitoring and Evaluation**
Yuan et al. (2018) conducted a research based on the premise that research results generated from evaluation models that are currently in use cannot be directly or effectively applied to the quality assessment of the innovation and entrepreneurship education at colleges and universities. In this research, they posit that though there has been research on the quality of innovation and entrepreneurship in universities and colleges, it is still at its infancy and focuses on the environment, educational, inputs and outputs. They also found that University neither pays enough attention to the development of the curriculum system regarding the innovation and entrepreneurship education nor fully strengthens the teacher training/ professional in this field. As a result, it becomes difficult to apply the findings of these studies in to the quality assessment of the innovation and entrepreneurship education at colleges and universities. The methods have been found to have either a weak scientific index system, or a simple calculation, or these approaches are not empirically tested. This is despite the fact that the government continues to pay significant attention to higher education in a bid to transform its innovation and entrepreneurial abilities.

Sevillano-García & Vázquez-Cano, (2015) Acknowledge that lack of professional development may cause the teacher to be sceptical about the process or product in use. Therefore, the concept of the innovation and entrepreneurship education has not been sufficiently integrated with the professional skill curriculum, making it impossible to operationalize and prove practically. This matches with the findings of Yuan et al., (2018) which indicate that there was imperfect mechanism of innovation incubation within the university. The result of this was slow growth or incomplete incubation. Proper evaluation system and more suitable methods of evaluation should be established to counter this. Further, providing increased financial support for the innovation enterprises, promoting the concept and facilitating the practice of the entrepreneurship education, and hiring talents from all walks of life to serve as teachers or tutors of the innovation and entrepreneurship courses will enhance entrepreneurship and innovation. Then, the overall quality of the innovation and entrepreneurship education will be enhanced only after establishing an accurate and effective quality evaluation system, and creating suitable evaluation methods have become an urgent task for the academia.

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Olaskoaga-Larrauri et al., (2015), conducted a study on ‘Political Nature And Socio-Professional Determinants of The Concept of Quality. The study not only sought to determine how factors like age and gender influence an academicians’ perception of quality, but also to establish how individuals in management positions within the institutions perceive quality. To attain variables for their study, Olaskoaga-Larrauri, et al (2015) used Harvey and Green (1993) definitions of quality that include: (1) quality as perfection or consistency; (2) Quality as fitness for purpose; (3) Quality as value for money; (4) Quality as efficiency in student transformation (5) Quality as excellence and compliance with standards. Qutanilla (1999) as quoted in Olaskoaga-Larrauri, et al (2015), connotes that Harvey and Greens concept of quality as excellence and compliance with standards, is the most traditional way of defining quality. The research found that women are more likely accept the idea of innovation as student transformation, while men are more likely to accept quality as setting of standards. Beutel and Marini (1995) as quoted in Olaskoaga-Larrauri, et al (2015) explain that this characteristic can be attributed to traditional societal roles of women, which help them to place value on activities that give service to others. The research also found that lecturers who held management positions felt that quality is more about value for money and excellence, and compliance with standards rather than transformation. This was translated to mean that those in management positions did this in support of the universities policy or values; and the funding procedures, as well as expectations placed on the university by funding bodies.
In the thematic area that dwelt on the concept of monitoring and evaluation, Yuan et al., (2018) Olaskoaga-Larrauri et al., (2015), and Kagondu and Marwa (2017), agree on the fact that there should be a common understanding on what quality really entails. Olaskoaga-Larrauri et al., (2015), and Kagondu and Marwa (2017) both had more than one concept of what quality would entail. Yuan et al., (2018 and Tefera (2013) are in agreement that in order for proper evaluation systems to be successfully implemented there has to be adequate funding. Yuan further notes that, apart from funding. Institutions need to bring on board unique talent from all walks of life to help with implementation and evaluation of entrepreneurship and innovation in higher education. This matches the sentiments of Coakes and Smith (2007) as quoted in (Xerri, Brunetto, & Shacklock, n.d.) advocating for the participation of innovation champions into the innovation process. I opine that, a universal definition of what quality in higher education entails would help form an understanding on the requirements of quality delivery and consequently make the monitoring and evaluation process more productive.

CONCLUSIONS
From the literature reviewed, it is evident that higher education contributes significantly to innovation. However, institutions of higher learning face major challenges such as deficits in funding, as well as weak quality assurance systems, both of which are essential elements in to successful incubation and implementation of innovation. The review has also established that knowledge sharing is essential though most often it takes place only among staff members. I did not come across a journal article on knowledge sharing among students. Also, if institutions of higher learning are to succeed in nurturing innovation the university leadership has to engage in transformational leadership. Much of the literature on transformational leadership is conducted in the business and management field with very few focusing on higher education. This review concludes that very few institutions are motivated to provide both the infrastructure and environment for innovation. Some of the institutions were said to have awards system to encourage innovation from staff and students. Those that had awarding system recorded improved participation in innovation activities. Institutions, especially in the developing countries like Iraq and those in Sub-Saharan Africa, faced big funding challenges that suppressed further, the provision of environment and infrastructure for innovation. Research should be conducted to help identify ways of encouraging stakeholders in the Higher education arena to participate in innovation. Research in this area would be beneficial in informing national and institutional policy on higher education and funding for innovation. It would also help identify how poor provision of these facilities could potentially lead to brain drain as mentioned in one of the papers. Findings of this research would also act as a guide to innovative techniques to motivate the stakeholders. In order to meet the development needs today and in the future, we have to be at the top of our innovation game. Higher education has a major role to play for us to achieve this end. Research should also be conducted to establish how the Higher Education sector in Kenya can encourage innovation among graduates and consequently reduce the levels of unemployment among Kenyan graduates.

REFERENCES


*The role of higher education in society.* (n.d.). 161.


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ABSTRACT
The study investigated the relevance of relevance of Kant probing method on implementation of curriculum in secondary schools in Meru-South Sub County. The study was based on the ideals and principles of a school curriculum as advocated by Kant’s transcendentalism philosophy. Descriptive survey research design was adopted for the study. A sample size of 357 respondents comprising of 322 students and 35 teachers was used for the study. Purposive sampling and simple random sampling were adopted to select the respondents. Questionnaires were used for data collection. The findings of the study will provide information to educational stakeholders on the vital role that probing method plays in the process of curriculum implementation in secondary schools. The study established that application of probing method in the process of curriculum implementation enhances learners understanding of curriculum contents as well as facilitating development of students’ critical thinking skills. The study recommends sensitization of teachers on the benefits of integrating probing method in the process of curriculum implementation through in-service training.

Keywords: Transcendentalism philosophy, Probing method, Curriculum implementation.

INTRODUCTION
Global and national education authorities around the world are seeking innovative curriculum implementation strategies to improve the quality and relevance of student learning (KICD, 2016). The strategies sought are those that enable students to apply their knowledge to the challenges and opportunities they encounter throughout their lives. Education is considered among the major factors contributing to the reduction of poverty, sustainable development and economic growth (Hightower, 2011). Effective curriculum implementation is viewed as the foundation of achieving high quality education. Curriculum represents a conscious and systematic selection of knowledge, skills and values which shape the way teaching and learning processes are organized, by addressing questions related to what students should learn, why, when and how (UNESCO, 2012). Philosophy provides educators, especially curriculum specialists, with a framework for organizing schools and classrooms (Allan, Edward & Stacey, 2008). It helps answer questions about what the school’s purpose is, what subjects are of value, how students learn and what methods and materials to use during curriculum implementation (Ravi, 2015). Philosophy also provides curriculum specialists with a framework for broad issues and tasks, such as determining the goals of education, subject content and its organization, the process of teaching and learning and in general, what experiences and activities to stress in schools and classrooms (Aggarwal, 2007).

Curriculum implementation entails putting into practice the officially prescribed courses of study, syllabuses and subjects (Tanner & Tanner, 2007). It takes place as the learner acquires the intended experiences, knowledge, skills, ideas and attitudes aimed at enabling the learner to function effectively in a society (Suneye & Agbonlure, 2007). Curriculum implementation is based on philosophical perspectives, which are sources of implementation decisions (Marlow, 2003). Philosophical perspectives are theories of knowledge such as rationalism, empiricism and pragmatism (Gatawa, 1990). Curriculum implementation process should be based on a philosophy that unifies the various philosophical perspectives. After empiricism fell into skepticism, and rationalism lapsed into dogmatism, Immanuel Kant took the position of synthesizing these two opposing positions through transcendental method (Louden, 2008). Kant’s transcendental philosophy maintains that both rationalism and empiricism are equally important in the knowing process (Hamilton, 2003). The main tenet of Kant’s transcendental philosophy is that human knowledge arises from the interplay of philosophical tenets of empiricism and rationalism (Carl, 2009). Shashidhar (2011) noted that interaction of philosophical ideologies of empiricism and rationalism plays a dominant role in epistemological and methodological perspective of curriculum implementation.

The main idea drawn from Kant’s transcendental philosophy is that approaches to curriculum implementation should be students centered. According to Kant (2012), these approaches are associated with a number of benefits. Kant probing method relates to Socratic Method, which is a form of inquiry and discussion between individuals, based on asking and answering questions to stimulate critical thinking and illuminate ideas (Boghossian, 2003). In
probing method, the classroom experience is a shared dialogue between teacher and students in which both are responsible for pushing the dialogue forward through questioning (De-Shalit, 2006). According to Kant, probing method helps students to think critically by focusing explicitly on the process of thinking, consequently enlarging learners’ knowledge, experiences and imaginative understanding (Paul & Elder, 2006). Probing Method helps students to develop critical thinking, communication and social skills as they compare and contrast various possibilities in order to draw their conclusions relating the subject matter. It helps students learn how to clearly articulate their ideas as well as to collaborate on tasks effectively by sharing their ideas amongst the group members (Boghossian, 2003).

Despite the benefits of students centered methods such as probing method, curriculum implementation strategies in Kenya are teacher centered (Njuguna, 2007; Boit, Njoki, & Koskey, 2012). According to Njuguna (2007), dissemination of knowledge to the learners is mainly through teacher explanation, dictating notes and drilling. The role of the learner is to listen, understand and remember, for purpose of examination. Studies have shown that use of ineffective methods in curriculum implementation impedes the achievement of stated goals of education (Kibett & Kathuri, 2005; Edward, 2001; Orora, Wachanga, & Keraro, 2005; Patriciah, Johnson, & Changeiywo, 2013).

Statement of the Problem
Teaching methods are key determinants of the success of the teaching and learning process. Conventional methods have over the years been blamed for poor teaching outcomes especially in sciences and other practical subjects. Thus, most of the learners exiting the education system at secondary school level may not have adequate skills and competences necessary for national economic development as well as self-development. One of the teaching method as espoused by Kant’s transcendentalism is probing method. The key function of this method suggested by Kant is to help students develop critical thinking skills, social skills and understanding of curriculum content. This study therefore sought to analyze the relevance of Kant’s probing method on implementation of curriculum in secondary schools of Meru-South Sub County.

LITERATURE REVIEW
Philosophy provides teachers and curriculum designers with framework for planning, implementing and evaluating curriculum in schools (Gutek, 2009). It forms the criterion for determining the aims, means, and ends of curriculum. The aims are statements of value, based on philosophical beliefs; the means represent processes and methods, which reflect philosophical choices; and the ends, can note the facts, concepts, and principles of the knowledge or behavior learned (Howard & Samuel, 2009). According to Allan, Edward and Stacey (2008) there is no single philosophy that should serve as the exclusive guide for making decisions concerning curriculum implementation. Kant’s transcendentalism philosophy is based on the major western philosophies of rationalism and empiricism.

In the Critique of Pure Reason, Kant has demonstrated that empiricism and rationalism necessarily complement each other in the process of gaining knowledge (Kant, 1999). Thus, on one hand, Kant concedes to the arguments of empiricist thinkers, such as Hume, who claim that all knowledge begins in experience, and on the other hand, he admits to rationalists, such as Leibniz, that ideas and thought are essential to knowledge (Broad, 2008). In this, Kant is alluding to transcendental knowledge, which is not derived, exclusively from experience but also from reasoning (Rohlf, 2010). Kant points out that content of curriculum in general is not rationalism, since subjects like sciences focuses more on material realities than on mind and its content, nor is it entirely empiricist since scientific conclusions depends on principle of causality (Annette, 2009).

Kant transcendental philosophy emphasizes student-centered methods in curriculum implementation. Student-centered is an approach that focuses and involves the learner fully in all activities of curriculum implementation. According to Hesson and Shad (2007), applying Student-Centered approach in curriculum implementation promotes students interest, analytical research and critical thinking. The approach also motivates goal-orientated behavior among students and hence improving student achievement (Hesson & Shad, 2007). One of the Student-Centered approaches proposed by Kant for curriculum implementation is the probing Method. According to Chapman (2001), probing Method is a dialogue between teacher and students instigated by continual investigative questions by the teacher. These disciplined dialogues are the pedagogical approach to teaching that encourages participants to seek deeper understanding of questioned concepts (Copeland, 2005).

Studies have been done on the of use of probing method in the process of curriculum. Rachid (2018) explored probing method of instruction in higher level Moroccan English classroom. The results of his study revealed that
probing method is the preeminent approach to critical thinking. The results of his study also indicated that probing method besides providing students with an arena in which to test their self-confidence as critical readers, thinkers, and speakers, it serves students as an insight for viewing the world from different perspectives. His study results further revealed that the role of the in teacher probing method should be limited to that of an observer and facilitator, documenting the participants’ successes and failures and thinking about ways to improve the probing method in the future. He recommended applying the probing method, in Moroccan and non-Moroccan educational contexts as it can create active learners by engaging them in the exploration and evaluation of novel ideas. These findings were consistent with those of other researchers such as Abdullah (2012), Copeland (2005) and Chapman (2001). In the current study, the researcher was keen to establish the relevance of Kant’s probing method in Kenyan situation, given that different countries have different approaches for curriculum implementation.

METHODOLOGY

Research Design
This study adopted descriptive survey research design. The design was used because it allows researchers to study phenomena that do not allow for manipulation of variables (Kothari, 2011). The design was also suitable for collecting descriptive data. According to Wiersma and Jurs (2005) descriptive survey research design is most appropriate when the purpose of the study is to create a detailed description of phenomena. Philosophical approaches such as critical analysis and Conceptual analysis were used to provide basis for a detailed analysis and description of data.

Location of the Study
The study was conducted in public secondary schools in Meru-South Sub County. Meru-South Sub County is located in Tharaka-Nithi County, Kenya. The choice of the location was based on the fact that the researcher was in a position of easily creating a rapport with the respondents. Meru-South Sub County was also accessible to the researcher and that a similar study may not have been conducted in the Sub County.

Study Population
The population for this study was 3,085 subjects comprising of 2,780 students in form three and 305 teachers in 50 secondary schools (Meru South sub county Education office, 2016).

Sampling Procedures and Sample Size
Orodho (2009) defines a sample as a part of the target population, which is thought to be representative of the population. Sampling is the process of selecting a number of individuals or objects from a population such that the selected group contains elements representatives of characteristics found in the entire group (Orodho, 2009). Kathuri and Pals (2005), recommends that a sample size of 341 respondents is sufficient from an accessible population of 3,085 subjects. The researcher used a sample size of 357 respondents to take care of attrition. This comprised of 322 students and 35 heads of academic departments.

To guarantee that all parts of the sub county were well represented, a proportional sample of secondary schools from each of the three divisions was taken, then a sampling frame consisting of the number of schools in each division was constructed and simple random sampling was used to select the one school required as sample. A total number of seven schools were selected from the three divisions. Heads of each of the five academic departments in a seven secondary schools sampled were purposively selected making 35 respondents. Simple random sampling technique was used to select students who participated in the study. The distribution of sample is as shown Table 1.

Table 49. Sample Distribution

<table>
<thead>
<tr>
<th>Division</th>
<th>Number of schools</th>
<th>of Schools Sampled</th>
<th>Students Sampled</th>
<th>Teachers Sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chuka</td>
<td>19</td>
<td>3</td>
<td>138</td>
<td>15</td>
</tr>
<tr>
<td>Magumoni</td>
<td>21</td>
<td>3</td>
<td>138</td>
<td>15</td>
</tr>
<tr>
<td>Igambang'ombe</td>
<td>10</td>
<td>1</td>
<td>46</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>7</td>
<td>322</td>
<td>35</td>
</tr>
</tbody>
</table>
Research Instruments

Data was collected by administering questionnaires to students and teachers. This data collection tool was used because according to Kombo and Tromp (2011) questionnaires are less expensive, time saving in administration and allow respondents freedom to bring out their views and feelings independently. According to Mugenda and Mugenda (1999), questionnaires also offer the advantage of uniformity to all respondents as it gives the same questions. The researcher developed two separate questionnaires for the students and teachers.

Data Analysis

After data collection, data cleaning was done in order to determine the inaccurate, incomplete items or multiple entries in data collection instruments. The cleaned data was coded by assigning a number to each answer in the question. The coded data was then entered to a computer for analysis using Statistical Package for Social Sciences (SPSS) version 20. The research yielded only quantitative data which was analyzed though descriptive statistics using counts, percentages and means. The results of the data analysis were presented using frequency distribution tables and pie charts to enhance clarity and brevity.

RESULTS AND DISCUSSIONS

The objective of the study sought to determine the relevance of Kant’s probing method on curriculum implementation in secondary schools. Effective curriculum implementation ensures that the student has achieved knowledge, skills and attitude as designated in the curriculum plan. Therefore, items on the relevance of Kant’s probing method on implementation of curriculum were constructed based on the domains of knowledge and skills. An item was included in the students’ questionnaire, which sought information on the relevance of Kant’s probing method in knowledge acquisition. The responses from students are as shown in Table 2.

Table 2. Students’ Responses on Relevance of Kant Probing Method in Knowledge Acquisition

<table>
<thead>
<tr>
<th>Kant probing method enables students to …</th>
<th>N</th>
<th>SA (%)</th>
<th>A (%)</th>
<th>U (%)</th>
<th>D (%)</th>
<th>SD (%)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easily understand what they learn</td>
<td>311</td>
<td>54.8</td>
<td>36.8</td>
<td>3.2</td>
<td>3.5</td>
<td>1.6</td>
<td>4.40</td>
</tr>
<tr>
<td>Acquire Knowledge for further education and training.</td>
<td>311</td>
<td>50.5</td>
<td>38.6</td>
<td>4.8</td>
<td>3.9</td>
<td>2.3</td>
<td>4.31</td>
</tr>
<tr>
<td>Easily remember concepts learnt.</td>
<td>311</td>
<td>62.7</td>
<td>28.9</td>
<td>4.2</td>
<td>2.3</td>
<td>1.9</td>
<td>4.48</td>
</tr>
<tr>
<td>Overall Average</td>
<td>311</td>
<td>56.0</td>
<td>34.1</td>
<td>4.1</td>
<td>3.2</td>
<td>1.9</td>
<td>4.40</td>
</tr>
</tbody>
</table>

The information in Table 2 shows that most of the students indicated that learning through Kant probing method enhances students understanding of curriculum content. This is as substantiated by the fact that 54.8% of the students strongly approved that learning through probing questions enables them to understand easily the concepts learnt. A large proportion of students (89.1%) approved and strongly approved that learning through probing questions enables them to acquire adequate knowledge for further education and training. Kant probing method as advocated by Kant’s transcendentalism philosophy helps clarify ideas held by the learners, which in turn helps them to acquire knowledge (Charton, 2015). According to Faith (2011), through probing questions, teacher makes use of the students pre-existing ideas and beliefs to enhance learning and understanding thus, improving their knowledge acquisition. The results of the study as seen in the Table 2 shows that majority of the students (62.7%) in the Meru South Sub County strongly agree that students easily recall concepts that they learn through probing method. The study also sought to establish from the teachers the relevance of Kant probing Method in knowledge acquisition. Their responses were as shown in Table 3.

Table 3. Teachers’ Responses on the Relevance of Kant Probing Method in Knowledge Acquisition

<table>
<thead>
<tr>
<th>Kant probing method enables students to …</th>
<th>N</th>
<th>SA (%)</th>
<th>A (%)</th>
<th>U (%)</th>
<th>D (%)</th>
<th>SD (%)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand what they learn easily</td>
<td>35</td>
<td>0.0</td>
<td>62.9</td>
<td>8.6</td>
<td>28.6</td>
<td>0.0</td>
<td>3.34</td>
</tr>
<tr>
<td>Acquire Knowledge for further education and training.</td>
<td>35</td>
<td>22.9</td>
<td>65.7</td>
<td>8.6</td>
<td>2.9</td>
<td>0.0</td>
<td>4.09</td>
</tr>
<tr>
<td>Easily remember concepts learnt.</td>
<td>35</td>
<td>22.9</td>
<td>68.6</td>
<td>5.7</td>
<td>2.9</td>
<td>0.0</td>
<td>3.71</td>
</tr>
<tr>
<td>Overall Average</td>
<td>35</td>
<td>19.9</td>
<td>65.3</td>
<td>7.6</td>
<td>11.5</td>
<td>0.0</td>
<td>3.71</td>
</tr>
</tbody>
</table>
The findings of the study as shown in the Table 3 indicate that none of the secondary schools teachers in Meru South Sub County strongly believes that students easily understand concepts that they learn through Kant probing method. If we were to compare the opinions of teachers and students on the same subject, there seems to be a disparity. As indicated earlier, contrary to the views of their teachers most the secondary school students (58.4%) in Meru South Sub County strongly believe that students easily understand concepts learnt through probing method. Furthermore, a significant number of teachers 28.6% were of the view that students do not understand concepts learnt through probing method. This is an indication that teachers do not find Kant probing method as an appropriate strategy of enhancing students understanding. The views of teachers in Meru South Sub county that the use of Kant probing questions does not promote students understanding of concepts as indicated in Table 3 differs with Kant’s assertion that, probing method invites students to be co-participants in the process of teaching and learning thus promoting their understanding (Annette, 2009).

Results in Table 3 indicate that largely, the teachers concur with the students that Kant probing method enhances knowledge acquisition as the number of teachers who strongly agree and those who agree that learning through probing questions enables students to acquire adequate knowledge for further education and learning stand at 88.6%. According to Kant, engaging students in collaborative and open-minded dialogue through probing method allows students and teachers to identify and correct misconceptions and misunderstandings (Broad, 2008). Further results in Table 3 shows that majority (68.6%) of the teachers indicated that students easily recall concepts that they learn through Kant probing method. This implies that exposing learners to opportunities and experiences that involves Kant probing allows them grasp subject concept into their minds and will be able to recall these concepts latter when required. Items were included in students’ questionnaire that sought information on the relevance of Kant probing Method in acquisition of skills. The findings are as presented in Table 4.

<p>| Table 4. Students’ Responses on Relevance of Kant Probing Method in Acquisition of Skills |
|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|</p>
<table>
<thead>
<tr>
<th>Learning through probing questions</th>
<th>N</th>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reasoning skills</td>
<td>311</td>
<td>80.5</td>
<td>14.5</td>
<td>2.3</td>
<td>2.7</td>
<td>0.0</td>
<td>4.48</td>
</tr>
<tr>
<td>Ability to socialize with others</td>
<td>311</td>
<td>19.2</td>
<td>18.5</td>
<td>25.8</td>
<td>14.5</td>
<td>10.9</td>
<td>4.28</td>
</tr>
<tr>
<td>Problem solving skills</td>
<td>311</td>
<td>41.8</td>
<td>46.8</td>
<td>5.8</td>
<td>3.0</td>
<td>2.6</td>
<td>4.01</td>
</tr>
<tr>
<td>Critical thinking skills</td>
<td>311</td>
<td>70.4</td>
<td>24.6</td>
<td>2.5</td>
<td>1.8</td>
<td>0.7</td>
<td>4.11</td>
</tr>
<tr>
<td>Overall Average</td>
<td>311</td>
<td>46.2</td>
<td>40.7</td>
<td>5.4</td>
<td>6.4</td>
<td>1.4</td>
<td>4.22</td>
</tr>
</tbody>
</table>

The results of the study as shown in the Table 4 above shows that majority of the students indicated that learning through Kant probing method improves reasoning skills as 80.5% of the students strongly affirmed that. Information in Table 4 also shows that although most of the students indicated that Kant probing method improves students reasoning skills, 2.7% of the students do not agree with this statement. The results presented in Table 4 above also reveals that, there exist diverse views within students on whether learning through Kant probing method promotes socialization skills. A significant percentage of students (25.8%) were indecisive on whether learning through probing questions promotes students’ ability to socialize with others. The results of the study as displayed in the Table 4 above also reveal that learning through Kant’s probing questions enhances development of students’ critical thinking skills. Majority of the students (70.4%) strongly agree that learning through Kant’s probing questions enhances the development of critical thinking skills.

