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UNIVERSITY

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Theme:

ADDRESSING CONTEMPORARY SOCIETAL AND ORGANIZATIONAL
CHALLENGES

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WELCOME REMARKS

By Prof. J. Kuria Thuo



Vice Chancellor Gretsä University

Prof. Thuo opened the conference by welcoming all participants and thanked them for honoring the invitation to attend the conference. He emphasized that the forum was ideal for academicians, practitioners and presenters to share ideas and deliberate on providing solutions to the contemporary challenges facing society and organizations.

By Prof. Daniel M. Mukunya

Vice Chairperson, Gretsä University Governing Council

Prof. Mukunya observed that 'Hope' is the cornerstone of Gretsä University since its founders were driven by the great hope for the future of the young people and Kenya. He invited every stakeholder of the institution to be proud of it and to invest their energies for the growth of the institution. He expressed his confidence that their hard work will be rewarded.

By Dr. Kibathi Mbugua

Chancellor, Gretsä University

Dr. Kibathi emphasized that research is the backbone of academics and that university stakeholders should be enthusiastic about research. He noted that research is a game changer in our society because it gives solutions to the problems we face in our daily lives and is the key contributor to the advancement of the society. He urged the conference participants to take the forum as a learning platform.



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KEYNOTE SPEECH 1

By Don Victor Simon Gichuki

Managing Director, Records & Information Management Africa Limited

Title: Knowledge Management and its Space in Preserving Culture

Mr. Gichuki stated by quoting Nelson Mandela thus: “If you talk to a man in a language he understands, that goes to his head; if you talk to him in his language that goes to his heart.” He further expounded that while Knowledge is facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject, Knowledge Management (KM) is the process of creating, sharing, using and managing the knowledge and information of an organization. It refers to a multidisciplinary approach to achieving organizational objectives by making the best use of knowledge.

Knowledge management is important for an organization’s administration. An increasing number of organizations understand that information and knowledge is their most important resource, unfortunately it stays as a passive property if the organizations do not engage in the management of this valuable resource. Knowledge management enables organizational learning, a concept where companies are interested, not only in the reliable, expert production of a product or service, but in the knowledge that underlies these production processes.

The speaker noted that an organization can grow more when it gets people’s perspective. Knowledge management has three dimensions namely: factual, conceptual and methodological.

Importance of Knowledge Management

1. A Foundation of Organizational Growth

Growing and expanding an organization requires the ability to quickly learn and adapt, which is much easier with the right knowledge systems in place. A strategy that considers the right combination of processes, policies, principles, methods, strategies, technologies and tools provides the kind of foundation that fosters growth well into the future.

2. Faster response time

When people have more direct access to the knowledge and tools they need, right when they need them, with a sustainable strategy and improved KM system in place for managing knowledge in a way that benefits everyone, the organization can respond faster and make more effective decisions ahead of competition. A multidisciplinary approach considers how the company, the customers, the employees, the industry and the stakeholders interact with knowledge, what they want and need, and how to best manipulate knowledge resources to the benefit of everyone involved.

3. Improved Products and Services

By more effectively managing an organization's knowledge resources, one can be more innovative, which is the key ingredient for improving product and service offerings.

Improving an organization's capabilities for collaborating and sharing knowledge, both in physical and virtual environments, paves the way for continuous improvements in processes and end products.

4. Increased Return on Investment

Organizations can be more productive and cut back on the number of mistakes that hold them back by strategically managing knowledge by implementing a systematic and collaborative set of processes and methodologies,

5. Radical Cost Cutting

An effective strategy allows organizations to manage their knowledge systems more effectively, reduce inefficiencies, redundancies and provide more convenient access to information through streamlined KM infrastructure. All this adds up to radical cost savings both immediately and in the future. With the right guidance and a strategy based on experience in getting results, an organization can develop a strategy for managing knowledge that will sustain profitable growth for years to come.

6. Enabling Better and Faster Decision Making

By delivering relevant information at the time of need through structure, search, subscription, syndication, and support, a knowledge management environment can provide the basis for making good decisions.

7. Reusing Ideas, Documents, and Expertise

Once one has developed an effective process, one wants to ensure that others use the process each time a similar requirement arises. If someone has written a document or created a presentation that addresses a recurring need, it should be used in all similar situations in future. When members of one's organization have figured out how to solve a common problem, know how to deliver a recurring service, or have invented a new product, one wants that same solution, service, and product to be replicated as much as possible. Just as the recycling of materials is good for the environment, reuse is good for

organizations because it minimizes rework, prevents problems, saves time, and accelerates progress.

8. Avoid making the Same Mistake Twice

George Santayana said, "Those who ignore history are doomed to repeat it." If we don't learn from our mistakes, we will experience them over and over again. Knowledge management allows us to share lessons learned, not only about successes, but also about failures. In order to do so, we must have a culture of trust, openness, and reward for willingness to talk about what we have done wrong. The potential benefits are enormous.

If NASA learns why a space shuttle exploded, it can prevent recurrences and save lives. If FEMA learns what went wrong in responding to Hurricane Katrina, it can reduce the losses likely to be caused by future disasters. If engineers learn why highways and buildings collapsed during a previous earthquake, they can design new ones to better withstand future earthquakes. If one learns that one's last bid or estimate was underestimated by 50%, one can make the next one more accurate and thus earn a healthy profit instead of incurring a large loss.

9. Communicating Important Information Widely and Quickly

Almost everyone today is an information worker, either completely or partially. We all need information to do our jobs effectively, but we also suffer from information overload from an increasing variety of sources. How can we get information that is targeted, useful, and timely without drowning in a sea of e-mail, having to visit hundreds of web sites, or reading through tons of printed material? Knowledge management helps address this problem through personalized portals, targeted subscriptions, RSS feeds, tagging, and enterprise search engines.

10. Promoting Standard, Repeatable Processes and Procedures

If standard processes and procedures have been defined, they should always be followed. This allows employees to learn how things are done, leads to predictable and high-quality results, and enables large organizations to be consistent in how work is performed. By providing a process for creating, storing, communicating, and using standard processes and procedures, employees will be able to use them routinely.

11. Showing Customers how Knowledge is used for their Benefit

In competitive situations, it is important to be able to differentiate oneself from other firms. Demonstrating to potential and current clients that one has widespread expertise and ways of bringing it to bear for their benefit can help convince them to start or continue doing business with one. Conversely, failure to do so could leave one vulnerable to competitors who are able to demonstrate their knowledge management capabilities and benefits.

12. Accelerating Delivery to Customers

Speed of execution is another important differentiator among competitors. All other things being equal, the company that can deliver sooner, more efficiently will win. Knowledge sharing, reuse and innovation can significantly reduce time to deliver a proposal, product, or service to a customer. And that translates into increased win rates, add-on business, and new customers.

Challenges Faced in Implementing Knowledge Management

There are many challenges that businesses face when implementing Knowledge Management. One of the most significant and enduring challenges of KM is creating a culture of flexibility and collaboration. Companies already struggle to implement new policies, because people naturally tend to resist

change. However, KM can be especially difficult because employees might want to protect their skills and knowledge, or be reluctant to learn from their peers.

1. Security. One needs to design a knowledge transfer system that makes it easy for the appropriate people to access information, while protecting sensitive or private intelligence from outsiders.

2. Measuring Knowledge. It can be difficult to define metrics to measure the knowledge within an organization, especially for tacit knowledge that it cannot be easily quantified. To overcome this, some experts recommend focusing on the purpose of knowledge, rather than the efforts or results (which are often also unquantifiable).

3. Identifying an expert. There won't always be a single "keeper" of every knowledge type, but one will still have to identify, who within the company, possesses certain knowledge and use them as the base level of knowledge from which you want to build. This process is difficult tactically, but can also be delicate among employees who might feel competitive about their skill levels.

4. Document Storage and Management. While not all knowledge makes for straightforward documentation, it will have to be stored and organized in some form. Document management is a challenge for many companies, but organization is a vital aspect of KM - otherwise, it will be impossible to locate and use the knowledge you have stored. Consider using a dedicated document management system to keep everything organized.

Disseminating Knowledge Throughout an Organization. One will need to devise a process where, once one has stored the knowledge, other team members can access it. This is complicated both theoretically and tactically; so many organizations opt for a software system designed specifically for this purpose. We'll take a closer look at KM systems later on.

Continual Improvement. Like most process-driven strategies, one should continually improve upon the knowledge management system implemented. Stage periodic reviews or, if possible, dedicate resources to continually optimize the process.

Determining Where Knowledge Management is housed. If KM serves one's entire organization, decide which department will "own" the strategy. Companies most commonly house KM in HR or IT. Remember, this department is not only responsible for effectively managing the Knowledge itself, but also for maintaining the community of knowledge sharing and organizational learning.

As Nonaka and Takeuchi first stated in their seminal academic papers, there are three main ways that people approach knowledge management:

1. People-centric: Centered on people, relationships, and how people form learning communities and other informal ways of knowledge sharing. This idea is also known as ecological KM theory.

2. Tech-Centric: Focused on the technology that facilitates knowledge storage and transfer, and aims to create technology systems that encourage knowledge sharing.

3. Process-Centric: Interested in how the organizational structure and processes

Knowledge Management versus Culture

Cultural heritage includes tangible culture (such as buildings, monuments, landscapes, books, works of art, and artefacts). It also includes intangible culture traditions or living expressions inherited from ancestors and passed on to descendants, such as oral traditions, performing arts, social practices, rituals,

festive events, knowledge and practices concerning nature and the universe or the knowledge and skills to produce traditional crafts and intangible culture (such as folklore, traditions, language, and knowledge), and natural heritage (including culturally significant landscapes, and biodiversity). Whatever shape they take, these things form part of a heritage, and this heritage requires active effort on our part in order to safeguard it. “The best way to preserve your cultural heritage, whatever it may be, is to share it with others”

The appreciation of cultural heritage should be communicated through an integrated education approach in this global society. Sustainability in the preservation of cultural heritage through education should be encouraged. It is a way of how tangible and intangible cultural heritage can be safeguarded.

The role of Media in Preserving Culture and Heritage

Digital storage has played a big role in the preservation of cultural heritage. It has enabled the sharing of cultural and historical heritage around the world. Digital storage is not only the most popular method of preservation, but it is the trend.

Conclusion

The speaker concluded that exposure of workers to knowledge enhances the culture in organizations. “Any fool can get; the point is to understand” Albert Einstein, “Knowledge has a beginning, no end line”, Geeta S. Iyengar.

Questions

1. What is the safety of documenting and having knowledge updated on social media? How can one ensure that the content is not stolen?
2. Is the problem documenting the culture or the language?

3. Does modernization or the adoption of Western Culture affect culture preservation?

Answers

1. Knowledge Management encompasses those with knowledge and those seeking the knowledge. Knowledge can be used in research or for making money. Social media gives free knowledge but if someone wants to acquire money through sharing knowledge then they can use the knowledge portals available.
2. The speaker explained that culture and language go hand in hand: hence if people feel the importance of culture then they will definitely preserve it.
3. The speaker argued that culture can be enhanced in the small community cultural activities so that all generations can get exposed and understand their culture. This will reduce the effect of modernization in the adoption of culture among generations.

KEYNOTE SPEECH 2

By Stanley Mwangi

Chief IT Officer, Madison Insurance Company Ltd

Title: The Role of IT in Addressing Contemporary Societal and Organizational Challenges

Industrial Revolution has been developing from The First Industrial Revolution to The Fourth Industrial Revolution. The First revolution started with steam engine, the Second came with electricity and the Third with computer.

The Fourth Industrial Revolution represents a fundamental change in the way we live, work, and relate to one another. It is a new chapter in human development, enabled by advances in technology that are commensurate with those of the first, second and third industrial revolutions, and which are merging the physical, digital, and biological worlds in ways that create both promise and peril. The speed, breadth, and depth of this revolution is forcing us to rethink how countries should develop, how organizations create value, and even what it means to be human; it is an opportunity to help everyone, including leaders, policy-makers and people from all income groups and nations, to harness technologies in order to create an inclusive, human-centered future. Contemporary issues in the Fourth Industrial Revolution include:

1. Inequality

Worsening inequality, and a corresponding negative impact on social stability, is one of the greatest potential risks associated with the technology innovation propelling the Fourth Industrial Revolution. While new technologies can democratize access to employment and entrepreneurial opportunities, not to mention education and knowledge, the tendency of new global technology

platforms to dominate winner-takes-all markets could exacerbate inequality and social fragmentation. A more digitally-connected world has created higher expectations, which can generate significant social risk if people feel they have no chance to attain the prosperity they see others enjoying. If the Fourth Industrial Revolution does result in greater social exclusion, it may make it even more difficult to find meaning in the modern world - and it may create further disenchantment with established elites and power structures. This could further motivate extremist movements, and augment their recruitment efforts.

2. Business Disruption

As a result of the Fourth Industrial Revolution, the relationship between businesses and their customers is shifting to an on-demand, always-connected model powered by digital communication. In early 2018, the Facebook-owned mobile communication service WhatsApp reported that its users were sending 60 billion messages every day.

The Fourth Industrial Revolution is also spurring new forms of collaboration. Established incumbents often lack sensitivity to evolving customer needs, while younger firms are in need of the capital and rich data enjoyed by older counterparts. When firms share resources, significant value can be created for both parties as well as for broader economies. As they consider new partnerships, organizations will increasingly pivot to open operating models that can capitalize on network effects. One model that has proven as disruptive as it is profitable is the so-called platform strategy, designed to broaden influence by encouraging peers to build on top of a company's established tools and infrastructure.

3. Disruption to Jobs and Skills

As business models are disrupted, employment is being profoundly impacted. The result will be significant job creation and job displacement, in addition to

both heightened labour productivity and widening gaps between the skills that employers need, and those that potential employees have. During previous industrial revolutions, it required decades to adapt - by building the training systems and labour market institutions necessary to develop new skill sets. Given the relatively faster pace and broader scale of disruption brought about by the Fourth Industrial Revolution, an interlude like that may not be an option this time around. Proactive talent management strategies are called for, as well as sustained dialogue and collaboration among businesses, governments, education providers, and civil society. As the where and how of work is transformed, it will lead to new management and regulatory challenges; and in an evolving labour market, preparing for the future is increasingly critical for seizing opportunities and mitigating undesirable outcomes.

4. Security and Conflict

The Fourth Industrial Revolution will dramatically affect the scale and character of conflict. Already, distinctions between war and peace, and between combatants and non-combatants, are becoming blurred. Meanwhile new technologies are making the battlefield both local and global. Groups such as the Islamic State may physically operate in defined areas, but can recruit fighters from hundreds of different countries, largely through social media. Modern conflict is increasingly hybrid in nature, combining traditional battlefield techniques with elements previously associated with armed, non-state actors; the internet is becoming as much a theatre of engagement as land, sea, and air. It is inevitable that future conflict will include an online dimension, as combatants disrupt, confuse, and destroy communications and decision-making capabilities.

5. Fusing Technologies

The Fourth Industrial Revolution is different from prior industrial revolutions, in the way that it builds from a fusion of technologies, and from a growing harmonization and integration of research disciplines. Nearly every new development in any field now leverages digital capability. Precision genome editing, for example, could not have happened without relentless improvement in computing power and data analytics. Similarly, advanced robots would not exist without new approaches made to artificial intelligence dependent on digital systems and processing power. The digital and physical worlds also collide in fields such as autonomous vehicles and 3D printing.

Advances that might have once been confined to digital systems, like the application of cryptography to blockchain technology to create programmable, secure, and distributed records, are now having widespread impact in the real world. Blockchain, for example, while it may be best known as the framework for virtual currency, can provide new ways to manage land records and track deforestation.

6. Innovation and Productivity

Rates of productivity around the world have either declined or remained flat during the past decade, despite exponential increases in both technological progress and investment in innovation.

This revolution has not yet reached many of the two billion people still disconnected from the global economy, who may ultimately benefit the most from it. Many of the technologies and processes being created to help better manage negative forces like the environmental impact of climate change have not yet been widely implemented. After all, we are still at the beginning of the Fourth Industrial Revolution, and few organizations have so far reorganized themselves to take full advantage of it. As with the digital revolution, and other

previous industrial revolutions before that, realizing the full benefit of the Fourth Industrial Revolution may take time, and require new organizational forms, new skills, and new mind-sets.

7. Ethics and Integrity

Innovation triggered by the Fourth Industrial Revolution, in disciplines like biotechnology and artificial intelligence, is redefining what it means to be human by pushing the limits of lifespan, health, and cognition in ways once confined to science fiction. As knowledge progresses and new discoveries are made, a related moral and ethical discussion is critical, if people are to be able to adequately respond to phenomena like life extension, so-called designer babies, and memory extraction. There are also growing concerns that, as the Fourth Industrial Revolution deepens our individual and collective relationships with technology, it may negatively affect social skills - like the ability to empathize.

To combat these challenges, there is a need to ensure that the Fourth Industrial Revolution fosters individualism and humanity, and is an empowering force that fosters technology as a tool that is made by people, and for people. Individuals and organizations need to take collective responsibility for creating a future where innovation and technology genuinely serve the public interest.

8. Agile Governance

Fourth Industrial Revolution technologies can be harnessed by governments to govern better, become more accessible, and increase transparency and trust - not to mention better track public assets. As the World Economic Forum's former Global Agenda Council on Software & Society argued, truly agile governance should take into account how new technologies affect job markets, money and taxation, liability, security, privacy, and inclusion - while assessing ways to remove power imbalances.

Conclusion

Businesses must adapt or die. Technology advancement can help understand a problem better and reduce current challenges like global warming. Ethics and integrity can be affected by advancements of implants sensing individual health status. Robotic automation and cloud computing are relating transformations in business technology advancements.

Questions

1. What is the preparedness of Africa for The Fourth Industrial Revolution?
2. What will people do when technology takes over human labour?
3. How is technological advancement playing a role in education and how can we take advantage of it?
4. What advice would you give to the Government of Kenya to counter fears of the people losing jobs to technology?

Answers

1. African countries have embraced technological advancements especially through improved penetration of internet.
2. There are still jobs that can't be replaced by technology. Jobs such as singing still need creativity from humans.
3. Education sector stakeholders should embrace technology advancements to better their competitiveness. Education institutions should teach real world issues using technology advancements.
4. The Government should invest in embracing cyber security, big data analytics and cloud archiving in Kenya.

KEYNOTE SPEECH 3

By Joseph Ndunda

General Manager, Merika Hotel Nakuru

Title: Challenges Facing Graduates in the Hospitality Industry

Mr. Ndunda emphasized that those joining the hospitality industry should avoid the attitude that they will make quick money. Using his own experience, he explained that it has taken him 20 years to get to where he is currently. He enumerated the challenges that are faced by graduates in the hospitality industry as follows:

1. **Sexual harassment:** Some managers are especially known to exploit those who seek employment. This has led to desperation among female graduates fearing, among others, unwanted pregnancies.
2. **High expectation in the industry:** New graduates are misguided into the belief that hospitality industry pays better than other industries. On realization that this is not so, many of them become frustrated and are tempted into stealing, which leads to imprisonment and loss of job.
3. **Alcoholism and drugs:** These affect one's performance and causes absenteeism. It must be noted that the hospitality industry is very sensitive and requires a lot of discipline;
4. **Long working hours:** In the hospitality industry "the guest is king". One must go by what the guest desires. Many new graduates are not used to the challenge of such demands.

5. **Job insecurity:** It is common practice in the hospitality to prefer employing new recruits, on casual basis, or on contract, which new graduates find to be a challenge.
6. **Intimidation and harassment:** Unqualified supervisors, who regard new graduates as a threat to older employees.
7. **Lack of money to settle:** Newly graduated professionals from especially economically disadvantaged backgrounds, have serious challenge in settling in, since they have no resources to be on their own. They may be compelled to put up with colleagues who may have bad influence.
8. **Lack of standard operating procedures:** Some hospitality establishments may not have clear and harmonized standard operating procedures. Sometimes this may impact negatively on the careers of new graduates in the hospitality industry.
9. **Exposure to different life style systems:** New graduates are forced to live a life of pretense that they cannot afford when they fail to live this life they end up getting spoiled.
10. **New employee's background check:** New graduates are strongly advised to never post negative things on social media, never create a negative impression on the people around you, as this has been a major challenge to the new graduates.
11. **Personal grooming:** New graduates need to acknowledge that personal grooming is all-important in the hospitality industry.
12. **Temptation to get rich quickly:** Affects new graduates in the hospitality industry who steal guests' money in effort to get rich quicker.
13. **Abusive language:** Especially in hotels kitchen, and lack of decorum towards colleagues and friends.