Engaging students in collaborative and open-minded dialogue through probing questions promote independent critical thinking skills (Boghossian, 2003). According to Charton (2015), nurturing of learners critical thinking provide the necessary opportunity for students and teachers to identify and correct misconceptions which in turn leads to acquisition of genuine knowledge. The study established that secondary school students in Meru South Sub County concur that learning through probing questions improves students’ problem solving skills. According to Kant’s transcendentalism philosophy, understanding curriculum contents can enable individuals to develop in aspects of identifying and solving social and economic problems affecting the contemporary society (Annette, 2009). The study sought from the teachers their perception on the relevance of learning though Kant probing Method in acquisition of skills. The findings are as shown in Table 5.
Table 5. Teachers’ Responses on Relevance of Kant Probing Method in Acquisition of Skills

<table>
<thead>
<tr>
<th>Learning through probing questions</th>
<th>N</th>
<th>SA (%)</th>
<th>A (%)</th>
<th>U (%)</th>
<th>D (%)</th>
<th>SD (%)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reasoning skills</td>
<td>35</td>
<td>25.7</td>
<td>68.6</td>
<td>1.9</td>
<td>3.9</td>
<td>0.0</td>
<td>4.17</td>
</tr>
<tr>
<td>Ability to socialize with others</td>
<td>35</td>
<td>57.1</td>
<td>20.0</td>
<td>2.9</td>
<td>20.0</td>
<td>0.0</td>
<td>3.77</td>
</tr>
<tr>
<td>Problem solving skills</td>
<td>35</td>
<td>62.9</td>
<td>14.3</td>
<td>11.4</td>
<td>11.4</td>
<td>0.0</td>
<td>3.80</td>
</tr>
<tr>
<td>Critical thinking skills</td>
<td>35</td>
<td>17.1</td>
<td>80.0</td>
<td>0.0</td>
<td>2.9</td>
<td>0.0</td>
<td>4.11</td>
</tr>
<tr>
<td>Overall Average</td>
<td>35</td>
<td>19.3</td>
<td>67.1</td>
<td>4.3</td>
<td>9.3</td>
<td>0.0</td>
<td>3.96</td>
</tr>
</tbody>
</table>

Table 5 reveals that majority of the teachers indicated that learning through Kant’s probing method enables students to develop critical thinking skills as 68.6% of them support this. From the results of the study, 3.9% of teachers do not find learning through Kant probing method relevant in enhancing students’ development of critical thinking skills while a mere 1.9% of students were undecided. It is evident in Table 5 that a significant portion of secondary school teachers in Meru South Sub County indicated that use of Kant probing method improves students’ problem solving skills. This can be inferred by the fact that 62.9% of the teachers who participated in the study strongly agree that learning through probing questions improves students’ problem solving skills. Moreover, 80.0% of teachers agree that learning through probing questions enables students to develop critical thinking skills while only 2.9% disagree. This is an indication of teachers’ emphasis of the relevance of Kant probing method in developing students’ critical thinking skills. Results in Table 5 also reveal that teachers support that learning Kant through probing method promotes students’ ability to socialize with others. The proportion of teachers who were undecided on whether learning through Kant probing method promotes students’ ability to socialize with others was 2.9% while none of the teachers strongly disagreed that learning Kant probing method promotes students’ ability to socialize with others.

Based on the findings in Tables 5, this study suggests that Kant probing Method if applied in the process of curriculum implementation could be relevant in equipping students with diverse skills. This corresponds with the observations of Becker and Maunsaiyat (2004), that curriculum implementation based on Socratic Method could lead to understanding of curriculum content, as well as promoting positive attitude towards learning. The findings in Table 5 also indicate that, teaching and learning through probing questions promotes developing students critical thinking skills, problem-solving skills, reasoning skills as well as skills to socialize with others. Based on the findings of this study, well-crafted probing questions may lead to new insights, generate discussion, and promote the comprehensive and critical exploration of subject matter, which is a critical characteristic of Kant’s transcendentalism philosophy point of view in education. According to Kant, effective education is that which challenges learners’ through processes such as posing probing questions to develop their critical thinking skills as well as social and collaborative interactions skills.

CONCLUSION

Students and teachers find teaching and learning through Kant’s probing method relevant in enhancing learners to acquire knowledge and skills. Curriculum implementation based on Kant’s probing method was found appropriate in enabling learners to develop critical thinking skills as well as improving their problem solving skills. Moreover, Kant probing method enhances learners understanding of curriculum content and easy retrieval of knowledge gained for application in their daily lives. However, a larger percentage of students over the teachers strongly endorse Kant’s probing method in the process of teaching and learning. This is an indication that, secondary school students would prefer that teachers use this method in the process of curriculum implementation.

RECOMMENDATION

There is need to sensitize teachers on the benefits of integrating Kant’s probing method in the process of curriculum implementation through in-service training. The ministry of education through in-service courses for serving and incorporating aspects of probing method in the course of training aspiring teachers can facilitate this.

REFERENCES


IMPACT OF TARGET SETTING ON TEACHING AND LEARNING IN SECONDARY SCHOOLS IN MAARA SUB COUNTY THARAKA NITHI COUNTY, KENYA

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ABSTRACT
The purpose of teacher performance appraisal is to enhance teaching and learning. However, despite the elaborate process of teachers performance appraisal put in place by the TSC, the students’ academic performance of Maara sub-county in KCSE has been on the decline. The objective was to determine the impact of timely preparation of lesson on teaching and learning in secondary schools in Maara Sub-County. The researcher adopted descriptive survey design and correlational research design. The target population was 532 subjects comprising of 49 principals, 483 teachers teaching in 49 public secondary schools in Maara Sub-county and 1 Quality Assurance and Standards Officer (QASO). Stratified sampling was used to select 35 schools, the principal of each of 35 schools were purposively selected. From the 35 schools selected, 6 teachers from each school were selected randomly giving a total of 210 teachers who took part in the study. The QASO was purposively. A questionnaire for teachers and head teachers was used in collection of data. An interview schedule was used for the QASO. A pilot study was conducted in five schools in the neighboring Chuka Igambang’ombe sub County. A Cronbach’s Alpha coefficient was used for reliability testing. Data collected was both qualitative and quantitative. Analysis of Quantitative data collected was aided by SPSS programme Version 23. Data analysis was done using inferential statistics and results were presented in cross tabulations, frequency and percentages. Pearson’s correlation and linear regression analysis were used in analysing data. The results obtained implied that there was a significant relationship between target setting and teaching and learning in secondary schools in Maara Sub-county. The researcher recommends that target setting should involve the learners. The study is significant to policy makers, TSC, teacher training institutions, teachers and trainees by providing information for informed decisions.

Keywords: Teacher performance, Appraisal, Learner involvement, Informed decisions

INTRODUCTION
Background of the Study
Learning is about how we perceive and understand the world, about making meaning (Marton & Booth, 1997). Teaching involves the transfer of knowledge and skills from the teacher to the student while learning is understood as the degree by which the participants apply the knowledge, abilities and attitudes to required application context (Baldwin & Ford, 1988). Class room teaching is the process that brings the curriculum into contact with students and through which educational goals are to be achieved (Brown, McNamara, Olwen & Jones, 2003). Teaching and learning are indispensable parts of any educational system (Muhammad, Hassan, Saira Yousaf & Noor, 2011).

Countries are giving prime importance to the quality of teachers and national policies have been influenced by the growing realization that teachers have a key role to play in determining the quality of output of educational institutions (Government of Pakistan, 2004). Keither (2010) argues that the role of a teacher is to teach, meaning to facilitate learning of some target curriculum, and there is a sense that if students do not learn, then whatever the teacher is doing does not deserve the label of teaching. Mac Gilchist, (1997) observes that effective teaching and learning constitute a pact between the teacher and the learner. According to Tucker, Stronge and Gareis (2002), on analysis of variables affecting educational outcomes, the teacher has proven to be the most influential school-related force in student achievement. According to Organisation for Economic Cooperation and Development (OECD) (2009), raising teaching performance is the policy direction likely to lead to substantial gains in student learning.

Statement of the Problem
Teaching and learning are the activities that are expected to take place in a school where teachers have the task of facilitating the student to be able learn in accordance to the prescribed objectives of the educational curriculum. Teacher’ performance appraisal provides the basis on which teachers’ performance is evaluated in an effort to ensure that the goals of an education system are being achieved. Despite the elaborate process of teachers performance appraisal put in place by the TSC target setting being a main activity, the students’ of Maara sub-county academic performance in KCSE has been on the decline which raises concern on the teaching and learning process. The study sought to determine the impact of target setting on teaching and learning in Maara Sub County.
Hypothesis of the Study
From the objectives of the study, the following null hypothesis was formulated:

H0: There is no statistically significant relationship between target setting and teaching and learning in secondary school in Maara Sub County.

LITERATURE REVIEW
Teaching and Learning in Secondary Schools
According to Skelton, (2005) it has been recognized that knowledge; skills and understanding are three essential elements of learning, and the ties among them set guidelines for curriculum designers. Skelton, (2005), argues that, important learning abilities and skills such as, critical thinking, creative thinking and metacognitive ability have emerged as important educational goals indicated in the curriculum objectives across different educational systems. Classroom teaching is nearly universal activity designed to help students to learn. The quality of classroom teaching is a key to improving students teaching (Brown, 2003). Particular attention should be paid to the actual process of teaching. Teaching is an important means of passing on values, skills, knowledge and attitudes required for democracy, citizenship, intercultural dialogue and personal development, which plays an essential role in acquisition of the key competences needed for a person to be successfully integrated into economic life (TALIS, 2010).

Teaching and learning in schools have strong social, emotional, and academic components (Wang & Walberg, 2004). Teaching is a complex endeavour, involving classroom management, lesson preparation and organization of teaching and learning activities, creating and maintaining a certain climate, and evaluation and feedback. Effective teaching should be considered only in relation to effective learning. Marton (1997) suggested that academic learning can be judged qualitatively as increase in knowledge and utilization of facts and methods in real situations. Learning is not a single thing; it may involve mastering abstract principles, understanding proofs, remembering factual information, acquiring methods, techniques and approaches, recognition, reasoning, debating ideas, or developing behavior appropriate to specific situations; it is about change.

The manner in which the content is presented to the learner determines the learners reception, retention and application of the content acquired, strategies of teaching, learning are broadly categorized into two: expository strategies (teacher-centered) in which the teacher dominates instructional processes and heuristic strategies (learner-centred) where learners take a greater role in their learning (Nyakundi, 2009). Teacher centered strategies are lecture, narration, demonstration and recitation. These strategies view teachers as people who have monopoly of knowledge, the giver of all knowledge and wisdom. Examples of learner centered strategies are role play, discussion, dramatization, discovery and debates. Learner centered strategies are based on educational philosophies which advocate for learning through experiment or learning by doing and applying of skills in real life situations. Teaching is a purposeful activity in which imaginative activities are directed towards targeted desired learning. Establishing instructional outcomes entails identifying exactly what students will be expected to learn.

The instructional outcomes should reflect important learning and must lend themselves to various forms of assessment so that all students are able to demonstrate their understanding of the content. Evaluation of student learning and the efficacy of the teaching processes is an integral aspect of curriculum design and it also serves as a quality assurance measure. UK Quality Assurance Agency (QAA, 2006) highlights four main purposes of assessment first, pedagogy which aims at promoting student learning by providing the student with feedback normally to help improve his or her performance. Secondly, measurement involving evaluating student knowledge, understanding, abilities or skills. Third, standardization by providing a mark or grade that enables a student’s performance to be established and finally, certification which enables the public (including employers) and higher education providers to know that an individual has attained an appropriate level of achievement that reflects the academic standards set by the awarding institution.

Assessment of student learning outcome plays an important role in classroom instruction. No longer does it signal the end of instruction but is now recognized to be an integral part of instruction. While assessment of learning has always been and will continue to be an important aspect of teaching, it has increasingly come to play an important role in classroom practice. In order to assess student learning outcome for purposes of instruction, teachers have a finger on the pulse of a lesson, monitoring student understanding and, where appropriate, offering feedback to students. When teachers are monitoring student learning, they look carefully at what students are writing, or listen carefully to the questions students ask, in order to gauge whether they require additional activity or explanation in order to grasp the content. For the purpose of monitoring, many teachers create questions specifically to determine
the extent of student understanding and use the questioning technique to ascertain the degree of understanding of every student in the class. Encouraging students and actually teaching them the necessary skills of monitoring their own learning against clear standards is demonstrated by teachers at high levels of performance. Wilson (1996) identifies the following roles and goals of assessment; feedback to the students, diagnostic information, summary data for record keeping, evidence for reports and helping with curriculum revision.

Target Setting
Effective teachers envision instructional goals for students, draw upon knowledge and training to help students achieve success (Nzyoka, 2009). Richard (1994) said if we don’t begin with clear statements of the intended learning, we won’t end with sound assessments. According Coe (2000) setting targets involves identifying a number of actions at a level of detail that is appropriate not only to the learning task, but also to the individual student. This requires a high level of knowledge, diagnostic skill and understanding on the part of the teacher or tutor, not only of the learning task but also of the individual student and the subject. For targets to be both challenging and achievable it is important to consider the process of teaching and learning. Targets need to be negotiated and agreed with the teacher but owned by the learner. This ownership has cognitive, emotional and motivating elements. Without challenge, learners will not be able to achieve to the best of their abilities. If the targets are not achievable, demoralization and disengagement will follow. Managing the relationship between challenge and achievability for the individual student demands a high degree of skill and professional expertise on the part of the teacher.

Targets will generally be expressed as minimum or minimum-acceptable targets. They will be kept under review and may be raised in the light of coursework assessments. Teachers therefore need to approach this as an ongoing process, rather than a once and for all event. The targets can be expressed in one or more of four dimensions; grade achievement in assessments, attainment of outcomes expressed in terms of competencies, timing and sequencing of attainment or/and underpinning processes. Targets need to be measurable so that both learners and teachers can monitor and review progress. Mastery learning involves setting attainable and short-term learning objectives, regular testing, frequent feedback and individualized corrective help (Petty, 1998). Target setting has led to significant improvements in learning outcomes when implemented sensitively and where the prevailing organizational ethos is one of professional trust and improvement, rather than ‘naming and shaming’ (Wang et al. 1993)

One approach to linking student achievement to teacher performance involves building the capacity for teachers and their supervisors to interpret and use student achievement data to set target goals for student improvement. Setting goals based squarely on student performance is a powerful way to enhance professional performance and, in turn, positively impact student achievement. Student Achievement Goal Setting is designed to improve student learning. For many teachers, measures of student performance can be directly documented. There has been growing interest in linking evaluations of teacher effectiveness directly to student learning, with “value-added” models among the most prominent examples of this trend (Cristopher, 2011). Value-added approaches seek to quantify the contribution of specific teachers, schools, or programs to student test performance while taking into account the differences in prior achievement and perhaps other measured characteristics that students bring with them to school (National Research Council and National Academy of Education, 2010). The teacher systematically gathers, analyzes, and uses relevant data to measure student academic progress, guide instructional content and delivery methods, and provide timely constructive feedback to both students and parents throughout the school year. The study sought to determine the impact of target setting on teaching and learning in Maara Sub-County.

Theoretical Framework
The study was guided by the cognitive theory of learning proposed by Jean Piaget and Vygotsky. Cognitive theories of learning which were proposed by scholars such as Jean Piaget (1896 – 1980) and Vygotsky (1896 – 1934). Cognitive theories of learning asserts that learning is a process of drawing connections between what is already known or understood and new information. Thus, prior knowledge is important to the learning process. Cognitive theories of learning proposes that people make connections and draw conclusions based on a sense of what the already know and have experienced. Learning can be viewed, in part, as a matter of encoding and storing information in memory, processing, categorizing and clustering material, and later retrieving this information to be applied at the appropriate times and situations. For learning to occur, facts, concepts and ideas must also be stored, connected to other facts, concepts, and ideas, and built upon. Knowing in advance what the big ideas are and how they relate to each other conceptually helps learners to make sense of information and to remember and use it more flexibly. Cognitivism emphasizes the role that environmental conditions play in facilitating learning. Instructional
explanations, demonstrations, illustrative examples and matched non-examples are all considered to be instrumental in guiding student learning. Similarly, emphasis is placed on the role of practice with corrective feedback.

Teachers are responsible for assisting learners in organizing that information in some optimal way. Teachers use techniques such as advance organizers, analogies, hierarchical relationships, and matrices to help learners relate new information to prior knowledge. Cognitivism imply that the major tasks of the teacher include; understanding that individuals bring various learning experiences to the learning situation which can impact learning outcomes; determining the most effective manner in which to organize and structure new information to tap the learners’ previously acquired knowledge, abilities, and experiences; and arranging practice with feedback so that the new information is effectively and efficiently assimilated and/or accommodated within the learners’ cognitive structure (Stepich & Newby, 1988). The cognitive theory of learning has helped the researcher conceptualize the dependent variable of the study.

METHODOLOGY
The research adopted a descriptive survey design and correlational research design. Descriptive survey was used to explain the status and condition of teacher performance appraisal while correlational design was useful to test for relationship between the independent and dependent variables. The researcher was interested in finding out the impact of performance appraisal on teaching and learning in Maara sub-county, Tharaka Nithi, Kenya, correlation research enabled the researcher to find out whether there was a relationship between teacher performance appraisal and teaching and learning.

Target Population of the Study
The target population of the study was 532 persons comprising of 49 principals and 483 teachers teaching in 49 public secondary schools in Maara Sub-county, Tharaka Nithi, Kenya.

Sample Size
Kathuri and Pals (1993) came up with a guide for determining needed size of a randomly chosen sample from a given finite population of N cases such that the sample proportion P will be within plus or minus 0.05 of the population proportion P with a 95% level of confidence. According to the formula proposed by Kathuri and Pals (1993), for a target population of 536 a minimum sample of 228 respondents is considered an acceptable representation of the target population. The sampling procedure and sample size is presented in Table 1.

Table 50. Summary of Sample from Target Population

<table>
<thead>
<tr>
<th>Target population Category of respondents</th>
<th>Target population</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principals</td>
<td>49</td>
<td>35</td>
</tr>
<tr>
<td>Teachers</td>
<td>483</td>
<td>210</td>
</tr>
<tr>
<td>QASO</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>533</td>
<td>246</td>
</tr>
</tbody>
</table>

For this study stratified sampling was used to select 35 schools each stratum representing 1 National school, 6 extra county school, 12 county school and 30 sub county schools in Maara sub county. 1 National school was purposively selected, 4 extra county out of 6 were selected randomly, 10 county school were randomly selected from 12 county schools and 20 sub county schools were selected randomly from 30 schools that form the sub county stratum. The principal of each of 35 school were purposively selected since they were the immediate supervisors and acted as appraisers. From the 35 schools selected, 6 teachers from each school were selected randomly giving a total of 210 teachers who took part in the study. The QASO was purposively selected given his role in teachers’ performance appraisal. This yielded a total of 246 participants as summarized in Table 1.

Data Analysis
Data analysis procedures that involves both qualitative and quantitative was employed. Qualitative data was analyzed qualitatively using content analysis based on analysis of meaning and implications emanating from respondent information and comparing responses to documented data on performance appraisal in relation to teacher performance appraisal and teaching and learning. Qualitative data was analyzed thematically, whereby similar responses were tallied to come up with frequency counts which were the basis of percentages calculated based on the total number of responses. Quantitative data was analyzed using descriptive statistics such as frequency counts, means and percentages. Quantitative data analysis was done using computer spreadsheet, and Statistical Package for
Social Sciences (SPSS) Version 23.0. Linear regression analysis was used to test study hypothesis. The following regression model was formulated:

\[ Y = \alpha + \beta_1 X_1; \]

Where:
- \( Y \) - Teaching and learning
- \( X_1 \) - Target settings
- \( \alpha \) - Intercept parameter
- \( \beta_1 \) - Coefficients of the independent variables

**FINDINGS AND DISCUSSIONS**

**Teaching and Learning**

The researcher sought to find out the extent to which the respondents agreed or disagreed with statements detailing involvement in teaching and learning. Different sets of activities anchored on a five point Likert type scale ranging from 1 = strongly agree to 5 = strongly disagree were used to measure teaching and learning. The findings are presented in Table 2.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean</th>
<th>Std. Error of mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers ensure strict adherence to the school timetable</td>
<td>2.0530</td>
<td>.08181</td>
</tr>
<tr>
<td>Teaching aids are prepared based on current curriculum</td>
<td>2.1126</td>
<td>.07251</td>
</tr>
<tr>
<td>Teachers give lesson assignment at the end of each lesson</td>
<td>2.1258</td>
<td>.07766</td>
</tr>
<tr>
<td>Learners complete all assignments</td>
<td>2.6358</td>
<td>.09085</td>
</tr>
<tr>
<td>Teachers ensure all students assignments are completed and marked before the beginning of a new lesson</td>
<td>2.6556</td>
<td>.09492</td>
</tr>
<tr>
<td>Learners are evaluated on mastery of content covered in line with current syllabus</td>
<td>2.4437</td>
<td>.21234</td>
</tr>
<tr>
<td>Teachers monitor students’ academic performance and calculate the value addition.</td>
<td>2.4040</td>
<td>.09216</td>
</tr>
<tr>
<td>Teachers evaluate the level of practical skills acquired by the learner at the end of every lesson</td>
<td>2.5298</td>
<td>.08855</td>
</tr>
<tr>
<td>Teachers and learners organize and implement individualized education program</td>
<td>2.4702</td>
<td>.08654</td>
</tr>
<tr>
<td>Teachers and learners integrate appropriate ICT teaching and learning materials</td>
<td>2.4967</td>
<td>.08657</td>
</tr>
<tr>
<td>Learners participate in co-curricular activities</td>
<td>2.3775</td>
<td>.15547</td>
</tr>
<tr>
<td>Learners follow the school rules and regulations which creates a conducive learning environment</td>
<td>2.5166</td>
<td>.10373</td>
</tr>
<tr>
<td>Teachers ensure the syllabus is well covered and in good time</td>
<td>2.3642</td>
<td>.09697</td>
</tr>
<tr>
<td>Overall Mean Score</td>
<td>2.3989</td>
<td>0.1031</td>
</tr>
</tbody>
</table>

The aggregate score of teaching and learning activities was computed as the average of the mean scores of the activities that were used to measure involvement in teaching and learning. Standard error of mean (Std. Error) was also computed. Standard error of mean is a measure of reliability of the study results. It is equal to the standard deviation of the population divided by the square root of the sample size. Standard deviation shows how far the distribution is from the mean. A small standard error implies that the sample mean has a good chance of being close to the population mean and a good estimator of the population mean. On the other hand, a large standard error illustrates that the given sample mean will be a poor estimator of the population mean (Harvill, 1991). Table 2 shows the information collected on teaching and learning the dependent variable.

Most of the respondents agreed that for schools to have the most effective teaching and learning measures to be put in place in order of their priority include; teachers to ensure strict adherence to the school timetable (mean score = 2.0530, Std. Error = .08181), teaching aids be prepared based on current curriculum (mean score =2.1126, Std. Error = .07251) and teachers to give lesson assignment at the end of each lesson (mean score = 2.1258, Std. Error = .07766,) in that order. These findings are consistent with the findings of Kadenyi (2014), who found that planning and preparation of a lesson is seen as the glue that holds the various pieces of learning and teaching together. The
findings are in line with the study by Danielson. (2011), who found out that teachers consistently adhere to school and district policies and procedures, but are willing to work to improve those that may be outdated or ineffective.

On the other hand the activities that reported a lower significance included teachers ensuring all students assignments are completed and marked before a new lesson (mean= 2.6556, Std. Error= .09492), learners completing all assignments (mean= 2.6358, Std. Error= .09085) and teachers evaluating the level of practical skills acquired by the learners at the end of every lesson (mean= 2.5298, Std. Error=.08855). These statement recorded the highest means above the overall mean of 2.3989. The overall mean score for the thirteen activities used to measure teaching and learning was 2.3989, Std. Error .1031. The mean of 2.3989 (agree) shows that the respondent have a general agreement with activities measuring teaching and learning as detailed in Table 2. The small Std. Error of .1031 implies that the sample mean has a good chance of being close to the population mean.

**Challenges encountered during Teaching and Learning**
The researcher sought information on the challenges faced during teaching and learning in secondary schools in Maara Sub County. The information is presented in Table 3.

**Table 3. Challenges faced during Teaching and Learning**

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Maara Sub County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abseentism of students from schools due to lack of schools fees</td>
<td>17%</td>
</tr>
<tr>
<td>Inadequate teaching and learning resources</td>
<td>39%</td>
</tr>
<tr>
<td>Indiscipline of students</td>
<td>15%</td>
</tr>
<tr>
<td>Overcrowded classroom that reduces teacher - learner contact</td>
<td>17%</td>
</tr>
<tr>
<td>Excess workload</td>
<td>12%</td>
</tr>
</tbody>
</table>

Information in Table 3 shows that 39% of respondents identified inadequate teaching and learning materials as a major challenge in ensuring that teaching and learning is effective in secondary schools in Maara Sub County. Abseentism of students from schools due to lack of school fees and overcrowded classroom that reduced teacher-learner contact were cited by 17% of respondents to be a constraint for effective teaching and learning in secondary schools in Maara Sub County. Indiscipline of students in the secondary schools was highlighted by 15% of respondents as a challenge that affect teaching and learning in Maara Sub County.

Excess teacher workload was given by 12% of respondents to be a challenge affecting teaching and learning in Maara Sub County. These findings were consistent with the findings of Yuguda and Yunus (2014) on teachers’ role in improving teaching and learning, where it was observed that there were a few reasons that contribute to low level of teacher performance which included inadequate pay, poor school facilities to facilitate teaching and learning, inadequate school disciplinary policy and students poor work attitudes.

**Ways to Enhance Teaching and Learning in Secondary Schools**
The researcher sought information on ways to enhance teaching and learning in secondary schools. The results are presented in Table 4.

**Table 4. Ways to enhance teaching and learning**

<table>
<thead>
<tr>
<th>Responses</th>
<th>Maara Sub County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide adequate teaching and learning materials</td>
<td>26%</td>
</tr>
<tr>
<td>Reduce teachers workload by the Ministry of Education employing more teachers</td>
<td>25%</td>
</tr>
<tr>
<td>Introduction of workable discipline policies in schools</td>
<td>4%</td>
</tr>
<tr>
<td>Adopt and integrate ICT in teaching and learning</td>
<td>24%</td>
</tr>
<tr>
<td>Motivation of learners by teachers and motivational speakers</td>
<td>13%</td>
</tr>
<tr>
<td>Construction of more classrooms</td>
<td>3%</td>
</tr>
<tr>
<td>Revised Syllabus that is learner centered</td>
<td>4%</td>
</tr>
</tbody>
</table>

Information in Table 4 shows a summary of responses given on ways of improving teaching and learning in secondary schools. Provision of adequate teaching and learning materials was given by 26% of the responses as the best way to enhance teaching and learning. Further, 25% of the respondents highlighted reduction of teachers’ workload as another way to enhance teaching and learning and they recommended that this would be achieved by the Ministry of Education employing more teachers. This will ultimately reduce teacher-pupil ration in secondary
schools. Another 24% of the respondents suggested adoption and integration of ICT in teaching and learning as yet another way to enhance teaching and learning. If this way is adopted, it would lead to adoption of e-learning and to an extent introduction of distance learning in secondary schools.

The findings are consistent with Hsiao-Hsuan Wang's (2002) who noted that integrating information technology into teaching can make learning more diversified and individualized and enhances the learning effectiveness. The findings are consistent with Lewis, Romi, Qui, & Katz, (2005), who noted that teachers’ discipline strategies have been suggested to be a potent force to promote students’ sense of responsibility in the classroom.

**Target Setting**

Target setting entails setting a goal that touch on expected results during a particular set time. Target setting involves identifying a number of actions at a level of detail that is appropriate and measurable. This study aimed at finding out how different aspects of targets setting influence teaching and learning. The findings are presented in table 5.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean</th>
<th>SE of mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers ensure timely preparation of professional documents</td>
<td>2.3510</td>
<td>.07984</td>
</tr>
<tr>
<td>Teachers ensure all lessons are taught as per the school timetable</td>
<td>2.1921</td>
<td>.08598</td>
</tr>
<tr>
<td>Teachers ensure that every lesson has lesson objectives</td>
<td>2.1325</td>
<td>.07439</td>
</tr>
<tr>
<td>Teachers and learners set academic target (mean grade) for each of their classes</td>
<td>2.1060</td>
<td>.07757</td>
</tr>
<tr>
<td>Teachers ensure exams are set, marked and feedback given as per the set deadlines</td>
<td>2.0861</td>
<td>.08961</td>
</tr>
<tr>
<td>Teachers and learners ensure that the learning environment is child friendly, safe and conducive for learning</td>
<td>2.2252</td>
<td>.08972</td>
</tr>
<tr>
<td>Teachers demonstrate an understanding of legal provision in education and the implication of non-compliance</td>
<td>2.3775</td>
<td>.07959</td>
</tr>
<tr>
<td>Teachers identify and nurture learners talent in at least one co-curricular activities</td>
<td>2.3046</td>
<td>.07918</td>
</tr>
<tr>
<td>Teachers plan and participate in teachers, parents and learner meetings</td>
<td>2.2781</td>
<td>.09590</td>
</tr>
<tr>
<td>Teachers maintain punctuality in reporting for duty and lesson attendance</td>
<td>2.3046</td>
<td>.09159</td>
</tr>
<tr>
<td>Teachers identify individual performance gaps and seek solutions through professional development courses</td>
<td>2.4503</td>
<td>.08596</td>
</tr>
<tr>
<td>Overall Mean Score</td>
<td>2.2553</td>
<td>0.0845</td>
</tr>
</tbody>
</table>

As evidenced by Table 5, teachers ensuring that exams are set, marked and feedback given as per the set deadlines (mean = 2.0861, Std.Error = .08961) was agreed by the majority of the respondents to be the most significant activity in enhancing teaching and learning. Second in line was teachers ensuring that every lesson has lesson objectives (mean= 2.1921, Std. Error=.08596). In third position was teachers ensuring that lessons are taught as per the school timetable (mean=2.1921. Std. Error=.08598).

On the other hand teachers identifying individual performance gaps and seeking solutions through professional development courses was least significant (mean=2.4503, Std. Error=.08596) followed by teachers ensuring timely preparation of professional documents (mean=2.3510, Std. Error=.07984). An overall mean score = 2.2553 and std. error of mean= 0.0845 of all the activities used to measure target setting was obtained. This denotes that a majority of respondents agreed that target setting influence teaching and learning. These findings were consistent with Petty (1998), who observed that mastery learning involves setting attainable and short term learning objectives, regularly testing, timely feedback and individualized corrective help.

**Challenges Encountered in Target Setting**

Respondents were asked to indicate the challenges they encountered in target setting. The results are in Table 6. Results in Table 6, shows that 64% of respondents said that setting unrealistic and over ambitious targets makes it hard to attain the set targets while 2% of the respondents listed lack or insufficient funds to support target setting. The findings are consistent with the finding of Coe, (2000) where it was noted that targets need to be negotiated and agreed with the tutor but owned by the learner, this ownership has cognitive, emotional and motivating elements.

**Ways of Improving the Target Setting Process**

The respondents were asked to suggest ways of improving the target setting process. Table 7 presents the results
Table 6. Challenges encountered in Target Setting

<table>
<thead>
<tr>
<th>Comments</th>
<th>Maara Sub County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absenteeism</td>
<td>6%</td>
</tr>
<tr>
<td>Setting high and unrealistic targets which are not achievable</td>
<td>64%</td>
</tr>
<tr>
<td>Lack of interest in subjects by students</td>
<td>6%</td>
</tr>
<tr>
<td>Learners with mixed abilities</td>
<td>9%</td>
</tr>
<tr>
<td>Non uniform entry behavior of different learners</td>
<td>8%</td>
</tr>
<tr>
<td>Lack involvement of learners in target setting</td>
<td>3%</td>
</tr>
<tr>
<td>Occurrence of unforeseen events</td>
<td>3%</td>
</tr>
<tr>
<td>Inadequate resources to implement the set targets</td>
<td>2%</td>
</tr>
</tbody>
</table>

Table 7. Ways of improving the target setting process

<table>
<thead>
<tr>
<th>Comments</th>
<th>Maara Sub County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Involvement of learners in the target setting process</td>
<td>60%</td>
</tr>
<tr>
<td>Involve all stakeholders in the process of target setting</td>
<td>23%</td>
</tr>
<tr>
<td>Set current targets based on past achievement</td>
<td>13%</td>
</tr>
<tr>
<td>Being realistic in setting the targets</td>
<td>4%</td>
</tr>
</tbody>
</table>

Information in Table 7, shows that 60% of respondents identified involvement of learners in the target setting process in secondary schools in Maara Sub County. Additionally, 23% of respondents suggested that there is need to involve all stakeholders in education sector in target setting process. A further 13% of the respondents suggested that the current targets be based on the previous achievement. Minority (4%) of the respondents argued that target setting process should be realistic. These findings are consistent with the findings of Wang and Walberge (2004) who observed that students do not learn alone but rather in collaboration with their teachers, in the company of their peers and with encouragement of their families.

Regression Analysis and Hypothesis Testing

The objective of the study aimed at determining the impact of target setting on teaching and learning in secondary schools in Maara Sub County. Based on this objective, the following hypothesis was tested.

\[ H_0: \text{There is no statistically significant relationship between target setting and teaching and learning in secondary schools in Maara Sub County.} \]

The regression results are presented in Table 8.

Table 8. Regression Results of Target setting and Teaching and Learning

(a) The Goodness of Fit

<table>
<thead>
<tr>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>.655</td>
<td>.429</td>
<td>.425</td>
<td>8.04206</td>
</tr>
</tbody>
</table>

(b) The Overall Significance

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>7228.277</td>
<td>1</td>
<td>7228.277</td>
<td>111.764</td>
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<tr>
<td>Residual</td>
<td>9636.531</td>
<td>233</td>
<td>64.675</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>16864.808</td>
<td>234</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(c) The Individual Significance

<table>
<thead>
<tr>
<th>Unstandardized Coefficients</th>
<th>Std. Error</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>11.135</td>
<td>2.006</td>
<td>5.550</td>
</tr>
<tr>
<td>Target Setting</td>
<td>.808</td>
<td>.076</td>
<td>10.572</td>
</tr>
</tbody>
</table>

Predictors: (Constant), Target Setting
b. Dependent Variable : Teaching and Learning

The results in Table 8 shows that target setting had a significant influence on teaching and learning. The goodness of fit estimated by R-square=0.429 implies that 42.9% variations of teaching and learning can be explained by target setting. The relationship between target setting and teaching and learning was statistically significant since the F statistics= 111.764 had a P-value =0.000<0.05. The regression coefficient value of the computed scores of target
setting was 0.808 with t-test of 10.572 and significance level of P-value=0.000. This implies that one unit increase in target setting would increase teaching and learning proportionally by a factor of 0.81.

The regression equation from Table 8 was stated as:

\[ Y = 11.14 + 0.81X_1 \]

Where,

- \( Y \) = Teaching and learning
- \( X_1 \) = target setting
- 11.14 = constant
- 0.81 = an estimator of the expected increase in teaching in response to a unit increase in target setting.

The constant of 11.14 indicates the level of teaching and learning that would take place when target setting is at zero, while a unit increase in target setting would lead to a 0.81 increase in teaching and learning. On the basis of these findings the null hypothesis that there is no statistically significant relationship between target setting and teaching and learning in secondary schools in Maara Sub County was rejected at 5% significance level. The study concluded that target setting has a positive and statistically significant effect on teaching and learning in secondary schools in Kenya. The finding agrees with Christopher (2011) who found that academic performance is improved if proper target setting is employed in secondary school.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary of the Research Findings

The purpose of this study was to assess the impact of target setting on teaching learning in secondary schools in Maara Sub County in Tharaka Nithi. The study employed questionnaires and interview schedule for data collection. The goodness of fit of the study models was given by R square and the overall significance of the models of the study was tested by F statistic. The t-probability value was used to test the significance of the individual parameters at 5% significance level.

Conclusions

Conclusions of this study were based on the summary of the study. The study established that there exists a positive and statistically significant relationship between target setting and teaching and learning. This implies that effective target setting in terms of time tables, class preparation, lesson objectives, effective exam administration, and well organized co-curricular activities will enhance teaching and learning in secondary schools. The null hypothesis that there is no statistically significant relationship between target setting and teaching and learning in secondary schools in Maara Sub County was not supported by statistical data. Therefore, the study concluded target setting has a positive and statistically significant relationship with teaching and learning in Maara sub County in Tharaka Nithi, Kenya.

Recommendations

From the findings of this study, the following recommendations were made:

- There is need to involve the learners and other education stakeholders in the target setting activities.
- This researcher suggests the following area for further research:
  - Impact of stakeholders’ involvement in target setting process on teaching and learning.

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SPECTRAL PICTURE OF ALMOST SIMILAR OPERATORS

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ABSTRACT
Various results that relate to almost similarity and other classes of operators such as isometry, normal, unitary and compact operators have been extensively discussed. In this paper, we describe the spectral picture of almost similar operators. To be more specific we will describe the spectrum, the spectral radius, the numerical radius as well as the norm of almost similar operators.

Mathematics Subject Classification: 47A05, 47B15, 47B25.

Key words: Almost similarity, spectral picture, norm of almost similar operators

INTRODUCTION
Let H denote a Hilbert space and B(H) denote the Banach algebra of bounded linear operators. If \( T \in B(H) \), then \( T^* \) denotes the self adjoint of \( T \), while \( \sigma(c), r(T), \omega(T) \), \( ||T||, W(T) \) stands for the spectrum, spectral radius, numerical radius, norm and numerical range of \( T \), respectively.

Recall that an operator \( T \in B(H) \) is

- Self-adjoint if \( T^* = T \)
- A projection if \( T^2 = T \) and \( T^* = T \)

Two operators \( T \in B(H) \) and \( S \in B(K) \) are said to be similar if there exists an invertible operator \( N \in B(H,K) \) such that \( NT = SN \) or equivalently \( T = N^{-1}SN \).

Jibril (1996) introduced the concept of almost similar and it was studied further by (Nzimbi et al., 2008) and (Musundi et al., 2013)

Two operators \( A \) and \( B \) are said to be *almost similar* if there exists an invertible operator \( N \) such that the following conditions are satisfied:

\[
A^*A = N^{-1}(B^*B)N \\
A^* + A = N^{-1}(B^* + B)N
\]

MAIN RESULTS
In this section we explicitly establish the spectral picture of almost similar operators.

2.1 Spectral picture of almost similar operators.

To establish the spectral picture of almost similar operators we need the following results:

**Lemma 2.1.1:** Let \( T \) and \( S \) be almost similar self-adjoint operators, then \( T \) and \( S \) are similar

**Proof.** Let \( N \) be an invertible operator such that

\[
T^*T = N^{-1}(S^*S)N \\
S^* + S = N^{-1}(S^* + S)N
\]

(1) \hspace{1cm} (2)

Since

\( T^* = T \) and \( S^* = S \) i.e. self-adjoint

then equality (1) becomes

\[
T^2 = N^{-1}(S^2)N
\]

(3)

and equality (2) becomes

\[
2T = N^{-1}(2S)N
\]

(4)

Dividing both sides of equality (4) by 2, equation (4) collapse to the equality

\( T = N^{-1}(S)N \), i.e. \( T \) is similar to \( S \).

Next we state the Halmos Lemma which is essential in proving the subsequent results.

**Lemma 2.1.2:** (Halmos, 1967)

Suppose that \( A \) and \( B \) are similar operators on a Hilbert space \( H \), then \( A \) and \( B \) have the same Spectrum
Point spectrum
Approximate point spectrum

**Theorem 2.1.3:** If T and S are almost similar projections then \( \sigma(T) = \sigma(S) \).

**Proof:** We first need to show that S and T are similar. Suppose that N is an invertible operator such that

\[
T^*T = N^{-1}(S^*S) N  \tag{5}
\]

and

\[
T^*+T = N^{-1}(S^*+S) N \tag{6}
\]

Since S and T are projections, then they are self-adjoint. According to Lemma 2.1.1 equality (5) and (6) collapse to the equality

\[ T = N^{-1}SN \]

i.e. T is similar to S and by Lemma 2.1.2 above we conclude that

\[ \sigma(T) = \sigma(S) \]

Since projection operators are self-adjoint then theorem 2.1.3 simplifies to the result below.

**Corollary 2.1.4:** If T and S are almost similar self-adjoint operators then \( \sigma(T) = \sigma(S) \).

**Proof**
Suppose T and S are self-adjoint (\( T = T^* \), \( S = S^* \)) and

\[
T^*T = N^{-1}(S^*S) N \tag{5}
\]

\[
T^*+T = N^{-1}(S^*+S) N \tag{6}
\]

That is T and S are similar according to theorem 2.1.3 and therefore have equal spectrum. i.e. \( \sigma(T) = \sigma(S) \).

**Remark 2.1.5:** Almost similarity does not preserve the spectrum of operators because almost similarity does not in general imply similarity.

**Definition 2.1.6:** Let \( \lambda_1 \ldots \lambda_n \) be the (real and complex) eigenvalue of matrix \( T \in \mathbb{C}^{n \times n} \). Then its spectral radius denoted by \( r(T) \) is defined as

\[ r(T) = \max \{ |\lambda_1|, \ldots, |\lambda_n| \} \]

**Theorem 2.1.7:** If T and S are self-adjoint operators which are almost similar then \( r(T) = r(S) \)

**Proof**
Since T and S are almost similar self-adjoint operators, then by Corollary 2.1.4

\[ \sigma(T) = \sigma(S) \]

and by definition 2.1.6, then

\[ r(T) = r(S) \]

Having seen that \( r(T) = r(S) \) in this part of our section 2.1, we now need to know whether two almost similar self-adjoint operators have equal norms and to know these we need the following.

**Proposition 2.1.8:** (Halmos, 1967)
Let \( TeB(H) \) be a self-adjoint operator. Then \( \omega(T) = r(T) \)

**Proposition 2.1.9:** (Skoufranis, 2014)
Let \( TeB(H) \) be a self-adjoint operator. Then \( \omega(T) = || T || \).

**Proposition 2.1.10:** Let \( T, SeB(H) \) be almost similar self-adjoint operator. Then \( || T || = || S || \).

**Proof.** Since T and S are almost similar self-adjoint operators, then by Corollary 4.4.4

\[ \sigma(T) = \sigma(S) \]

and by definition 2.1.6, then

\[ r(T) = r(S) \]

Using Proposition 2.1.8, then

\[ \omega(T) = \omega(S) \]

and so by Proposition 2.1.9

\[ || T || = \omega(T) = \omega(S) = || S || \]

i.e.

\[ || T || = || S || \]

**Remark 2.1.11:** We now conclude that almost similar self-adjoint operators have equal norms.
Definition 2.1.12: An operator $T \in B(H)$ is said to be normaloid if $\omega(T) = \|T\|$

Theorem 2.1.13: Let $T, S \in B(H)$ be self-adjoint and almost similar normaloid operator. Then $\omega(T) = \omega(S)$.

Proof
Since the operators are normaloid and self-adjoint. Then
$\omega(T) = \|T\| = \|S\| = \omega(S)$.
Its evidence that two self-adjoint almost similar normaloid operators have equal numerical radius.

Example
$$T = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$
and
$$S = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$
Both operators are self-adjoint and a simple computation shows that $A$ and $B$ are almost similar with
$$N = \begin{bmatrix} -1 & -1 \\ -1 & -1 \end{bmatrix}$$
A simple computation shows that
$\sigma(T) = \sigma(S) = \{-1, 1\}$.
This implies that
$r(T) = r(S) = 1$
but from Proposition 2.1.8
$\omega(T) = r(T) = r(S) = \omega(S) = 1$
And again using Proposition 2.1.9
$\|T\| = \omega(T) = \omega(S) = \|S\| = 1$.
It is also evident that almost similarity in general does not preserve the norm of operators since almost similar does not in general imply similarity.

References

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MECHANICAL AND STRUCTURAL PROPERTIES OF THE GOLDEN ORB WEAVING SPIDER’S DRAGLINE SILK: A REVIEW

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ABSTRACT
Spider Silk fibers have tensile strengths comparable to steel and some are nearly as elastic as rubber on a weight to weight basis. These properties may be utilized in applications such as suspension bridge wires, bulletproof vests, and medical adhesives. The spider spins its silk at ambient temperatures, low pressures and with water as solvent. Spiders are ectotherms and the ambient temperature affects the spinning speed and the properties of the silk spun. Silk ageing causes the cleavage of hydrogen bonds linking silk proteins. The effect of temperature, spinning speed and aging of the Golden orb weaving spider’s dragline silk on its mechanical and structural properties is scarcely known. This paper reviews related literature on the effects of ambient temperature, spinning speed and aging on the mechanical and structural properties of Spider’s dragline silk. The paper reviews techniques used in spider silk basic studies that include Fourier-transform infrared spectroscopy (FTIR), X-ray diffraction, Dynamic mechanical analysis amongst others. It is expected that different spinning rates will result in different microstructures, implying that the mechanical properties will not be identical. It’s also expected that the mechanical properties of Golden orb weaver spider silk will be varying varies as function of time (silk ageing).

Keywords: Dragline, Ambient, DMA, Microstructures, Ectotherms, Silk

INTRODUCTION
Spider Silk
Spider silk has captured the interest of scientist for a long period, largely due to the unrivaled visual and functional properties of silk fiber and the unique structures that have been generated by various silk-producing species in nature. These structures include orb web structures spun to capture prey, cocoons to house offspring, adhesives used to anchor webs and fibrous tethers to capture flying prey (kluge et. al., 2008). The silk fibers have unique high performance properties that make it a desirable model for artificial fibers and its performance under benign conditions has important implications for biomimicry (Agnarsson et. al., 2008). Spider silk is an outstanding fibrous biomaterial which consists almost entirely of large proteins. Silk fibers have tensile strengths comparable to steel and some silks are nearly as elastic as rubber on a weight to weight basis (Vollath 2005). In combining these two properties, silks reveal a toughness that is two to three times that of synthetic fibers like Nylon or Kevlar (Hinman and Lewis 1992). Spider silk is also antimicrobial, hypoallergenic and completely biodegradable (Römer and Scheibel, 2008). It is regarded as one of the best natural polymer fibers especially in terms of low density, high tensile strength and high elongation until breaking (Lepore et. al., 2016). Ancient Greeks used cobwebs to stop wounds from bleeding and the Aborigines used silk as fishing lines for small fish. Silk was also used as the crosshairs in optical targeting devices such as guns and telescope (Leah et. al., 2010). According to Harmer 2011, ‘spider silk’s toughness and elasticity properties may be utilized in applications such as suspension bridge wires, bulletproof vests, and medical adhesives. Silk produced by major ambulate (MA) is known as dragline silk. It is composed of two different proteins; spidorins 1 and 2. Both proteins contain alanine-rich motifs that form crystalline regions (Hinman and Lewis 1992). Dragline has a combination of elasticity along with a high tensile strength and toughness making it one of the toughest biomaterials (Shao and Vollrath 2001). It is about one-tenth the diameter of human hair (Frank et. al., 2001).

Structure and Function of Various Types of Silk
Spider silk is a fibrous biomaterial of proteins referred to as fibroins. Its inner core is made up of a set of fibers called fibrils assembled though a process illustrated in Figure 1 Fibroins have repeated amino acids sequence motifs that form sticky crystalline structures embedded in an elastic matrix. Other repeated motifs form amorphous spring like regions that allow extensibility (Swanson et. al., 2006).
Figure 1. Structural hierarchy in silk assembly related to assembly into fibers. (a) i) Repeat amino acid Sequences ensemble into b-sheets. The b-sheet joins together soft micelles. As the protein concentration increases, micelles transform into gel-like crystalline structures. (ii) Due to environmental factors, the gel state converts into a more stable b-sheet. The resulting fibrils are extruded as spider silk. Molecular structures of spider silk protein (Kluge et. al., 2008).

These motifs explain the high extensibility and low stiffness of the spider silk (Hinman and Lewis 1992). The strength of dragline comes from the crystalline lattice that composes roughly 10% of the total webbing while its elasticity is as result of the amorphous region (Benmore et. al., 2012 Spiders produce silk from seven different glands with varying mechanical properties.). Silks differ widely in composition, structure and properties depending on the specific source (Altman et. al., 2002). The silk glands are found on the spinnerets, which are located on the spider’s abdomen. The glands include the major and minor ampullate (used for locomotion and web frames), tubuliform (egg-case silk), flagelliform (capture spiral silk in orb-weaving spiders), aggregate (the glue in orb and cobwebs), pyriform (attachment disc for joining fibers) and aciform (prey wrapping silk) (Altman 2014) Flagelliform silk achieves its high extensibility largely due to the interactions of its constituent protein molecules.

An orb web consists of a framework of stiff and strong radial threads that supports a spiral of sticky capture silk, the primary means by which prey adhere to the web. In addition to being covered with viscous glue, capture silk is also highly extensible, which allows the silk to gradually decelerate intercepted insects; thereby preventing prey from ricocheting out of webs (Shao & Vollrath 2001). Thus, the potential for an orb web to retain prey long enough to be captured by the spider depends intimately upon the mechanical properties of these capture threads (Todd & Cherry 2006). Figure 4 shows the pattern of small crystal-forming blocks alternating with larger ‘amorphous’ blocks which is a feature of spider silk fibroins produced in at least three silk glands: the MA gland, the minor ampullate (MI)
gland and the cylindrical (CY) gland (Gosline et. al., 1999). It should be noted that different silk glands express fibroins with different proportions of crystal-forming and amorphous sequence elements, imparting different tendencies for the formation of crystals in their silk fibers.

Major ampullate gland (MA) fibroins

Nc-MA-1: AGAAAAAAAAGGAQQGGGYGGLGSQAGRGGLGGQG
Nc-MA-2: SAAAAAAAAGGYYGGQGGGGYGGGQGGGGYGGGGQ
Table 1. Compares modulus, strength and energy to break of similar materials (Tarakanova and Markus 2012).

<table>
<thead>
<tr>
<th>Material</th>
<th>Modulus (Nm⁻²)</th>
<th>Strength (Nm⁻²)</th>
<th>Energy to break (Jkg⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spider frame silk</td>
<td>$1 \times 10^{10}$</td>
<td>$1 \times 10^9$</td>
<td>$1 \times 10^5$</td>
</tr>
<tr>
<td>Kelvar</td>
<td>$1 \times 10^{11}$</td>
<td>$4 \times 10^9$</td>
<td>$3 \times 10^4$</td>
</tr>
<tr>
<td>Cellulose fibers</td>
<td>$3 \times 10^{10}$</td>
<td>$8 \times 10^8$</td>
<td>$9 \times 10^3$</td>
</tr>
<tr>
<td>High tensile steel</td>
<td>$2 \times 10^{11}$</td>
<td>$2 \times 10^9$</td>
<td>$1 \times 10^3$</td>
</tr>
<tr>
<td>Tendon</td>
<td>$1 \times 10^9$</td>
<td>$1 \times 10^8$</td>
<td>$5 \times 10^2$</td>
</tr>
<tr>
<td>Bone</td>
<td>$2 \times 10^{10}$</td>
<td>$2 \times 10^9$</td>
<td>$3 \times 10^2$</td>
</tr>
<tr>
<td>Rubber</td>
<td>$ca. 10^6$</td>
<td>$1 \times 10^8$</td>
<td>$8 \times 10^4$</td>
</tr>
<tr>
<td>Viscid silk</td>
<td>$3 \times 10^8$</td>
<td>$5 \times 10^7$</td>
<td>$1 \times 10^4$</td>
</tr>
</tbody>
</table>

Force-drawn silkworm fibers compare favorably with Nephila dragline silk, silk spun at 4 mm/s (slow spinning) has a breaking elongation of (37%) for Bombyx silk while the breaking elongation for spider silk at the same speed is 35%. For faster spinning (13mm/s) breaking energies are ($1.2 \times 10^5$J/kg and $1.6 \times 10^5$J/kg) for Bombyx silk and Nephila respectively (Shao et. al., 2002).

**Effects of Environmental Conditions on the Properties of the Spider Silk**

An environmental variable such as temperature, moisture and humidity greatly alters the mechanical properties of spider silk. Water can easily permeate into the fiber and it’s incorporated into the amorphous matrix. This hydration interferes with hydrogen bonds between the amorphous chains, which in turn leads to a loss of rigidity (Vehoff et. al., 2007). When MA silk is immersed in water, it shrinks by approximately 40–50 %, and its mechanical properties change markedly. The initial stiffness drops by three orders of magnitude, and the material behaves like rubber (Gosline et. al., 1999). Studies have shown that Spider silk spun under water displays greater stiffness and resilience compared to silk spun naturally into air. Spiders have the ability to withstand a high temperature variation and humidity variation up to 70% (Koh et. al., 2015). The non-crystalline segments of a spider’s dragline silk are oriented with the silk thread and held together by hydrogen bonds that are broken when a temperature of 198 degrees is reached. The molecular chains separate and become disordered to give the rubber state. In such a state, the crystalline part of the silk still exists and provides multivalent crosslinks (Yang et. al., 2003).