Conclusion

As, new graduates be prepared to face challenges, be wary of impropriety on social media, work hard for your success.

Questions

1. Is the Blue Economy a solution to underutilization of resources?
2. Why is the hospitality industry foreseeing low numbers in terms of employment?
3. What action can be taken to protect interns in the hospitality industry?
4. Why are investors in the hospitality industry concentrating in Nairobi?

Answers

1. Most of the guests are Europeans, who dominate the blue economy resources. However, there is need for more research.
2. The trend of employment has changed, many employers fear to give permanent jobs. Politics also plays a negative role in terms of self-respect.
3. Report to the supervisor or manager and play your role.
4. People do not want to travel far; it also needs initiative from County Governments to attract more investment at the County Level.

KEYNOTE SPEECH 4

By Prof. Adiel Magana

Dean Faculty of Engineering, Science and Technology, Chuka University

Title: Ethical Issues in Research Involving Human Subjects

Prof. Magana noted that ethics was an aspect that cuts across the board in matters research. However, his presentation was on the issues that affect the human subject.

Why Ethics in Research?

- i. It is a legal requirement by the government;
- ii. It is a requirement by publishers;
- iii. All funding agencies require ethical clearance from NACOSTI.

Code of Conduct for Basic Research

- i. Informed Consent: Participants must voluntarily consent to participate. However, researchers should take note of the vulnerable groups in the society: women, children, prisoners, street children among others;
- ii. Research must contribute to the good of the society and not just research for its own sake;
- iii. Research must be built on sound theory and prior animal test using animal models;
- iv. Participation in research should not cause physical and/or mental torture;
- v. In the event of risk taking, the risk benefit should outdo the risk itself;
- vi. Provide a conducive/proper environment for participants i.e. have the component of facilitating the research. Compensate the participants in case anything goes wrong since current research can go wrong; but do not pay them for participation;

- vii. Experiments should be carried out by qualified people who are able to identify danger signals;
- viii. Allow discontinuation with the research by participants at any time if they want to withdraw from it.

Prof. Magana informed the audience about the existence of the Ethics Review Committees which are responsible for monitoring and evaluation of research work. The ERCs should comprise of:

- a. Experts in the research discipline;
- b. Specialists in ethics;
- c. Lay persons (they are good at reporting issues as they are on the ground);
- d. Professionals from other fields.

Prof. Magana further noted that not all research require clearance. He gave examples of research involving accredited universities and research using data from common knowledge like Newspapers.

It is also the responsibility of the ERC in the institution to come up with guidelines on conduct of ethical review. For instance, does your spouse need to approve your research?

Conclusions

The speaker urged researchers to observe the code of conduct when carrying out research. He also re-emphasized the need to:

- i. Seek informed consent;
- ii. Respect privacy (confidentiality);
- iii. Avoid coercing people to participate in research;
- iv. Respect human rights as enshrined in the Kenyan constitution 2010;
- v. Respect the principle of justice.

Questions

1. How far are we in terms of implementing Ethics Review Committees (ERCs) in Kenya?
2. Why do we still have issues of plagiarism involving researchers copying from one another?
3. Are there restrictions on what to research on in literature and Humanities?
4. In the event of conducting a research involving street children, from whom do you ask permission?

Answers

1. The National Commission for Science, Technology and Innovation (NACOSTI) requires institutions to have the ERCs for training. Currently there are 22 in Kenya. NACOSTI helps in setting them up and offers free training. Institutions need to simply get in touch with them for assistance.
2. There is software that should be used to detect plagiarism such as turn-it-in. There are also cases of falsification of data by researchers which should be dealt with by the ERCs in the affected institutions.
3. There is a lot of emphasis on clinical, medical and scientific research, but there are also psycho-social effects in research. It depends on what one wants to be accredited for. The speaker noted that he only dwelt on medical sciences in his presentations but all researches are regulated, including research in Literature and Humanities.
4. Even street children have their owners including child welfare institutions/departments. Hence researchers should seek consent from such bodies when planning to involve street children in their research.

PAPERS PRESENTED



CLUSTER 1	Sub-Theme 1: Computing and Informatics Sub-Theme 2: Library and Information Science
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Moderators:

1. **Dr. Irene Wanjiru:** School of Pure and Applied Sciences, Kirinyaga University
2. **Prof. Wanja Thairo :** School of Science and Technology, Kenya Methodist University

Rapporteurs:

1. **Faith Too:** School of Computing and Informatics, Gretsia University
2. **Vincent Mbandu:** School of Computing and Informatics, Gretsia University
3. **Mugambi Frankline:** Department of Library and Information Services, Gretsia University

Effectiveness of Overdue Fines on Book Returns by Library Defaulters at Gretsia University, Kenya

By Mugambi F. M¹ and Njoroge R. W²

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Abstract

Libraries are deposits of knowledge tasked with two major functions in the society: collecting and organizing information and helping people find the information. A lot has been written about acquisition, organization and helping people find information in the libraries, but the logistics of getting people to use the scarce physical resources has been left unexplored, especially the effectiveness of overdue fines on book returns (Reed, et al. 2014). This is the information gap that the research sought to fill. The effectiveness of overdue fines on book returns by library defaulters at Gretsia University Library was analyzed. The research adopted a descriptive survey methodology and used a structured system inquiry to collect data from Gretsia University KOHA Library Management System. A total of 2,683 circulation transactions were carried out in the period between 2nd May 2018 and 10th August 2018. A sample of 337 circulation transactions was used for the study. The findings indicate that loan period has a greater influence on book returns than overdue fine. The use of overdue fine as a deterrent against overstaying with borrowed library items seems to bear minimal results. The research recommends the university library to explore use of alternative methods to overdue fines, such as no-fine method or hybrid systems which incorporate the two in trying to encourage book returns on time.

Key words: Academic Library, Overdue Fine, Loan Period, Library Defaulter

1. Introduction

Libraries are deposits of knowledge where scholars of all ages and different backgrounds come to seek information and knowledge. To meet diverse information needs of library patrons, libraries have always maintained a collection of information resources. Most libraries across the globe operate on open system where valid library patrons are allowed access to the library collection during library hours with the option of borrowing the library resources to use outside the library for a defined period of time at no cost (Mitchell & Smith 2005).

The library open system offers the convenience of using the library resources anywhere anytime. However, the system creates a problem on the other hand, whereby some of the patrons fail to return the borrowed library items on time, causing inconvenience to other



library patrons who would wish to use these same library resources. The resources end up being inaccessible, thereby degrading the quality of library collection.

To solve the problem, libraries invented overdue fine chargeable to patrons who fail to return borrowed library items on time. Fines are meant to deter patrons from overstaying with borrowed library items and act as a punishment for repeat offenders, (Qingyi, 2014). However, critics of overdue fines argue that the familiar practice which has existed for centuries is supported by little evidence that fines are effective in reducing overdue library resources. Further critics argue that charging overdue fines, especially in public, school and academic libraries is unethical and the meagre results realized through this practice are not worthy the negative publicity libraries incur (Read, Blackburn, and Sifton, 2014).

Sung & Tolppanen (2013) argue that although fines have a positive influence on library user behaviour towards returning borrowed items on time, fines also hurt the library image and deter users from accessing the library. They recommend libraries to carefully scrutinise this long-held library practice of fines and make changes that promote library usage. The most commonly used alternative to fines, is the no-fine policy in which overdue items do not attract any fine. Rather, patrons with overdue items receive overdue notifications for a set duration (grace period). After the lapse of the grace period the item is considered lost and the patron is billed replacement cost and processing fee. Psychologists argue that a no-fine policy is a positive reinforcement which has been found to be more effective in influencing patrons' behaviour to return borrowed items on time and less damaging to the library image (Wilson, 2014).

Academic libraries have always been regarded as the heart of universities that circulates the lifeblood of the university. Ranganathan(1992) noted that academic libraries are not a store house of knowledge but rich sprays of knowledge out to irrigate fields of education. Braaksma, (2008) notes that although academic libraries invest a lot to gain student's trust in an effort to ensure high library usage and portray the image of library as public good, overdue fines are a good example of library's perceived inflexibility.

Other researchers argue that although charging overdue fines may correct human behaviour, it may encourage widening of the information gap and create knowledge inequity. Wilson (2014) argues that sometimes it is difficult to enforce the overdue policy because of different reasons, such as social status or personal connection, so patrons who

know library staff or hold influential position in the university or rank in a community may get away from overdue charges, which eventually projects a negative image to the students.

Despite increase in adoption and use of electronic resources especially in academic libraries, circulation of physical library resources remains the major function of academic libraries. While libraries would prefer borrowed items to be returned on time in order to ensure that every patron has fair access to the library collection, usually this is not the case. Often libraries have imposed overdue fines on patrons who fail to return borrowed items on time. Fines are thought to discourage patrons from overstaying with borrowed items.

1.2 Problem Statement

The existing fine policy at Greta University Library imposes a fine of Ksh. 5 and Ksh 30 for long-loan and short-loan library items respectively for every extra day a patron overstays with the borrowed item. A survey carried out on library patrons' satisfaction with library services at the beginning of 2018 revealed that a majority of library patrons considered the fine policy very punitive. Despite the fine policy being punitive, on average 31% of checked out items were overdue, accruing an outstanding fine of Ksh. 114,220. To get a better understanding of the problem, this research investigated the effectiveness of existing fine policy with the goal of delivering recommendations designed to reduce the number of overdue items in the library.

1.3 Objective of the Research

. The research aims at delivering recommendations designed to reduce the number of overdue items in the library.

1.4 Research Questions

The research was guided by the following questions:

1. Are fines effective to recover overdue library materials?
2. Is there a relationship between the loan period and overdue period?

1.5 Conceptual framework

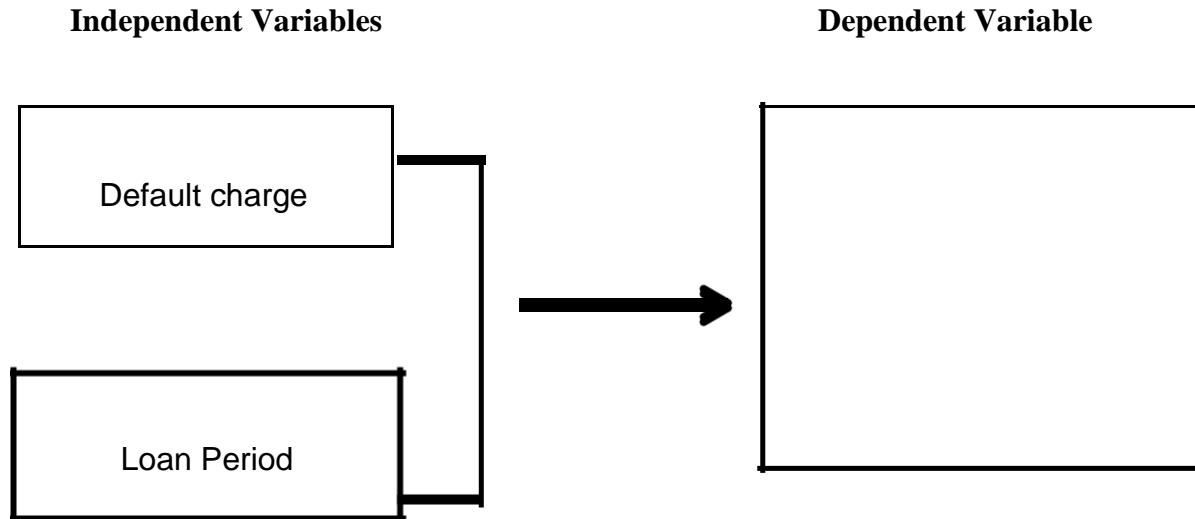


Figure 1: Conceptual framework

2. Methodology

Trochim (2005) describes research design as the glue that holds the research together; it binds all major parts of the research together with the aim of addressing the research problem. Descriptive survey design was adopted in this research. The research used a structured system inquiry to collect data from Gretsia University KOHA Library Management System. The purpose was to collect comprehensive and in-depth information on overdue fines and book returns.

Books at Gretsia Library are generally categorised into two sections: General collection and Short-loan collection. Books on general collection are normally circulated for fourteen days while those on short-loan are circulated for three days. If a book is overdue, a charge of Ksh. 5 per day is levied for General collection books and Ksh. 30 per day for Short-loan books. A total of 2683 circulation transactions, consisting of 1059 General collection transactions and 1629 Short-loan transactions, were carried out in the period between 2nd May 2018 and 10th August 2018. The period was chosen for this study because it constitutes a full academic semester when students are expected to be in the University. A sample of 337 circulation transactions was used for this study; that is: 137 circulation transactions from general collection and 200 transactions from short-loan collection.

Each transaction was traced to determine the number of days the book was checked out and the number of days the book was overdue. The sample circulation transactions were compared using the t-test, hypothesizing no difference in the means.

Structured Query Language (SQL) was used to fetch data on the 337 sample circulation transactions carried out during the identified period from the KOHA Library Management System database. Findings were presented in tables, percentage, figures and text.

3. Findings

This section presents findings of the research in line with the objectives and research questions of the study.

3.1 Overview of the library

Gretsa University library is a fully automated academic library with 10,228 volumes of books in its collection serving 1081 library users. The library uses KOHA library Management System to manage its operations. KOHA is a web-based integrated library system used in managing a wide range of administrative processes typically found in modern libraries. Key modules in KOHA include: cataloguing, authority management, serials management, circulation, acquisitions, and reporting. The study was interested in the circulation and reporting modules.

3.2 Circulation transactions

In the study period, out of the 2683 circulation transactions carried out, a total of 166 books were found to be have been overdue.

3.3 Effect of loan period

Table 1 Summarizes circulation transactions and t-test.

The mean days overdue in short loan collection is greater at 1.68 compared to 0.21 for the general collection. The p value is greater than 0.05 meaning the difference in mean days overdue between the two collections is significant.

Table 1: Results of t-test on overdue

Collection Category	Loan period		Mean	T-test
General collection	14	Average days out	14.17	P = 0.11
		Average days overdue	0.21	P = 0.36
Short loan collection	3	Average days out	4.60	P = 0.43

		Average days overdue	1.68	P = 0.85
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3.4 Effect of overdue fine

Another indicator of the effect of fines is the number of fines paid. For this sample, fines for books were assessed retroactively beginning one day after the due date. There were 105 books overdue representing 31% of all books checked out one day after the due date, 73 (22%) books were overdue two days after due date and 46 (14%) books were overdue more than three days after due date. Table 2 Summarizes books overdue, fine paid.

Table 2: summary of overdue and fines paid

Collection Category	Loan period	Books overdue			Overdue charge per day	Total fines paid
		1 day after due date	2 days after due date	More than 3 days after due date		
General collection	14	29 (21%)	20 (14%)	14 (10%)	Ksh 5	1255
Short loan collection	3	76 (38%)	53 (27%)	32 (16%)	Ksh 30	7530

4. Discussion

The findings demonstrated high variance which is an indication that other factors other than overdue charge and loan period affect book returns in a library. The findings appear to indicate that loan period has a greater influence on book returns than overdue fine. For example, the overdue mean for short loan checkouts is greater than that of general collection at 1.68 days and 0.21 days respectively, yet short loan overdue fine is six times higher than that of general collection at Ksh. 30 compared to Ksh. 5 for general collection. However it is worth noting that materials on short loan collection are usually on high demand compared to those on general collection, in fact the high demand is the primary reason why libraries build short loan collection to ensure fair access to the limited resources by minimizing loan period and charging high overdue fines to deter users from overstaying with the items.

The impact of overdue fine on book returns seemed to be minimum, despite the high overdue fine of Ksh. 30, 76 (38%) books checked out from short loan collection were overdue one day after due date compared to 29 (21%) books checked out from general collection with an overdue fine of Ksh 5. The characterization of overdue fine however is highly debatable especially considering how it becomes a barrier to the library usage by

the poor students who cannot afford the overdue charges and therefore are forced to return the borrowed materials on time while students who can afford and are willing to pay will stay with the borrowed library materials for as long as they need them.

5. Conclusion

Libraries exist to collect information and help people find it by making it available in an organized manner. Much is known about acquisition, organization and helping people find information in the libraries but the logistics of getting people to use the scarce physical resources has been left unexplored. This is the information gap this research sought to fill by analysing the effectiveness of overdue fines on book returns by library defaulters. The findings indicate that loan period has a greater influence on book returns than overdue fine and use of overdue fine as a deterrent to patrons overstaying with borrowed library items bears minimal results.

6. Recommendations

First Greta University library should explore use of alternative methods to overdue fines, such as no-fine method or hybrid systems which incorporate the two.

Second future researchers may consider exploring the impact of the inconvenience involved in paying overdue fines such as going to a different building to pay the overdue fine and going back to the library to present the receipt, on library usage or book returns.

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Block-Chain and Bitcoin: Understanding the Efficiency of SHA-256 Cryptographic Hash Function

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Abstract

This paper sought to bring forth a deeper understanding of the efficiency of SHA-256 cryptographic hash function as implemented in the Bitcoin's Block-Chain technology. It involved an analysis of fundamental characteristics of all hash functions. These fundamental characteristics were scrutinized in terms of security, collision resistance and performance analysis in comparison with SHA-256. The data used for this analysis was acquired through comparative analysis of secondary data from literature resultant from experimental studies done. To ensure integrity of the information acquired from literature, consistency of results in from comparative analysis was queried. Identified inconsistencies were excluded from the final compilation of this paper. This paper has covered an overview of cryptography and digital signing, cryptocurrencies and the block-chain technology and hash functions as well as the efficiency of the specific hash function under scope. This paper then discusses the issues associated with hash functions including their pitfalls, how they operate and their applications from a wider perspective. The paper then concludes on the findings declaring the efficiency of the SHA-256 cryptographic hash function. As



the study discovered, the hash function in question is currently secure however, as with its predecessors this might cease to be with the emergence of new technologies such as quantum computing. The last part of the paper dwells on recommendations for policy makers in the computing spectrum as well as recommendations for future studies.

Key words: Block-Chain, Cryptography, Cryptocurrency Digest, Hash Function

1. Introduction

1.1 Cryptography

Cryptography is the art of writing or solving code (Concise Oxford Dictionary, 2007). This definition referred to cryptography in its simple form of secret communication. Traditional cryptography techniques referred to as classical ciphers were widely applied by empires before the 20th Century AD. Modern day cryptography has a different conceptualization. (Yehuda et al, 2007) defined cryptography as the scientific study of techniques for securing digital information, transactions and distributed computations. This evolution enabled its application in everyday activities, most notably connections to any secure website using a Secure Sockets Layer (SSL) certificate.

In 1967, asymmetric cryptography was openly proposed by Deffi, Hellman and Merkle. In its implementation, asymmetric cryptography had to use a pair of keys, a public key and a private key. To achieve the characteristics of integrity, authenticity, confidentiality and non-repudiation, asymmetric cryptography ensured that anyone could encrypt a message using a public key but such a message could only be decrypted using a private key. The private and public keys had to be mathematically related but infeasible to derive one key from another. This was significantly different from symmetric cryptography where the decryption and encryption relied on only one key that had to be kept private and transmitted only through a secure channel.

1.2 Hash Functions

1.2.1 Introduction

(Wikipedia) defines a cryptographic hash function as a hash function which took an arbitrary amount of input data (or 'message') and returned a fixed size alphanumeric string. In this sense, the input can be any number of bits, it could be infinitely big but the resultant output shall always be of a fixed size. A hash is basically a string or number generated from a string of text. Hashing is fundamentally different from encryption because of the output after a process of either hashing or encryption. Unlike hashing, encryption turns data into a string of unreadable characters that are not of a fixed length

and with encryption; the strings can be reversed back into the original plaintext through decryption with the right key.