This implies that spider silk is likely to show considerable storage modulus above 198 degrees due to imperfect crystalline structure before its destruction. Spiders are ectotherms and the effect of ambient temperature affects the spider’s behavior. In ectotherms, the external temperature normally affects the body temperature hence the spinning speed(Koh et. al., 2015). It is not yet known how the ambient temperature affects the mechanical properties of Golden Orb weaving spiders’ dragline silk. Silk reeling speed affects the diameter of silk thread. In web building the fiber is spun at approximately 1 cm s⁻¹ while when escaping predator, the rate is an order of magnitude faster. The different spinning rates do not result in identical microstructures, implying that the mechanical and structural properties should not be identical either (Guess et. al., 1997). The spinning speed also affects the breaking energy, stress and strain (Vollrath et. al., 2001). Studies have shown that the protein polypeptide chain network structure of spider dragline silks changes substantially with reeling speed. The β-crystallites exhibit a better alignment at higher reeling speed, implying that the protein macromolecules in amorphous state are better aligned under higher reeling speed and are more efficient in resisting external stress (Zhang &Min 2016). It implies that as the reeling speed changes, the structure of silk produced changes. It is not yet known how these changes, affects the properties of Golden Orb weaving spiders’ silk.

**Degradation of Spider Silk**

Orb weaving spiders such as *L. cornutus* generally renew their webs daily by repairing the old broken silk threads or spinning a new one. Silk reeling speed & body temperature affect the diameter of silk thread hence no orb web silks are normally required to function for longer than ~1 day even if the bridge line and frames of orbs can be very long lasting (Lepore et. al., 2016). Degradation processes that occur in silkworm silk and, in many polymers are also presents in spider silk. Ageing causes the cleavage of hydrogen bonds linking silk proteins, the decay of amino acids via emission of ammonia gas from the silk fiber and even oxidation (Blackedge et. al., 2012). Spider silk shrinks to half its original length & doubles in diameter when stored under water (super contraction). This is because hydrogen bonds are destroyed by water molecules; resulting in molecular chain motion and disorientation. Super contraction also takes place in the presence of NaSCN, urea, methanol and also take place in air (RH% of 90%) (Schebel et. al., 2012).
It is not yet known how the mechanical and structural properties of Golden Orb weaving spider are affected as the spider silk ages.

**Variation of Dragline Silk across Species**

Spiders are a diverse group with more than 37,000 species in over 100 families, all of which produce silk. Dragline silk is spun by all araneomorph spiders most of which do not construct aerial orb-webs (Swanson et. al., 2006). Samples of dragline properties on closely related and ecologically related species have shown that diverse ecological functions have led to dragline silk with different material properties (Todd & Cherry, 2006). *Kukulcania* and *Plectreurys*, from the Haplogynae lineage of spiders, have dragline silks with higher initial stiffness and lower strength than dragline silks spun by the distantly related orb and cobweb weavers (members of the Araneoidea lineage). This contrast could be due to selective pressures resulting from differences in silk use and spider ecology (Swanson et. al., 2006). Different spider species produce draglines with rather different mechanical properties. Fig 4 shows typical stress–strain characteristics of silk reeled from *Euprosthenops* (Pisauridae), *L. mactans* (Theridiidae), *C. citricola* (Araneidae), *A. diadematus* (Argiopidae) and *N. edulis* (Tetragnathidae).

![Stress–strain characteristics of silk reeled from spiders belonging to widely diverging taxa:](image)

*Figure 4. Stress–strain characteristics of silk reeled from spiders belonging to widely diverging taxa: Euprosthenops sp (Pisauridae) (1), C. citricola (Araneidae) (2), L. mactans (Theridiidae) (3), A. diadematus (Araneidae) (4) and N. edulis (Tetragnathidae) (5)*

Each curve is a representative example taken from at least 25 tests of silk from different individuals within the species. Note the large interspecific differences in drag- and structural-line which might or might not correlate to web type: *Euprosthenops*, *Latrodectus* and *Cyrtophora* build 3D space knock-down webs that catch by breaking threads and that have a long active life (several months) whereas *Araneus* and *Nephila* build 2D orb webs that catch by sticking to the prey and swinging through the air and that have a short service life (a few days at most) (Madsen et. al., 1999). The spiders maintained on a high-prey diet gained significantly more weight than spiders on a low-prey diet however, comparison of their dragline silks showed no statistical difference in the amino acid content. When spiders switch from flies to crickets, the serine content of their silks increased (Craig et. al., 2000).

**CONCLUSION**

The mechanical and structural properties of the silk fibers will change as ambient temperature changes. Molecular structure of the fiber will be determined by separating the crystallite and amorphous phase hence determining the interplanar spacing of the silk. This structure will be expected to change as a function of temperature since some compounds will boil off at different critical temperatures. The general structure of the silk is expected to vary as a function of silk’s age (degradation) due to the cleavage of hydrogen bonds linking silk proteins.

**REFERENCE**


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EMERGING DISRUPTIVE INNOVATIONS IMPELLING THE ENERGY SECTOR IN EAST AFRICA

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ABSTRACT
In determination of comparative advantages between organizations and countries in the East Africa Region, innovation, is the key driver to their success or failure. Continuous innovations in products, services and processes has led to the transformation of the global energy sector. Elevated levels of innovations in energy industry is proliferated by strict ecological protocols, surge in utilization of energy and diminishing energy sources. The objective of this paper is to examine the emerging disruptive innovations impelling the Energy Sector in East Africa. This paper reviews the current literature on Disruptive Innovations such as energy saving technologies and renewable energy technologies (solar and wind). The study identified electric vehicles, energy storage, Micro-grids, smart grid networks, early stage technologies, distributed generation, Beyond Meter and High-efficiency gas turbines as technologies with big impact potential in the energy industry in East Africa. Adoption of these innovations has led to the supply of affordable energy, reduced indoor air pollution, combats deforestation and favorable climate. Other benefits associated with disruptive innovations include but not limited to lighting, short cooking time and income savings. Our analysis majorly covers the period of 2000-2018. This study makes a significant contribution to the body of knowledge concerning disruptive innovations impelling the Energy Sector in East Africa, the challenges and benefits of adopting such innovations.

Keywords: Energy, Innovation, Disruptive Innovations, Renewable Energy, Research & Development

INTRODUCTION
Most discussions around disruptive innovations reiterate the earlier critical attention to contemporary social sciences devotion to the field of energy globally. Many nations are taking the issue of disruptive innovations very seriously in order to have a comparative advantage over others through studies and implementation of off-grid and decentralized renewable technologies like solar, biogas, wind, and geothermal. According to Trott (2012), innovation is not only an action but an entire process of interrelated sub-processes. It is not just commencement of a new idea, nor the discovery of a new device, nor is the discovery of a new market, innovation combination of all these things.

Innovation can be considered as new technologies, paradigms, cultures, behaviours and norms which have continuously changed through inventions and disseminations with both intended and unintended consequences. According to Rogers (2003) innovation is an idea, practice(s) or object that is perceived new to an individual or other unit of adoption. Disruption is an alteration in the social system. Disruption Innovation Process is the interaction between society and technology which culminates into either positive or negative changes in the adopter’s daily lives or their social systems. Positive Disruption accrue through the benefits of innovation as new lifestyle enhances the adopter’s well-being and social economic status. Negative Disruption are the changes in the social system that are perceived as sacrifices or the opportunity cost to realize the adoption of an innovation.

Disruptive Innovation is a term adopted by industries to define situations where new technologies or new business models are implemented and outperform the market in which they operate to transform the various companies in the industries (García, Carlos, & García, 2018). Christensen’s Disruptive Innovation Theory is the most influential theory in the academic and management literature. This is not only reflected in his bestselling books “The Innovator’s Solution” and “The Innovator’s Dilemma” but also in the discussion and follow-up the work that his theory created among academics and managers. In its original formulation Christensen (2006) focused primarily on technological innovation and explored how new technologies came to surpass seemingly superior technologies in a market. According to Rogers (2003) Innovation Diffusion Theory is the adoption of an innovation as the best cause of action available. He further defines it as a process by which alteration occurs in the structure of a social system.

Statement of the Problem
With continuous demand for energy in the world making it a basic need and for calls to have better and efficient ways of production and storage through Research and Development, the societal shift and focus on the green and environmental friendly sources has called for innovation especially in renewable sources as they are in abundance with little negative externality to the ecology hence greatly disrupting the status quo in overall energy sector.
Research Objectives and Questions
To find out the innovations in the energy sector and to determine the emerging disruptive innovations affecting the energy sector in East Africa. The following pertinent questions guided the study: What are the forms of Energy available in East Africa? Which energy sector innovations have been are experienced in East Africa and What innovations in the energy sector is East Africa likely to experience in future?

LITERATURE REVIEW
Disruption Innovation Theory
In the 1990s Christensen enriched the academic world with introduction of the Disruption Innovation Theory (DIT) that has continuously gained interest over the years as researchers study the disruptive innovations. Discussions around DIT focuses on how firms are prepared to confront the challenges associated with innovations and disruptors (van Balen, Tarakci, & Sood, 2019). This theory is very significant as it focuses on primary technological innovation and how they seemingly surpassed the superior technologies in the market over time.

Dewar & Dutton (1986) emphasized the incremental progress that was made to further innovation thinking. Later in the 1990s, the father of DIT enriched the argument further through the preposition and categorization of sustaining versus disruptive innovation, Jans, Denters, Need, & Van Gerven (2016),opines that sustaining innovation established an existing set of clients and shareholders while disruptive innovation is never initially attractive to warrant any investment and development yet in the long run it matures and considerably grows leading to the capturing of a huge percentage of the existing incumbent market.

The fascination in academia and practical business world of this phenomenon where established market actors being better at sustaining innovation while new entrants are good at disruptive innovation. The established market actors compete for a limited market share hence the need to introduce new products and service which is product innovations, and become more efficient and shrink their production costs which is process innovation (Scholten & Kunneke, 2016). This was true in the European Market during the energy liberation phase that were characterized by high pace and intensity in innovation leading to the development of the two dimensions that is disruptive demand-sided or component innovation and disruptive supply-side or architectural innovation.

Disruptive Innovation Theory has four elements. They include: i) the incumbents are improving along a trajectory of innovation it results from sustaining innovation through the yearly improvements that firms grind out, there is improvement in few established value areas, ii) the pace of sustaining innovation overshoots customer needs, there is outstripping of the value proposition to what the customer needs in a particular tier of the market, iii) incumbents have the capability to respond but fail to exploit it, managers fail to employ and effectively combat the potential disruptors yet they have capabilities to do so, firms with disruptive innovation avoid head on competition as they target low end customers, iv) incumbents flounder as a result of disruption, this is the failure framework that indicates the circumstances to gain foot hold in new and low end markets indicating that disruptors will ultimately crush the incumbents (Christensen, Raynor, Rory, & McDonald, 2015).

Warbroek & Hoopes (2017) define the steps towards innovation as the following; i) Over-equipped premium products that exceed the needs of the average mass customers, ii) the successful incumbent solely focuses on the high-end market with high revenues from its premium products, while the company ignores the low-end (or new) market where new products with less revenues and only a small customer base are located, iii) a new market entrant focuses on the low-end market or a new market with a new product that at first glance is less interesting from an Return On Investment perspective and from the perspective of the average mass-customer as well. Therefore, the incumbent does not bother much about the new competitor.

According to Butenko & Lauroche (2015), In Germany incumbent utilities did not actively invest significant capital in renewables until 2006 when the feed in tariffs were introduced and secured a stable Return on Investment on renewable generators over a period of 20 years. This disruption of renewables entered the market at the lower-end level with low revenues and open new market segment such as photovoltaic power plants that can be constructed on any roof or balcony. The Renewable energy offered a new feature of zero carbon dioxide emissions to the investors targeting low end and new market although the incumbents did not invest in the renewable energy only private investors put significant capital investment because the Return on Investment of the feed in tariff were sufficient for private investors (Bennet, 2013). Jordan & Huitene (2014) argue that Disruptive Innovation Theory reduces revenue on premium products where renewable push conventional power plant out of the market through merit-order effect.
by reducing the average wholesale electricity price and full-load hours of conventional power plant especially gas-fired power plant by increasing market share of renewable energy.

**Job-To-Be-Done Theory**

Ulwick & Hamilton (2016) states that this theory is comprised of set principles that explain how to make marketing more effective and innovation more predictable by focusing on the customer’s job to be done. It comprises of nine building blocks for predictable growth and they include, i) people buy products and services to get the job done, here there is clarification of the target customer and the job it’s going to help the customer accomplish with the products and services it creates, ii) jobs are functional with emotional and social component, this is put into practice with the customers defining the market, the emotional and social jobs associated with the jobs to be done thus the statements can be captured, quantified and used to inform a variety of marketing and development decision, iii) job to done is stable over time, the leverage of this tenet is the recognition that a Company’s short and long term strategy should never change and should always help customers get the entire job done cheaply on a single product platform, iv) a job to be done is solution agnostic, it calls for competition as a home grown solution to get the job done which helps the company avoid disruption through technological advancement.

Ulwick (2017) further continues to explain the following blocks, (v) success comes from making the job the unit of analysis, a job map is created that is different from a customer journey’s map describing the step by step flow by the customer to get the job done through the identification of why and where customers are struggling to get the job done, brainstorm the ideas of new offering and determine in advance which ideas will help the customers get the job done best, vi) a deep understanding of the customer’s job makes marketing more effective and innovation far more predictable here the theory of job to be done encourages teams to focus on the customers’ needs through better positioning, sell off and improving firms products of the existing firms and the continuous creation of new products and services, vii) People want products and services that will help them get a job done better and/or more cheaply, that comprehend the existence of the different types within the market forms the basis for a different way of thinking about the growth strategy enhancing the focus on the principle on the matrix of jobs to be done that helps us to elaborate on the dynamics of disruptive innovation, viii) People seek out products and services that enable them to get the entire job done on a single platform meaning that products and services naturally evolve to help customers get the entire job done on one pedestal, through the job map that will give the blue print for ultimate improvement, ix) Innovation becomes predictable when needs are defined as the metrics customers use to measure success when getting the job done which will involve knowing which product or service concept will get the job done best early in the product planning before the development is key to predictable and profitable innovation (Ulwick & Hamilton, 2016).

**Innovation Diffusion Theory**

Rogers & Everett (1983) states that this theory explains how, why, and at what rate new concepts and technologies blowout. The communication of an innovation over time among contributors through certain channels of a social system is known as diffusion. This theory focuses on five essential areas, i) features of an innovation that may influence its adoption, ii) decision-making process when entities are contemplating adopting a new concept, product or idea, iii) physiognomies of entities associated with adoption of an innovation, iv) consequences of adopting an innovation to individuals and communities; and iv) communication channels to be embraced in the adoption process.

Dearing & Cox (2018) identifies new idea, innovation itself, communication channels and a social system as the four main elements of the Innovation Diffusion Theory. The theory has is influenced by several players, i) Innovators, who are individuals that are risk averse this allows them to adopt technologies that would fail but their financial liquidity helps them absorb these failures, ii) Early adopters- these are persons of a higher social status, advanced education, financial liquidity and will readily accept and try out new innovations, iii) Early majority, are individuals of above average social status they take a significantly longer time to adopt to innovations compared to early adopters and innovators and they form the majority of the market, iv) Late majority, these individuals are skeptical about innovations, they adopt innovations after the average participants, have below average social status, little liquidity and show little to no opinion leadership, v) laggards, these are the last individuals to adopt an innovation, they have an aversion to change, they are focused on the tradition, lowest social status and financial liquidity and their social life is limited to family and close friends only (Dearing & Cox, 2018).

Ismail Sahin (2006) states that the Innovation Diffusion Theory entails a five-step decision making process namely; i) Awareness- where an individual is first exposed to an innovation but lacks information about the innovation hence is inspired to find out more information about the innovation, ii) Interest- where an individual shows interest in the
innovation and actively seeks related information and details, iii) Evaluation- the individual weighs the advantages and disadvantages of using the innovation and decides whether to adopt or reject the innovation, iv) Trial- where the individual implements the innovation at varying degrees depending on the situation, the party determines the usefulness of the innovation and seek further information and, v) Adoption-the individual finalizes the decision to adopt the innovation.

Empirical Review
There are five types of innovation: introducing a new product, entering a new market, implementing a new organogram, implementing a new production method and introducing a new marketing concept ((Nyga-Łukaszewska, 2016). According to Schumpeter (1934), continuous economic challenges facing diverse society members continuously fans innovation. Kotler (1994) introduced a new line of rationality that indicates, a new product or service will lead to new market creation, championing of a new line of goods, complement the current product or service line, represent elevated characteristics, shrinking costs while satisfying customer needs.

Schumpeter(1934) and Kotler (1994) approaches have been combined by Drucer (2014) to emphasize their differentiation based on impact. There is continuous complimentary, radical, additive and incremental innovation is not limited to the production and organizational processes alone but also on the product itself. Rothwell (1994) extricates the five models of innovation as: i) technology push models, positive societal attitudes towards scientific advances in industrial innovation post the second world war for about 20 years, ii) Demand-oriented innovation which focused on the needs of the market for about a decade after that, iii) coupling model of innovation, which developed new models based on technological capabilities and market need, iv) Parallel/Integrated models, this encompassed supplier integrated into new product development while working with other departments on product development, v) company-outside approach, that included customer feedback in the innovation process and this approach is used presently.

Hoppe, Butenko, & Heldeweg (2018) identifies blind spots commonly found in retailer companies which are attributed to a narrow innovation approach and they include, i) Rapid development of battery storage, ii) Ecosystem convergence, iii) New market entrants, iv) Regulatory Environment, v) Cyber Threats. Rapid development of battery storage -the continuous innovation has led to cost reduction, performance improvement and new application for battery storage at pace that has been surprising to so many. The new developments in this field is the new business models that aggregate customer sited storage to avoid a range of service to utilities, grid operators and electricity customers (Fuchs, 2014).

Ecosystem Convergence- There has been a rise in ecosystem convergence and at times collusion in new innovations like smart cities, internet of things, microgrids, renewable power, self-driving vehicles, energy management and battery storage (Hannon, 2012). New Market Entrants-The rise in technology is attracting new players and more competition into the value chain making it easier for companies to implement new business models through start-ups and established players from adjacent industries to enter the energy sector (Dombrowski & Gholz, 2009).

Regulatory Environment- The regulatory structures in many parts of the world are yet to catch up with the disruptions in the energy sector. Policy Constraints failed to show how effectively to adopt to disruption since incentives are not going to be aligned with the new priorities like decarbonization, decentralization and digitization. Through incentivization of technology enabled business models like energy storage, predictive analytics and forecasting are increasingly providing an opportunity for collaborative innovation (Bento & Fontes, 2019).

Cyber Threats- with cyber- attacks making headlines around the world and the lack of awareness has provided a blind spot in many energy companies as there is inadequate realization of what it takes to stay ahead of the rapidly evolving threat landscape. This threat is expected to be more complicated in the power sector as the need to adopt smart technologies leveraging internet of things and digitization of the back-office systems meaning that the corporate office systems and operational technologies are becoming more intertwined and interdependent than before. Many power companies can reduce their chances of being blind-sided by the above five vulnerabilities by adjusting the approach to innovation and think more broadly (IRENA, 2019).

Renewable energy sources replenish themselves naturally without being depleted in the earth; they include bioenergy, hydropower, geothermal energy, solar energy, wind energy and ocean energy. Ensuring reliable and stable supply of energy is essential for the economic of a country because energy is used for heating, industrial
equipment, lighting and transport. Renewable energy supplies reduce the emission of greenhouse gases when replaced by fossil fuels. Renewable energy supplies should be sustainable since they are obtained naturally, these energies must be limitless and cause no harm to the environment (Twidell & Weir, 2015).

Renewable technologies are considered as clean sources of energy and optimal use of these resources decreases environmental impacts, produces minimum secondary waste and are sustainable based on the current and future economic and social needs. Renewable energy technologies provide an exceptional opportunity for mitigation of greenhouse gas emission and reducing global warming through substituting conventional energy sources (Panwar, Kaushik, & Kothari, 2011).

Ajibola, Ajala, Akanmu, & Balogun (2018) discusses renewable energy examples as; hydropower is a form of kinetic energy that results from the movement of water from the river following through a turbine and is translated into electricity. Geothermal Energy is heat that is stored in the crust of the earth to generate electricity by means of Geothermal plant (Salazars, Munoz & Ospino, 2017). Solar Energy is usable energy generated from the sun in form of thermal that is captured through photovoltaic solar panels that convert the rays into usable electricity. According to Manwell, McGowan, & Rogers (2010) wind energy has taken a lead as an important source of World’s energy and it harnesses kinetic energy from moving air as the wind turbines convert the energy of wind into electricity. Bioenergy is a form is renewable energy that is derived from living materials known as biomass which can be used to produce transport fuel, heat and electricity. Ocean Energy is a form of energy where a variety of extraction options including but not limited to waves, tides, ocean currents, ocean thermal energy, salinity gradients, marine biomass and sub marine geothermal energy are harnessed through potential and kinetic energy components to generate electricity (Rusu & Onea, 2018).

WinDForce Management Services (2013) said biodigesters are used anaerobically to decompose biodegradable materials such as kitchen waste, human and animal waste to produce biogas (methane, Carbon-dioxide and hydrogen sulphate and some bio-slurry). Biogas is used in lighting, cooking and electricity generation while the slurry is used as fertilizer. In East Africa, Kenya specifically, biodigesters were introduced in the 50s, followed by Tanzania in the 70s while in Burundi, Rwanda and Uganda followed later on through the support of German Technical Corporation and WinRock International. Briquettes and pellets are made from crop residue as wood and charcoal alternatives in Rwanda, Namibia, Kenya and Egypt. African sugar industry has invested in generating electricity and heat required at the factory using sugarcane bagasse to ensure proper utilization of bagasse.

Morocco has the largest installed wind capacity in Africa. Kenya has not been left behind either with the recent installation and commissioning of a 300Megawatts wind farm in Marsabit County increasing the installed capacity to approximately 325 Megawatts, there is an additional ongoing Kipeto wind power estimated to be 100 Megawatts will push the installed capacity to over 400 mw once the project is completed. The Global Energy Wind Council estimate that Africa will have will have well over 86 Gigawatts of Wind Power by 2030 (Kazimierczuk, 2019).

Africa is believed to have a lot of hydroelectric power resources with a technical feasibility of 92% of the areas with potential. The ongoing Renaissance Dam in Ethiopia with an estimated 6 Gigawatts is expected to expand electricity supply within the East African region to support the growing economies. According to Electricity Regulatory Authority (2019) the installed hydropower capacity in Uganda is 933 Megawatts. Tanzania has an installed hydropower capacity of 561 Megawatts according to Tanzania Electric Supply Company Limited, 2019. KenGen in Kenya has an installed hydropower capacity of 818 Megawatts drawn from both its large and small power stations accounting for over 50% of the total installed capacity (Owiro, Poquillon, Njonjo, & Odour, 2015).

The East African Rift Valley is endowed with a huge Geothermal potential estimated to be over 15,000 Megawatts. Kenya has taken a leading role and has been able to generate up to 700 Megawatts currently with more discovery and exploration ongoing. The different East African Countries of Ethiopia, Uganda, Zambia, Djibouti, Malawi, Eritrea and Tanzania are at different levels of Geothermal research/exploration and it is estimated they have a great electricity generation potential (Johnstone & Kivimaa, 2018).

According to Tsuo, Chen, & Pai, (2010), Solar energy is a clean inexpensive renewable power that is harvestable anyway in the world as it’s a limitless source of power as the sources are infinite. Solar energy is steadily becoming a larger part of the World’s energy profile due to cost reductions making it more competitive. The combination with solar batteries to store electricity which can be drawn during low solar production periods. This combination
provides added benefits from reliability, resilience and lower cost power. According to Electricity Regulatory Authority, Uganda has installed solar capacity 51 Megawatts. According to Rural Electrification and Renewable Energy Corporation, Kenya has an installed solar capacity of 50 Megawatts.

Innovations in the Energy Future

Innovations in the Energy Industry has been facilitated by the following enablers, i) reaching price and performance parity on and off the grid, ii) Cost effective and reliable grid integration, iii) Technology for automated, intelligent, block chain and transformed renewables, iv) smart renewable cities, v) community energy on and off the grid, vi) emerging markets as leading markets, and vii) Growing scope of corporate involvement (Economics, 2012).

Verbong and Loorbach (2012) noted a shift in energy dynamics to a material phase characterized by massive actual investment in infrastructure from futuristic, scenarios and visions. With greater interests at stake, Governments are more concerned to ensure that they derive economic benefit from the energy policy. In most economies the focus has shifted to industrial strategy and clean growth. The provisional UK Industrial Strategy has a list of energy innovation priorities: smart systems, electric vehicles, battery storage technologies and hydrogen systems.

According to Fuchs (2014), the cost of electricity storage has been falling greatly leading to the development of innovative approaches that increase the flexibility of the system. Some of the benefits of these storage is the back up support during off peak demand thus reducing the investment requirement during the peak hours. Some of the innovations under electricity storage are; i) utility scale batteries that are associated with the provision of controllable and firm generation as a grid support function. Their contribution includes that there is effective integration of local renewable energy, some peak loads profile, provides flexibility in the system through facilitation of demand responses and enhances the maximization of self-consumption through cost cutting of the renewables. They also provide load shifting, ancillary services, capacity reserves, reliability to isolated grids and offsetting transmission and distribution upgrades. ii) Behind the Meter Batteries, usually located next to the site of energy usage and downstream next to the customers. In 2007, South Australia installed a 100MW/129 MWh battery storage system that is charged by wind energy, the storage system then delivers electricity during peak hours this helps to maintain reliable operations while lowering ancillary service grid cost to consumers. Together with digital technologies, Battery storage is changing the power sector paradigms and opening new doors to new applications that unlock system flexibility(Renewable & Agency, 2019).