Stevens, (2012) stated the importance of one-way functions due to their irreversibility nature. There was no key that could reverse a one-way function, it was designed that way. A one-way function is a function that mapped a huge (possibly infinite) domain on one of all possible bit strings of a length of 256 bits. The functions were designed in a way that it was easy to compute but infeasible to invert.

Hashing has been used for a variety of purposes and it has proved to be secure. One of the uses of hash functions is in the affirmation of data integrity. Being a characteristic of a hash function, a specific input shall always result in the same output; a slight alteration significantly changes the output. This means that hash functions are deterministic. Data integrity can then be maintained. Another use is ensuring authenticity of a message or piece of data. A message coming from the same source could be affirmed to come from the same source with the implementation of digital signatures. Another use is ensuring non-repudiation where a statement's author could not deny authorship of the same statement. These applications have been implemented by renowned corporations including WikiLeaks and Oracle among others in the authentication of downloaded content.

1.2.2 Characteristics of a Good Hash Function

Michal, (2008) noted that cryptographic hash functions were basic primitives used in many applications on which more complex cryptosystems were built. With that in mind, it would then mean that hash functions would have to contain some fundamental characteristics that could contribute to the overall security of the cryptosystem. A weak hash function meant a weak cryptosystem that could easily be broken by cryptanalysts.

There were three basic characteristics of a hash function that had to be possessed by and cryptographic hash function that was considered efficient, or good in nature. The first was speed. Speed of computing a message into a hash had to be balanced. It had to be fast enough for it to be useful in environments that involved normal computers yet slow enough to deter any speedy act of breaking them. To authoritatively measure this characteristic, the hash creation speed and the consumption of the CPU could be used.

The second characteristic was determinism and randomization. In as much as a hash function could always output the same hash if the same message was input into the hash function, there had to be an extensively large difference if the input was slightly changed.

To achieve this, randomization had to ensue. This could be measured using the Avalanche Coefficient which showed a rate of randomization. The last fundamental characteristic of any good hash function was the ability to have a high collision resistance. That would mean it would be astronomically unlikely to have two different messages hash to the same digest.

1.2.3 Characteristics of SHA-256 and its Comparison with Other Functions

Sebastian, (2008) described SHA-256 as a hash function that transformed a 512-bit message block into 64 expanded message words of 32 bits each and a state update of transformation. In relation to its sister function, SHA-512, Christoph et al, (2015) found that SHA-256 had a word size of 32 bits and application of the step function 64 times compared to 64 bit word size and 80 times step function application of the SHA-512.

Henri et al, (2003) described the weakness of earlier versions of the SHA functions and categorized them as broken. Attacks had been formulated and one renowned attack on SHA-0 was by Chabaud and Joux, (.....?). Another hash function that had met its fall was MD5 which was broken through the use of rainbow tables as illustrated on the website; <https://crackstation.net/> where virtually any unsalted hash could be translated to its plaintext equivalent. Table 1 shows the comparison of popular hash functions characteristics.

Table 1: Characteristics Comparison of Popular Hash Functions.

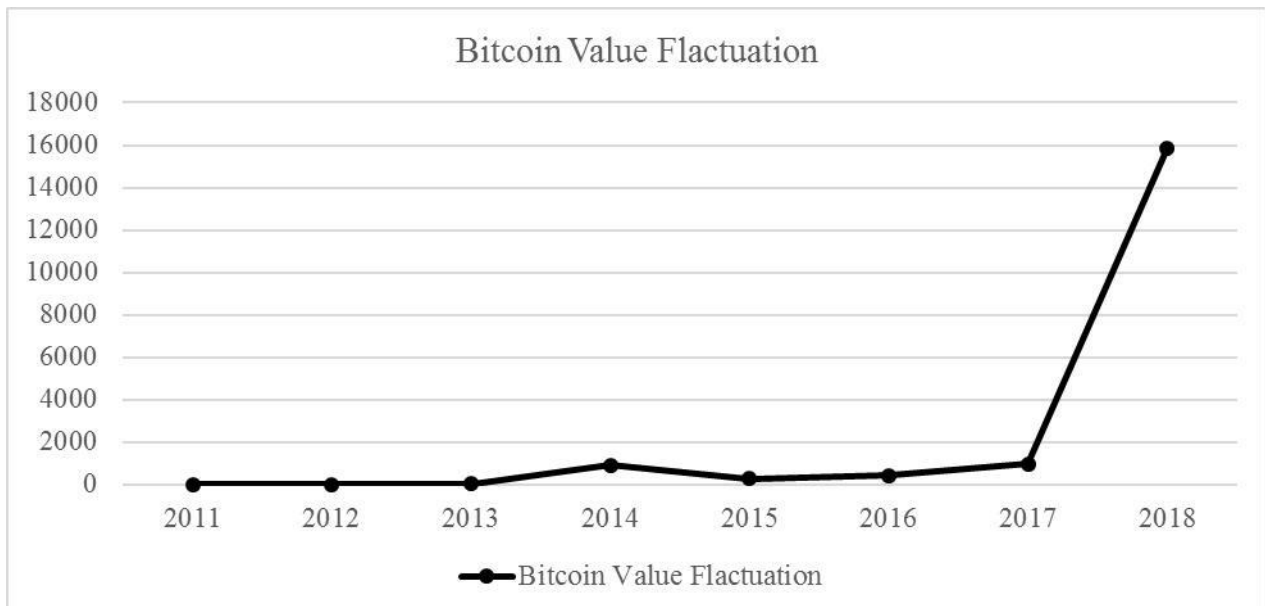
Algorithm & Variant	Output (bits)	Size	Block (bits)	Size	Security (bits) against collision attacks	Capacity against length extension attacks	Publication Year
MD5	128		512		≤ 18	0	1992
SHA-0	160		512		< 34	0	1993
SHA-1	160		512		< 63	0	1995
SHA -2 (256)	256		1024		< 128	32	2001
SHA-3 (256)	256		1088		< 128	256	2015

1.3 Cryptocurrencies and the Bitcoin

Dibyoyoti et. al. (2015) defined a cryptocurrency as a special form of digital currency and essentially a medium of exchange. The most significant difference between a cryptocurrency and traditional Dollars and Euros was that the acceleration of the product of money was not controlled by an entity; rate of production was publicly known and defined.

Bitcoin was conceived in January 2009 as an open source project by a pseudonymous researcher referred to as Satoshi Nakamoto. Bitcoin was created based on the principle of proof-of-work that there was a secure transaction being processed on a peer-to-peer network without the need of a central clearing house. The creation and success of Bitcoin led to the creation of other cryptocurrencies such as Namecoin, Litecoin, Peercoin and Freiconn. Sindri, (2015) elaborated that Bitcoin had been using the SHA-256, a cryptographic system designed by the U.S NSA, and was the most widely known type of digital currency with a total value of \$3.069 billion and over 13 million total Bitcoins were in circulation. Every Bitcoin ever transacted linked to a specific key or address making it unique. According to Sindri, (2015), a Bitcoin transaction was when one Bitcoin moved from one address to another.

Figure 1: Bitcoin Financial Trend since Inception in 2009 (Value in USD against Year)



(Dweyer, 2014)

1.4 Block-Chain

A block-chain is a public database that records every transaction or trade of Bitcoin (Dwyer, 2014). Ittay et. al, (2015) further explained block-chain as a list of records called blocks which are linked using cryptography. To enhance security, each block contained a cryptographic hash of the previous block, a timestamp and transaction data. This made for the authenticity of the block making it tamper-proof, yet allowed it to be viewed by the public with all the transactions that had ever taken place.

A block-chain had four core technologies underpinning it. These were hash codes, Merkle Trees, Hash Puzzles and Asymmetric Cryptography.

2. Review of Leading Theories: Kerckhoffs' Principle

This theory posed a challenge to all cryptosystems identifying the requirements of any cryptosystem and the necessities when the system was exposed to the public domain. Kerckhoffs, (1883) stated that a cryptosystem should be secure even with everything about the system, except the key, is public knowledge.

This concept has been borrowed to and implemented time and again in all cryptosystems that use asymmetric keys for encryption. According to Kerckhoffs, this cryptosystem should not have to be hidden from the general public; in fact the public should be aware of everything about the system but should not be able to break it.

American mathematician (Claude, 1949) reformulated Kerckhoffs' principle but insisted that a system should be designed with the assumption that the enemy would immediately gain full familiarity with it. In this form, it was called the Shannon's maxim.

In his paper Kerckhoffs, (1883) "*La Cryptographie Militaire*", he stated six design systems for military ciphers. The first was that the system (crypto) had to be practically, if not mathematically indecipherable. The second principle was that the system did not have to require secrecy and it also did not have to be a problem in the case that it fell into enemy hands.

He also added that it had to be possible to communicate and remember the keys without having to write notes and correspondents had to have the ability to change or modify it at will. The fourth principle was that it had to be applicable to telegraph communication. Also, it had to be portable not requiring several persons to handle or operate. The final principle was that the system had to be easy to use and should not be stressful to use or require users to know and comply with a long list of rules.

3. Efficiency of SHA-256 Cryptographic Hash Functions

3.1 Introduction

Efficiency of the SHA-256 Cryptographic Hash Function could be measured through a variety of ways including the use of the three fundamental properties any hash function would have to pass to be considered secure for usage; speed, avalanche effect and collision resistance. For this study however a measure of the security of the hash algorithm through the use of brute force attack, collision resistance deduced using the avalanche coefficient and resource efficiency deduced from the digest creation speed and CPU consumption.

SHA-256 hash function used a 32 bit word size with a 64 step allocation. This made it more resilient against attacks as compared to the other functions in the MD family. Upon further examination, this study discovered that SHA-256 had relatively high implementation standards and was implemented in the year 2001 after its sister function, SHA-1 was found to be susceptible to breakage. In comparison with other MD family hashes, the function in question had a high in block size, message digest output size, bits against collision attacks and capacity against length extension attacks. These characteristics made the hash function secure and usable in the presence of current threats.

3.2 Security of SHA-256

To measure the security of SHA-256, comparison had to be done. A viable comparison had to include hash functions that had been broken as well as those that were yet to be broken. To achieve the distinction, this study categorized hash functions that had been broken before SHA-256 in all experiments and those that had yet to be broken after. Broken hashes include SHA-0, SHA-1 and MDS while unbroken hashes included SHA-3 family.

To have a reasonable conclusion on the conclusion of the hash function in question, the researcher had to examine various perspectives of security in hash functions. To achieve this, the researcher looked into the digest output size and the capacity of these functions against length extension attacks of the function.

3.2.1 Digest Output Size

The size of a digest largely affects the security of a hash function when a brute force attack comes into play. For a message digest with a number of bit in the message digest,

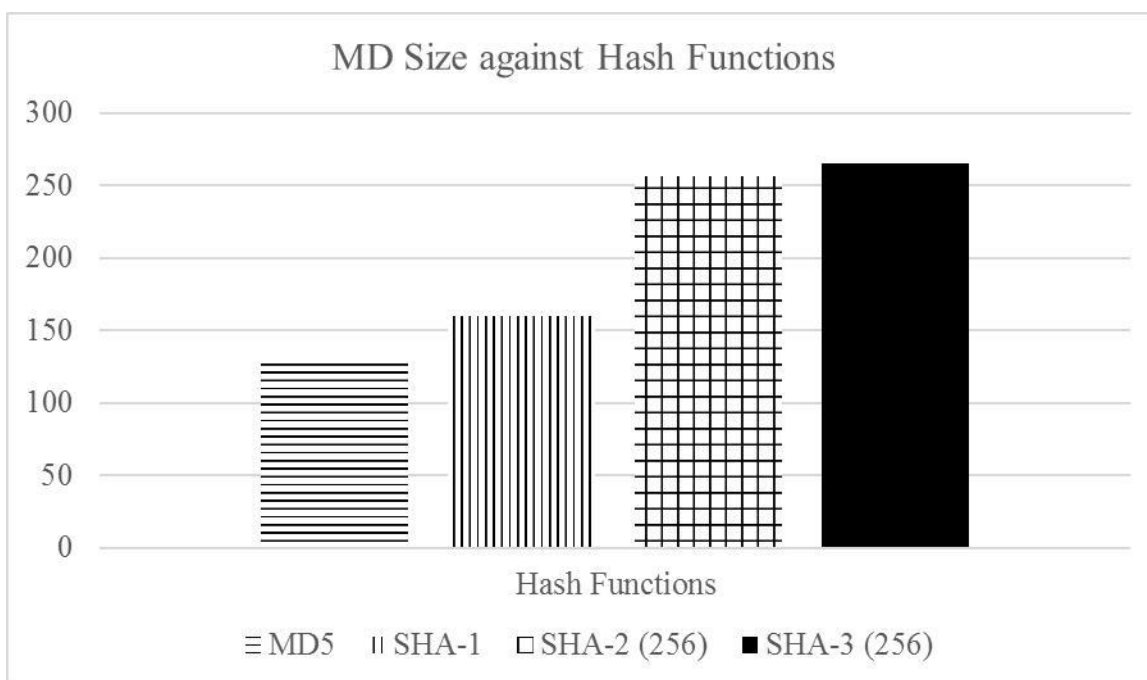
finding a message that corresponds to a given message digest could be done using a brute force of evaluations of 2 raised to the number of bits in that digest. This was referred to as a preimage attack and could be infeasible depending on the number 2 was being raised to. A high number of bits per message digest not only meant a greater time needed for evaluation, it also meant the computational resources increased exponentially. In comparison, the number of bits per digest was 256 for SHA-256 and 512, 160 for SHA-1 and 128 for MD5. This meant that for one to successfully map a preimage attack on SHA-256, a maximum of 2^{256} evaluations had to be performed. This equated to 1.1579209×10^{77} evaluations. This meant that there was only one in over 115 quattuorvigintillion chance of finding a collision.

Table 2: Comparison of Message Digest Sizes

Hash	MD5	SHA-1	SHA-256	SHA-512
MD Size (bits)	128	160	256	256

(Krystian, 2007)

Figure 2: Graph Showing the Output Size of Message Digests of Various Hash Functions



3.2.2 Capacity against Length Extension Attacks

A length extension attack was a type of attack where an attacker could use a hash message and the length of the corresponding plain text to calculate the plain text from

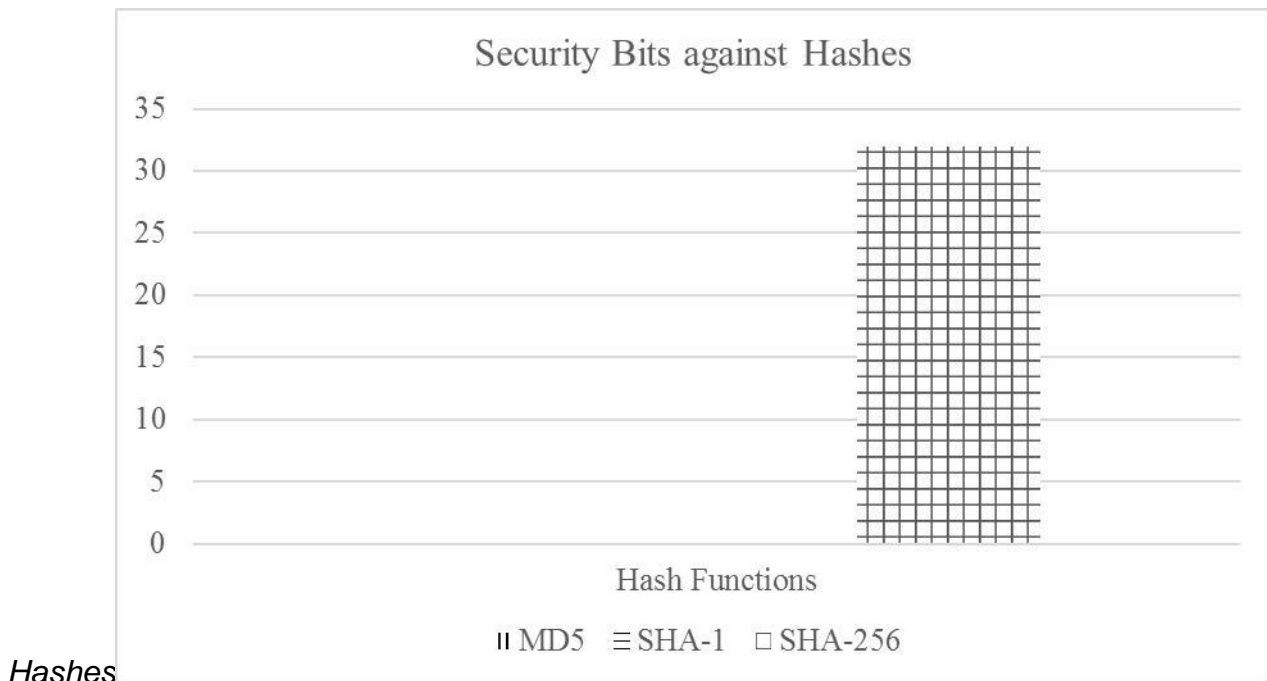
another hash message. In the research, it was found that MD5 and SHA-1 had no defence against this attack. SHA-256 had a resistance of 32 bits and this meant that it would be in mathematically infeasible to perform a length extension attack on SHA-256.

Table 3: Length Extension Attacks Capacity of Various Hash Functions

Hash	MD5	SHA-1	SHA-256
Capacity of Hash	0	0	32

Michal, (2008)

Figure 3 : Capacity against Length Extension Attacks for Various



3.3 Collision Resistance

Collision resistance was a very important factor for any hash function to be considered efficient. Its usefulness was evident in all applications of cryptographic hash functions. More specifically, it was important for SHA-256 to have a high collision resistance due to the delicate nature of the proof-of-work system that was used in the blockchain technology. In such systems, users provided hash collisions as proof that they had

performed a certain amount of computation to find them. If there would be an easier way to find collisions other than brute force, Bitcoin could possess its value. To show the difficulty of finding collision resistance, avalanche coefficient was used.

3.3.1 Avalanche Coefficient

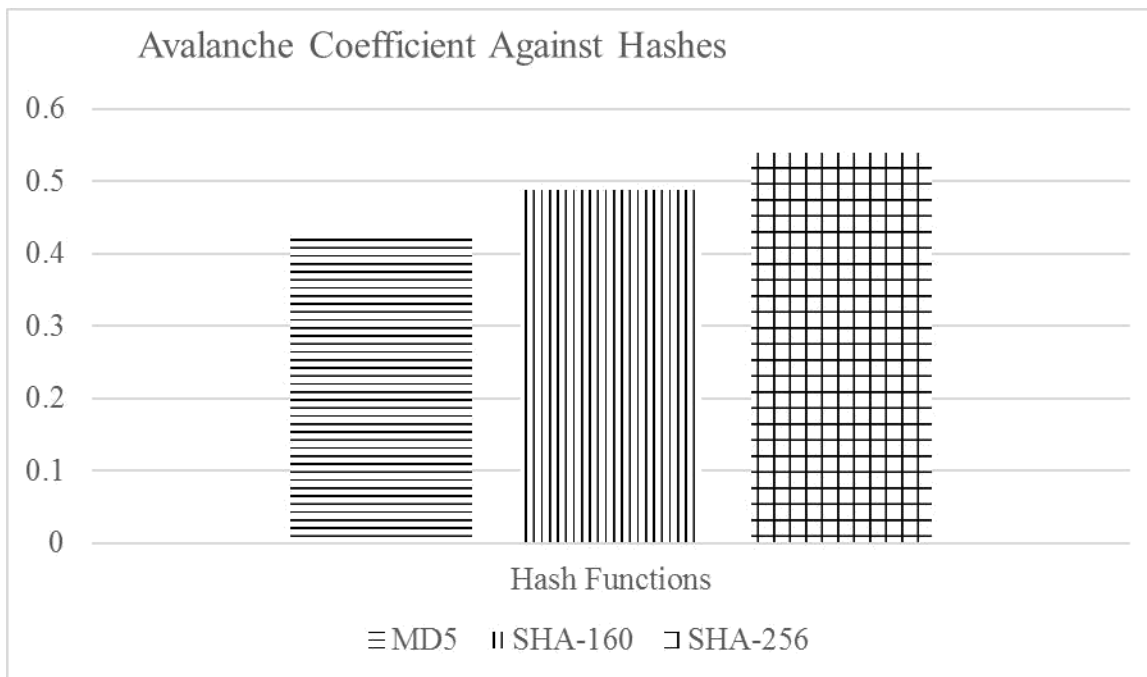
It is a desirable property for cryptographic hash function where is an input is changed slightly, the output changes significantly. This concept of randomization would ensure that a cryptanalyst could make predictions about the output of a message after being hashed. If the pattern for hashing could be predicted, then the cryptanalyst could potentially break the cryptographic hash function. A high avalanche coefficient would be desirable for any function. Ideally, it should be more than half the output bits flip. In the study, the researcher found out that the coefficient for SHA-256 was significantly higher than its predecessors. In comparison to MD5 which had 42.2% of the output, SHA-160 with 48.74% randomization of the output, SHA-256 was superior. Both the former hash functions had not attained the ideal 50% randomization or 0.5 avalanche coefficient. With the results tabulated in table 10, it was evident that SHA-256 had high collision resistance.

Table 4: Avalanche Coefficient of Various Hash Functions

Hash	MD5	SHA-160	SHA-256
Coefficient	0.422	0.4875	0.5391

Rahul, (2013)

Figure 4: Graph Showing Avalanche Coefficient of Different Hashes



3.4 Digestion Creation Speed and CPU Consumption

These two factors were useful in determining the usefulness of the hash function in question in a real-world environment. If the digest creation took a very long time to create and used a lot of CPU cycles, then such a hash function would be unusable in a real-world environment. The two factors had to be balanced with the ability for them not to be used against the hash function itself. The two tests were performed to confirm the usability of the SHA-256 hash function in a real-world environment.

3.4.1 Digest Creation Speed

The optimum digest creation speed could not be deduced from the research experiments conducted. The researcher however found it relevant to note that all functions produced digests in micro seconds. It would then be right to presume that the digest creation speed had to be <0.1 seconds. It also had to be time enough to avoid the feasibility of a brute forces attack in conjunction with other hash characteristics. The hash digest creation speed also had to be small enough to avoid deadlocking the CPU while cycles were being performed so as to release the CPU resources. It was found that MD5 had the smallest time for creating the digest speed followed by SHA-160. In terms of percentages, MD5 took 0.016% of a second to produce a digest, while SHA-256 took 0.031% to produce a digest. This was attributed to the length of the digests and the operations that had to be performed. It was observed that the time required for the creation of a SHA-256 digest

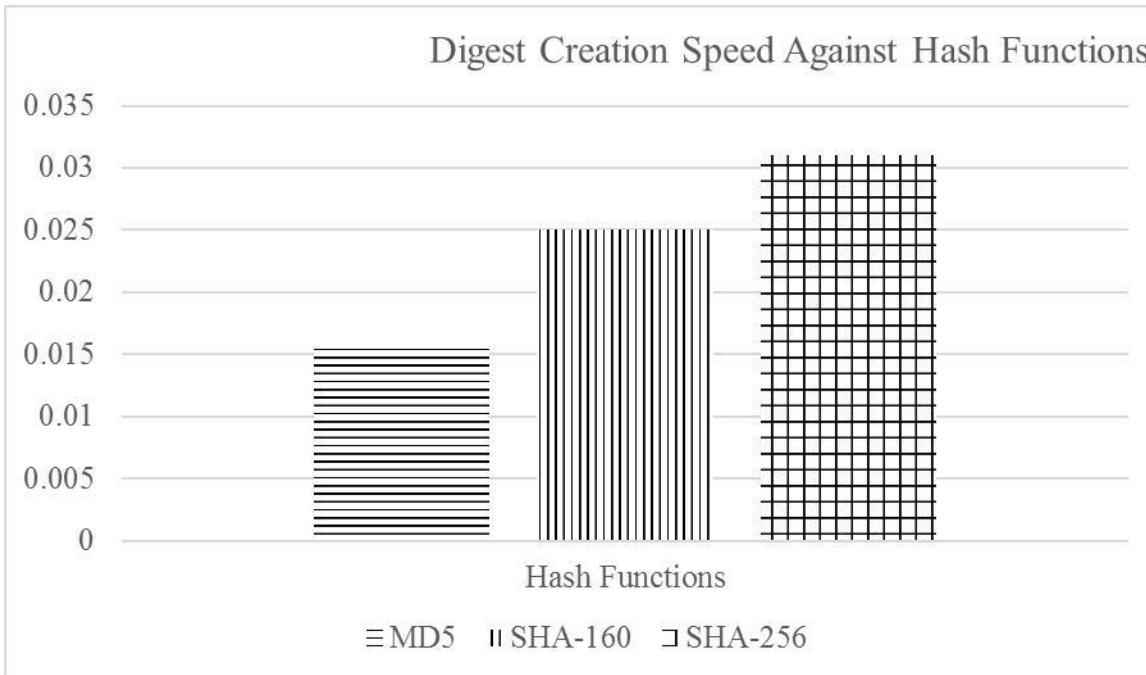
increased by 93.75% from MD5 and by 24% from SHA-160.

Table 5: Digest Creation Speed of Various Hashes

Hash	MD5	SHA-160	SHA-256
Time (seconds)	0.016	0.025	0.031

Rahul, (2013)

Table 6: Graph Showing the Digest Creation Speed of Various Hash Functions



3.4.2 CPU Consumption

The number of cycles that were performed during the creation of a digest was a very important factor in the determination of the usability of the hash function on computers that could be deployed for day to day use. As with the time taken to create the digest, the number of cycles had to be in a reasonable range for normal micro-processors to handle the hashing algorithm forward but infeasible to invert it. The researcher found data on the cycles required to create digests and compared three hash functions. SHA-256 required 310.17% more CPU cycles for a single digest compared to MD5 and 10.62% more CPU cycles as compared to SHA-160. This made it adequately straining on an older computer but manageable for modern day computers.

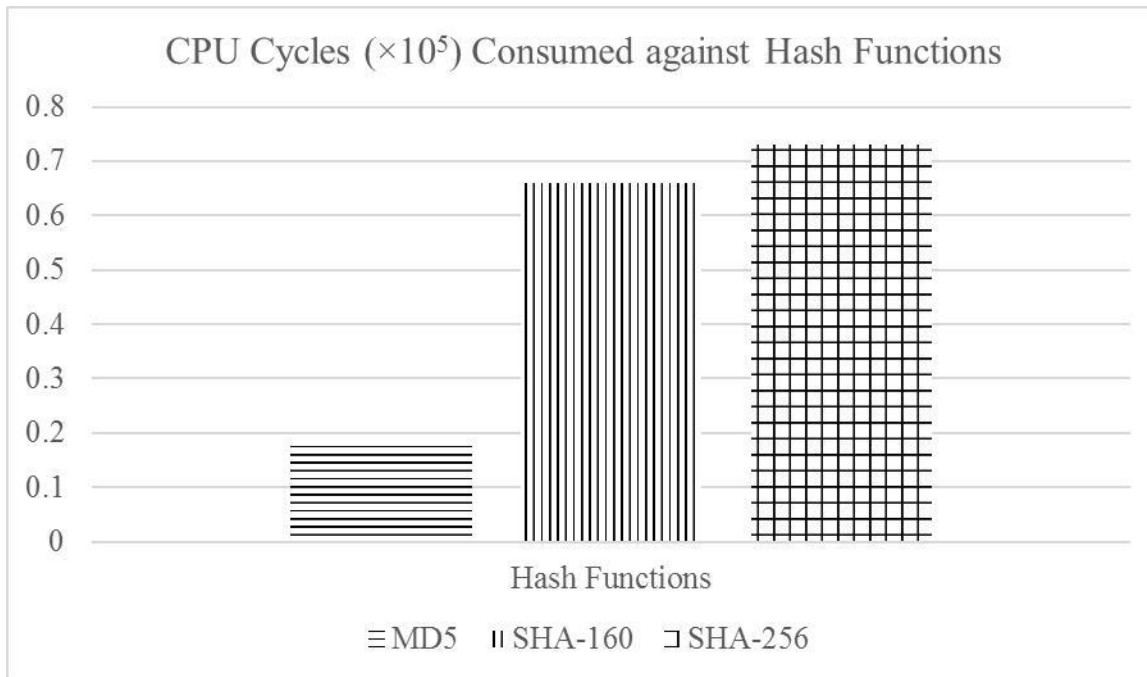
Table 7: CPU Cycles Consumed against Various Hashes



Hash	MD5	SHA-160	SHA-256
CPU Cycles ($\times 10^5$)	0.178	0.66	0.7301

Krystian, (2007)

Figure 5: Graph Showing CPU Consumption of Various Hashes during MD Creation



4. Conclusion

This study concluded that the hash algorithm in question was efficient as implemented in the blockchain technology of the Bitcoin. The SHA-256 cryptographic hash function met all the requirements of a secure hash function. In that sense, this study found out that the hash function under scope had not been compromised in any fashion and it was still unfeasible to inverse the message digest creation process. This then made it relevant in ensuring the blockchain’s security by being tamper-proof and being able to present authenticity of any transaction that had been done. The public ledger of Bitcoin had been made secure and was still secure due to the efficient nature of the SHA-256 hash function in terms of security; digest creation speed and collision resistance. To note, the high avalanche coefficient ensured security as well as collision resistance and digest creation speed had been made efficient as had been seen in the experimental studies.

5. Recommendations

It had been deduced that an advancement in computers led to an increase in processor

capabilities in terms of processing speed and multithreading. In turn, this increased the probability of a successful brute force attack, generation of rainbow tables or discovery of collisions in the hash functions. This had been the case with the predecessors of the SHA-256 hash function, MD5, SHA-0 and 1. With new technologies in place including the possibilities of generalized quantum computing, the security of these hashing algorithms would then be compromised.

This study discovered that the best future path would be to migrate the blockchain to the use of a stronger hash function with a larger message digest, most notably the successors of SHA-256 which included SHA-3. These would then guarantee efficiency as the function under scope had done in the previous decade since SHA-1 breaking in the year 2005.

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Understanding Big Data Concept in Computing

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Abstract

Big data concerns large-volume and complex, data sets with multiple, autonomous sources which are growing rapidly. Big data is rapidly expanding in all science and engineering domains due to fast development of networking, data collection capacity and its storage. The use of big data underpins critical activities in all sectors of our society. This paper aims to present a discussion of the big data concept; dimensions, benefits, applications, issues, Platforms and big data's future direction. These discussions aim to provide a comprehensive overview and big picture to readers of this exciting area.

Key words: Big Data, Big Data Analytics, Hadoop, Map Reduce, Structured Data,

Unstructured Data

1. Introduction

The big data is an emerging area applied to manage data sets whose size is beyond the ability of commonly used software tools to capture, manage, and timely analysis of that amount of data.

Apache Hadoop (2010), defined big data as “data sets, which could not be captured, managed, and processed by general computers within an acceptable scope”. Following this, in 2011, McKinsey Global Institute defined big data as "data sets whose size is beyond the ability of typical database software tools to capture, store, manage, and analyze”. International Data Corporation (IDC) defines big data technologies as a new generation of technologies and architectures, designed to economically extract value from very large volumes of a wide variety of data, by enabling high-velocity capture, discovery, and/or analysis. Big data is relatively a new concept which refers to datasets whose size is beyond the ability of a typical database. The accumulated huge amount of data that was previously of no value has been put into maximum use due to the availability of newly designed big data tools that surpass earlier available data mining tools. Big data is now of tremendous importance to organizations and data mining researchers because better results are gotten obtained from larger volume of data. Predictions and analysis of business are becoming more accurate and interesting with the advent of big data tools.



Millions of networked sensors are being embedded into the physical world in devices such as mobile phones, smart energy meters, automobiles, and industrial machines that sense, create and communicate data in the age of the internet of things. Social media sites, smart phones, and other consumer devices including personal computers and laptops have contributed to the amount of big data available and the growing volume of multimedia content that has played a major role in the exponential growth of big data (Wu,et al. 2014).

Recently, industries have become interested in the high potential of big data, and many government agencies announced major plans to accelerate big data research and applications (Munoz,et al., 2016). Every day, 2.5 quintillion bytes of data are created and 90 percent of the data in the world today were produced within the past five years (Wu, et al.,2014).

Conversion of unstructured data to structured data can lead us to unexpected discoveries. The main problem faced today is how to convert unstructured data to structured data. The term unstructured data refers to the information which is not organized in a proper format. Such kind of data cannot be fitted in the database relational tables. Unstructured data is human information like emails, videos, tweets, face book posts, call center conversations, closed circuit TV footage, mobile phone calls and website clicks. Unstructured data is considered as “loosely structured data” because the data sources possess a structure but all the data within a dataset do not have a particular predefined structure (Lohr, 2012). Unstructured data is data without a pre-defined data model, and is hence difficult to analyse.

2. Dimensions of Big Data

Big data was brought about by the increased data with a 3Vs model, i.e., the increase of Volume, Velocity, and Variety, (Laney, 2001). Gartner and many other enterprises, including IBM (Zikopoulos, et al. 2012) and Microsoft still used the “3Vs” model to describe big data (Meijer, 2011). This definition has since been reiterated by NIST (Demchenko, 2013) and M & D, (2012) expanded upon by IBM and others to include a fourth V: Veracity and fifth V: Value. The five dimensions are thus explained below:

2.1 Volume: refers to the enormous amount of data generated every second. Volume constitutes numerous emails, video clips, multimedia data, Facebook and Twitters

messages which are produced and shared every second by people. Volume of data now is larger than terabytes and petabytes. As technology advances, numbers get quickly outdated for some companies, this might be 10s of terabytes, for others, it might be 10s of petabytes (Oracle, 2013). **2.2 Velocity:** refers to the speed at which vast amounts of data are being generated, collected and analyzed. Data is streaming at unprecedented speeds and must be dealt with in a timely manner (Troester, 2012). While it is unlikely that any real analysis will have to be completed in the same time period, delays in execution will inevitably limit the effectiveness of campaigns, limit interventions or lead to sub-optimal processes (Troester, 2012).

2.3 Veracity is the quality or trustworthiness of the data. Due to many forms of big data, quality and accuracy cannot be controlled much: for example, twitter posts with hash tags, abbreviations, typos and colloquial speech. Big data and analytics technology allows us to work with veracious data.

2.4 Variety refers to the different types of data. With big data technology we can now harness different types of data including messages, social media conversations, photos, sensor data, and video or voice recordings and bring them together with more traditional, structured data. Managing, merging and governing different varieties of data is something many organizations still struggle with (Troester, 2012).

2.5 Value: This refers to the worth of the data being extracted. Cost is one major factor that all organizations need to look into when it comes to big data implementation, or for that matter any software package or framework implementation.

3. Benefits of big data

There are many benefits of big data. Some of the benefits include;

3.1 Cost reduction: Rather than processing and storing vast quantities of new data in a data warehouse, for example, companies are using Hadoop clusters for that purpose, and moving data to enterprise warehouses as needed for production analytical applications.

3.2 Faster, better decision making: Driven by the speed of Hadoop and in-memory analytics, several companies are focused on speeding up existing decisions.

3.3 New products and services: Big data analytics is used to create new products and services for customers. The adoption of big data and analytics has proved to be a very powerful strategy for online businesses.

3.4 Fraud Detection: High-performance analytics represent a revolutionary change in the way organizations harness data. With new distributed computing options like in-memory processing and on commodity hardware, businesses can have access to a flexible and scalable real-time big data analytics solution at a reasonable cost. This is sure to change the way insurance companies manage big data across their businesses especially in fraud detection.

3.5 Improving customer service: Big data improves customer service since an organization can understand customer's preferences. For instance, Netflix can detect traffic details for various devices, spot problems in the area and add systems that can help the future demands (Chaffey, 2016). Organizations are also able to get more vision of their customers' desires.

4. Applications of Big Data

Some of the areas where big data is applied include;

4.1 The financial industrial sector (Roosboard, 2016). This is flooded with an enormous amount of data, ranging from banking transactions to analyst projections, stock prices and through various other ways. To integrate the various kinds of data coming in at different velocity and enormous volumes, organizations have started to explore analytics and related tools as a solution. This helps to comprehend finance processes to reduce fraud, improve efficiency and comply with regulatory requirements.

4.2 Healthcare: The healthcare industry has become more efficient at gathering and collecting big data. Using technology, laboratory systems, radiology systems, electronic health records have created massive stores of clinical and financial data which have become a greater problem to analyze. For all this big data problems the healthcare concern has taken solution by moving into right business intelligence tools to give significant insights from little data information to big data information and make out their health sector most reformed and a successful one (Roosboard, 2016).

4.3 Manufacturing: Many global manufacturers in a range of industries around the world are finding it difficult to manage, predict, analyze and visualize the data as needed in

particular time. Managers in the manufacturing industries are moving forward with advanced technologies to make the efficient analytics and dive deep into historical process data, identify patterns and comprehend the relationships among discrete process steps and inputs, and then optimize the factors that prove to have the greatest effect on yield (Roosboard, 2016).

4.4 Banking: By using the big data analytics most of the banking sector has made a great change by reducing the fraud cases. By keeping up with Big Data and other newer global trends, the many types of industries are able to get better knowledge about their hidden parts and client requirements, so they can provide great services in a timely manner.

4.5 In Agriculture: Big data is influencing the entire food supply chain. Big data are being used to provide predictive insights in farming operations, drive real-time operational decisions, and redesign business processes for game-changing business models (Wolfert et al. 2017).

4.6 Social Media Analytics: The advent of social media has led to an outburst of big data. Various solutions have been built in order to analyze social media activity like IBM's Cognos Consumer Insights, a point solution running on IBM's Big Insights Big Data platform; can make sense of the chatter. Social media can provide valuable real-time insights into how the market is responding to products and campaigns.

5. Issues

5.1 Challenges Related to Characteristics of Big Data

5.1.1 Velocity: Every day the number of emails, twitter messages, photos, video clips etc. increases fast around the world. The speed of transmission and access to the data must also remain instantaneous to allow for real-time access to website, credit card verification and instant messaging.

5.1.2 Volume: a large volume of data is generated each second from social media, cell phones, cars, credit cards, m2m sensors, photographs, video, etc. Distributed systems are used where parts of the data is stored in different locations and brought together by software.

5.1.3 Value: The most important part of embarking on a big data initiative is to understand the costs and benefits of collecting and analyzing the data to ensure that ultimately the

data that is reaped can be monetized. Large amounts of data need to be changed to value.

5.1.4 Variety: Most of today's data is in the form of photos, video sequences, social media updates, etc. New and innovative big data technology is now allowing structured and unstructured data to be harvested, stored, and used simultaneously.

5.1.5 Veracity: Due to many forms of big data, quality, reliability and accuracy cannot be controlled much, e .g twitter posts with hash tags, abbreviations, typos, etc. gathering loads of data is useless if the quality or trustworthiness is in doubt. Satellite signals are lost as they bounce off tall buildings or other structures.

5. 2 Big Data Management Issues and Challenges

Big data management deals with organization, administration and governance of large volumes of structured and unstructured data. It aims to ensure a high level of data quality and accessibility for business intelligence and big data analytics applications.

There are however some challenges with big data and its management:

5.2.1 New concept of big data: As organizations are new to big data, it typically has inadequate data analysts and I.T professionals having the skills to help interpret digital marketing data (Kaisle, et al. 2013).

5.2.2 Sources of big data: Digital data comes from various sources e. g documents, drawings, pictures, sounds, video recordings, models and user interface designs, with or without metadata describing what the data is and its origin and how it was collected. Immaturity with these new data types and sources and inadequate data management infrastructure are a big problem. Hiring and training new consultants and progressing by virtue of learning are the only way out.

5.2.3 Big Data analytical skills: The skill of a data analyst must not be limited to the technical field. It should be expanded to research, analytical, interpretive and creative skills. Along with the organizations that train for data scientist the universities must also include education about big data and data analysis to produce skilled and expert employees (Kaisle et.al, 2013).