Johnstone & Kivimaa (2018) states that electrification occurs through decarbonizing end user sectors vide renewable electricity and flexibility in integration of more renewables in power systems. Innovations under Electrification of end-use sectors include, i) Electric vehicle charging enabling the vehicles to be integrated into the power system in a grid and user-friendly way. It helps mitigate curtailment of renewables and additional infrastructure cost. Power could be brought back to the grid through vehicle to grid. Oil and Gas companies are entering the power sector as the demand for oil and gas decreases through electrification of the transport sector where Electric Vehicle chargers have been installed in petrol stations, ii) Renewable-Power-to-Heat is useful in the heating of buildings and industrial processes. It could also store energy in large scale through thermal storage. It could help in transforming renewable energy into heat and help decarbonize other energy sectors, iii) Renewable Power to Hydrogen, hydrogen is produced through electrolysis and used as a medium storage which could be distributed to users in re-proposed grids. The hydrogen could store large volumes of energy for a long duration (Johnstone & Kivimaa, 2018).

Several Power-To-Hydrogen Projects have been implemented in the world such as, i) Hystock in Netherlands which is the first power-to-gas facility in Netherlands. The project supplies electricity required to generate hydrogen from water and is located next to a salt cavern that is used as a buffer to store the produced hydrogen that is inserted into storage cylinders and transported to end-users (Energy Stock, 2018), ii) Hy Balance in Denmark where excess wind power is used to produce hydrogen by electrolysis that helps balance the grid, then produce hydrogen which is used in transport and industrial sectors in Hobro, Denmark, iii) Refhyne in Germany, established at a large oil refinery to provide the hydrogen required for refinery operations (Energy Stock, 2018). According to Energy Stock (2018), Power-to-heat has had a massive expansion in Denmark where electric boilers and heat pumps are designed to utilize the excess wind generation in Western Denmark to cater for the high demands for heat during winter.

Hoppe et al., (2018) defines digitalization as the conversion of data into value for the power sector. The gathered information provides a pattern that proactively monitors the grid and reduce outages. These technologies help reshape the energy system through massive data collection and analysis, enhancing controllability and increased
flexibility. Energy innovations facilitated by digitalization are; i) Internet of Things enabling real time communication through internet among the different devices across the grid this could increase flexibility through remote management. Decreasing uncertainty improved renewable energy forecasting. All Nordic countries are moving towards the implementation of data hubs for electricity meter data and market processes. Transmission system operators in Denmark, Finland, Norway and Sweden are responsible for introducing a data hub for each of the electricity retail markets (NordREG, 2018). ii) Artificial Intelligence and Big Data, this combination is an important development that has enabled the processing of sufficiently sized data sets providing meaningful learning for energy market applications. These combinations increase the accuracy level of energy forecasting, improved operations of the system and better management of the distributed resources and improving asset management through remote monitoring and analysis (Nyga-Lukaszewska, 2016). Information Technology companies are entering the power sector industry at different levels, they are developing various new applications in the sector to provide new services to customers, to ensure energy efficiency and demand management, to facilitate renewable energy forecasting, energy trading and mini-grid operation internet of things technologies (Energy Stock, 2018).

According to PWC (2016) Blockchain is a technology that can securely record all transactions taking place on a given network. Blockchain allows; increased direct trading and sharing of verifiable information, elimination of middle men thus enhancing small scale operating models, flexibility in the system that enables centralization of services into the grid and enhancement of cyber security benefits. Germany, Netherlands and the United States are the top three countries to pilot blockchain initiatives in the energy sector. Brooklyn Microgrid, a start-up in the New York developed a pilot microgrid using Blockchain technology where electricity producing residents and businesses can sell their surplus to a network that is connected to other neighborhoods participants. The Microgrid interconnects the users in a reliable way, the platform allows peer-to-peer transactions by taking advantage of blockchain where the electricity is bought and sold by local community through their utility bills, pricing is based on supply-demand curve (Lacerda & van den Bergh, 2014).

Kempener et al (2013) assets that mini grid solutions offer reliable and green energy to both on and off while super grids are transporting renewable energy over long distances. Mini grids technology is present in the following forms; i) Renewable mini grids that are integrated energy infrastructures that combine loads and renewable energy resources that are self-sustaining and are made up of intelligence switching and protection, controller and energy storage. The provide flexibility and frequency response reducing grid congestion and load management, ii) Super grids they combine renewable energy generation and power log centers across long distances with fewer line losses hence reducing the electricity cost transport from remotely located renewable sources to distant consumers(M. Rogers, 2012). Conventional Thermal Generators are made flexible through retrofitting certain physical component and making operational modification in order to achieve lower minimum load and shorter start up times this increases flexibility and integration in the system, profitability of conventional generators (Kim & Wilson, 2019) According to Smith (2015), Consumers are quickly becoming prosumers hence can ignite and extract power to and from the grid respectively. Consumers have been empowered by the following innovations; i) Aggregators operate multiple energy sources creating sensible capacity giving them the ability to sell wholesale electricity to the market. Aggregators allows for system flexibility through smoother integration of distributed energy resources in the world, ii) peer-to-peer-electricity trading that encourages more renewable energy distributed generation and increased use of local energy resources. It provides an online market place for energy that is transparent and fairly balanced, iii) Energy as a service; this is the shift from selling Kilowatt hours to selling services to customers. It enables deployment of distributed generation and supports demand side management through unlocking of demand side flexibility (Smith, 2015).

Based on study by Lacerda & van den Bergh (2014) that identified the need for environmental concern and sustainability goals led to the emergence of these business models that enable supply of renewable energy. They include; i) community ownership models which are the collective ownership and management of energy related assets bringing benefits to the community members which encourages deployment of energy from sustainable local renewable energy sources, ii) Pay-as-you-go models that allows customers to pay directly for the service they use and they do not receive any service that they have not subscribed to making the customers have a greater control over their consumption and spending (Lacerda & van den Bergh, 2014).

According to IRENA (2019), Digitalization, decentralization and electrification has led to new markets where prices and services are properly based and remunerates all actors that are able to provide these services. Innovative Wholesale Market Design that is facilitated through the changes in the rules of the power market leading to
adaptability in the new markets with an increased value flexibility behavior that is needed to counteract the short-term variability and uncertainty of renewables that calls for new product designs and new participants allowed to offer the services. i) Increasing the time granularity in electricity markets through the introduction of products like 15 minutes contracts that shows a quicker way of adaptability to the ever-changing conditions due to short time leads, ii) Increasing of the space granularity in electricity markets by use of zonal prices at both distribution and transmission levels capturing the inefficiencies or constraints if any. iii) Innovative ancillary services that are adopted to increase the flexibility of the system to incentivize the first responses and enhance the remuneration of each of the services. iv) Redesigning of the capacity markets which ensures that there is adequacies in the system in the long term and the enhancement could be done through the participation of the renewables in the capacity markets like combination of wind-solar and battery projects, flexibility of the capacity market and the allowance of cross border inter connections to participate in capacity markets, v) Regional markets through the harmonization of rules and consolidation which balances areas and increases the flexibility and reduces the costs in the long-run (Renewable & Agency, 2019).

Hoppe et al., (2018) said decentralization of power systems has been enabled through emerging distributed energy resources that are connected to the end users such as rooftop solar PV, Micro wind turbines, battery energy storage systems and plug-in electric vehicles. For residential consumers, the availability of smart home devices has spurred the monitoring and control of electricity consumption. Commercial and industrial consumers are analyzing options to reduce the cost of electricity procurement by shifting to renewable energy-based sources of generation such as rooftop solar PV and adopting smart devices that can operate, monitor, control and optimize energy consumption.

In 2016, Great Britain had the largest photovoltaic installations in the entire Europe. They adopted the method of payment for the amount of power that is generated and exported. Similarly, Cyprus made it mandatory for photovoltaic installations on every new residential structure. The United States has the second largest global market share of photovoltaic installations at 20%, this has been enhanced through federally assisted housing schemes on infrastructure investments. The Peoples Republic of China has the largest photovoltaic installation in the world at 46%, they have enhanced this through, the direct installation to poor households at free costs. As for the Oceania Country of Australia the employment of feed-in-tariffs and grants have incentivized the market. For India’s case generation-based incentives and accelerated depreciation have supported the feed-in-tariff leading to increased use of photovoltaics. In Kenya, more than 320,000 households were installed with the solar photovoltaics increasing the installed capacity to about 20 Megawatts by 2014. Public institutions receive grants for Photovoltaic installations and are offered tax exemptions on Photovoltaic modules only (Kombe & Muguthu, 2018).

According to Nyga-Łukaszewska (2016), Innovative retail market design through the increased deployment of distributed generation together with storage technology placed at the consumer end, which enhances the demand response by the consumers making them active participants in the market. This could be done through i) Time of use tariffs which exposes the consumers to different prices like ultra-peak time period prices leading to the shifting of the consumers to off peak times reducing the congestion. ii) Market integration of distributed energy resources, which allows the participation of distributed energy resources in the wholesale energy market increasing the flexibility. iii) Net billing schemes which calls for compensation to be done by considering the kilo watt hour injected at that moment and the value of the with-drawn energy providing the flexibility to the grid. Sweden, United Kingdom, Spain, Estonia and Romania have implemented Hourly real-time pricing for the supply of electricity (ACER,2016). Other regions such as Mexico, California, New York and Arizona have implemented the net billing. Winkel & Radcliffe (2014) state that there has been an increased overriding of the obstacles affecting the wind and solar energy sectors through enablers like, grid parity, cost effective/ reliable grid integration and technological innovation. The perception of expensive, for the top echelon society wind and solar can now beat conventional sources and are increasingly matching their performance. Their integration has also been addressed hence helping to solve grid problems and finally there ceasing cutting edge technologies to pull ahead of conventional sources.

CONCLUSION
A Country’s innovation process anchors its success on energy and their respective prices. The concept of ‘disruptive innovations’ is adopted by many Energy- related innovations that follow the idea of the fifth-generation innovation models where stakeholder participation is adopted. Theoretical Analysis has identified a number of changes in the Energy Sector, First, existing conventional generators need to be more flexible as they are being replaced by small-scale renewable generation. Second, through demand coupling, there will be increasingly development of technologies like battery and thermal storage that will synchronize availability and distribution grids. Thirdly, the
affordability of battery technology will maximize self-consumption, the addition of mid-scale batteries (Power-to-heat and Power-to-Hydrogen) instead of upgrading the networks has also been enhanced. Fourthly, the increased certainty and predictability will call for increased and better visibility on lower voltage parts of the networks and the respective tools of control. And lastly, the increasing rise of prosumers is changing the dynamics of the energy sector with the potential to unlock the demand side flexibility.

RECOMMENDATIONS
System Operation through the enhancement of bi-directional power flow networks and enhancement of storage appliances reduces the high investment on storage appliances. The development of operational distributed energy resources has elevated the grid from a sleeping giant into an active and important player in the energy industry. i) Future role of distribution system operators should be expanded to effectively manage the distributed energy resources connected to the respective grids and this could be done through procurement of grid services from distributed energy resources and optimization of the existing grid to defer new unnecessary investments. ii) Cooperation between transmission and distribution system operators. There should be efficient coordination between the distribution and transmission system operators through data exchange platforms enhancing the visibility and flexibility and the benefit maximization of the connected assets. In Belgium, operators have developed a data hub where data related to procuring distributed energy resources are shared and all users and generators are connected to the distribution and transmission grid on a daily basis (ELIA, 2018).

Hoppe et al., (2018) argues that accommodation of the uncertainty through the purchase of back up capacity (reserve capacity) to cope with the variability. i) Advanced forecasting of variable renewable power generation by use of cloud-based computing, improved mathematical models and artificial intelligence, which will reduce the uncertainty. With good forecasting in the future helps with the alternative capacity development when the requirement arises. ii) Innovative operation of pumped hydropower storage, which are flexible plants, that are complimentary to wind, solar and help in the management of the variability of the seasonal generation patterns.

IRENA (2018), states that Grid reinforcement deferral that requires and prevents congestion through the encouragement of the non-wire alternatives like wind-solar battery hybrids that are a substitute to expansive upgrade to the transmission infrastructure. i) Virtual power lines that calls for the installation of reserve batteries on both sides of the transmission line that will help prevent the over load during the peak times. ii) Dynamic Line rating which allows different varying capacities of transmission lines according to the weather conditions and that calls for proper alignment of how to integrate wind to maximise the benefits as the thermal capacity is higher during the duration of high wind blows and low temperatures which will improve the reliability performance of power systems. In Germany, Dynamic Line Rating systems have been installed to improve the integration of wind generation into the transmission system and for better congestion management, In Europe eleven transmission system operators have the Dynamic Line Rating in operation and are used in distribution networks such as UK Power Networks and Northern Power Grid in the UK (IRENA, 2018).

The empirical review of the other forms of innovations happening in the developed world will be a key area of study on the applicability in East Africa and Kenya to be specific will be another area of further research. Further research should be considered to cover the same research area with statistical analysis in order to draw proper conclusions.

REFERENCES
AN E-VOTING SYSTEM BASED ON BLOCKCHAIN TECHNOLOGY: A CASE STUDY OF KENYA ELECTIONS

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ABSTRACT
This paper presents a blockchain based e-voting system used to record cast votes. The study was carried out to understand how general elections are conducted in Kenya as well as to explore some of the challenges encountered during that process. Common challenges included lack of credibility on the results and lack of transparency during the process. A custom-made Java-based blockchain e-voting system emerged as a good platform for resolving the stated problems, as guided by the rapid application development methodology. The availability of java platform, supported API’s and the technical expertise of the researcher informed the development of the prototype. The prototype demonstrated that the blockchain is very capable in enabling data protection and confidentiality during the voting process. Therefore, Kenya stands to gain through use of blockchain technology by improving the way Kenyans vote, costs and time taken to vote and tally, which eliminate inconsistencies leading to mistrust of election results. General Terms: General election, prototype, Web Services, voting process.

Keywords: Voting process, blockchain technology, Service-oriented Architecture (SOA), web service

INTRODUCTION
The Internet's arrival and explosion has transformed the way we live, communicate and share information over the past two decades. Politics has not been immune to this transformation and thus we have seen developing countries establishing promising digital-voting initiatives with the objective of enhancing the democracy for their citizens. In Kenya, we have had a number of elections over the years and one of the key challenges the electoral body has faced especially since introduction of multiparty is disputed results or lack of credibility on the results by the citizens. [18] In the current research, use of Block chain technology in developing a voting application has been identified as the solution that could solve the mentioned problems. Due to lack of a single point of failure, Blockchains are secured by many computers that run nodes and confirm transactions on the networks. Any centralized database can easily be corrupted and generally requires trust in a third party to keep the information accurate.

LITERATURE REVIEW
Most of the research done has focused on Internet Voting Systems. The first system was used in polling stations instead of the paper ballot voting system; Voting in the second system was done using any device with Internet connection. Technical threats to the e voting system have always been a concern. [14]

Examples of the e-voting systems
Estonian I-Voting System
Estonian’s were the first to cast their votes using only the Internet and an electronic National identification card designed to run on an integrated circuit, a chip platform with 2048-bit PIN. The card was able to create signatures using SHA1/SHA2. The card was used for authentication, encryption, and signatures. The voter has to download the voting application, authenticate and cast a vote. The vote was encrypted using the election’s public key and signed with the voter private key. As soon as the vote was cast, it was sent to a vote storage server controlled by the Estonian government. Some of the security problems with Estonian I-Voting system included

Technical Security:
This system was unguarded against Attackers at the state level such as agencies of public intelligence These hackers had access to network traffic, sufficient data storage and analysis capabilities. In addition, they can perform attacks.

Centralized Infrastructure:
In this type of system, all servers were connected in one main data center hence, the system is susceptible to Distributed denial of service or similar kind of attacks. In addition, decentralizing the servers would result in greater accessibility, but definitely expensive and complex than simply maintaining everything in a centralized place. Furthermore, it is quite complex to secure decentralized servers and their communication.

Attacks on the client side:
under this system, the aim was geared to manipulating the voter’s personal computer. For this reason, the voter may hardly detect direct manipulation of votes on the voting machine (ghost attack) [14]
Norwegian E-Voting System
The Norwegian system was developed similarly to the Estonian voting system. Instead of the paper based voting application, the software application was originally used in polling stations, afterwards, there were some improvements and the system was meant to allow mobility and Use of any Internet-connected device to improve voters experience to cast their ballots from anywhere. Although electronic Voting software made casting a ballot a little bit easy and quite convenient, and increase the number of citizens willing to cast their ballot. However, there exist a number of technical threats to the electronic voting scheme.

In Norway, the voter could obtain a poll card with aggregated listing of all participating parties and a 4-digit code computed separately for the individual voter. This was sent through postal mail. After the vote was cast, the voting server could send a brief signal on the mobile phone of the voter containing a 4-digit code, enabling the voter to compare the received code and to guarantee that it matched the code of the voter's choice. This enabled the voter to confirm the vote. The voters could cast various votes however, for coercion protection, only the last could count and her prior votes were automatically withdrawn.

Security Problems with the Norwegian e-voting system
I-Vote Project in 2014 was halted in Norway because of security concerns. The main criticisms were the Votes will be made public in the event of a cyber-attack. In addition, Network attack was also a concern where an Internet Service Provider level attacker was a perceived threat because they Could observe traffic easily and establish a relationship between the voter and the voting servers. Hence, the person casting a ballot is partially prone to acts of coercion attacks. The system's centralized nature created a central failure point as an attacker required only one server to be compromised and could impact the entire election.

A case study of Kenyan elections
In Kenya, the first election happened in 1920 during the British colony. During the parliamentary elections in 1957, Kenya's African population got a chance to vote for the first time. Then universal suffrage took place in 1961, and Kenya African National Union (KANU) was proclaimed the winner with a total of 65 seats, which, despite European dominance, was the majority of parliamentary seats. KANU won majority seats during the following election. Additionally, the country had Jomo Kenyatta as the first African Prime Minister. This led to independence in December 1964 when Kenya was declared a republic and the first president was Jomo Kenyatta.

In 1966, there was disagreement between the president and his first deputy (Jaramogi Oginga Odinga) which conduced to Jaramogi’s withdrawal from Kenyatta's KANU party and the formation of the Kenya People's Union (KPU) party. As a result, it resulted to ethnic divisions along party lines with Kikuyu's behind KANU and Luo's behind KPU. Following a constitutional amendment, a by-election was held the same year to allow the breakaway that enabled KPU to stand for elections. In 1969, Kenya was transformed into a one-party state and KPU was banned, leaving KANU as the only party to win all seats from 1969 to 1988. In 1992, President Moi restored multi party politics. He won the elections of that year. Daniel Arap Moi ruled from 1978 until 2002.

In 2002, Moi stepped down for Uhuru Kenyatta to vie for presidency and Mwai Kibaki, who was opposition coalition leader then, defeated him. After the 2007 elections, there rose post-election violence Where nearly 1,300 individuals were murdered and over 600,000 displaced. An investigation was conducted to identify the cause and perpetrators of post-election violence, resulting in six well-known Kenyan leaders inclusive of Uhuru Muigai Kenyatta and William Samoei Ruto being charged at an intergovernmental organization and international tribunal that situated in The Hague, Netherlands, where they were charged with inciting ethnic violence against the followers of opposition leader Raila Odinga. The charges were dropped at different stages of the trial. National Accord and Reconciliation Act. (NARA) came up in 2008 this triggered by Violence after the election that led to the creation of the post of the Prime Minister that had earlier been abolished in 1964.

In 2010, the new constitution was inaugurated and in 2013, under the new constitution elections were held. Later in August 2017 presidential election were cancelled the Supreme Court of Kenya due to cited Irregularities in the elections and fraud allegations by the opposition party led by Raila Odinga and thereafter Raila withdrew from the repeat elections since he wanted IEBC reformed and postponement of repeat elections. Moreover, thereafter, there was a repeat, then Uhuru was declared the winner. [20]
Biometric Voter Registration System (BVR) in Kenya

BVR is a system that is used to register Voters. The 2011 Kenya Election Act enabled the Electoral Commission to make appropriate use of technological innovations in the electoral process. This would increase the electoral process's efficiency and effectiveness. Mandates the Commission to implement easy, precise, verifiable, safe, secure and transparent technological innovations. Registration by electronic means of electors in Kenya started in 2009 as a trial involving 18 electorates across the country and was a great success. Some voters who had been recorded manually in other constituencies were drawn by technology and pleaded that they too be registered with biometric characteristics. Inspired by IEBC's achievement in 2012, biometric voter registration was rolled out across the country's 290 constituencies. Biometric Voter Registration information was transmitted to a centralized storage server. hard copy registers are printed from centralized storage. The physical register with the voter's thumbnail picture, is circulated to voting centers for individuals to check and verify their information of registration [16]

Blockchain Technology

Blockchain is stamped with time sequence of an unchanging information record managed by a computer collection not owned by any single entity. Each of these information blocks is secured and interconnected using cryptographic principles (i.e. chain). (D. Lee Kuo Chuen, 2015).

Figure 1 and 2 below shows the blockchain structure

![Blockchain Architecture Diagram](image)

Fig 2.

Blockchain architecture a block is made up of the body and the header. The header especially includes Block version, a set of regulations for validation. Merkle tree root hash is the hash value of all block transactions. Timestamp relates to the present moment in universal time as seconds. nBits relates to a valid block hash target limit. Nonce It is a random number given in an authentication protocol to guarantee that it is impossible to reuse ancient communications in replay attacks. Its four-byte field, generally starting at zero, increments with each hash calculation. Parent hash block: a hash value of 256-bit pointing to the earlier block. A transaction counter and transactions are comprised of the block body. Blockchain utilizes a system for asymmetric cryptography to validate transaction authentication [24].

METHODOLOGY

This section outlines the proposed rapid application development methodology, research design, information sources, instruments for collecting information, and system design. The user will be required to log in using the username and password provided to registered voters by the local authorities (IEBC). If valid, the user will be authorized to cast a vote. Voters will have vote for one candidate per position. After the user casts his vote, the system will generate a string, containing the voter's name as well as the hash of the previous vote. The encrypted
information will be recorded in the block header of each vote cast. The information related to each vote will be encrypted using SHA one-way hash function that has no known reverse to it.

**System Development Methodology**

The prototype has been created using the Rapid Application Development (RAD) concept. RAD is a development cycle designed to make development much faster and higher quality results when it comes to system development compared to the traditional lifecycle. RAD highlights the quick and iterative release of prototypes and apps and generally includes object-oriented programming methodology, which inherently encourages the reuse of software. The method entailed Document Analysis (Requirement gathering), quick design, prototype, Construction and cutover. During the first phase, we started by conducting fact-finding tasks, the real issue faced by the target users was investigated. In this situation, it was performed through face-to-face interviews, document analysis, target user conversations, and literature review research. In the user design phase, architecture created mainly using Java programming language. The design was done, taking into consideration the current problems. At the construction phase of the cycle, a prototype system was developed. Limitations and strengths for further action / intervention were observed and recorded. A number of users were allowed to use the system, and their view on it was gathered. Lastly, general findings were identified, and the outcome of action clearly identified.

**Data Collection Tools**

The study was a qualitative research method. It has been used in diverse areas such as computer science. Its goal is all about “getting to know” or putting yourself into the shoes of the phenomena. The particular type of research method used was face-to-face interview and analysis of life histories concerning Kenya election,

**Business analysis**

The objective of this phase was to identify the objectives of the Independent Commission on Electoral and Boundaries (IEBC), business goals and key performance indicators about tackling issues related to elections. This phase also defined the technology, applications and people skills in the current setup. Common business vocabulary, business rules, business actors and main business use cases. The phase resulted in the creation of “as-is ”and a "to-be "business models.

**System Analysis, Design and Implementation**

**Analysis of the current voting systems already existing in Kenya**

A situational analysis entailed investigating existing voting systems and identifying the limitations of each mode using various data collection methods.

**Problem Analysis and Requirements Gathering**

**Analysis of Current Processing:**

The investigation of the information flow associated with the voting process showed that currently a combination of digital, manual systems are used concurrently, and hence, the system is faced with a lack of integrity and transparency. Additionally, there is no reliability on the results submitted, as evidenced by the post-election violence in different parts of this country.

**Current process:**

The process starts with the registration of voters using the Kenya Integrated Election Management System (KIEMS)'s kit, followed by verification of voters during voting. Voting happens in a manual ballot box, and record of seals kept prior to counting for each elective position. This starts with breaking seals (in the presence of party agents and observers who are at the polling station) followed by emptying contents onto counting container. Thereafter ballots are unfolded to determine their validity and sorted according to the candidate. Counting begins and filing of Forms 33. The counted ballot papers are bundled in groups of 25 and forms 34 or 35 are filled respectively and statement of rejected ballots where applicable. Thereafter, results announced and delivered to the Constituency Tallying Center and finally delivery of the manual Forms 34, 35 & 36 from county to the National Tallying Centre (NTC). (IEBC, 2016)

**Analysis of current system data:**

The research showed many challenges faced by the current systems including human error knowingly or unknowingly during tallying, or wrong entry of the results on the different forms filled by the returning officers and as a result of the wrong tabulation of the data, which led to wrong results.
Current process: The process starts with the registration of voters using the Kenya Integrated Election Management System (KIEMS)'s kit, followed by verification of voters during voting. Voting happens in a manual ballot box, and record of seals kept prior to counting for each elective position. This starts with breaking seals (in the presence of party agents and observers who are at the polling station) followed by emptying contents onto counting container. Thereafter ballots are unfolded to determine their validity and sorted according to the candidate. Counting begins and filing of Forms 33. The counted ballot papers are bundled in groups of 25 and forms 34 or 35 are filled respectively and statement of rejected ballots where applicable. Thereafter, results announced and delivered to the Constituency Tallying Center and finally delivery of the manual Forms 34, 35 & 36 from county to the National Tallying Centre (NTC) [18].

Analysis of current system data:
The research showed many challenges faced by the current systems including human error knowingly or unknowingly during tallying, or wrong entry of the results on the different forms filled by the returning officers and as a result of the wrong tabulation of the data, which led to wrong results.

Proposed System.
The prototype was designed and built as an illustration of the proof-of-concept that the blockchain technology indeed could be used to conduct elections in Kenya without compromising on results.

Development tools
The system was developed in MSQL database, java development kit and NetBeans as an integrated development environment and glassfish, which enables for distributed systems development.