5.2.4 Lack of I.T Investments: I.T investments are also lacking: like purchasing modern analytical tools to manage bigger data and analyze with better efficiency more complex data.

5.2.5 lack of governance: Due to lack of governance or stewardship, business sponsors and a compelling business case it is difficult for new projects to start (Chaudhari & Srivastava, 2016).

5.3 Big Data Technical Issues and Challenges

5.3.1 Fault tolerance: with the advent of technologies like cloud, whenever failure occurs the damage done must occur within acceptable threshold rather than the entire work requiring to be redone. Fault-tolerant computing is tedious and requires extremely complex algorithms.

5.3.2 Data heterogeneity: almost all data sets can have different levels of heterogeneity in structure, meaning of data type, organization and accessibility. The representation of the data makes data more semantic for information processing system and the human interpretation. However the lack of proper representation of data can trim down the value of master data (Chen,et al. 2014). Working with unstructured data is inconvenient and also expensive. Converting these to structured data is also not feasible as well (Kaisle et.al,2013).

5.3.3 Data quality: Storage of big data is very expensive and there is always a difference of opinion between business leaders and I.T professionals regarding the amount of data the company or the organization is storing. Ensuring that the amount of data is enough for a particular conclusion to be drawn or whether the data is relevant at all are further areas for research (Kaisle et.al,2013).

5.3.4 Scalability: The challenge in scalability of big data has led to cloud computing. Data sets collected today and in future must be supported by the analytical mechanisms of big data. The algorithms designed for analytical systems must ensure the process of large and complex data sets, (Chen et al., 2014). There should be some tools and techniques developed that support the scalability of the diverse big data.

5.3.5 Data compression and redundancy reduction: Normally, data sets have high altitude of redundancy. Compression of data and redundancy reduction is necessary to reduce the cost of the entire system on the assumption that the expected value of the data will not be increased. (chen et al., 2014).Big data contains huge data volume and variety with variable speed means data generated from various sources with different formats and video data require more space than others so that compression techniques are required.

For video data, lossy compression as well as lossless compression techniques can be used according to need.

5.4 Big Data Capture and Storage Issues

5.4.1 Heterogeneous sources: Heterogeneous sources of data include mobile devices, social media, sensors and live feeds. Data is collected from these various sources that are organized as message streaming patterns. The amount of raw information that is to be analysed and stored is massive. Messages can also be disparate where some messages could be out of context. Arrival speed of messages could be as high as a million messages per second (Chaudhari & Srivastava, 2016). To record this massive data is a difficult task.

5.4.2 Big data storage: Big data storage issue has been well explained by (Schmitt, 2013) as a very good example. Each time a new storage medium is invented the quantity of data increases. The capacity of current disks is about 4 terabytes per disk so 1 exabyte requires 25000 disks. Even if a single computer system is capable of processing 1 exabyte, to directly work with, the number of disks is well beyond its capacity. Accessing this surge of data overwhelms current communication networks. If 1 gigabyte per second network has an effective sustainable transfer rate of 80% its sustainable bandwidth is about 100 megabytes. This boils down to transferring 1 exabyte for 2800 hours, provided the sustainable transfer rate is maintained. This is actually transferring from the storage point to the processing point for a longer duration than actually processing it (Schmitt, 2013).

5.4.3 Distributed storage and search: Efficient searching and distributive data storage for immediate analysis of massive data needs to decrease the potential sources of latency and improve the searching algorithms. Data is collected from geographically distributed locations and integrated then further processed. This data is heterogeneous in nature making it difficult to search and record.

5.5 Big Data Security Issues and Challenges

5.5.1 Confidentiality of data: Currently service providers and owners of the big data cannot maintain and analyse this massive data sets efficiently because their capacity is confined. Clients must have trust on professionals and related tools that are used in analysis of such huge amount of data sets. This directly or indirectly increases the security risks. Big data can be handed over to another party for further processing only when the

professionals strictly consider the preventive measures that are bound to protect sensitive raw information, to assure the privacy of clients indirectly (Chen et al., 2014).

5.5.2 Data security: A lot of personal information is stored and transmitted through internet service providers, mobile network operators, supermarkets, local councils; medical and financial service organizations (e.g. hospitals, banks, insurance and credit card agencies). Information is also shared and stored on social networks, by religious organizations, educational institutions and employers. Each organization has the challenge of organizing, securing and exploiting their business, operational and customer data (Singh & Singh, 2016).

5.5.3 Securing and protecting data in real time: Due to large amounts of data generation, most organizations are unable to maintain regular checks. However, it is most beneficial to perform security checks and observation in real time or almost in real time.

5.5.4 Protecting access control method communication and encryption: A secured data storage device is an intelligent step in order to protect the data. Yet, because most often data storage devices are vulnerable, it is necessary to encrypt the access control methods as well.

5.5.5 Privacy protection for non-rational data stores: Data stores such as NOSQL have many security vulnerabilities, which cause privacy threats. A prominent security flaw is that it is unable to encrypt data during the tagging or logging of data or while distributing it into different groups, when it is streamed or collected.

5.6 Big Data Processing Issues and Challenges

Effective processing of big data requires immense parallel processing and new analytics algorithms so as to provide rapid information. Challenges also include finding out data points that are really of importance and how to utilize the data to extract maximum benefit from it (Alexa, 2013).

5.6.1 Management of data life cycle: Typically, the big data life cycle includes four phases as: (Chaudhari & Srivastava, 2016):

- i) Collection phase

- ii) Storage phase
- iii) Processing and knowledge derive phase
- iv) Usage of the knowledge phase,

So, big data analysis can be handed over to another party for further processing only when the professionals strictly consider the preventive measures that are bound to protect sensitive raw information, to assure the privacy of client indirectly (Chen et al., 2014).

5.6.2 Analytical process: The environment of big data processes the huge amount of diverse data within a limited time. But, conventional database and management systems are strictly designed for highly structured data which is lacking in expandability and scalability, and unable to meet the performance prerequisites (Chen et al., 2014). Applications and performance problems still exist in unstructured databases. Researchers need to find a resolution between highly structured and unstructured databases. There are some companies that use the combined database architecture that integrate the best points of both databases e.g., Face book and Taobao). Taobao is a Chinese online shopping website, headquartered in Hangzhou. It is the world's biggest e-commerce website, as well as the eighth most visited website in the world according to Alexa (2013) as of 31 March 2018, Taobao had over 617 million monthly active users.

5.6.3 Effective online data analysis: OLAP (on-line analytical processing) techniques should be adapted for the online analysis of multidimensional data. (Song et al., 2015a). There are many existing tools like ROLAP (relation on-line analytical processing), MOLAP (multidimensional on-line analytical processing), HOLAP (hybrid on-line analytical processing) that is a combination of ROLAP and MOLAP technique for the large amount of data analysis.

5.6.4 Data preparation, quality and trustworthiness: Precise, trustworthy and availability of high-quality data tends to make firm and accurate techniques for their management or analysis to enhance the value of information that is pulled out by the big data analytics techniques. Better preparation and high-quality data must increase the value of processed data. Data should be trustworthy for high quality and reliable result.

5.6.5 Result delivery: When the processing phase is complete organizations are required to present the complete information in real time to the end users in the form of KPIs, organised and appealing dashboards, different type of reports, charts, emails,

intervening events like sending alerts by user channels like tablets, smart phones, or personal computers, (Chaudhari & Srivastava, 2016). Result delivery to the end user always plays a crucial role in information representation because end user may not be the I.T professional.

6. Big Data Platforms

A Big Data platform is an ecosystem of services and technologies that needs to perform analysis on voluminous, complex and dynamic data. The big data platforms commonly used today include:

6.1 Apache Kafka: It can process many events per day (LinkedIn has reported Kafka to be ingesting 1 trillion events a day!) and process this data. It can generate messages for parallel consumption in a fault-tolerant manner.

6.2 Cloudera: offers a comprehensive console that gives great insight into the state of all your Hadoop clusters.

6.3 Splunk: is used in analyzing machine-generated big data (like logs, error reports, status reports etc.). It can be used in the areas of application management, security and compliance to process logs for discrepancies and anomalies.

6.4 QlikView: provides excellent dashboards, statistics, drillable reports and other Management Information System functionality to make sense of all the data that you have painstakingly gathered.

6.5 Apache Cassandra: database is widely used today to provide an effective management of large amounts of data.

6.6 Open Refine: It helps to work with messy data, cleaning it and transforming it from one format into another.

6.7 Rapid Miner: is an open source big data tool. It is used for data prep, machine learning, and model deployment. It offers a suite of products to build new data mining processes and setup predictive analysis.

6.8 Tensor Flow: The famed Artificial Intelligence system from Google that helps in implementing machine learning functionality and generating insights from data, with AI

features. An example of this is the *Google Photos app*, where Tensor Flow has been used to automatically detect the locations of the pictures and the context.

6.9 Hive: is a data warehouse tool that allows requesting and managing vast distributed data. Hive provides capabilities to access the storage using SQL-like language called HiveQL.

7. Conclusions and Recommendations

This paper presents a detailed understanding of the big data concept. The big data challenges have been classified according to big data characteristics, management challenges, technical issues, Data capture and storage issues, security issues and data processing issues and challenges. Building a viable solution for large and complex data is a challenge that companies in the Information Technology field are continuously learning and implementing new ways to handle. Data Science is an area that has come up and is evolving with the aim of handling big data. Data Science is the branch of science that deals with discovering knowledge from huge sets of data, mostly unstructured and semi structured, by virtue of data inference and exploration. It is a revolution that is changing the world and finds application across various industries like finance, retail, healthcare, manufacturing, sports and communication. Search engine and digital marketing companies like Google, Yahoo and Bing, social networking companies like Facebook, Twitter and e-commerce companies like Amazon and E-Bay still require data scientists. As far as security is concerned the existing technologies are promising to evolve as newer vulnerabilities to big data arise and the need for securing them increases.

At present there are many issues and problems and as time passes problems will continually arise. Some problems are already solved and some are about to be solved. Solved issues require further attention such as modification of algorithms to maximize the accuracy and speed of big data systems. In order to store and process Big Data, new technologies are evolving to address these problems. To deal with these challenges, there is a need for a new approach such as building a scalable and elastic Big data architecture. Existing data analytics tools and frameworks need to be validated further to enhance their effectiveness. Hence, further research is required to develop a robust system.

8. The Future of Big Data



As far as the future of big data is concerned it is for certain that data volumes will continue to grow and the prime reason for that would be the drastic increment in the number of hand held devices and internet connected devices. SQL will remain as the standard for data analysis and SPARK, which is emerging, will emerge as the complimentary tool for data analysis. More advanced tools for analysis without the presence of an analyst are set to take over, with Microsoft and Sales Force both recently announcing features letting non-coders to create apps for viewing business data. According to the international data corporation (IDC), half of all business analytics software will include intelligence where it is needed by 2020. In other words it can be said that prescriptive analytics will be built into business software. Programs like KAFKA and SPARK will enable users to make decisions in real time. Machine learning will have a far bigger role to play for data preparation and predictive analysis in businesses in the coming days. Privacy and security challenges related to big data will grow and by 2019, 50% of business ethics violations will be related to data. The Chief data officer will be a common sight in companies in the recent future. Autonomous agents and devices like robots, autonomous vehicles, virtual personal assistants and smart devices will be a huge trend in the future. The International Institute for Analytics predicts that companies will use recruiting and internal training to budding data scientists to get their own problems done. Businesses will soon be able to buy algorithms rather than program them by themselves and add their own data. Existing services like *Algorithmia*, *Dataxu*, and *Kaggle* will grow in a large scale leading to emerging of algorithm markets. More companies will try to derive their revenue from their data. Companies are expected to ask the right questions and make better use of the data they have, much of the big data they have is unused these days (Kaur & Kaur, 2015). The gap between insight and action in big data is going to decrease and more energy will be given to obtaining insights and execution rather than collecting big data.

Fast and actionable data will replace big data.

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Enhancing Fault Tolerance in Web Application Using Weighted Round-Robin Algorithm

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Abstract

The exercise of expending a network of distant servers held on the internet to store, manage, and process data, relative to a native server or individual computer is known as cloud computing. The number of web users increases exponentially hence one server cannot handle effectively the high concurrent user requests. The researcher has conducted an experiment to demonstrate how fault tolerance can be achieved by determining how requests are assigned to clustered nodes. Fresh links are forwarded in ratio to for each node's allocated weight. As a result, traffic is circulated more proficiently to the servers that you rank as being further capable of managing requests. The weighted round-robin algorithm allocates a relative value for each node. A higher value gives a node a greater proportion of the load, so more requests are given to that listener. Lesser values are allocated to less powerful or more deeply burdened server, so fewer requests are sent to those listeners. A value of zero prohibits a server from handling any requests and typically is not used. In this paper, the researcher improves the web application with load balance technology configured with weighted round-robin algorithm. With the load balance technology configured with weighted round-robin algorithm, the strength and accessibility of the server can be improved significantly.

Keywords: Cloud Computing, Load Balancing, Cluster, Algorithm, Node, Weights

1. Introduction

Load balancing amenities are progressively offered by several cloud providers (Al Nuaimi et al., 2012). Loads are forwarded by the load balancer to upstream servers adhering to certain load balancing rules. These rules usually aim at reducing the inequality between different nodes to increase server throughput or to decrease response time. Among frequently accessible load balancing rules, round robin algorithm is the commonest among cloud providers. Bearing in mind the heterogeneous resources existing in the cloud, the weighted round robin algorithm, also used by most cloud providers, distributes more requests to the servers with more weight, using a rule similar to round robin. This is much more efficient than round robin for cloud deployments to allocate requests according to the capability of the backend servers. However, a challenging issue is how to select the weights allocated to the servers. A simple instinctive way is to allocate the weights according to the computing power of the servers. With the algorithm a load is allocated to

each server based on the web server processing capability. The server with the higher capacity is allocated more requests; for instance, if server 1 has five times serving capacity than server 2 then server 1 is allocated a load of 5 and server 2 a load of 1. The load balancer then redirects five requests to server 1 and one request to server 2 (Chaczko et al.,2011).

2. Literature Review

In the cloud structure it is likely that some servers are deeply burdened and other is flippantly loaded (Samal & Mishra, 2013). This type of condition can result to low throughput. Load balancing is used to allocate the traffic among servers in cloud setting. Distributing traffic is one of the key challenges in cloud computing. For proper resource usage, it is necessary that requests in the cloud system to be distributed evenly. Hence, a load balancing algorithm distributes the total server traffic by transparently redirecting the traffic from highly loaded servers to slightly loaded servers to guarantee better throughput in relation to specific metric of server throughput. The response time of the processes is the metric used while considering the performance of the web servers. Total server throughput is the metric involved while considering performance from the resource point of view. Throughput ensures that clients are treated fairly and that all are satisfied. Load balancing policies in cloud helps in increasing the throughput of the server and it also ensures that there is high resource distribution (Zhao et al., 2010). Load balancing features are: to allocate load uniformly across all the servers; to attain a great user satisfaction; enhancing the total performance of the server; to decrease response time and to attain resource usage ratio. What if we have created one application and set up it on cloud? In the meantime this application is most popular. Assume hundreds of customers using this application at the same time from one server and we did not use load balancing approach to our application: The specific server is occupied to process the requests from users but the rest of the servers are not heavily loaded (Pang et al., 2013). The customers are dissatisfied because of inadequate response and performance of the server. When load balancing is used, some of the servers can be allocated other user's requests. This will enhance the performance and faster response time. In this way the above features of load balancing can be attained.

2.1 Taxonomy of Load-Balancing Algorithms



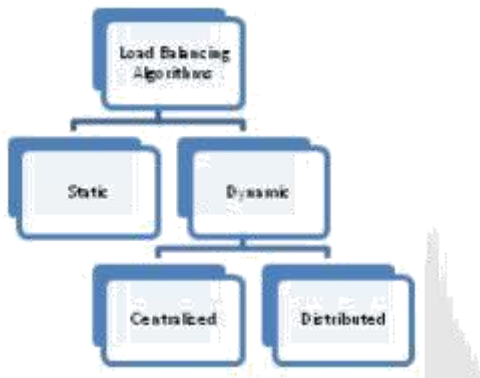


Figure 1: Classification of Load balancing algorithms

2.2 Load balancing categories

- i. Static
- ii. Dynamic

Static algorithms use only information about the average actions of the server, assuming the present state of server. Dynamic algorithms respond to the server state that alternates dynamically (Randles et al, 2010). The capability of static algorithm is restricted by the reason that they do not respond to the present server state.

3. Methodology

Load balancing is an outstanding technique to scale out your application and enhance its performance and redundancy. NGINX, is a web server software, which can be configured as a load balancer to increase your servers' resource availability and efficiency. In a load balancing configuration the web server acts as the only entrance point to a distributed web application working on multiple separate servers.

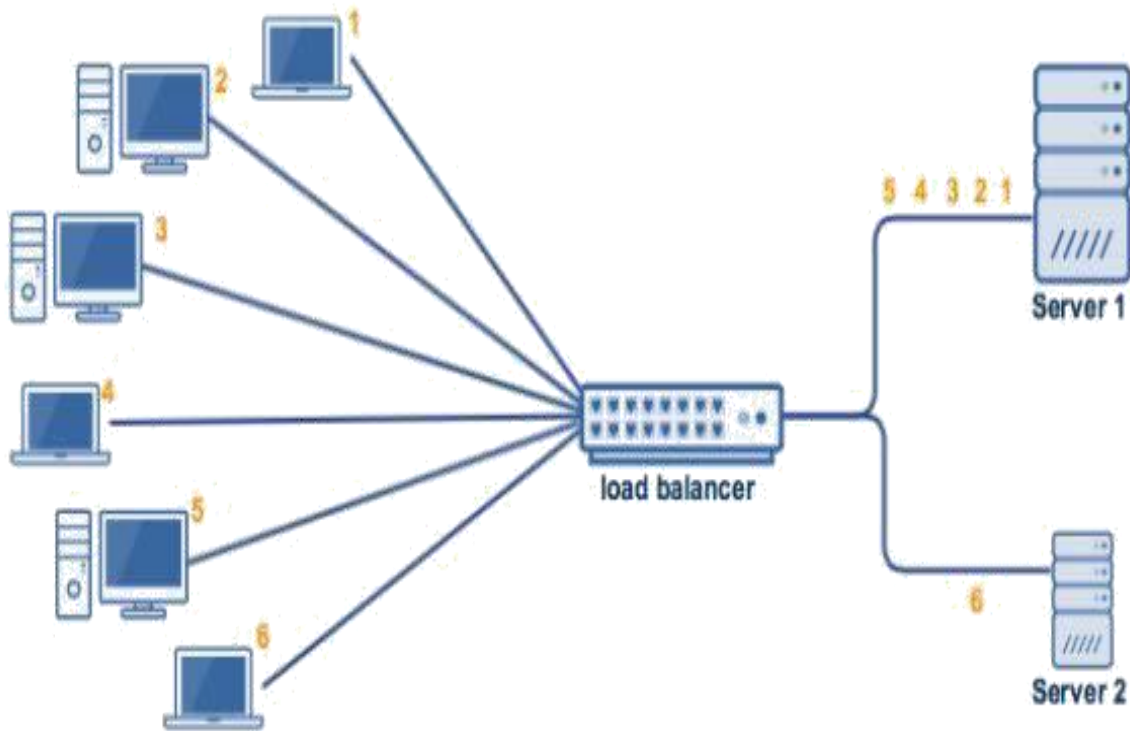


Fig 2. Load balancing Conceptual Model

3.1. Implementation of the Load Balancer

The idea is, once a request is made, the server is able to redirect to the current, active server to prevent an overload.

3.1.1. What to Consider During the Implementation

Outline which servers to contain in the load balancing structure. Use the servers' private IPs for enhanced performance and security.

Servers defined example of a code snippet

upstream e-maize {

server 142.93.246.29 weight=5;

server 142.93.246.37;

}

The servers receives all traffic to port 80 and forwards it to the upstream servers.

The upstream name and the proxy_pass need to match.

```

#basic redirection example
# when a request is made, the server tries to look for a server that is unoccupied
and active, so in this example, it listens to port 80
server {
    listen 80;
#redirect if free
    location /
        proxy_pass http://e-maize;

```

If one points a browser to the IP address of Server 1 (in our case 142.93.246.29), the load balancing will begin to round-robin requests to the web servers at the other addresses, configured within the load-balancer.conf file.

3.1.2. Steps Followed During the Implementation

1. Decide which block of server a request is assigned to. They may be defined using exact names, wildcard names, or regular expressions
2. Enable HTTP authentication to backend servers in order to redirect http request to backend servers.
3. Get the IP address of your proxy server in set_real_ip_from directive, so that only that server's X-Real-IP header is allowed.

These directives tell nginx that it should use the IP address listed in the HTTP header instead of the IP address of the TCP connection source as the source IP of the connection.

Then, in the proxy server you need to make sure it sets the X-Real-IP header with the value of client IP address.

In summary, in proxy server you set the header, and in the main server you tell web server to use the header (Krishna, 2013).

4. Establish the connection between load balancer and upstream servers.

Keep alive connection between load balancers and upstream servers. If the load balancer does not get any error code for connection failure it should receive a default error page.

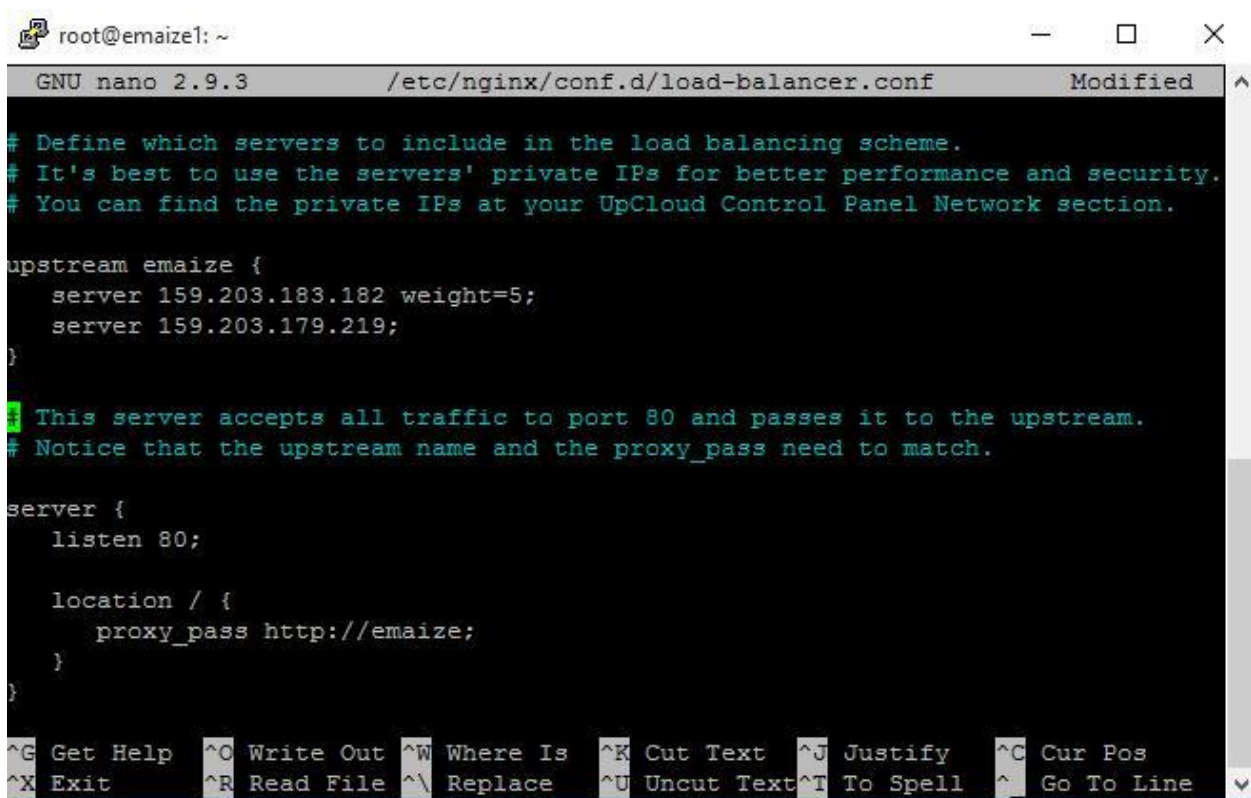
5. If it receives an error code from a particular server (especially when the server is down) then the requests are redirected to another server which is active.

4. Results and Discussion

The main purpose of the experiment is to verify whether the user can access the e-maize application when one of the servers is down and the other one is active. The NGINX webserver set up and verified one can start designing it for load balancing. All one requires to do is configure NGINX webserver with commands for which type of connections to attend to and where to forward them. To achieve this, make a fresh configuration file with nano text editor.

```
sudo nano /etc/nginx/conf.d/load-balancer.conf
```

Inside *load-balancer.conf* you will require to outline the *upstream* and the *server*



```
root@emaize1: ~
GNU nano 2.9.3 /etc/nginx/conf.d/load-balancer.conf Modified
# Define which servers to include in the load balancing scheme.
# It's best to use the servers' private IPs for better performance and security.
# You can find the private IPs at your UpCloud Control Panel Network section.

upstream emaize {
    server 159.203.183.182 weight=5;
    server 159.203.179.219;
}

# This server accepts all traffic to port 80 and passes it to the upstream.
# Notice that the upstream name and the proxy_pass need to match.

server {
    listen 80;

    location / {
        proxy_pass http://emaize;
    }
}
```

Fig 3. Load balancer configuration

4.1. Using Amplify Agent to collect performance metrics.

The Amplify Agent is a Python application that provides system and webserver metric collection.

This metrics includes connections per second, Requests per second, traffic, request time, upstream response time etc.

The following is a representation of request per second metric collected.

Request per second

The figure below shows the number of requests accumulated by the webserver against time. It is a clear indication from the figure below that all the http requests that were sent to the server to be processed were all received by the server and hence there was a connection established between the client and the webserver.



Fig 4. Request per second

4.2 Response time

Load balancing is the method of allocating requests across several servers. This make sure no single server accepts too much requests. By distributing the load uniformly, load balancing increases application responsiveness. It also improves availability of applications and web applications for users.

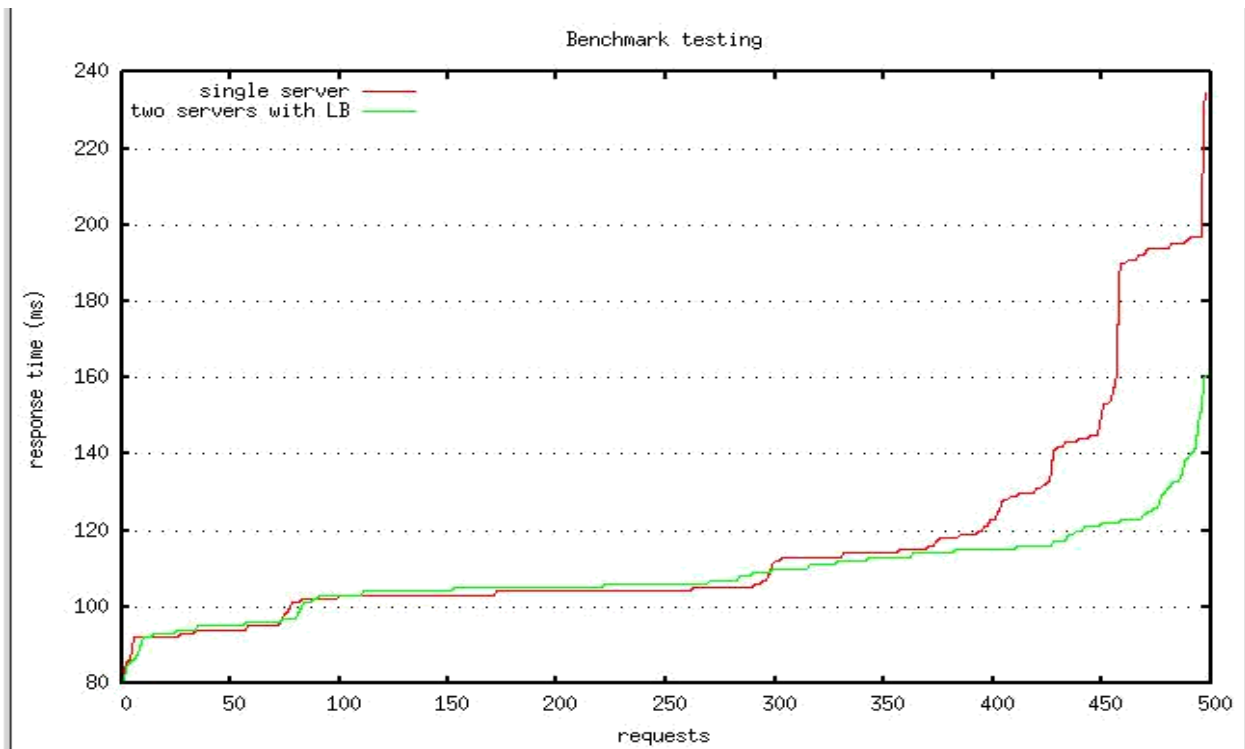


Fig 5. Response Time

From the figure above, while attending to the low requests, the configurations' performance is nearly the same, but as the number of traffic is grows, the response time for the setting with a single application server instance grows significantly, causing less requests to be processed simultaneously. Hence, if one is receiving a high traffic for one's web server, increasing the number of its instances with a balancing server with weighted round robin algorithm will be the best way to keep clients happy.

5. Conclusion

The e-maize application has made great success, and it provides quick and convenient information about how to grow maize, but one server cannot withstand the large concurrent user requests effectively. In this paper, the researcher enhanced the accessibility of the e-maize application with load balance technology configured with weighted round robin algorithm. The researcher has verified that with the algorithm, the robustness and availability of the application can be improved significantly.

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Challenges in Implementation of Internet of Things in Cities

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Abstract

Contemporary, cities face complex challenges to meet their objectives regarding the social-economic development and Quality of Life. The development of Smart cities is an attempt to technologically address these complex challenges. This paper explores current literature and outlines some of the challenges the Internet of Things (IoT) technologies encounter, that derail the implementation of Internet of things in Cities. Major challenges include: Security and privacy of information, Technological and Semantic interoperability, Retrofitting, Smart things and reliability and resilience. However, among the papers reviewed, there was no paper that addressed the possible health risks that humans might be exposed to due to the increased electromagnetic radiations.

Keywords: IoT, Smart Cities, Smart homes, e.m.f, RF, QoL, QoS

1. Introduction

According to Al-Sarawi et al, (2017), Internet of Things can be defined as the advanced connectivity of devices: systems referred to as things and people; to provide access to the users at any time in any place. By use of internet of things, physical objects can see, hear, think and execute jobs by talking to each other to share information and coordinate decisions, Al-Fuqaha, (2015).

Internet of Things (IoT) was first introduced by Kevin Ashton in 1998. By embedding short-range mobile devices into a wide array of additional gadgets and everyday items, it enables new forms of communication between people and things, and between things themselves. The development of sensors, wireless mobile communications, cloud computing and embedded systems, IoT technologies have been implemented in intelligent buildings, Smart meter, Logistics, public security, parking in towns, Dump site controls, in road infrastructure to report pot holes and many others. Because of its huge market potential, IoT has received a lot of attention from several governments all over the world. It is regarded as the third wave of information technology (Zhu etal, 2010).

With the full implementation of IoT technologies, quality of life will improve as people are able to do things at the comfort of their homes, in transit and so on. It would not matter the location, time. And all these will be possible using a seamless interaction.

There various technologies that have enabled the implementation of IoT. The following sections will discuss the various IoT Elements, challenges faced in the implementation of the technologies, and the possible solutions that have been employed in an attempt to address the challenges.

1.1 IoT ELEMENTS

The following table explains the six IoT elements.

	IoT ELEMENT	PURPOSE
1.	Identification	In IoT, it is crucial to name services and match them with their demands. The methods of Identification for Internet of Things services include the UPC and uCode. It enables differentiation between objects IDs and addresses. Object ID refers to a particular sensor and Object address refers to its address in a communications network (Sakamura, 2010) Identification methods provide a clear and unique identification of every device within the network.
2.	Sensing	IoT sensing means objects being able to gather data from related objects and sending it back to the cloud or data warehouse. Analysis of the data is performed in order for the objects to take appropriate actions or collaborate with other devices or objects to make decisions. These Internet of Things sensors can be smart sensors, actuators or wearable sensing device.
3.	Communication	Heterogeneous devices are connected together using IoT technologies in order to deliver specific smart services. IoT devices operate in a Lossy and noisy communication links using low power.
4.	Computation	The brain and computational ability of IoT is the processing units and Software applications used by the hardware devices. The various hardware platforms developed to run IoT applications include: Arduino, UDOO, FriendlyARM, WiSense, Mulle, T-Mote Sky, Intel Galileo, BeagleBone, Gadgeteer, Zi and CubieBoard. Some of the Operating systems used to run IoT services include: Contiki RTOS, TinyOS, LiteOS, ROS etc.
5.	Services	Overall, IoT services can be categorized under four classes [Gigli and Koo (2011)]: Identity-related Services, Information Aggregation Services, Collaborative-Aware Services and Ubiquitous Services. Identity-related services are the most basic and important services that are used in other types of services. Every application that needs to bring real world objects to the virtual world has to identify those objects. Information Aggregation Services collect and summarize raw sensory measurements that need to be processed and reported to the IoT application. Collaborative-Aware Services act on top of Information Aggregation Services and use the obtained data to make decision and react accordingly. Ubiquitous Services, however, aim to provide Collaborative-Aware

		Services <i>anytime</i> they are needed to <i>any one</i> who needs them <i>anywhere</i> .
6.	Semantics	In IoT, Semantics means the ability to get knowledge smartly by different devices and to provide services that are required. Extraction of knowledge involves discovering and utilizing resources as well as modelling information. It also includes the ability to offer the exact service by analyzing data and making the right decisions. [Barnaghi, et al. 2012]. Hence, semantic is the brain of the IoT and it sends demands to the right resource. In agreement is the Semantic Web technologies which include the Resource Description Framework (RDF) and the Web Ontology Language (OWL).

2. Smart Cities

As a result of rural migration and suburban concentration towards cities, urban living has become a significant challenge to both citizens and to the city governance. Waste, traffic, energy, water, education, unemployment, health and crime management are some of the critical issues (Ju et al, 2018).

Smart Cities are expected to address these challenges efficiently and effectively using information and communication technologies (ICT).

According to Chiarti, (2018), A Smart city is a city where investments in human and social capital, infrastructure fuel, transport and modern communication infrastructure provide sustainable economic growth and a high quality of life for the residents, as well as a good management of natural resources.

By definition, *Smart cities have six common characteristics which include: A smart economy, smart people, smart governance, smart mobility, smart environment and smart living* (Orecchin et al. 2018).

2.1 Benefits of Smart Cities

It monitors and integrates the conditions of all its critical infrastructures, roads, bridges, tunnels, rails, airports communications, water, power and optimizes its resources. It helps to plan preventive maintenance, monitor security aspects as well as maximizing services to the citizens. It connects its physical infrastructure, IT infrastructure, social and physical infrastructure and business infrastructure to leverage the collective intelligence of the city (Chourabi et al., 2012). It uses smart computing technologies to make the critical infrastructure components and services of a city more intelligent and connected .i.e. education, public safety, healthcare, administration, transport (Toppeta, 2010). Energy management and energy consumption can be gathered automatically to improve efficiency of systems.

3. Main Challenges of Internet of Things Implementation

According to Orecchin et al. (2018), in order to attain most of the benefits of Internet of Things, Intelligent systems must be optimized for the Quality of Life (QoL) and the Quality of Services (QoS). The integration of heterogeneous IT services and different networks should be seamless; meaning that users of the services need not to notice that several systems are involved in providing the services. Users of the services include the people requesting for a service, sensors communicating with other sensors, mobile devices as well as people.. Several devices and Sensors involved in the communication will anticipate flawless communication for Quality service to be provided.

3.1 Technological Interoperability

People interact with devices for services. The interaction should be a seamless one, between the devices and between people and devices. People interact with the network by use of the mobile devices, of which the mobile devices will need to communicate with other devices i.e. sensors, actuators and also the internet. The devices differ in power consumption and technological capabilities and users should not experience any inconveniences as a result. No delays or interruption of service should result due to this.

3.2 Semantic Interoperability

Internet of Things (IoT) technology demands persistent connectivity to billions of heterogeneous devices. Recently, the rapid growth of Internet of Things devices in smart home environment expected a wide range of novel services and applications. However, due to the inherent heterogeneity, home environment is more complex, rendering device management very difficult (Perumal et al. 2015). To achieve full interoperability, it will be necessary for all the devices to correctly interpret the shared information and use it accordingly. Failure in the devices to interpret properly the information received might be fatal or lead to expensive losses which might be impossible to recover. Therefore, improvements are necessary regarding the distributed ontology, semantic web, or semantic device discovery. This will enable devices to receive and interpret signals and information correctly and accurately.

3.3 Privacy and Security of information

The main challenges for IoT are Data integrity, unique identification and data encryption since most of the data that is shared or communicated contain information that is personal. People are currently posting a lot of information about their current status, location etc. This information needs to be private and well managed without being misused or escaping to unauthorized parties.

In addition, data ownership, liability and legal issues have to be addressed properly. There is need also to consider energy efficient encryption technologies.

According to Mohammed, (2017), some of the main IoT security issues include:

3.3.1 Ease of use and simplicity principle for electronics

Manufacturers always consider making their products easy and simple to use to attract customers. These are crucial principles for electronics industry as well as IT products i.e. Software applications have to be designed to be easy to use. It ensures that the customers are not confused by unnecessary complexities of the products. This might however make manufacturers take short cuts and fail to implement adequate security features.

3.3.2 Insecure log in or default credentials

In practice, manufacturers might choose to hide the “Change password/Username” options in the User Interface making it out of sight for most people. This might make it unavailable to most devices if most of the Internet of Things devices had randomized the credentials.

3.3.3 Poor or no software updates

Majority of Internet of Things manufacturers do not create patches or create software updates to software that came with their devices. This makes them more vulnerable to attacks and again there is very little customers can do to help the situation. The customer will only have to get back to the manufacturer for assistance.

3.3.4 Insecure user interface of software applications for IoT devices

Malicious hackers first look at a device’s user interface for any vulnerability. This can include manipulating the “I forgot my password”, to reset it or at minimum find out the username or the email address. Properly and correctly designed devices should block users who attempt to log in a lot of times. This can stop dictionary and brute force target or attack passwords, greatly securing device credentials from the malicious attackers. In other cases, the password also needs to be encrypted when being sent to a central server instead of having it in plain text.

3.3.5 Inadequate privacy protection

There is need to protect and limit the amount of data that IoT or internet devices store for you. The less information about you the devices store for you, the less a cybercriminal can learn about you if the device is hacked. It is necessary to be wary of devices asking for unnecessary information about you such as location, bank account number etc.

3.4 Smart Things

For IoT to be fully implemented, especially in Third World countries, various challenges have to be addressed. There are issues of lack of electricity, no internet coverage as well as high temperatures that do not suit some of the necessary Computing devices.

IoT will require low powered devices that can perform multiprocessing, adapt to autonomous behavior as well as guaranteeing trust, privacy and security. Battery energy and energy harvesting and storage technologies will also need to be addressed as they form most of the IoT challenges as far as devices are concerned.

The developments of Ultra low power circuitry devices that can overcome and perform in harsh environmental conditions are necessary for the successful implementation of this technology.

3.5 Resilience and Reliability

Application of IoT technologies in emergency use cases will not anticipate random or temporary outages since a small outage can cause unperceived damages. Therefore, these devices need to be resilient, reliable, robust and flexible in communication in changing environmental conditions to avoid central points of weaknesses.

Speedy methods should be found to address challenges for continued service. Emergency services cannot be interrupted as it will render the entire technology useless if it cannot be relied on during such situations.