The goal of a good, reasonably secure information system is to always to ensure that the following basics of information security are all well accounted for in the IT infrastructure, policies and procedures, and people involved with deployment in which the e-voting application does:

1. Integrity – the process of preventing alteration of data in transit by unauthorized third parties. This is provided via replication of the database in more than one site. Immutability of votes is usually a main concern when it comes to elections. Many popular blockchain platforms use the Merkle tree (some implementation also use other variants of the Merkle tree) to verify the integrity of the data added to the blockchain. Even if a single bit of data is altered or tampered, it can be easily detected using a Merkle tree verification. This property of the blockchain to ensure that a vote once added to the blockchain cannot be altered or tampered helps in achieving immutability as well as integrity verification of the votes.

2. Authentication – process of validating true identity of user requesting access by use of password in each module.
3. Authorization – the method of establishing the rights and privileges of a user during interaction with the system.
4. Confidentiality – means ensuring that all sensitive data being transmitted can only be read by authorized parties.
5. Non-repudiation – the assurance that someone cannot deny the validity of something.
6. Data redundancy - The blockchain is synced across all the nodes participating in the blockchain network, and hence this provides data redundancy.

3.5.2.3 Electronic voting process using the e-voting system based on blockchain.
Voting using blockchain follows the following steps:
1. Voter authentication (username and password)
2. Vote for the preferred candidate on different positions.
3. Vote recorded and a hash generated based on blockchain.

This is shown in the E-voting System Model in Fig 4
Implementation
System implementation entailed the following activities:
Operating system setup.
The steps for each item implemented is outlined below:
• Installation of the Java Development Kit (JDK) programming codes needed for software development of communication codes for the prototype.
• NetBeans Integrated Development Environment (IDE) installation.
Mount the NetBeans file or CD/DVD media to the operating laptop and boot it. It is an integrated development tool that enables reusability of the java codes. Follow the installation instructions to finish the process.
• Installation of MYSQL (Structured Query Language) database. The prototype database is named muvote. To be able to access the database there was need to install the MYSQL graphical user interface (GUI).
• Create the database muvote
• Prototype run on windows 10 or any other operating system that can run Java Virtual Machine that is installed in the laptop. Mount the executable installation files or DVD media to the host computer and boot it. Follow the instructions below to finish the process.
- Insert the live DVD in the drive;
- Boot the computer;
- On the BIOS menu select boot from DVD;
- Select the NetBeans option on the GRUB menu that follows;
- Let the GUI desktop load;
- On the GUI desktop launch the install command and follow the easy steps that will follow

Database implementation.
Table 1. Below depict the tables on the database

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin</td>
<td>Holds systems administrators details</td>
</tr>
<tr>
<td>Blockchain</td>
<td>Hashes generated while a voter votes</td>
</tr>
<tr>
<td>Candidates</td>
<td>Those being voted in different positions</td>
</tr>
<tr>
<td>Voters</td>
<td>Registered voters</td>
</tr>
<tr>
<td>Positions</td>
<td>Existing positions</td>
</tr>
<tr>
<td>Results</td>
<td>Total votes casted against each candidate</td>
</tr>
<tr>
<td>Constituency</td>
<td>Existing constituencies in Kenya</td>
</tr>
</tbody>
</table>

Table 1. Database Tables
RESULTS AND DISCUSSION
In this chapter, testing was done on the developed e-voting application using sample data in the system. The SoapUI tool was used to build test cases of the various tests carried out on the web services.

Time Taken By a Node to Open On a Browser
Time taken to load the system on the browser was 40m/s, which was a pass (good). Security Test. A security test was also carried to test if the web service was secure in terms of cross site scripting, boundary scan, fuzzing scan, invalid data type, malformed xml, SQL injections, weak authentication, xml bomb and x path injection.

Loading Testing
Loading testing was also carried out on the e-voting application and below were the results. Load testing included increasing the load and observing how the system behaved under higher load. During load testing, response times was captured. The goal of load testing is not to break the target environment though. The goal was to find metrics for system performance under high load.

4.4 Comparison with related research work done before
As shown in table 2 some of the key security feature that were achieved by the already existing e voting system comparing with the e-voting prototype

<table>
<thead>
<tr>
<th></th>
<th>E-voting prototype</th>
<th>Estonian I-Voting System</th>
<th>Norwegian I-Voting System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blockchain</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Central database</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Authentication</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>confidentiality</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Transparency</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Elimination of manual work</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Authorization</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Non-repudiation</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Data redundancy</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

CONCLUSION
At the beginning of the research work, key objectives were set. These objectives were met. The development of block chain based e-voting application was successfully done and thus the system will only allow legitimate registered voters to login and vote only for one candidate per position. The results will be displayed and updated in real time across the voting nodes. This research work will therefore contribute towards a solution for better voting process and eliminate the highlighted problems in the research problem in the earlier chapter.
In this paper, we have presented a proof of concept system for developing an e-Voting system that utilized blockchain technology. It is a decentralized system and data from one node passes across all the others in real-time. Every registered voter has the capacity to vote using any Internet-connected device. The blockchain can be verified openly and circulated in such a manner that nobody can corrupt it.

REFERENCES


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DEVOLUTION OF HEALTHCARE SERVICES AS A MEANS FOR SUSTAINABLE DEVELOPMENT IN THARAKA NITHI COUNTY, KENYA

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ABSTRACT
The study examined devolution of healthcare services which was introduced in Kenya at the beginning of 2013. Good health is emphasized in sustainable development goals as number three. It is a key human need and this makes the provision of healthcare services to be a basic human right. The specific objective was to assess the human resource capacity as a critical component of devolution on the provision of healthcare services. Devolution of healthcare service is still in its early stages in Kenya and has been faced by numerous challenges including strikes of health workers due to poor salary among others. The study site was Chuka General Hospital where 177 health workers including doctors, clinical officers and nurses formed the target population. The sample size was 123 respondents sampled using proportionate stratified random sampling and key informants were selected using purposive sampling. Questionnaires were used to collect quantitative data while interview guide to collect qualitative data. SPSS version 22 was used in data analysis. The study found out that the respondents salaries had increased and this motivated them to do their duties effectively hence boosting the healthcare services. Despite the increment, they termed it as inadequate. The salaries were received in time before 30th. On the other hand, staffing in terms of number of health workers had decreased and this made each of them to attend more than 101 patients a day. The number of patients had increased after devolved system. Majority of the respondents did not get a chance to improve their skills through trainings. The study concluded that devolution had a potential of improving the delivery of health care services both at county and individual levels hence enhancing sustainable development. The study recommended that the county governments should enhance human resource capacity by paying health workers well, increasing the numbers and supporting their trainings. To promote sustainable development, County governments should majorly focus on preventive and primary healthcare through empowerment of CHW other than majoring on curative measures.

Key words: Devolution, healthcare services, human resource capacity, health-workers, provision, system.

INTRODUCTION
Good health is a key human need and this makes the provision of healthcare services to be a basic human right involving curative, promotive, preventive and rehabilitative care. Health has been considered as the main factor in the realization of sustainable development goals. Devolved system of healthcare involves the transfer of powers, responsibilities, functions, and services from the national to county governments. Through devolution, the county governments have powers to deliver effective health services by planning for resources, monitoring activities and coordinating of health services (Omolo, Kantai & Wachira, 2010). Globally, devolution of healthcare services has been accepted as a way of enhancing effectiveness and efficiency of the health system. In addition, different countries have various health care policies and practices in their own context (Jongudomsuk & Srisasalux, 2012). In Thailand, decentralization of health care services could not be achieved appropriately without central government support. The staff working at the local government level were fully mentored and their capacity strengthened by central ministry staff with experience to ensure they carry out duties effectively (Jongudomsuk & Srisasalux, 2012).

In Africa, health systems have also been affected by health professionals migrating to well-paying countries in the west. Research shows that 1.3% of the world's health workforce attends individuals who face 25% of diseases globally. Most of the countries are developing and they experience the problem of staffing in the health centers which highly affect the delivery of health services. There is an average of 2.3 medicinal services specialists in Africa for each 1000 populace and in America, there are 24.8 social insurance laborers for every 1000 populace. This clearly indicates that in Africa, there is a problem of medical staffing. 37% and 7% of South African doctors and nurses respectively have migrated to Australia, Canada, UK, U.S, France and Germany since 1996 (WHO, 2006). In Kenya, devolution of healthcare services is viewed as a good step towards achieving sustainable development goals and Kenya Vision 2030. The government aims at providing a high quality of health services by ensuring proper funds management with a focus on improving Kenyans livelihood (GoK, 2007). A research done by Thuku
and Wario (2014) on the influence of devolution in strategy implementation of healthcare services reveals that local needs have been solved through an increased responsiveness of health systems.

**Statement of the Problem**

Devolved government is enshrined in chapter 11 of the 2010 Kenyan Constitution and it is a key mandate for the 47 counties to actualize its objectives. The constitution has given the counties powers for self-governance and effective delivery of services. Since new county governments came into power in 2013, much has been expected to be achieved in terms of effective health care service delivery. However, counties have tried but much more need to be done to ensure various gaps are filled in order to provide effective healthcare services. World Health Organization recommends the doctor to the population ratio be 1:1000 but in Kenya 1 doctor serves 1700 people. In Canada, the ratio is 2:1000 (WHO, 2016). In Kakamega and Kajiado counties, the ratio is 1:14,246 and 1:76,000 respectively (Chitere & Ngundo, 2015). Devolution of healthcare service is still in its early stages in Kenya and has been faced by numerous challenges such as human resource. Therefore, studies on the devolution of healthcare services in Kenya are very important.

**REVIEW OF LITERATURE**

Human resource is a key function in the health system since competent workforce is needed for effective health service delivery. This means having the right service providers at the right time with the required knowledge and skills (Mills, 2011). Britnell (2015) assert that in 2013, South Africa had a vacancy rate of 56% for the doctors and 46% for nurses. 3% of the newly qualified doctors went to do job at rural areas where half of the South Africa population lives. 70% of the doctors go into private sector for job due to poor remuneration. According to South African Child Gauge (2006), the African National Congress (ANC) has been at the forefront in preventing inequalities in the health sector. There was an introduction of free health care in 1994 involving all children less than six years. In 2003, an extension was made for the scheme to benefit children older than 6 years and those with cases of disability.

Sub-Saharan African countries face a challenge of scaling up their health services and fail to provide a universal healthcare services due to lack of adequate and well-motivated health workers. This problem need attention and the amicable way of solving it is by training more health personnel and providing incentives. Therefore, providing an enabling environment is critical for improved health services (Mshelia et al; 2013). Kenya is one of the countries in Africa that experience shortage of health workforce. Health sector report (2012), assert that 100,000 populations were served by 19 doctors and 173 nurses. This is in contrary with WHO which recommends 36 doctors and 356 nurses. There was an establishment of 59,667 staff as of 2102 but 49,096 positions get occupied hence leaving a shortage of 10,371. According to Kariuki (2014), the current strikes in the health sector has largely been contributed by the inadequate health workforce in the Kenyan counties.

More than 22 counties experienced health personnel strikes between the month of January and August 2015. The author continues to argue that health personnel unrest had been influenced by high rate of corruption in the country, lack of enough funds at the county levels to employ health staff and inappropriate structures in the national and county levels. Magokha (2015) assert that the health sector faces the challenge of brain drain which result to 30%-40% which estimate to 600 doctors of the graduate annually move to other countries for better jobs. A study by Rosser, Hamisi, Njorge & Huchko, (2015) on the government health care facilities focusing on health care providers and support staff indicated that the shortage of the staff at 62% resulted to improper cervical cancer screening. A study by Essendi et al., (2015) indicated that ward rounds in two health facilities located in Kitonyoni and Mwania sub-location was not well done due to insufficient staffing.

**METHODS**

The study adopted descriptive survey research design. The population consisted of 177 health workers in Chuka General Hospital specifically doctors, clinical officers and nurses. Proportionate stratified random sampling was used to select the sample size of each stratum. This was done by dividing the population of each stratum by a sampling fraction of 1.44 to get a sample size of 16, 19 and 88 respectively. Sampling fraction of 1.44 was arrived at by dividing the entire population of 177 with the whole sample of 123 which was earlier determined through a statistical formula. Simple random sampling was then applied to get the determined sample of each stratum from its respective population.
To collect quantitative data, a survey method was used through a questionnaire. Qualitative data was collected through interviews from four key informants comprising of medical superintendent, human resource manager, head of finance and procurement.

Sample size determination

\[ n = \frac{N}{1 + N (e)^2} \]

Where n = sample size
N = Target population (177)
e = acceptable margin of error of 5%
n = Sample size (123)

RESULTS AND DISCUSSION

Increment of salary

The study assessed if respondents’ salaries had increased since devolution.

<table>
<thead>
<tr>
<th>Increment of salary</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>44</td>
<td>50.0</td>
</tr>
<tr>
<td>No</td>
<td>33</td>
<td>37.5</td>
</tr>
<tr>
<td>Not sure</td>
<td>11</td>
<td>12.5</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>100</td>
</tr>
</tbody>
</table>

50.0% of the respondents said yes hence agreeing that there has been an increment of salary after the introduction of devolution. 37.5% said no and 12.5% were not sure of the increment. This shows that Chuka General Hospital health workers feel motivated by the increment of salary to work and this enhances positive provision of healthcare services. A key informant who played the role of management said the following: “It’s true that our salaries have increased but even before devolution, health workers were entitled to annual increment through the national government. In fact, only a slight increment was made by the county government. County government has promised a lot to the health workers in terms of salary increment and rewards which are yet to be fully fulfilled but they are trying” (Key Informant 4).

Salary Description

The respondents were asked about the option that could best describe the salary they earn.

<table>
<thead>
<tr>
<th>Salary description</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very inadequate</td>
<td>19</td>
<td>21.6</td>
</tr>
<tr>
<td>Inadequate</td>
<td>60</td>
<td>68.2</td>
</tr>
<tr>
<td>Adequate</td>
<td>8</td>
<td>9.1</td>
</tr>
<tr>
<td>Very Adequate</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>100</td>
</tr>
</tbody>
</table>

68.2% indicated that the salary was inadequate, 21.6% very inadequate, 9.1% adequate and 1.1% very adequate. This shows that health workers still need more salary increment for them to be satisfied.

Dates for monthly salary

The table below indicates the dates when respondents receive their monthly salary.

<table>
<thead>
<tr>
<th>Dates</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>31st and below</td>
<td>77</td>
<td>87.5</td>
</tr>
<tr>
<td>1st to 5th</td>
<td>9</td>
<td>10.2</td>
</tr>
<tr>
<td>6th to 10th</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>11th to 15th</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>16th and above</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>100</td>
</tr>
</tbody>
</table>

87.5% of the respondents said that they receive their salaries on date 31st and below. 10.2% talked of 1st to 5th, 2.3% 6th to 10th, 0% 11th to 15th and above 16th. Timely pay of salaries motivates health workers and this positively influences provision of health care services. This was supported by a key informant with financing knowledge:
“Sometimes, health workers receive salary as early as date 24th but most of the months they are paid on 28th to 30th (Key Informant 3).

**Staffing**
The respondents were requested to indicate if staffing had increased or decreased in terms of numbers after introduction of devolution.

<table>
<thead>
<tr>
<th>Staffing</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase</td>
<td>52</td>
<td>42</td>
</tr>
<tr>
<td>Decrease</td>
<td>59</td>
<td>48</td>
</tr>
<tr>
<td>Not sure</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>123</td>
<td>100</td>
</tr>
</tbody>
</table>

48% indicated that staffing in terms of numbers had decreased, 42% said that it had increased and 10% were not sure. This implies that health workers were inadequate and this made them attend many patients in a day. A key informant in the management lamented that:

“When county government employs health workers, most of them are posted to dispensaries, there is an assumption that big hospitals like Chuka have many health workers but not true” (Key Informant 3).

**Number of Patients**
The respondents were asked to indicate the number of patients they attend to per day and results are showed in the table below.

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 and below</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>21-40</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>41-60</td>
<td>6</td>
<td>6.8</td>
</tr>
<tr>
<td>61-80</td>
<td>17</td>
<td>19.3</td>
</tr>
<tr>
<td>81-100</td>
<td>12</td>
<td>13.6</td>
</tr>
<tr>
<td>101 and above</td>
<td>53</td>
<td>60.2</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>100</td>
</tr>
</tbody>
</table>

60.2% indicated 101 and above as the number of patients they attend per day, 19.3% attend 61-80, 13.6% 81-100, 6.8% 41-60 and 0% 21-40 and below 20. WHO (2016) recommends doctor-patient ratio to be 1:1000. This indicates that more health workers are needed.

**Average number of working hours**
Responses on the working hours per day by the respondents are indicated in table below.

<table>
<thead>
<tr>
<th>Average number of working hours</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4-6</td>
<td>6</td>
<td>6.8</td>
</tr>
<tr>
<td>7-9</td>
<td>60</td>
<td>68.2</td>
</tr>
<tr>
<td>10-12</td>
<td>22</td>
<td>25.0</td>
</tr>
<tr>
<td>13-15</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>16 and above</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>100</td>
</tr>
</tbody>
</table>

68.2% respondents worked for 7-9 hours. 25.0% for 10-12 hours, 6.8% for 6 hours and no respondents worked for 1-3, 13-15 and above 16 hours. Majority of respondents worked within standard of 8 hours recommended.

**Trainings**
The respondents were requested to indicate if they go for trainings sponsored by the facility to improve their skills.

<table>
<thead>
<tr>
<th>Trainings</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>31</td>
<td>35.2</td>
</tr>
<tr>
<td>No</td>
<td>57</td>
<td>64.8</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>100</td>
</tr>
</tbody>
</table>
Majority of respondents (64.8%) said no, showing that they did not go for training to improve their skills. 35.2% said yes. Training is important because it improves the knowledge and skills of offering healthcare services. The respondents said that some of the trainings they have been able to attend were in form of workshops or conferences facilitated by the facility and other benefited through formal schooling directly through the facility.

A key informant from the management said the following:
“**We had come up with a scheme to facilitate staff training consistently and it was never implemented. We have been facing a challenge of resources to enhance this but we do facilitate few trainings that are less costly**” (Key Informant 3). This was supported by another key informant from management who argued that:
“**Nowadays, only few staffs who are going for formal training to increase their education. This is because, no promotions have been done for long and those who are finishing schools are not promoted immediately. When health workers were under national government, they moved in grades**” (Key Informant 4).

The findings are supported by Mills (2011) who asserts that human resource is a key function in the health system since competent workforce is needed for effective health service delivery. This means having the right service providers at the right time with the required knowledge and skills.

### General improvement

The respondents were asked if there has been general improvement of healthcare services since devolution

<table>
<thead>
<tr>
<th>General improvement</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>44</td>
<td>50.0</td>
</tr>
<tr>
<td>No</td>
<td>36</td>
<td>40.9</td>
</tr>
<tr>
<td>Not sure</td>
<td>8</td>
<td>9.1</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>100</td>
</tr>
</tbody>
</table>

44% indicated yes, showing that there is general improvement of healthcare services since devolution. 40.9% said no and 9.1% of the respondents were not sure. This implies that despite many challenges experienced and various loopholes available, in real sense, devolution of health services brought some changes in Chuka General Hospital.

This is in support of key informant 4 who stated that;
“**Many facilities have been built and are functional. Some facilities for churches have been renovated by the county government. Some of the ambulances are now operating than before. We have even new equipment bought. Therefore, we cannot completely dispute devolution since some changes are seen physically**” (Key informant 4).

### Diseases

The respondents were asked if some of the diseases they used to refer to other facilities can now be treated in the facility.

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>79</td>
<td>89.8</td>
</tr>
<tr>
<td>No</td>
<td>6</td>
<td>6.8</td>
</tr>
<tr>
<td>Not sure</td>
<td>3</td>
<td>3.4</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>100</td>
</tr>
</tbody>
</table>

89.8% of the respondents as majority said that they could now be able to treat some diseases they used to refer while 6.8% said they still refer and 3.4% were not sure. One of those diseases includes acute renal failure.

This was supported by key informant 4 who said that; “**We now have dialysis machine and CT scan. Dialysis machine is already working but CT scan is yet to be functional but will soon start working. Before, we used to refer such cases in Nyeri and Kenyatta hospitals**” (Key Informant 4).

Other than enhancing human resource capacity, the key informants emphasized that sustainable development could easily be boosted if devolution focused on lower levels of preventive measures. Key informant 3 emphasized the need of strengthening primary health-care levels including dispensaries, health centers and district referral hospital, in order to realize proper devolved healthcare system

“**For devolution of healthcare to be well realized, there is need to ensure primary care levels are strengthened since we cannot manage to treat all the patients at our level. Many cases can be managed by community themselves though CHW**” (Key informant 3).

Key informant 4 lamented on the same saying that:
“The 4 tier system is very important in the run of health care system and more so tier 1 and 2 need full support. We support the big 4 agenda specifically on the universal healthcare proposed by the president Hon. Uhuru Kenyatta. It is important to have community health workers who report various cases on matters of health. Primary care can ensure most of diseases are prevented at the grassroots level. Isiolo County has already started challenging us since they are now focusing on preventive measures at the primary level” (Key informant 4).

CONCLUSIONS AND RECOMMENDATIONS
The study concluded that devolution had a potential of improving the delivery of health care services both at county and individual levels hence enhancing sustainable development. There has been a general improvement of healthcare delivery but health workers need more motivations. The study recommended that the county governments should enhance human resource capacity by paying health workers well, increasing the numbers and supporting their trainings. To promote sustainable development, County governments should majorly focus on preventive and primary healthcare through empowerment of CHW other than majoring on curative measures.

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MODELLING THE EFFECTS OF MINDFULNESS BASED STRESS ON BREAST CANCER SURVIVAL RATE AMONG WOMEN IN MERU AND NYERI COUNTIES, KENYA, USING COX PROPORTIONAL HAZARD MODEL

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ABSTRACT
Breast cancer is the most frequently diagnosed cancer in women, affecting 34 women per every 100,000. This has led to high number of fatalities annually, which need to be mitigated. Among cancer survivors and their families, there is substantial interest in whether there is anything that they can do beyond conventional therapy to improve their prognosis. Among these is interest in working on mindfulness-based stress (MBS) that patients undergo after diagnosis as complementary and alternative therapies. Despite this interest, there is little that is known about the effects of these factors on breast cancer survival. Management of breast cancer can be enhanced through modelling the effects of MBS on breast cancer survival rate. However, there is limited information on accuracy of existing models. This study focused on developing a model to predict the effect of MBS factors on breast cancer survival rate among women in Meru and Nyeri Counties. Both Primary data and Secondary data were used. Primary data was obtained using a structured questionnaire from the breast cancer survivors and the medical practitioners. Secondary data was obtained from records at Meru teaching and referral hospital and Nyeri level five hospital on the MBS variables (cost burden of treatment, stress on diagnosis, prolonged time taken to access treatment, poor diet, alcohol use, physical activity and lack of awareness) among breast cancer patients for the period 2012 to 2017. Mixed method research design was used in the study. Both quantitative and qualitative data was analysed using R software. Cox proportional hazard model was used in establishing the survival rates, with the breast cancer survival rate being the dependent variable while MBS factors were the independent variables. Kaplan-Meier estimators were used in determining the varying effects which the MBS factors have on survival rate. Log-rank test was used to perform comparisons of survival curves using hypothesis tests on the patients’ survival rate considering age. The likelihood ratio test showed that MBS factors are significant in predicting hazard rates ($X^2 = 66.7, p = 0.0000119$). Treatment period significantly ($p = 0.00014$) affect survival rate compared to other covariates. Lack of awareness ($p=0.0010124$), ease of coping with stress (0.000514) and observing the right diet (0.04092) were also found to significantly affect survival rate. Access of treatment immediately after diagnosis, availing the right information to the patients, helping patients to cope easily with stress and observing the right diet were found to be the best estimators in increasing breast cancer survival rate. The study therefore recommends use of the model in predicting breast cancer survival rates which can greatly improve breast cancer prognosis.

**Keywords:** Breast cancer, Survival rate, Cox proportional Hazard model, Predictive modelling

INTRODUCTION
Breast cancer is a major health burden in the society worldwide, especially in developing countries where 60% of the world’s total new cases are diagnosed (Ruff et al., 2016). Cancer ranks third among the causes of morbidity and mortality in Kenya with an estimate of 39,000 new cases each year and more than 27,000 deaths where 60% of Kenyans affected by cancer are younger than 70 years old (Kenya Cancer Statistics and National Strategies (KCSNS), 2016). Breast cancer is the most common form of cancer in women worldwide and the second main cause of death in women, after lung cancer (Nordqvist, 2018). Breast cancer and prostate cancer are classified as the leading types of cancers in Kenya with standardized incidence rate (SIR) of 40.6 and 51.7 per 100,000, respectively (Korir et al., 2015). Breast Cancer is a major health burden in the society with high incidence and mortality rates (Bozorgi et al., 2016). Breast cancer ranks high among the common cancers affecting women with 571,000 deaths worldwide (Siegel et al., 2017). In 2019, it's estimated that among U.S. women there will be 268,600 new cases of invasive breast cancer and 41,760 breast cancer deaths with California having the highest number of breast cancers deaths at 4,560 (Susan, 2016).

The risk of breast cancer has been found to be increasing with age, with the highest incidents among women in the age bracket of between 40 and 59 years (Salah et al., 2010). Breast cancer is the most common cancer in women in sub-Saharan Africa (SSA), with 94,000 new cases of breast cancer and 48,000 deaths due to breast cancer occurring in 2012. This burden was projected to double between 2012 and 2030 due to population ageing and expansion.
(McKenzie et al., 2016). The high number is largely contributed by the increasing habit of adopting a Western lifestyle, such as changes in diet and delayed first childbirth, lower parity, and shorter periods of breastfeeding, which are important determinants of a higher incidence of breast cancer among those regions (Franco & Rodriguez 2018). Mindfulness-Based Stress is a condition experienced by person going through a difficult time, for example, through pain, illness and stress (WebMD, 2005-2017). Being diagnosed with breast cancer is generally experienced as a life threatening situation resulting in a particularly high degree of emotional strain that breast cancer patients always battle with (Musiala et al., 2011). A diagnosis of breast cancer is one of the most devastating things a woman can hear (Wu et al., 2019). The patient gets a lot of stress due to the uncertainty of the future, the unpredictability of the cancer, disability, and financial difficulties (Frauke et al., 2011). For some patients, even once the initial confusion and grief have dissipated, a serious mental health issue may develop (Wu et al., 2019). Psychological distress associated with a diagnosis of breast cancer can evoke an array of emotional experiences, ranging from sadness and despair to anxiety and depression (Rachel et al., 2012). Over time, these physiological responses to stress may increase the risk of chronic disease and influence breast cancer mortality (Rachel et al., 2012). Breast cancer diagnosis therefore leads to mindfulness-based stress which need an urgent and timely response to work on the ‘existential plight’ induced by a cancer diagnosis, a whole spectrum of therapeutic interventions including mind-body medicine should be involved (Musiala et al., 2011).