3.6 Converting a pre-built architecture (Retrofitting)

This involves applying the technology to already existing structure. Since most of the structures in cities are already in place and existed even before the technology of IoT was developed and they still continue to exist for more several years, it brings an element of extra cost. Therefore, there is need to explore ways of integrating the new technology to these structures that existed long ago into optimal costs that will not discourage the stakeholders. All buildings, vehicles, roads, bridges, irrigation plants and many other structures will need to be restructured to allow the technology to be implemented.

3.7 Mobility

IoT is built on the premise that it will ensure service regardless of the location of the user. Users will need to remain connected while on the move without any service interruption due to mobility. This will involve devices transferring from one gateway to another.

3.8 Availability

Availability of service means ability for users to access a service anywhere and anytime. IoT applications should provide services for customers on the software and hardware levels to provide anytime and anywhere service to customers. IoT applications ability to provide services to everyone at different places is referred to as the software availability while hardware refers to the existence of hardware devices all the time and being compatible with IoT functionalities and protocols.

IoT has been gradually brought a lot of technological changes in our daily lives, thus helping make our lives more comfortable and simpler through various Hardware technologies and applications.

There innumerable uses of IoT applications fall into categories such as medical, manufacturing, transportation, industrial, administration, education, mining, habitat etc. More applications need to be developed to suit every situation, so as to have a total IoT implementation, where people entirely depend on the technology for almost every service.

4. Conclusion and Recommendations

IoT technology utilizes the Wireless networks and internet connectivity. This means that there might be increased exposure to electromagnetic radiations and people might be exposed to some health risks. Most wireless devices will utilize the Radio Frequency (RF) radiations, the lowest range of the electromagnetic spectrum, with frequencies of up to about 30 billion hertz, or 30 gigahertz (GHz), and wavelengths greater than about 10 millimeters (0.4 inches) (LiveScience). Electromagnetic (EM) radiation is a form of energy that is all around us and takes many forms, such as radio waves, microwaves, X-rays and gamma rays. Sunlight is also a form of EM energy, but visible light is only a small portion of the EM spectrum, which contains a broad range of electromagnetic wavelengths (Live Science).

Radiation is sending out of energy from a source. X-rays are an example of radiation, but so is the light that comes from the sun and the heat that is constantly coming off our bodies. (Li, Y. Z., Chen et al, 2013). According to Lund et al. (2014), billions of things will be connected by 2020.

The literature reviewed in this study did not address the health hazards posed by these e.m.f radiations from the ever increasing connected devices. There is need for further research to shade more light in this area.

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Cluster, Moderators, and Rapporteurs

CLUSTER 2	Sub-Theme 3: Hospitality and Tourism Management
	&
	Sub-Theme 4: Business

Moderators:

1. **Dr. Jonathan Mulwa** : Rongo University
2. **Dr. Ray Mutinda** : Mount Kenya University
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Drivers of Performance of Large Manufacturing Firms in Thika Sub-County- Kenya: A Baseline Survey

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Abstract

The key purpose of this study was to conduct a survey on the factors driving the performance of large manufacturing firms in Thika sub-county, Kenya. The study was guided by the following question; what are the drivers of performance of large manufacturing firms in Thika Sub-County, Kenya. The study had one specific objective namely: Establish the effect of management on the performance of large manufacturing companies in Thika Sub-County, the study adopted a cross-sectional, descriptive research design. The study had one hypothesis based on the objective. Empirical data was collected from large firms based in Thika town. About ten firms were targeted as the population of the study. Four responded making a response rate of 40%. Data analysis using SPSS Version 16.0 revealed that Management is significant. The variable resulted in an R² of 0.97 suggesting that the variable accounted for 97% of the variation in the specified model. The study concluded that the performance of large manufacturing companies in Thika Sub-County is driven by Management. The coefficient of Management was found to be positively correlated to performance. This, however, provides an opportunity for further work in this area.

1. Introduction

1.1 Background of the Study

The industries in Kenya have been growing since the late 1990s and into the new century. Manufacturing companies in Kenya are relatively diverse. Some of the most common manufacturing industries in Kenya include Horticulture, Aluminium industries, Steel industries, Small-scale consumer goods (flour, cigarette, clothing, batteries, furniture, and plastic textile), cement industries, Oil refining, Agricultural products, and lead industries.

Kenya is well known for its booming agricultural sector and hence a dependable source of raw material for agro-based manufacturing. Kenya is one of the most favorite destinations for investors willing to put their money in manufacturing. The manufacturing firms are located in various towns some include: Mombasa, Nakuru, Eldoret, Nairobi, Thika, Kericho, Webuye, Bungoma, Kisumu and others.

Thika in Kiambu County has served as Kenya's industrial town in the past, for a long time, being home to several industries, and with the construction of the Thika Super Highway, one would expect that there would be a boost in the industries production level. However, what is observed is far from the expected. Therefore, the essential problem of this study is to conduct a baseline survey on the factors affecting the effectiveness of large manufacturing firms in Thika sub-county.



1.2 Problem Statement

The manufacturing sector is very important in the realization of Kenya's vision 2030. The sector adds to Kenya's economic growth, provide a livelihood to millions of Kenyans and is a source of much-needed jobs. Gathogo (2011) in a study of SMEs in the manufacturing sector in Thika Municipality asserts that factors that affect the manufacturing firms are many and varied. If these factors are properly identified and analyzed, the managers of these firms would be in a better position to steer their firms into improved and sustained profitability, thereby positively impacting the Country's GDP. Moreover, they would create more jobs and improve the general welfare of the communities they serve in Thika and elsewhere in the Country.

In the 1970s and 80s, Thika Sub-County had many well-performing manufacturing firms and had earned the reputation of being the "Industrial Town of Kenya". However, over the years, this reputation appears to have declined dramatically, with several industries either closing or relocating to other towns. It is not clear what has contributed to this sorry situation as no rigorous study appears to have been done to explain this unfortunate observed phenomenon. This study, therefore, aims to narrow this knowledge gap by providing an empirical baseline status of large manufacturing firms in Thika Sub-County. The study was guided by the following question; what are the underlying drivers of performance of large manufacturing firms in Thika Sub-County? Therefore, the study sought to establish the extent to which management affects the performance of large manufacturing companies in Thika Sub-County.

2. Literature Review

2.1 Marketing and Company Performance

Marketing is important for any business. Scholars have emphasized that without marketing, there is no business to manage. Marketing is performed mainly based on its key traditional 4Ps of Product, Price, Place (Distribution) and Promotion. For example, Brooks bank et al. (1992) did a study of 231 medium-sized manufacturing firms in the U.K., and in-depth interviews with the Chief Marketing Executives of a sub-sample of 20 firms. The study confirmed that the most successful companies are those which are marketing orientated.

Nyaoga *et al.* (2015), set to study a sample of 138 large-scale manufacturing firms in Kenya from a population of 627 firms. The purpose of their study was to establish the relationship between supply chain strategies and performance of large-scale manufacturing firms in Kenya. The authors identified three primary gaps in the literature namely; the relationship between supply chain strategies and firm performance; biased and unbalanced analysis of the different measures of firm performance; and failure to use weighted scores to measure firm performance. The authors used Resource-Based View to guide their study and concluded that Supply

chain strategies are useful predictors of the firm's performance as supply chain strategies explained nearly 77 % of the changes in the firm's performance.

2.2 Technology

Technology can be described as the integration of people, knowledge, tools, and systems with the objective to improve people's lives (Porter, 1985). Industrial technology is the use of engineering and manufacturing technology to make production faster, simpler and more efficient. The industrial technology field employs creative and technically proficient individuals who can help a company achieve efficient and profitable productivity. Technology contributes to change and this change fuels economic growth. The technology incorporates, among other things, research and development, design, process and production engineering, maintenance, management and entrepreneurship, marketing, investment and finance, human resources, information technology, and many others. Technology is always the means of creating new tools serving humans and their environment (Betz, 1998).

Information technology (IT) is the application of computers to store, study, retrieve, transmit, and manipulate data, or information, often in the context of a business or other enterprise. IT is considered a subset of information and communications technology (ICT). Zuppo (2012) proposed an ICT hierarchy where each hierarchy level "contain[s] some degree of commonality in that they are related to technologies that facilitate the transfer of information and various types of electronically mediated communications.

2.3 Review of Empirical Literature

In the United States of America, the distribution of Multi-National Corporation in the industry in the year 2003 was 36% in manufacturing, 19% in wholesale trade, 2% in retail trade and less than 10% in service industries. In contrast, the distribution for Large Scale Manufacturing Firms was 12% in manufacturing, 2% in wholesale, 20% in retail trade and 40% in service industries. This means that Large Scale Manufacturing Firms generally operate in less "globalized" industries, they may still experience the spill-over effects of globalization. The second observation is that the wage and employment effect of globalization may be more profound for Large Scale Manufacturing Firms than larger domestic firms due to their relatively smaller size. Finally, since Large Scale Manufacturing Firms are dominant in the services industry, the non-tradable services needed for production by MNCs are likely to be provided by Large Scale Manufacturing Firms suggesting that there are linkages between Large Scale Manufacturing Firms and MNCs (Lasserre, 2013).

Dasanayaka (2011) conducted a study pertaining to global challenges for Large Scale Manufacturing Firms in Sri Lanka and Pakistan in comparative perspectives and found that small and medium scale enterprises/industries (Large Scale Manufacturing Firms) function as a lifeline in informal sectors of Pakistan and Sri

Lanka due to their immense contribution in areas such as employment generation, exports, equitable income distribution, social stability, efficient domestic resources usage and regional development. However, a large number of Large-Scale Manufacturing Firms in both countries are struggling to survive in today's globally competitive market. Their sustainable growth is threatened by the impact and challenges of rapid globalization. Absence of any networking and cooperation among the Large-Scale Manufacturing Firms and lack of linkages with large scale industries have aggravated these problems. In spite of the various policy reforms, establishment of SME related apex bodies, incentives, and assistance offered by the national governments in both countries, the SME sector has suffered on many fronts.

Lozi (2008) examined the role of small scale industry in the economic development of Jordan and found that growth of small scale industry in terms of employment, production, and sales has increased due to globalization and domestic liberalization, but not as planned, therefore, small scale industry should be encouraged to make a sustainable contribution in national income, employment, and exports. Further, the author suggested some recommendation for the development of this sector namely; establishment of government centers in all districts of Jordan to provide the needed services and facilities to small scale industry; specialized training centers; fostering technology development through either technology transfer or technological innovations or inter-firm linkages should be emphasized; through seminars and workshops at the local level; adequate inflow of credit; strong linkages between small and large scale industries; encourage to employ more Jordanians women. However, the author identified marketing as one of the major problems of the small-scale industries in Jordan.

Boojihawon (2006) argues that unlike the East -Asian and Latin American economies, globalization has brought few economic gains to Africa. Mytelka (2010) explains that unlike the Asian countries, African countries have been unable to improve their human and technological infrastructures, macro-economic policies and institutional frameworks. These factors have affected Africa's ability to attract foreign investment as the global race intensified and becomes entrenched in the survival of the fittest philosophy.

Further studies by Dohlman and Halvorson-Quevedo (2010) have demonstrated that there is a general lack of awareness by African businessmen about the possible gains and consequences of ongoing globalization, a difficulty in establishing partnerships and strategic alliances between local Large Scale Manufacturing Firms and Multinational Enterprises (MNEs), limited marketing and managerial capabilities and limited capacity to implement latest Information Communication Technology (ICT) applications. A few exceptions, however, have been countries like Botswana, Mauritius and South African where significant economic gains have been achieved

despite the underlying deficiencies. These countries are, till to date, the good examples of successful economic development in sub-Saharan Africa.

According to Hitt *et al.* (2011), globalization encourages international integration, which has increased substantially during the last generation. In the globalized market and industries, financial capital might be obtained in one national market and used to buy raw materials in another one. This integration of national economies has encouraged international business as sellers and buyers meet to exchange goods and services. According to Hitt *et al.* (2011), two main forces are spurring the globalization of markets and production-lower trade and investment barriers and increased innovation. Innovation in technology: as lower barriers to trade and investment encourage globalization, increased innovation is accelerating the process.

Auwah and Amal (2011) carried a study to discuss how globalization affects the competitiveness of small to medium-sized enterprises and how these opportunities and challenges can be handled. The study found that firms' capabilities with regards to innovation, learning, and internationalization, which increase their competitiveness, are enhanced by institutional setups. The researchers however made a contribution that there is still so much debate on the impact of globalization on the competitiveness of firms, particularly Large-Scale Manufacturing Firms, in LDCs. They, however, agree that globalization has brought considerable benefits to many actors worldwide.

Asiedu and Freeman (2006) studied the effects of globalization on the small and medium enterprises in the United States. The researchers' measures of globalization capture two important aspects of globalization; international trade and foreign direct investment. They found that minority-owned businesses that operate in more globalized regions earn lower profits. In contrast, globalization has no significant effect on the profits of white-owned businesses. According to Asiedu and Freeman (2006), the effect of globalization on small and medium enterprises (Large Scale Manufacturing Firms) has received a lot of attention in international circles in the past few years. One of the reasons for the international focus on Large Scale Manufacturing Firms is that these firms make significant contributions to the economy of both developing and developed countries. Large Scale Manufacturing Firms contribute over 55 % of GDP and over 65 % of total employment in high-income countries (UNCTAD, 2004). In East Asia, Large Scale Manufacturing Firms are major players in the exporting industry, accounting for about 56 % and 40 % of exports in Taiwan and South Korea, respectively. Furthermore, in many developing countries, Large Scale Manufacturing Firms have been identified as making significant contributions to poverty reduction.

Lipsey (2011) points out that Large Scale Manufacturing Firms are largely concentrated in the services and retail industries and MNCs are generally

concentrated in manufacturing and wholesale trade. The distribution of multinational companies in the U.S. by industry in 2003 was 36% in manufacturing, 19 % in wholesale trade, 2 % in retail trade and less than 10% in service industries. In contrast, the distribution for Large Scale Manufacturing Firms was 12% in manufacturing, 2% in wholesale, 20% in retail trade and 40% in service industries.

The point is that, although Large Scale Manufacturing Firms generally operate in less “globalized” industries, they may still experience the spill-over effects of globalization. The second observation is that the wage and employment effect of globalization may be more profound for Large Scale Manufacturing Firms than larger domestic firms due to their relatively smaller size. Finally, since Large Scale Manufacturing Firms are dominant in the services industry, the non-tradable services needed for production by MNCs are likely to be provided by Large Scale Manufacturing Firms suggesting that there are linkages between Large Scale Manufacturing Firms and MNCs.

2.4 Conceptual Framework

This section reviewed several concepts proposed in this study. In particular, some literature was cited relating technology, marketing, resource availability and management as it affects the performance of large firms. Figure 1 summarizes these concepts and consolidates them into a framework and then reduced then into a mathematical model. It presents the conceptualized interaction between the independent variable Performance of large manufacturing companies and the various dependent variables.

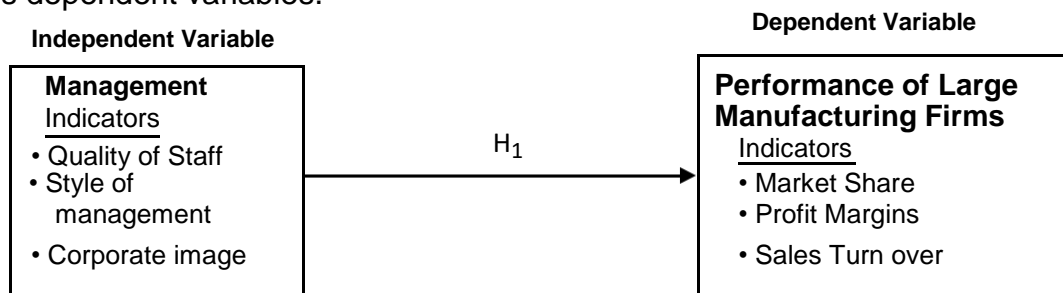


Fig 1: Conceptual Framework

Source: Researcher

H₁: Management policies have no significant effects on the performance of large manufacturing companies in Thika Sub-County.

2.6 Analytical Model

Based on the above conceptual framework, it is postulated that the Performance of Large Firms (PFM) will be influence individually by Management (Mgt) among other factors. The following analytical model is extracted to represent the above conceptual framework;

Performance of Large Firms () = Management (Mgt)

$$=0 + \dots + \varepsilon$$

Where ε is the error term for each Firm i , i = Performance of the Firm

$\varepsilon = \dots$ are coefficients representing the slopes of each variable

3. Methodology

3.1 Research Design

Research design is the blueprint for fulfilling research objectives and answering research questions (John *et al.*, 2007). In other words, it is a master plan specifying the methods and procedures for collecting and analyzing the needed information. It ensures that the study would be relevant to the problem and that it uses economical procedures. The same authors discuss three types of research design, namely exploratory (emphasizes discovery of ideas and insights), descriptive (concerned with determining the frequency with which an event occurs or relationship between variables) and explanatory (concerned with determining the cause and effect relationships). The types of research employed under this study will be descriptive cross-sectional. The major purpose of descriptive research is a description of the state of affairs as it exists at present. This study describes and assesses the factors affecting the performance of large manufacturing firms in Thika sub-county. Moreover, the study will utilize a cross-sectional study in the sense that all relevant data will be collected at a single point in time. The reason for preferring a cross-sectional study is due to the vast nature of the study and the limitation of time. Furthermore, obtaining information from a cross-section of a population at a single point in time is a reasonable strategy for pursuing many descriptive types of research (Ruane, 2006).

This study sought to employ a quantitative approach of doing research as recommended by (Mugenda, 2009). Quantitative methods emphasize objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data using computational techniques.

3.2 Population

The target population for this research is the large manufacturing firms in Thika sub-county.

3.3 Sampling

Since this is a baseline survey, it was not necessary to do sampling. Instead, a census was considered to be more appropriate depending on how many firms there are.



4. Data Analysis and Findings

4.1 Descriptive Statistics

Empirical data was collected from large firms based in Thika town. About ten firms were targeted as the population of the study. Four responded making a response rate of 40%. The analysis was done using SPSS Version 16.0. Table 1 reports the descriptive statistics of the four Firms analyzed.

Table 1: Descriptive Statistics

Variable	N	Min	Max	Mean	Std Dev
Performance (Pfm)	4	2.5	4.3	3.500	0.8124
Management (Mgt)	4	4.0	5.0	4.625	0.4787

Source: Researcher

The following criterion of Mean Score (MS) was used in interpreting the results of the descriptive data.

If MS > 4.50 - Respondents agree to a very large extent

If MS 3.50-4.49 - Respondents agree to a large extent

If MS 2.50-3.49 - Respondents moderately agree

If MS 1.50-2.49 - Respondents agree to a small extent

If MS 0-1.45 - Respondents did not agree at all

The Mean Score for the independent variable, Management was 4.625 meaning that all the respondents agreed to a very large extent that Management is an important factor in the performance of large manufacturing firms in Thika Sub-County.

The Pearson correlation coefficients are reported in Table 2. The results show that the variable has a positive correlation of 0.986.

Table 2 Pearson Correlation

	Performance (Pfm)	Management (Mgt)
Performance (Pfm)	1	
Management (Mgt)	0.986	1

Source: Researcher

4.2 Goodness of Fit

Table 3 reports the results of the goodness of fit analysis of the specified model.

Table 3: Model Summary (Goodness of Fit)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.986	0.972	0.957	0.1679

a. Predictors: (Constant), Management (Mgt)

Source: Researcher

The results reveal that both the constant and the variable specified in the hypothesized model were found to be significant with the p-value < 0.05. The SPSS output showed that the coefficient of determination $R^2 = 0.972$ implying that the variable management explains a high 97% of the variation in the specified model.

Only 3% of the variation is due to other factors. The variables, therefore, fit the model very well. Table 4 reports the results of the ANOVA of the multiple regression analysis. The results show that the regression model is significant with a p value < 0.05 at 0.014 level of significance.

Table 4. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.924	1	1.924	68.258	0.014 ^a
	Residual	0.056	2	0.028		
	Total	1.980	3			

Notes:

a. Predictors: (Constant), Management (Mgt)

b. Dependent Variable: Performance (Pfm)

Table 5 reports the results of the coefficients of the multiple regression analysis.