Breast cancer survival rate is very key to any one diagnosed with breast cancer. Survival analysis involves the consideration of the time between a fixed starting point (e.g. diagnosis of cancer) and a terminating event (e.g. death) (Bradburn et al., 2003) This is because survival of breast cancer patients can help to reconsider grounds for adjuvant treatment and give hope to breast cancer patients (Musiala et al., 2011). Working on the mindfulness based stress and helping the patient to accept their condition and be positive to help them fight the disease is the biggest challenge. Statistical modelling therefore becomes very key because they are capable of integrating biological knowledge in predicting the hazards rates. (Bradburn et al., 2003). Statistical models help in predicting the future probabilistic behaviour of a system hence their use in predicting breast cancer survival rate (Waljee et al, 2014). Cox Proportional hazard model was therefore found most reliable in estimating the hazard ratios and establishing the significant covariates that could increase breast cancer survival. The study concentrated on working on support that can be offered to breast cancer patients to help in reducing mortality rates. These was made possible by identifying the statistically significant factors on survival rate and then help patients to work on them to increase survival rate.

**METHODOLOGY**

This study was conducted in Meru and Nyeri counties which were selected purposively. In Meru County, the study was conducted at Meru level 5 hospital while in Nyeri County, in Nyeri referral hospital. Mixed method research design was used for this study because multiple ways of collecting data were applied. This research design is appropriate when both quantitative and quality data sets are used in handling a research problem (Creswell & Clark, 2017). Both secondary and primary data was used, with primary collected from the breast cancer survivors and medical practitioners while secondary data was collected from the hospitals records for the period 2012-2017. The variables that were of interest to this study and obtained from both the primary and secondary data included age of the patient, whether the patient was still alive or dead, alcohol and drug use, stress after diagnosis, adherence to prescribed diet, access to treatment, burden of treatment, regular exercise after diagnosis and awareness of how to handle the disease after diagnosis. A sample size of 620 was used which was picked using simple random sampling. The study targeted the female breast cancer patients and survivors who were younger than 80 years.

The data was analysed using R-core software and involved generation of descriptive statistics and inferential statistics. Descriptive statistics generated were inform of tables and graphs. The inferential statistics generated included the Kaplan Meir curves and the log rank tests. Kaplan –Meier curves were used to represent the differences in survival among different covariates and their outcomes. Log rank tests were used to determine significance of different covariates. This involved determining the p values of different covariates. The covariates with p values less than 0.05 were statistically significant in predicting breast cancer survival rate. The breast cancer survival rate model was generated using the obtained data by the help of cox proportional hazard model.
RESULTS AND DISCUSSION

Preliminary Analysis

The average age of the respondents was 52.23 years (Table 1). The skewness and the kurtosis values showed that the data satisfied the normality assumptions. The average number of fatalities from breast cancer reported by medical practitioners was on average 42.19 per year (Table 1). The average time of survival for the breast cancer patients was 3.77 years (Table 1).

Table 1: Summary statistics for data on the breast cancer patients and the medical practitioners

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Number of fatalities</th>
<th>years worked</th>
<th>Time</th>
<th>Patient Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>42.19</td>
<td>6.44</td>
<td>3.77</td>
<td>52.23</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>16.41</td>
<td>5.56</td>
<td>2.03</td>
<td>10.74</td>
</tr>
<tr>
<td>Median</td>
<td>39</td>
<td>5</td>
<td>4</td>
<td>53</td>
</tr>
<tr>
<td>Skewness</td>
<td>0.42</td>
<td>2.2</td>
<td>0.36</td>
<td>-1.3</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-0.17</td>
<td>5.7</td>
<td>0.04</td>
<td>4.19</td>
</tr>
<tr>
<td>Maximum</td>
<td>90</td>
<td>31</td>
<td>10</td>
<td>75</td>
</tr>
<tr>
<td>Minimum</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>
The findings of this study were in agreement with other studies. For example, with respect to the average age of the breast cancer patients was in the age group of 40 – 69 years. This indicated that this age group is more prone to breast cancer as compared to other age groups. This finding is in agreement with what was found at Cancer.net (2017). Cancer .net (2017) found out that if the cancer is located only in the breast, the 5-year survival rate of women with breast cancer is 99% and decreases to 27% if it has spread to other parts of the body.

**Analysis of Mindfulness-Based Stress following Breast Cancer Diagnosis**

Medical practitioners’ sentiment was that being diagnosed with breast cancer stressed the patient both financially and emotionally (Table 2). The practitioners also tended to agree that patients’ observing the diet prescribed helped them feel better and patients accessing treatment within the shortest time possible made their journey easier (Table 3). However, they were not sure if regular exercises made the patients feel better, if the patients getting the right information helped them to face the disease bravely and if the patients’ abstaining from alcohol use facilitated their healing (Table 2).

**Table 2: Mindfulness-based stress following breast cancer diagnosis analysed from practitioners’ perspective**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Strongly Agree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress</td>
<td>44</td>
<td>14.67</td>
<td>33</td>
<td>11</td>
<td>36</td>
<td>12</td>
<td>91</td>
<td>30.33</td>
<td>96</td>
<td>32</td>
</tr>
<tr>
<td>Diet</td>
<td>31</td>
<td>10.4</td>
<td>40</td>
<td>13.42</td>
<td>75</td>
<td>25.17</td>
<td>79</td>
<td>26.51</td>
<td>73</td>
<td>24.5</td>
</tr>
<tr>
<td>Regular exercise</td>
<td>30</td>
<td>10.07</td>
<td>52</td>
<td>17.45</td>
<td>81</td>
<td>27.18</td>
<td>67</td>
<td>22.48</td>
<td>68</td>
<td>22.82</td>
</tr>
<tr>
<td>Treatment period</td>
<td>27</td>
<td>9.09</td>
<td>36</td>
<td>12.12</td>
<td>78</td>
<td>26.26</td>
<td>73</td>
<td>24.58</td>
<td>83</td>
<td>27.95</td>
</tr>
<tr>
<td>Awareness</td>
<td>28</td>
<td>9.33</td>
<td>45</td>
<td>15</td>
<td>81</td>
<td>27</td>
<td>65</td>
<td>21.67</td>
<td>81</td>
<td>27</td>
</tr>
<tr>
<td>Cost burden</td>
<td>18</td>
<td>6</td>
<td>15</td>
<td>5</td>
<td>21</td>
<td>7</td>
<td>100</td>
<td>33.33</td>
<td>146</td>
<td>48.67</td>
</tr>
<tr>
<td>Drug use</td>
<td>46</td>
<td>15.38</td>
<td>69</td>
<td>23.08</td>
<td>82</td>
<td>27.42</td>
<td>55</td>
<td>18.39</td>
<td>47</td>
<td>15.72</td>
</tr>
</tbody>
</table>

Patients tended to agree with the statement that diagnosis of breast cancer stresses them financially, observing the diet prescribed helped them feel better and accessing treatment within the shortest time possible made their journey easier (Table 3). However, they were not sure if regular exercises made them feel better and if abstaining from alcohol use facilitated their healing.

**Table 3: Mindfulness-based stress following breast cancer diagnosis as analysed from patients’ perspective**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Strongly Agree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress</td>
<td>44</td>
<td>14.67</td>
<td>33</td>
<td>11</td>
<td>36</td>
<td>12</td>
<td>91</td>
<td>30.33</td>
<td>96</td>
<td>32</td>
</tr>
<tr>
<td>Diet</td>
<td>31</td>
<td>10.4</td>
<td>40</td>
<td>13.42</td>
<td>75</td>
<td>25.17</td>
<td>79</td>
<td>26.51</td>
<td>73</td>
<td>24.5</td>
</tr>
<tr>
<td>Regular exercise</td>
<td>30</td>
<td>10.07</td>
<td>52</td>
<td>17.45</td>
<td>81</td>
<td>27.18</td>
<td>67</td>
<td>22.48</td>
<td>68</td>
<td>22.82</td>
</tr>
<tr>
<td>Treatment period</td>
<td>27</td>
<td>9.09</td>
<td>36</td>
<td>12.12</td>
<td>78</td>
<td>26.26</td>
<td>73</td>
<td>24.58</td>
<td>83</td>
<td>27.95</td>
</tr>
<tr>
<td>Awareness</td>
<td>28</td>
<td>9.33</td>
<td>45</td>
<td>15</td>
<td>81</td>
<td>27</td>
<td>65</td>
<td>21.67</td>
<td>81</td>
<td>27</td>
</tr>
<tr>
<td>Cost burden</td>
<td>18</td>
<td>6</td>
<td>15</td>
<td>5</td>
<td>21</td>
<td>7</td>
<td>100</td>
<td>33.33</td>
<td>146</td>
<td>48.67</td>
</tr>
<tr>
<td>Drug use</td>
<td>46</td>
<td>15.38</td>
<td>69</td>
<td>23.08</td>
<td>82</td>
<td>27.42</td>
<td>55</td>
<td>18.39</td>
<td>47</td>
<td>15.72</td>
</tr>
</tbody>
</table>

**Effects of Mindfulness-Based Stress on Breast Cancer Survival**

Analysis using the Kaplan Meier survival function curve and the survival table showed that 6 patients died within a year after diagnosis (Table 4). The percentage of the patients who survived within the first year was 98%. By the second year, 9% of the patients had succumbed to breast cancer and 91.33% had survived (Table 4). Only 53.1% of the patients had remained by the 8th year. Twenty one patients were at risk of succumbing to breast cancer by the end of the 8th year. The five year survival rate for the breast cancer patients in this study was at 68.38%.

**Table 4: Kaplan-Meier survival analysis for breast cancer**

<table>
<thead>
<tr>
<th>Time (year)</th>
<th>Number</th>
<th>Survival (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>199</td>
<td>98</td>
</tr>
<tr>
<td>2</td>
<td>190</td>
<td>91.33</td>
</tr>
<tr>
<td>5</td>
<td>180</td>
<td>68.38</td>
</tr>
<tr>
<td>8</td>
<td>169</td>
<td>53.1</td>
</tr>
</tbody>
</table>

**Table 5: Kaplan-Meier survival analysis for breast cancer**

<table>
<thead>
<tr>
<th>Time (year)</th>
<th>Number</th>
<th>Survival (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>199</td>
<td>98</td>
</tr>
<tr>
<td>2</td>
<td>190</td>
<td>91.33</td>
</tr>
<tr>
<td>5</td>
<td>180</td>
<td>68.38</td>
</tr>
<tr>
<td>8</td>
<td>169</td>
<td>53.1</td>
</tr>
</tbody>
</table>
The effect of alcohol use on the survival of breast cancer patients was also investigated inferentially using the log rank test (Table 5). The chi-square value obtained was 1.6 at 4 degrees of freedom and a P-value (p= 0.803) showing there was no significant difference between the survival times in the different groups that had different views on how abstaining from alcohol affected their wellbeing after being diagnosed with cancer (Table 5).

**Table 5: Log-rank Test for effect of alcohol use on survival of breast cancer patients**

<table>
<thead>
<tr>
<th>Alcohol use</th>
<th>n</th>
<th>Observed</th>
<th>Expected</th>
<th>((O-E)^2/E)</th>
<th>((O-E)^2/V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol use</td>
<td>1</td>
<td>15</td>
<td>14.7</td>
<td>0.0053</td>
<td>0.00683</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>2</td>
<td>10</td>
<td>12.2</td>
<td>0.4079</td>
<td>0.51310</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>3</td>
<td>10</td>
<td>12.9</td>
<td>0.6335</td>
<td>0.80129</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>4</td>
<td>31</td>
<td>29.5</td>
<td>0.0782</td>
<td>0.12228</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>5</td>
<td>34</td>
<td>30.7</td>
<td>0.3524</td>
<td>0.55879</td>
</tr>
</tbody>
</table>

\(\chi^2 = 1.6\) on 4 degrees of freedom, p= 0.803

Effect of coping with stress on survival of breast cancer patients was also analysed using the Kaplan-Meir curve (Figure 2) and also inferentially using chi-square test. The chi-square value obtained was 19.9 at 4 degrees of freedom and a P-value (p= 0.000514) meaning there was significant difference between the survival and coping well with stress.

**Figure 2: Kaplan-Meir curve for effect of coping with stress on survival of breast cancer patients**

Log rank test showed that there was a significant difference between survival curves of those in different groups of diet, that is, those who felt diet improved their wellbeing and those who did not feel that diet increased their wellbeing (Figure 3). The chi-square value obtained was 9.5 at 4 degrees of freedom and a P-value of 0.04092, showing significance between observing the right diet and breast cancer survival rate.
Patients who showed lack of awareness portrayed less survival than those who had awareness of breast cancer (Figure 4). This result was confirmed inferentially using the log rank test. The log rank test results were; chi-square value of 18.439521 at 4 degrees of freedom and a p-value (P = 0.0010124.) This showed that there were significant different survival proportions for the different awareness groups. This means that if a survivor is fully aware what to do in fighting breast cancer, they are likely to live long.

Access to treatment and its effect on survival of breast cancer patients was analysed also using the Kaplan – Meir curve (Figure 5) and the log rank test. The results revealed that more patients who agreed that accessing treatment within the shortest time possible made their journey easier lived longer as compared to those who disagreed (Figure 5). Log rank test showed that there was a significant difference between those in different groups of views on the The chi-square value obtained was 12.5 at 4 degrees of freedom and a P – value (p=0.0143).
Engaging in regular exercise and its effect on survival of breast cancer patients was analysed using the Kaplan–Meir curve and the log rank test (Table 6). Log rank test showed that there was not statistical significant difference between those in different groups of views. The chi-square value obtained was 5.6 on 4 degrees of freedom and a P-value (p=0.229).

Table 6: Logrank Test for effect of regular exercise on survival of breast cancer patients

<table>
<thead>
<tr>
<th>regular_excercise</th>
<th>n</th>
<th>Observed</th>
<th>Expected</th>
<th>(O-E)^2</th>
<th>(O-E)^2/V</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30</td>
<td>12</td>
<td>9.54</td>
<td>0.637</td>
<td>0.773</td>
</tr>
<tr>
<td>2</td>
<td>52</td>
<td>20</td>
<td>17.37</td>
<td>0.397</td>
<td>0.529</td>
</tr>
<tr>
<td>3</td>
<td>81</td>
<td>22</td>
<td>25.94</td>
<td>0.598</td>
<td>0.891</td>
</tr>
<tr>
<td>4</td>
<td>67</td>
<td>28</td>
<td>22.24</td>
<td>1.489</td>
<td>2.111</td>
</tr>
<tr>
<td>5</td>
<td>68</td>
<td>17</td>
<td>23.91</td>
<td>1.995</td>
<td>2.897</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 5.6 \text{ on 4 degrees of freedom, } p=0.229 \]

**Cox Proportional Hazard Model**

The Cox proportional hazard model was used to investigate how several mindfulness based stress affected the hazards of succumbing to breast cancer (Table 7; Table 8). The likelihood ratio test value for the model was 17.4 and with a probability value of \( p = 0.0000119 \). These values indicate that the overall model was significant. The mindfulness based stress factors that were significant in the model were diet, awareness, and cost of treatment burden and treatment period (Table 8).

Table 7: Cox Proportional Hazard Model Summary

<table>
<thead>
<tr>
<th></th>
<th>Coef</th>
<th>exp(coef)</th>
<th>se(coef)</th>
<th>Z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>stress2</td>
<td>0.3054337</td>
<td>0.7368038</td>
<td>0.4260715</td>
<td>0.7168602</td>
<td>0.0636625</td>
</tr>
<tr>
<td>stress3</td>
<td>0.5865294</td>
<td>0.5562545</td>
<td>0.4686214</td>
<td>1.2516063</td>
<td>0.3098143</td>
</tr>
<tr>
<td>stress4</td>
<td>0.1254778</td>
<td>0.3572049</td>
<td>0.3512768</td>
<td>0.3512768</td>
<td>0.0000266</td>
</tr>
<tr>
<td>stress5</td>
<td>0.0781929</td>
<td>0.9247860</td>
<td>0.3515676</td>
<td>0.2224122</td>
<td>0.0095962</td>
</tr>
<tr>
<td>diet2</td>
<td>0.7228825</td>
<td>2.0603637</td>
<td>0.4023171</td>
<td>1.7967978</td>
<td>0.0723677</td>
</tr>
<tr>
<td>diet3</td>
<td>0.1906592</td>
<td>0.8264142</td>
<td>0.3987844</td>
<td>0.4781011</td>
<td>0.6325783</td>
</tr>
<tr>
<td>diet4</td>
<td>0.0523518</td>
<td>0.9574646</td>
<td>0.3844833</td>
<td>0.1361596</td>
<td>0.8969151</td>
</tr>
<tr>
<td>diet5</td>
<td>0.1280030</td>
<td>0.8798507</td>
<td>0.3944284</td>
<td>0.3245280</td>
<td>0.7455384</td>
</tr>
<tr>
<td>regular_excercise2</td>
<td>0.3336016</td>
<td>0.7163320</td>
<td>0.4092474</td>
<td>0.8151588</td>
<td>0.4198148</td>
</tr>
<tr>
<td>regular_excercise3</td>
<td>0.3918727</td>
<td>0.6757901</td>
<td>0.3572049</td>
<td>0.3512768</td>
<td>0.0000266</td>
</tr>
<tr>
<td>regular_excercise4</td>
<td>0.0328456</td>
<td>0.9676879</td>
<td>0.3672161</td>
<td>0.0893220</td>
<td>0.9288260</td>
</tr>
<tr>
<td>regular_excercise5</td>
<td>0.7066434</td>
<td>0.4930317</td>
<td>0.4015523</td>
<td>1.7597564</td>
<td>0.0784941</td>
</tr>
<tr>
<td>awareness2</td>
<td>1.1643320</td>
<td>3.1213111</td>
<td>0.4760576</td>
<td>2.4457798</td>
<td>0.0144593</td>
</tr>
<tr>
<td>awareness3</td>
<td>1.1813812</td>
<td>3.0685465</td>
<td>0.4176557</td>
<td>2.8266005</td>
<td>0.0046752</td>
</tr>
<tr>
<td>awareness4</td>
<td>0.0780022</td>
<td>0.9249624</td>
<td>0.3763764</td>
<td>0.2070471</td>
<td>0.8359731</td>
</tr>
<tr>
<td>awareness5</td>
<td>0.5754583</td>
<td>0.5624470</td>
<td>0.3773989</td>
<td>1.5248012</td>
<td>0.1273078</td>
</tr>
<tr>
<td>cost_burden2</td>
<td>0.2314046</td>
<td>1.2603691</td>
<td>0.6430587</td>
<td>0.3598499</td>
<td>0.7189594</td>
</tr>
<tr>
<td>cost_burden3</td>
<td>0.7506953</td>
<td>0.4720382</td>
<td>0.7251326</td>
<td>1.0352524</td>
<td>0.300511</td>
</tr>
<tr>
<td>cost_burden4</td>
<td>0.0873911</td>
<td>1.9163186</td>
<td>0.4513698</td>
<td>0.1936131</td>
<td>0.8464789</td>
</tr>
<tr>
<td>cost_burden5</td>
<td>0.0547216</td>
<td>0.9467487</td>
<td>0.4364036</td>
<td>0.1253922</td>
<td>0.9002131</td>
</tr>
<tr>
<td>alcohol_use2</td>
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<td>2.1802559</td>
<td>0.4202895</td>
<td>1.8545364</td>
<td>0.4734604</td>
</tr>
<tr>
<td>alcohol_use3</td>
<td>0.4176038</td>
<td>1.5183599</td>
<td>0.4112110</td>
<td>1.0156118</td>
<td>0.2107134</td>
</tr>
<tr>
<td>alcohol_use4</td>
<td>1.6932928</td>
<td>5.4373551</td>
<td>0.4030935</td>
<td>4.2007440</td>
<td>0.2753807</td>
</tr>
<tr>
<td>alcohol_use5</td>
<td>1.1439328</td>
<td>3.1390896</td>
<td>0.4416647</td>
<td>2.5900483</td>
<td>0.8239930</td>
</tr>
<tr>
<td>treatment_period</td>
<td>0.1845982</td>
<td>1.2027351</td>
<td>0.0941169</td>
<td>1.9613708</td>
<td>0.0498358</td>
</tr>
</tbody>
</table>

The interpretation of the mindfulness based stress factors and their effects on the hazards of succumbing to breast cancer was done using the odds ratios (Table 7). For instance, a patient who got stressed after diagnosis of breast cancer increased their hazards of succumbing to breast cancer with a factor 1.1336900 as compared to a patient who did not get stressed after diagnosis (Table 7). In this case, failing to get stressed was used as the reference level with all the other covariates being held constant. Further, adhering to the prescribed diet reduced the hazards of...
succeeding to breast cancer by a factor 0.0537464 as compared to not adhering to the prescribed diet. Failing to adhere to the prescribed diet was used as a reference level with all the other covariates being held constant (Table 7). Holding all the other covariates constant and taking failing to exercise as the reference level, regular exercising after diagnosis decreased the hazards of succumbing to breast cancer with a factor 0.9676879. Taking lack awareness as the reference level and holding all the over covariates constant, awareness of how to handle breast cancer reduced the hazards of succumbing to the disease with a factor 0.9249624. Holding all the other covariates constant, patients who are burdened financially by breast cancer have their hazards of succumbing to the disease increase by a factor 1.9163186 with having no financial burden being taken as the reference level. Alcohol use increases the hazards of succumbing to breast cancer with a factor 5.4373551. This is when all the other covariates are held constant and lack of alcohol use taken as the reference level (Table 7).

Table 8: Analysis of variance for the cox proportional hazard model

<table>
<thead>
<tr>
<th>Coef.</th>
<th>Exp(coef)</th>
<th>Se(coef)</th>
<th>z</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness 2</td>
<td>0.8406</td>
<td>0.4315</td>
<td>0.4482</td>
<td>-1.875</td>
</tr>
<tr>
<td>Awareness 3</td>
<td>0.8554</td>
<td>0.4251</td>
<td>0.3999</td>
<td>-2.139</td>
</tr>
<tr>
<td>Awareness 4</td>
<td>0.2456</td>
<td>1.2784</td>
<td>0.3572</td>
<td>0.687</td>
</tr>
<tr>
<td>Awareness 5</td>
<td>-0.6919</td>
<td>0.7267</td>
<td>0.3650</td>
<td>-0.1.716</td>
</tr>
<tr>
<td>Alcohol_use 2</td>
<td>0.3192</td>
<td>1.9974</td>
<td>0.4031</td>
<td>1.875</td>
</tr>
<tr>
<td>Alcohol_use 3</td>
<td>0.3390</td>
<td>1.4036</td>
<td>0.4035</td>
<td>0.840</td>
</tr>
<tr>
<td>Alcohol_use 4</td>
<td>1.3858</td>
<td>0.3628</td>
<td>0.3871</td>
<td>4.125</td>
</tr>
<tr>
<td>Alcohol_use 5</td>
<td>0.3263</td>
<td>0.9365</td>
<td>0.3628</td>
<td>0.899</td>
</tr>
<tr>
<td>Treatment period 2</td>
<td>-0.3068</td>
<td>0.7358</td>
<td>0.4644</td>
<td>-0.661</td>
</tr>
<tr>
<td>Treatment period 3</td>
<td>-0.7094</td>
<td>0.4919</td>
<td>0.4070</td>
<td>-1.743</td>
</tr>
<tr>
<td>Treatment period 4</td>
<td>0.2579</td>
<td>1.2942</td>
<td>0.3736</td>
<td>0.690</td>
</tr>
<tr>
<td>Treatment period 5</td>
<td>0.3263</td>
<td>1.3858</td>
<td>0.3628</td>
<td>0.899</td>
</tr>
</tbody>
</table>

Model selection
Model selection was done by the help of Akaike information criterion (AIC). On fitting all the estimators the AIC was 1001.47. The burden of treatment was dropped to achieve an AIC value of 994.55. The stress was further dropped to achieve an AIC of 991.55. The next covariate to be dropped was regular exercise and awareness level, alcohol use and treatment period were found to be the best estimators since they gave the least AIC (989.30). The final model selected is presented in summarised in Table 9 and 10.

Table 9: Cox Model summary of the fitted Model

<table>
<thead>
<tr>
<th>Coef.</th>
<th>Exp(coef)</th>
<th>Se(coef)</th>
<th>z</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness 2</td>
<td>-0.8406</td>
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<td>0.4482</td>
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<td>1.875</td>
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<tr>
<td>Alcohol_use 3</td>
<td>0.3390</td>
<td>1.4036</td>
<td>0.4035</td>
<td>0.840</td>
</tr>
<tr>
<td>Alcohol_use 4</td>
<td>1.3858</td>
<td>0.3628</td>
<td>0.3871</td>
<td>4.125</td>
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<tr>
<td>Alcohol_use 5</td>
<td>0.3263</td>
<td>0.9365</td>
<td>0.3628</td>
<td>0.899</td>
</tr>
<tr>
<td>Treatment period 2</td>
<td>-0.3068</td>
<td>0.7358</td>
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<td>-0.661</td>
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<tr>
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<td>-0.7094</td>
<td>0.4919</td>
<td>0.4070</td>
<td>-1.743</td>
</tr>
<tr>
<td>Treatment period 4</td>
<td>0.2579</td>
<td>1.2942</td>
<td>0.3736</td>
<td>0.690</td>
</tr>
<tr>
<td>Treatment period 5</td>
<td>0.3263</td>
<td>1.3858</td>
<td>0.3628</td>
<td>0.899</td>
</tr>
</tbody>
</table>

Table 10: Summary Statistics of the fitted Model

<table>
<thead>
<tr>
<th>Test</th>
<th>$\chi^2$</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fitted Model</td>
<td>Loglk</td>
<td>55.24</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Waldtest</td>
<td>53.32</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Logrank test</td>
<td>56.33</td>
<td>12</td>
</tr>
</tbody>
</table>

REFERENCES


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Proceedings of the 6th International Research Conference
ABSTRACT
Since the ban of Female Genital Mutilation (FGM) in Kenya, the Ameru community continues the practice in spite of the associated stigma and adverse effects on the initiates. Basically FGM involves the partial removal, total removal or alteration of girls’ or women’s genitalia which in effect disorients the initiates’ physical lives. This study sought to determine the effects of FGM on the girl child’s physical health among the Ameru community of Kenya. The study employed the descriptive survey research design on a sample comprising of 408 girls who had undergone the ‘cut’, 48 health workers, 3 social workers and 30 Focus Group Discussion members selected by the use of snowball sampling and purposive sampling techniques. Data was collected using questionnaires, interview schedules and Focus Group Discussion schedules. The data was analyzed using Statistical Package for Social Sciences version 17.0. Descriptive statistics were used to analyze the data whose findings indicated that FGM negatively affected the physical health of the girl child and in some instances resulted in death. Thus, it was recommended that the government and non-governmental organizations should enhance interventions on physical health effects of FGM to alleviate the sufferings of the girl child among the Ameru community.

Key words: Female Genital Mutilation, Girl Child, Physical Health

INTRODUCTION
The Ameru community in Kenya practice FGM despite the ban by the Government and the Njuri Ncheke (Supreme Council of Ameru Elders) due to adverse effects the practice has. Basically, FGM or female genital cutting also known as clitoridectomy is a traditional practice that involves the partial removal, total removal or alteration of girls’ or women’s genitalia (WHO, 2006). The practice has existed over a long time among diverse communities in the world (Toubia, 1994) as a traditional rite of passage from childhood to adulthood. However, FGM is common in Africa although through immigration and population movements the practice has spread to Europe, North and South America, Australia and New Zealand thus, becoming a worldwide issue (Pillinger, 2007).

The World Health Organization estimated that about 130 million girls and women living today in the world have undergone the FGM and yet every year another 2 million girls and young women are at risk despite its many adverse consequences (WHO, 2006). However, there are diverse FGM physical health effects experienced by initiated girls. The effects may be immediate including excruciating pain, shock, wound formation, urinary tract infection, fever, septicaemia and at times death due to haemorrhage or septic shock; intermediate effects like delay in wound healing, anaemia, pelvic infections, irregular bleeding and vaginal discharge; and eventually late effects such as infertility, difficulty in urinating, rectovaginal fistula, anal incontinence and urinary incontinence (Wabaki, 2007; WHO, 1996). While these effects may not be experienced by some initiated girls and that effects tend to differ from one person to another, there are initiated girls who experience some of the effects on a daily basis (Abusharaf, 2000).

Unfortunately, many initiated girls may be suffering from FGM physical health effects in silence partly because of the cultural explanations of such effects and possibly due to fear of victimization by the authority when medical care is sought from public health facilities. In particular, some cultures rationalize the physical health effects of FGM as part of life and the initiated girls should persevere for the purpose of preserving personal social identity (Valderman, 2002). Similarly, the Nandi community of Kenya advocate for FGM because the clitoris is culturally perceived as being filthy, foul smelling and can grow very long even develop branches if not cut (Nyangweso, 2001) thus, nullifying the physical health effects of FGM. Besides, in Sierra Leone physical health effects of FGM are attributed to witchcraft, supernatural powers and general bad luck (Taubia, 1999). In an attempt to demystify FGM and create awareness of the adverse consequences, this study sought to determine the effects of FGM on the girl child’s physical health among Ameru community of Kenya.

Objectives of the Study
The main objective of this study was to determine the effects of FGM on the girl child’s physical health among Ameru community of Kenya.
METHODOLOGY
This study employed the descriptive survey research design targeting a population of 137,044 respondents. A sample comprising of 408 girls who had undergone FGM were selected using snowball sampling technique while 48 health workers, 3 social workers and 30 Focus Group Discussion members were purposively selected for the study. Data were collected using questionnaires, interview schedules and Focus Group Discussion schedules. Qualitative data were coded and analyzed using Statistical Package for Social Sciences version 17.0 while qualitative data from interviews and focus group discussion were thematically analyzed. Descriptive statistics including frequencies, percentages, means, and standard deviation as well as themes and excerpts were used to analyze the data. The study findings were presented on tables and as prose narrations.

RESULTS AND DISCUSSION
Demographic Characteristics of the Respondents
This section focuses on the demographic characteristics of the respondents whose background information is essential in understanding some of the salient features of the study participants.

Demographic Characteristics of the Girls
Demographic analysis of the girls was done on the basis of the respondents’ age, residence settings, and level of education as well as religious affiliations. The number of girls who participated in the study was 407 of whom 41 girls were aged between 14 years and 19 years, 244 girls between 20 years and 24 years while 122 girls were aged between 25 years and 30 years. Regarding the residence settings, it seems that majority of the girls comprising 90.7% came from rural areas as opposed to only 9.3% who came from the urban setup. This observation reflects the general trend where FGM is widely practiced among the rural population (Kanake, 2001). Remote rural areas in most cases are less exposed to formal government services and administrators, and this perhaps encourages the practice of FGM. This is supported by the high number of respondents who have undergone FGM in rural areas. Studies done by DOM-CPC (2008) suggest that the Ameru girl’s rural home is the main place where FGM is carried out. The distribution of the respondents by religious affiliation suggests that majority of the respondents constituting 51.8% were Protestants; 42.3% were Catholics and 2.7% were Muslims. The high percentage of the Christians that is Protestants and Catholics may be attributed to the contribution of the early church missionaries to social development projects such as building of schools, hospitals and churches in most parts of the Ameru community (DOM-CPC, 2008). Nevertheless, the small percentage comprising 2.7% of girls affiliated to Muslim religion is perhaps a reflection of the small number of people who profess Muslim faith among the Ameru.

Demographic Characteristics of the Health Workers
A total of 46 health workers provided supplementary information on the post FGM effects on the girl child’s physical health. The distribution of health workers by gender was almost proportional, with female health workers making up 54.3% and the male health workers’ percentage being 45.7%. This distribution trend is common in Kenyan health sector where the majority of the medical staff are female. These findings may be attributed to the traditional thinking that provision of medical services is a females’ occupation. The age distribution of the health workers indicated that 54.3% of the respondents were between ages 25 years and 34 years; 21.7% were between ages 35 years and 34 years while 17.4% were at least 45 years. Regarding work experience, a large proportion constituting 32.6% of the respondents had experience of between 5 years and 10 years; 28.3% had worked for less than 5 years.

Demographic Characteristics of the Social Workers
The three female social workers involved in the study were from Igembe South District, Tharaka District and Meru South District respectively. The findings also indicated that two of the social workers were above 45 years of age while the third one was aged between 35 years and 44 years. At these ages, the social workers are energetic and mature enough to handle community activities efficiently and also have more community service experiences as well as enough knowledge on FGM issues necessary for this study. In addition, all the social workers had college or university education meaning that these respondents were qualified professionally to comment on FGM related issues for this study.

Physical Health Effects of FGM on the Girl Child
In this study, three Physical Health areas were examined which included Sexual difficulties, Maternal health and Bodily harm and infections. Responses were generated by use of questionnaires, interviews and focus group
discussions. The questionnaires were administered to the initiated girls and health workers, interviews were conducted with the social workers while the focus group discussions involved selected community members.

**Girls’ Views on Physical Health Effects Related to FGM**

Information sought from the girls on physical health effects related to FGM were analyzed by determining the mean and the standard deviation of 20 items on a 5 point Likert Scale where Strongly Disagree = 1, Disagree = 2, Undecided = 3, Agree = 4, Strongly Agree = 5. The information on Table 1 represents the data analysis results.

**Table 1. Girls’ Views on Physical Health Effects Related to FGM**

<table>
<thead>
<tr>
<th>Sexual Difficulties Related to FGM</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>FGM practice has led me into being sexually dysfunctional</td>
<td>407</td>
<td>3.8796</td>
<td>1.13074</td>
</tr>
<tr>
<td>I experience regrettable sexual memories because of FGM</td>
<td>407</td>
<td>3.6855</td>
<td>1.08929</td>
</tr>
<tr>
<td>FGM makes me experience painful sexual intercourse</td>
<td>407</td>
<td>3.6216</td>
<td>1.16362</td>
</tr>
<tr>
<td>FGM caused my genitalia dryness and post-coital bleeding</td>
<td>407</td>
<td>3.2973</td>
<td>1.20858</td>
</tr>
<tr>
<td>After FGM I experience no sexual arousal</td>
<td>407</td>
<td>3.7125</td>
<td>1.24109</td>
</tr>
<tr>
<td>FGM has been a limitation to my sexual satisfaction</td>
<td>407</td>
<td>3.9582</td>
<td>1.11555</td>
</tr>
<tr>
<td>Overall Mean and Standard Deviation on Sexual Difficulties Responses</td>
<td>3.7572</td>
<td>0.85453</td>
<td></td>
</tr>
<tr>
<td>Maternal Health Issues Related to FGM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FGM caused my childbirth complications</td>
<td>407</td>
<td>3.6806</td>
<td>1.22422</td>
</tr>
<tr>
<td>FGM caused my urinary and menstrual problems</td>
<td>407</td>
<td>3.0147</td>
<td>3.30922</td>
</tr>
<tr>
<td>I suffer recurrent reproductive tract infections due to FGM</td>
<td>407</td>
<td>3.0762</td>
<td>1.11488</td>
</tr>
<tr>
<td>FGM contributed to my difficult gynecological examination</td>
<td>407</td>
<td>3.2039</td>
<td>0.98270</td>
</tr>
<tr>
<td>After FGM I have limited contraceptive choices</td>
<td>407</td>
<td>2.5381</td>
<td>1.07726</td>
</tr>
<tr>
<td>FGM caused maternal death to some of my friends</td>
<td>407</td>
<td>3.4079</td>
<td>1.19140</td>
</tr>
<tr>
<td>Overall Mean and Standard Deviation on Maternal Health Responses</td>
<td>3.1536</td>
<td>0.78651</td>
<td></td>
</tr>
<tr>
<td>Bodily Harm and Infections Related to FGM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Am worried that FGM may transmit STIs and HIV/AIDS infections to me</td>
<td>407</td>
<td>4.0835</td>
<td>1.08182</td>
</tr>
<tr>
<td>FGM made me suffer from severe Anaemia</td>
<td>407</td>
<td>3.8280</td>
<td>1.06900</td>
</tr>
<tr>
<td>FGM exposed me to tetanus infection</td>
<td>407</td>
<td>2.8649</td>
<td>1.27264</td>
</tr>
<tr>
<td>FGM led to my urethra and bladder damage</td>
<td>407</td>
<td>3.1057</td>
<td>1.25205</td>
</tr>
<tr>
<td>FGM led to the growth of keloids scars around my genitalia</td>
<td>407</td>
<td>3.8501</td>
<td>1.07806</td>
</tr>
<tr>
<td>Some of my friends have bleed to death due to FGM</td>
<td>407</td>
<td>3.9975</td>
<td>0.90836</td>
</tr>
<tr>
<td>FGM has made me to suffer from painful and blocked menses</td>
<td>407</td>
<td>3.2948</td>
<td>1.20408</td>
</tr>
<tr>
<td>FGM made me experience urine retention due to pain, swelling and blocked urethra</td>
<td>407</td>
<td>3.2727</td>
<td>1.31375</td>
</tr>
<tr>
<td>Overall Mean and Standard Deviation on Bodily Harm and Infections Responses</td>
<td>3.5372</td>
<td>0.80339</td>
<td></td>
</tr>
</tbody>
</table>

Key: M – Mean   SD – Standard Deviation   N – Number of respondents

The overall mean and standard deviation of initiated girls’ responses about sexual difficulties associated with FGM were 3.7572 and 0.85453 respectively out of the maximum mean score of 5 points. This indicates that the initiated girls were moderately prone to experiencing sexual difficulties including dryness and pain during sexual intercourse, not enjoying sex, post coital bleeding and never or rarely experiencing orgasm. Although some of the girls could still have been too young to begin getting into sexual affairs while others may not have associate negative sexual experiences with FGM, many respondents affirmed that FGM had been a limitation to sexual satisfaction, caused sexual dysfunction and negatively interfered with sexual arousal. This finding is in agreement with Njeru & PATH (2000) studies among Aembut girls; where it was observed that girls who had undergone FGM, had limited sexual satisfaction, experienced pain during intercourse and never experienced orgasm. Besides, Njeru and PATH (2000) confirms that with FGM, parts of the women’s erogenous genital areas as well as sexually responsive vascular tissue are removed. This excision of women’s genital parts coupled with damaged nerve-endings and the development of scar tissue and adhesions around the excised parts reduce a woman’s capacity for sexual enjoyment.

The overall mean and standard deviation of initiated girls’ responses about maternal health difficulties were 3.1536 and 0.78651 respectively out of the maximum mean score of 5 points. This depicts that most of the initiated girls were undecided on whether maternal health difficulties were caused by the FGM. This is probably because maternal
health difficulties may not have been experienced by most of the girls, particularly those who had not given birth. Otherwise, majority of the initiated girls as reflected by higher mean scores were of the opinion that FGM caused child birth complications including maternal deaths. These views are supported by Hansen (1972) noting that maternal death in most cases is caused by excessive bleeding from FGM practice which may also precipitate other obstetric complications including prolonged and obstructed labour and bleeding resulting into difficulties in child delivery and sometimes death of the mothers. Mwangi (2001) also affirms that there are many delivery problems among the FGM women.

The overall mean and standard deviation of initiated girls’ responses about bodily harm and infections related to FGM were 3.5372 and 0.80339 respectively. This insinuates that the initiated girls experienced moderate bodily harm and infections as a result of FGM. According to Abusharaf ((2000) not everyone who undergoes FGM experiences painful complications and those who do, the complications experienced differ from one person to another. However, many of the initiated girls were worried that FGM would promote transmission of STIs and HIV/AIDS infections to them. This is mainly because of the unhygienic conditions in which the FGM procedures are carried out as indicated by (Barstow, 1998) linking this to transmission of STIs, HIV/AIDS and tetanus infections. Besides, WHO (2006) purports that FGM initiates are prone to transmission of STIs and HIV/AIDS due to bleeding during sexual intercourse as a result of lasting damage to the genital area.

Health Workers’ Views on Physical Health Effects Related to FGM

Information sought from the girls on physical health effects related to FGM were analyzed by determining the mean and the standard deviation of 20 items on a 5 point Likert Scale where Strongly Disagree = 1, Disagree = 2, Undecided = 3, Agree = 4, Strongly Agree = 5. The information on Table 2 represents the data analysis results.

### Table 2. Health Workers’ Views on Physical Health Issues Related to FGM

<table>
<thead>
<tr>
<th>Sexual Difficulties Related to FGM</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>FGM practice leads to sexual dysfunction among the girls</td>
<td>46</td>
<td>3.6957</td>
<td>1.31436</td>
</tr>
<tr>
<td>FGM practice is a source of regrettable sexual memories</td>
<td>46</td>
<td>3.6739</td>
<td>1.31748</td>
</tr>
<tr>
<td>The practice of FGM results to painful sexual intercourse</td>
<td>46</td>
<td>3.8261</td>
<td>1.08124</td>
</tr>
<tr>
<td>FGM causes genitalia dryness and post-coital bleeding</td>
<td>46</td>
<td>3.3261</td>
<td>1.30050</td>
</tr>
<tr>
<td>Girls who have undergone FGM experience no sexual arousal</td>
<td>46</td>
<td>3.8261</td>
<td>1.28762</td>
</tr>
<tr>
<td>FGM limits a girls’ sexual satisfaction</td>
<td>46</td>
<td>4.0000</td>
<td>1.11555</td>
</tr>
<tr>
<td>Overall Mean and Standard Deviation on Sexual Difficulties Responses</td>
<td></td>
<td>3.7836</td>
<td>0.96983</td>
</tr>
<tr>
<td>Maternal Health Issues Related to FGM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FGM causes child birth complications</td>
<td>46</td>
<td>4.3913</td>
<td>.80217</td>
</tr>
<tr>
<td>FGM leads to urinary and menstrual problems</td>
<td>46</td>
<td>2.8261</td>
<td>1.33840</td>
</tr>
<tr>
<td>FGM is a source of recurrent reproductive tract infections</td>
<td>46</td>
<td>2.9565</td>
<td>1.19176</td>
</tr>
<tr>
<td>FGM results to difficult gynecological examinations</td>
<td>46</td>
<td>3.7609</td>
<td>1.28556</td>
</tr>
<tr>
<td>FGM limits contraceptive choices</td>
<td>46</td>
<td>2.6087</td>
<td>1.4972</td>
</tr>
<tr>
<td>FGM is a contributory factor to maternal death</td>
<td>46</td>
<td>3.9130</td>
<td>1.13188</td>
</tr>
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<td>0.85830</td>
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<tr>
<td>Bodily Harm and Infections Related to FGM</td>
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<tr>
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<td>.97925</td>
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<td>Girls who have undergone FGM suffer from severe anaemia</td>
<td>46</td>
<td>3.6522</td>
<td>1.19661</td>
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<td>Girls involved in FGM suffer from tetanus</td>
<td>46</td>
<td>2.7609</td>
<td>1.09919</td>
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<tr>
<td>FGM damages girl’s urethra and bladder</td>
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<td>FGM leads to growth of keloid scars around the genitalia</td>
<td>46</td>
<td>3.8261</td>
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<tr>
<td>FGM excessive bleeding and infected wounds cause death</td>
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<td>.84098</td>
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<td>FGM causes urine retention due to pain, swelling and blocked urethra</td>
<td>46</td>
<td>3.2727</td>
<td>1.31375</td>
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<tr>
<td>FGM results to painful or blocked menses</td>
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<td>Overall Mean and Standard Deviation on Bodily Harm and Infections Responses</td>
<td></td>
<td>3.4946</td>
<td>0.78879</td>
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</table>

Key: M – Mean    SD – Standard Deviation    N – Number of respondents

The overall mean of the health workers’ responses regarding Sexual difficulties experienced by initiated girls after FGM was 3.7826 with a standard deviation of 0.96983 out of the maximum mean scores of 5 points. This implies
that the girls experience moderate sexual difficulties after undergoing FGM process a response that supports the girls’ responses. This suggests that the health workers were in agreement that FGM limits a girl’s sexual satisfaction and sexual arousal as well as causing genitalia dryness, post coital bleeding and regrettable sexual memories. Indeed, FGM causes permanent, irreparable changes in the external female genitalia potentially disrupting its sexual functioning (WHO, 2000). In line with these findings, Nyangweso (2007) affirms that the mutilation of the clitoris during FGM is believed to reduce a woman’s desire for sex, sexual pleasure and orgasm during intercourse. In addition, Einstein (2008) notes that with FGM some fundamental structures for sexual stimulation and orgasm are exercised leading to immediate sexual consequences such as pain during intercourse, lack of sexual satisfaction, never experiencing orgasm, no arousal during intercourse and post coital bleeding.

The health workers’ responses’ mean on maternal health difficulties related to FGM was 3.4094 with a standard deviation of 0.85830 out of the maximum mean score of 5 points. This suggests that the maternal health of the girls is moderately affected by the FGM practice. This indicates that initiated girls experienced maternal health difficulties especially with regard to child birth complications, maternal deaths and difficulty in gynecological examination. In agreement with these results, Abor (2006) asserts that FGM affects the maternal well-being of a girl because the female genitalia is deformed making it difficult for the baby to pass through. Therefore, caesarian sections mode of delivery is preferred to avert the problems associated with the risks of excessive bleeding due to lacerations and tears at the genital area and excessive pain associated with the scared tissue. In addition, Toubia (1999) explains that after episiotomies, because the structures are not normal, the FGM victim experiences excessive bleeding that may lead to anaemia and eventually death.

The overall mean of the health workers’ responses on bodily harm and infections experienced by initiated girls was 3.4946 with a standard deviation of 0.78879 out of the maximum mean score of 5 points. This indicated that the health worker were undecided whether FGM actually caused bodily harm and infections. However, the higher mean scores indicated that initiated girls suffered sexually transmitted infections including HIV/AIDS as a result of FGM. Moreover, excessive bleeding and infected wounds were deemed as causing anaemia and even death among the initiated girls. In addition, the initiated girls developed keloid scars around the genitalia. It may be inferred that the lack of strong evidence for existence of tetanus and problems with menses due to FGM may have been contributed by failure of the girls to seek medical attention thus, hindering the health workers from keeping any records of such cases. In retrospect, Taubia (1999) observes that FGM complications may be attributed to witchcraft, supernatural powers and general bad luck. As a result, the initiated girls may not seek medical care intervention for the bodily harm and infections.

Social Workers’ Views on Physical Health Effects Related to FGM

The social workers were asked to expound on the physical health effects of female genital mutilation on girls who underwent the procedure. The participants highlighted sexual difficulty issues as tearing, bleeding and pain during sexual intercourse, limited sexual desire as well as impaired sexual responses. These findings support the idea that removal of clitoris and other sensual organs may decrease a woman’s sexual desire and dampen sexual responses (Einstein, 2008). Incidentally, these sexual difficulties were purported to generate marital problems such as infidelity, quarrels, communication breakdown as well as divorce.

The maternal difficulties associated with FGM emerged as complicated child birth and inability to use some contraceptives. In particular, a certain participant stated “even during child birth, initiated girls prefer traditional birth attendants who may not have the skills and facilities to negotiate complicated deliveries. This may increase the risk of further maternal health complications and death as well”. In agreement with this finding, Abor (2006) postulates that deformity of the genitalia due to FGM contributes to difficult child birth. Thus, there is need for the government and non-governmental institutions to intervene either by educating the traditional birth attendants or availing special user friendly maternal facilities for the initiated girls in order to curb unnecessary maternal deaths.

Bodily harm and infections prevalent among FGM initiates according to social workers included scaring of the genitalia, fainting especially immediately after the procedure due to excruciating pain, excessive bleeding often leading to anaemia or sometimes death and the risk of HIV/AIDS infection. This finding confirms that initiated girls are more likely to suffer from sexually transmitted infections (WHO, 2006). Besides, with regard to tendencies of seeking medical attention by the initiated girls, the social workers were of the opinion that traditional healers received most of the cases generally because of the fear of government authority and lack of funds to visit private
health facilities. Thus, treatment was mostly by use of traditional herbal medicine meaning that majority of the initiates had to bear lengthy periods of pain and discomfort.

**Focus Group Discussion Members’ Views on Physical Health Effects Related to FGM**

The focus group discussions had various views regarding physical health effects of FGM on initiated girls. Concerning sexual difficulties experienced by the initiated girls, issues of bleeding during and after sexual encounters, pain during sex, decreased sexual arousal and lack of sexual pleasure were raised. The following excerpt pertains a response from a certain participant, “pain and bleeding during sex is as a result of the narrowing vaginal opening due to FGM. Consequently, serious marital relationship conflicts emerge.” In essence, marriages involving initiated girls called for patience and understanding by a spouse in order to avert disagreements, conflicts or even divorce. In addition, another participant stated, “The vaginal opening can narrow until it almost closes up. Such girls must be opened up either surgically or through penetrative sex. This means that sexual intercourse especially in the first months of marriage is usually painful for the initiated girls.” Aside from the removal of clitoris (the source of sexual pleasure), the pain experienced during sex impaired sexual responses and pleasure causing many of the initiated girls not to enjoy sex. The findings are supported by DOM-CJPC (2008) who affirms that with sexual expression being problematic, many initiated girls who get married encounter marital relationship conflicts.

With respect to maternal health difficulties, thematic analysis of focus group discussions revealed that initiated girls presented issues with still births due to obstructed labour, difficulty in normal delivery, contraceptive difficulties like the use of intra uterine contraceptive devices and even infertility. Mwangi (2001) affirms that FGM causes numerous maternal complications which require specialized care. In particular, a certain participant noted, “I know of a woman who had been cut and her vagina opening sealed almost completely. This prevented her from having children of her own.” Technically, midwives who are not familiar with FGM get alarmed when encountering a maternity case of an initiated girl for the first time. Thus, midwives need training exposure to deliveries involving initiated girls.

The focus group discussions also brainstormed about bodily harm and infections related to FGM. Generally, immediate complications experienced after FGM were deliberated as including haemorrhage, wound infection, pain, shock, injury to adjacent structures like the urethra, anal sphincter and vaginal walls, excessive bleeding and sometimes death occurred as a terminal consequence. One participant emphasized, “Death may occur due to haemorrhage because the cutting of the clitoris involves cutting across the clitoral artery whose blood flows at high pressure. Haemorrhage may also occur after the first week as a result of sloughing of the clot over the artery usually because of infection. If the bleeding is very severe and uncontrolled especially due to fear of seeking medical intervention, death becomes inevitable.” The findings confirm that post FGM effects are severe and depend on the circumciser’s age, eyesight and dexterity as well as the type of FGM procedures employed, the tools used and the struggle put up by the girl (WHO, 2006). Actually, HIV/AIDS infections were reported to have been caused by FGM among Ameru girls as reflected in the following excerpt, “It is sad to report that some of our Ameru girls have been infected with HIV/AIDS out of this FGM practice. This has been due to “sharing a knife” which was part of what enhanced the feeling of community membership or belongingness among initiates cut the same time. However, the rate of HIV/AIDS infection is declining as each girl carries a fresh blade for use during the FGM process for fear of infection.” This may explain why the initiated girls affirmed that they were worried FGM would transmit HIV/AIDS and other sexually transmitted infections.

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Plate 1: Pumpkin fruits and leaves

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