Table 5. Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	t	
1 (Constant)	- 4.236	0.940		- 4.506	0.046
Management (Mgt)	1.673	0.202	0.986	8.262	0.014

Notes: Dependent Variable: Performance (Pfm)

The results show that the coefficient of Management (Mgt) is positive (1.673) while that of Constant is -4.236. This seems to suggest that Management has a positive impact on the performance of large-scale firms in Thika Sub-county.

4.3 Conclusion of the Study

The positive coefficient of Management (Mgt) (1.673) together with a high coefficient of determination $R^2 = 0.972$ seems to suggest that the driving force of performance of the large-scale manufacturing firms in Thika sub-County is mainly the quality of management of those firms.

4.3.1 Revised Model

Based on the analysis results, the new specified model is as given below; $= -4.236 + 1.643$

The study concludes that the performance of large manufacturing firms in Thika Sub-County, Kenya is driven by the management of the firm.

4.3.2 Suggestions for Further Study

The limitations highlighted above provide an opportunity for further work in this area. Some of the opportunities include the following;

- (i) A study including more firms drawn from a wider area would form a basis for a

good study.

- (ii) Although the management explains a high of 97% of the variation, there is still a 3% portion that was not explained by the specified model. This provides an opportunity for further work in this area.

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Workplace Stressors and Job Engagement of Frontline Employees at Gelian Hotel, Machakos Town, Kenya

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Abstract

The purpose of the study was to examine the influence of workplace stressors and job engagement of frontline employees at Gelian Hotel in Machakos County, Kenya. Specifically, the study sought to determine the influence of role stress, job insecurity and supervisor support on frontline employees' job engagement. The study targeted all (56) frontline employees working at Gelian hotel. A descriptive cross-sectional survey research study of 56 employees through self-administered questionnaires was conducted. All the 56 frontline employees working at Gelian hotel were issued with questionnaires during data collection exercise. All variables in the study were measured using adapted and modified constructs from previous researches. Both descriptive and inferential statistics were used to analyze collected data in line with the study objectives. For descriptive statistics, means and standard deviations were used to describe the patterns exhibited by the study constructs. With regard to inferential statistics, simple linear regression analysis was used to establish the influence of each independent variable on the study dependent variable (job engagement of frontline employees). The study results revealed that role stress was a significant predictor of job engagement of frontline employees. Likewise, study results indicated that supervisor support is a significant positive predictor of job engagement of frontline employees at Gelian hotel. Also, results revealed that job insecurity was a significant negative predictor of job engagement. The study recommends the management of Gelian hotel to understand that role stress (role conflict and role ambiguity) and job insecurity have negative effects on work engagement of frontline employees. The hotel managers to minimize the effects of the factors leading to role stress. To perform job analyses within the organization and recruit employees on the basis of the information acquired. To cope with role stress, training new and existing employees in the organization in techniques for overcoming stress, time management and teamwork may tip the scales in the hotel's management favor with regard to role stress. Also, the management of the hotel to focus on developing training programs for the supervisors of frontline employees. These training can focus on how to form relationships with subordinates and help them grow and succeed. In addition, the hotel management to develop strategies that would address work policies and guidelines thus making clear the responsibilities and duties of frontline employees.

Keywords: Frontline Employee, Job Engagement, Job Insecurity, Role Stress, Supervisor Support, Work-Place Stressors

1. Introduction

Work engagement represents a positive working state that enhances organizational performance (Sonnetag, 2003), and is considered a chief indicator of organizational



soundness because it significantly influences employees' level of job performance, job satisfaction, intentions to leave an organization, customer satisfaction, success of the organization, and organization's profitability (Richman, 2006). Studies have indicated that highly engaged employees are more positive about their jobs and organizations, treat their colleagues with a lot of respect, assist others to hone their work effectiveness, are more positive about their jobs and organizations, are highly active and show excellent performance (Bakker & Demerouti, 2009). Given these benefits, organizations invest a huge amount of resources toward establishing practices that enhance employees' work engagement.

The hospitality industry complexity and vigor provide unending challenges which can bring and worsen job stress and reduce employees work engagement. On this, literature (Karatepe *et al.*, 2012) has recorded job stress as a major challenge in the hospitality industry. Stress has been defined differently by different people. Hans Selye (1976) has defined stress as a non-specific reaction of the body to any demands made upon it. According to Robbins (2001), stress is a non-static situation in which a person is engulfed with an opportunity or demand related to what he or she desires and for which the result is viewed to be both uncertain and imperative. Although stress can be positive (eustress), negative stress (distress) can have serious consequences on the organization such as reduced employee work engagement and weakened organizational performance as a whole. In the hospitality industry, researchers have identified several workplace stressors, namely; minimal wages (Bernhardt *et al.*, 2003), work routinization (Chiang *et al.*, 2010), role conflict (Gilboa, Shiram, Fried, & Cooper, 2008), unclear job expectations and deficient motivational strategies (Robbins, 2001), and unhospitable hours of working with low pay (Seta, Paulus, & Baron, 2000).

Role stress is notably one of the workplace cause of job stress in the hospitality industry (Karatepe & Karatepe, 2009). Role stress is a task-oriented source of job stress (Vandenberghe, Panaccio, Bentein, Mignonac & Roussel, 2011) and it emanates from role conflict and role ambiguity (Singh & Dubey, 2011). Role conflict comes as a result of employees having to accomplish two different roles concurrently whereas role ambiguity is as a result of employees experiencing unclear job expectations, roles, and responsibilities. Moreover, hotel frontline employees encounter customers from different origins and cultures with different needs and preferences. Job insecurity is another workplace stressor which can be defined as balance and continuity of one's job as an employee knows it. Although job insecurity has been defined differently, the underlying point is that it is a subjective concept (Klandermans, Klein Hesselink, & Van Vuuren, 2010). Previous studies have revealed job insecurity as having significant relationships with employee engagement and their job performance (Chen & Chan, 2008). For example, Wang, Lu, and Siu (2014) revealed that job insecurity is negatively related to various types of job performance. However, numerous studies have conducted in other industry

other than hospitality and more so in the developed nation.

Supervisor support is a positive acknowledgment that has been found to mitigate the effects of job stress in the hospitality industry. However, it should be noted that the lack of it causes immense job stress to employees. Supervisor support occurs in the perceptions of employees with regard to how helpful their supervisors are helpful or not (Kavanagh & Tracey, 2013). This has been found to enable employees to be more committed to their work in particular and organization as a whole. When employees perceive the availability of supervisor support, they are less likely to leave the organization (Harris, Wheller, Kacmar, 2011).

Today's business environment has become very competitive, and thus the prime aim of any hospitality organization is to deliver excellent customer service. To do this, frontline employees play the most critical role in the process (Yavas, Karatept, & Babakus, 2010). In the face of stiff competition, hospitality establishment can attain an advantage when frontline employees perform their roles and duties at their best mentally, physically, and unreservedly (Ncube *et al.*, 2013). However, despite their important role in the service delivery process, frontline employees are confronted with a number of problems emanating from long hours of working, customer aggression, increased job demands, and irregular work shifts (Karatepe, 2011).

Studies have indicated that, due to their exposure and direct interactions with customers, frontline employees suffer from job stress which in turn negatively affects their job performance. They are faced with role stress (Karatepe, Yorganci, & Haktanir, 2009). While the job environment characterized by reduced stress enhances job performance, working conditions in the hotel industry are difficult and stressful (Kim *et al.*, 2007). The industry is known to employ workers on a casual basis, pay low wages, has excessive workload (Mansour, 2012). Under these circumstances, it can be assumed that frontline employees in the hospitality industry may express fear of losing their jobs and role stress (Vujicic, Jovicic, Lalic, Gagic, & Cvejanov, 2014).

In Kenya, Kinyita and Nyangahu (2015) conducted a study to determine the relationship between work stress and employee performance in a transit hotel and found significant relationships between the two. Although there are many studies of job stress by previous researchers (Yang Che, & Spector, 2008), there needs to be more work undertaken to understand the direct effects of workplace stressors on frontline employees' work engagement as such a study remains indescribable in the Kenyan hospitality industry. The purpose of the study is to assess the influence of role stress (role ambiguity and role conflict), job insecurity and supervisor support on work engagement of frontline employees with a focus on Gelian Hotel in Machakos County, Kenya. The study was guided by the figure I.

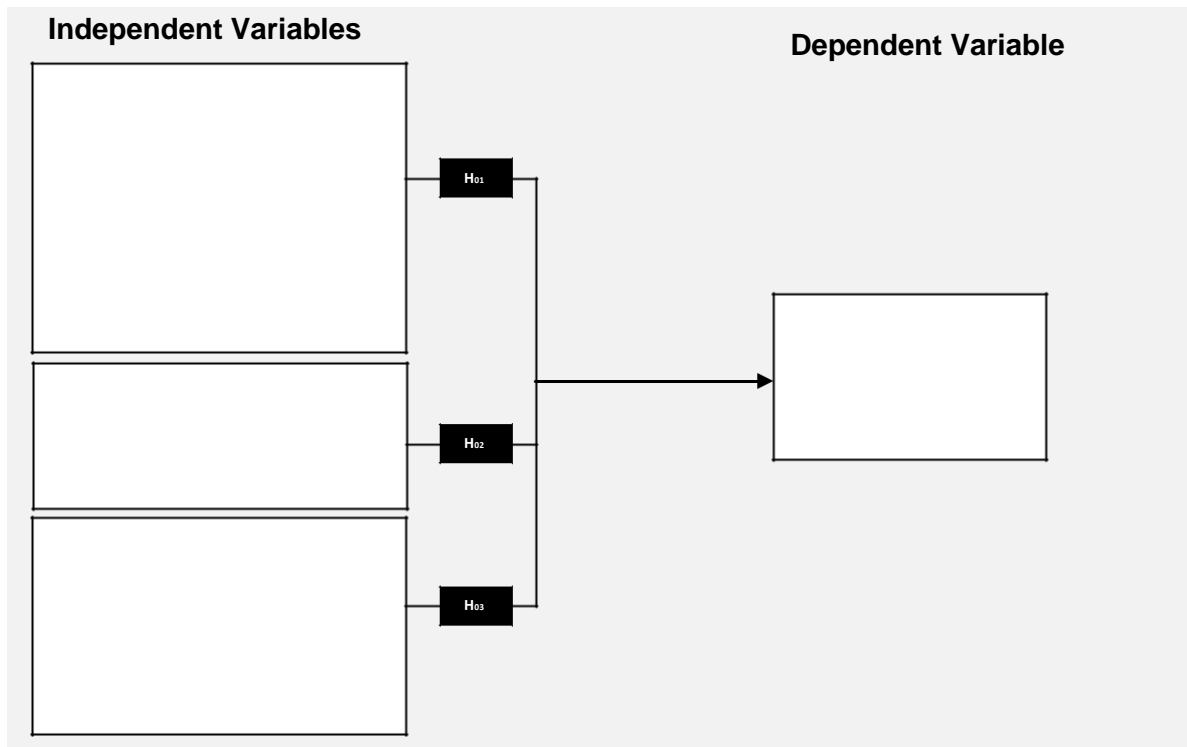


Figure 1: Conceptual Framework for Examining Role Stress, Job Insecurity and Supervisor Support as effectors of Work Engagement of Frontline Employees

2. Research Methodology

2.1 Research Design

According to studies carried out by Hair, Anderson, Tatham, and Black (1995) research design provide a fundamental direction for conducting the study. In line with this statement, the study used descriptive cross-sectional survey design in order to describe the relationships between independent variables (role stress, job insecurity, and supervisor support) and dependent variable (work engagement of frontline employees) (Mugenda & Mugenda, 2003).

2.2 Study Area

The survey was conducted at Gelian hotel situated in Machakos county of Kenya. The hotel is 5 minutes from Machakos people's park and Machakos golf club. The hotel offers a wide range of services to cater to business and leisure travelers. It offers a panoramic view of the town and its environs. It is beautifully designed to offer maximum comfort and luxury to its guests.

2.3 Sample Size

The sample size for the study comprised of 56 frontline employees working at Gelian hotel in Machakos county. Both purposive and convenience sampling techniques

were used to select the participants. The former was used to identify frontline employees in the hotel whereas the latter was used to select the participants at the time of the study.



2.4 Research Instruments

The researcher used a questionnaire to collect data from the selected participants. The questionnaire was structured and specifically focused on the study constructs of interest. The questionnaire was used to collect data on the participants' demographic characteristics, role stress, job insecurity, supervisor support, and work engagement. Items that were used to measure each construct were adapted from previous studies that have used and validated them. A 5-point Likert type scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used to measure items in the construct.

2.5 Validity and Reliability of the Questionnaire

Validity refers to the degree to which the instrument actually measures its intended focus (Proctor, 2005). The study used a face validity technique to evaluate the validity of the questionnaires. This technique refers to the representativeness of sampling adequacy of the content of the measurement instrument (McDaniel & Gates, 2006). Reliability refers to the degree to which a survey instrument produces stable and consistent results. Thus, internal consistency reliability was used to evaluate the degree to which different construct items will produce similar results.

2.6 Data Collection Techniques

The process of collecting data had several stages. First, the researcher sought and obtained permission from the human resource manager of Gelian hotel. Upon permission approval, the researcher through the supervisors of frontline employees sought consent from selected participants to participate in the study. Subsequently, selected participants who consented to participate in the study were given questionnaires to fill and return them to their respective supervisors. After this exercise, the researcher collected filled the questionnaires from the supervisors.

2.7 Data Analysis

The gathered questionnaires were sorted to ensure completeness of data. Subsequently, the questionnaires were coded and data entered into SPSS V.20. Frequencies were used to clean data against errors of data entry. Descriptive statistics comprising means and standard deviations were used to identify patterns in the data. Inferential statistics comprising correlations were computed in order to test the study hypotheses.

3. Results

3.1 Reliability Results

Table 1 presents the results of the reliability of the constructs used in the study. As indicated, all α ranged from 0.795 to 0.931. Hair, Black, Babin, Anderson, and Tatham (2006) suggested 0.60 to 0.70 to be in the lower limit of acceptability. Based on the results, all of the dimensions had an acceptable value of internal consistency reliability (i.e. above 0.60).

Table 1. Reliability of the constructs

Variables	Items	Cronbach's α
Role Stress	9	0.812
Supervisor Support	5	0.823
Job Insecurity	3	0.795
Job Engagement	14	0.931

3.2 Descriptive Results

3.2.1 Role Stress

Table 2 shows the results of the analysis of role stress construct. In this study, role stress was operationalized as role conflict and role ambiguity. As indicated, participants rated the highest their level of agreement with having planned goals and objectives for their job ($M = 4.12$, $SD = 0.87$). In addition, they disagreed with having to work under vague directives or orders ($M = 2.78$, $SD = 1.02$).

Table 2. Role Stress

Statements	Mean	SD
I work under incompatible policies and guidelines	3.56	0.85
I have to back a rule or policy to carry out an assignment	4.01	0.81
I receive incompatible requests from two or more people	4.06	0.78
I have to work under vague directives or orders	2.78	1.02
I receive an assignment without adequate resources and materials to execute it	2.85	0.99
I feel certain about how much authority I have	3.85	0.92
I have clear planned goals and objectives for my job	4.12	0.87
I know what my responsibilities are	4.07	0.85
I know exactly what is expected from me	4.02	0.98

Notes: All items measured on a scale of 1 to 5 (1=SD to 5=SA),

3.2.2 Job Insecurity

Table 3 presents the results of job insecurity construct. as demonstrated, employees had the confidence that the chances of keeping their job were high ($M = 4.02$, $SD = 1.05$).

Table 3. Job Insecurity

Statements	Mean	SD
Chances are, I will keep my job	4.02	1.05
I feel insecure about the future of my job	3.85	1.15
I think I might lose my job in the near future	3.75	1.16

Notes: All items measured on a scale of 1 to 5 (1=SD to 5=SA)

3.2.3 Supervisor Support

Table 4 presents the results of the supervisor support construct. as indicated, participants in this study were positive about the support they received from their supervisors. Particularly, they indicated that their supervisors encouraged them to develop new ways of doing things ($M = 4.02$, $SD = 0.98$) and showed them how to improve their performance ($M = 4.21$, $SD = 0.85$).



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Table 4. Supervisor Support

Statements	Mean	SD
My supervisor encourages employees he/she supervises to develop new ways of doing things	4.02	0.98
My supervisor shows me how to improve my performance	4.21	0.85
My supervisor encourages employees he/she supervises to work as a team	4.20	0.91
My supervisor offers new ideas	3.96	1.22
My supervisor encourages employees he/she supervises to exchange opinions and ideas	4.01	1.01

Notes: All items measured on a scale of 1 to 5 (1=SD to 5=SA)

3.2.4 Work Engagement

Work engagement in this study comprised of vigor, dedication, and absorption. Descriptive results presented in Table 5 indicated that employees in this study agreed with all items of vigor, dedication, and absorption. This indicated that they felt bursting with energy to work in the organization and were engaged and absorbed in their work.

Table 5. Work Engagement

Vigour/Energy	Mean	SD
At my work, I feel bursting with energy	4.21	0.85
At my job, I feel strong and vigorous	4.02	0.56
When I get up in the morning, I feel like going to work	4.32	0.92
I can continue working for very long periods at a time	3.98	1.13
At my work, I always persevere, even when things do not go well	4.01	1.02
Dedication		
I find the work that I do full of meaning and purpose	4.23	0.88
I am enthusiastic about my job	4.36	0.78
My job inspires me	4.45	0.77
I am proud of the work that I do	4.36	0.73
To me, my job is challenging	4.12	1.10
Absorption		
Time flies when I'm working	4.03	0.75
I feel happy when I am working intensely	3.88	1.03
I am immersed in my work	4.12	1.22
It is difficult to detach myself from my job	4.21	1.02

3.3 Hypothesis Testing

To test study hypotheses, multiple linear regression analysis was performed at 95% confidence level. Role stress, job insecurity, and supervisor support were simultaneously entered in the regression model and results are presented in Table 6.

Table 6. Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	0.589	0.413		2.142	.000
Role stress (RR)	-0.047	0.038	-0.353	-1.762	.000
Job insecurity (JI)	-0.372	0.072	-0.253	-1.861	.000

Supervisor support 0.474 0.172 0.068 1.261 **.000**
(SS)

Notes: Outcome Variable: Work engagement (WE); ANOVA F- test (3, 52) = 2.432, $p < 0.001$, R = 0.858; Coefficient of determination (R^2) = 0.736 (73.6%)

As indicated, the regression model constant ($B = 0.589$) was statistically significant ($t = 2.142$, $p < 0.001$) indicating that the regression model with role stress, job insecurity, and supervisor support could be used to predict changes in frontline employees' job engagement at Gelian hotel. The regression model coefficient of determination ($R^2 = 0.736$) demonstrated that 73.6 % of the variation in job engagement could be accounted for by the regression model. All the variables entered into the model were significant predictors of job engagement. The regression equation is:

$$WE = 0.589 - 0.047*RR - 0.372*JI + 0.474SS$$

Table 7 is a summary table of the regression coefficients at 95 % confidence level.

Table 7. Summary of the regression coefficients

Predictor	P	Null Hypothesis	Decision	Conclusion
Constant	0.000	$B_0 = 0$	Reject H_0	The regression model constant is retained in the model
Role stress	0.000	$B_1 = 0$	Reject H_{01}	Role stress significantly contribute to work engagement
Job insecurity	0.000	$B_2 = 0$	Reject H_{02}	Job insecurity significantly contribute to work engagement
Supervisor support	0.000	$B_3 = 0$	Reject H_{03}	Supervisor support significantly contribute to work engagement

4. Implications and Recommendations for Future Research

4.1 Theoretical Implications

Role stress is a significant predictor of work engagement of frontline employees at Gelian hotel. Findings support those of George and Zakkariya (2015) comparative study whose focus was job-related stress and job satisfaction among bank employees in Kerala, India. However, results contradict Jain and Cooper (2012) study findings where role overload was found to enhance job performance – they found that stressed employees performed better. Role stress and job insecurity had a significant negative effect on work engagement. Walsh, Yang, Dose, and Hille (2014) study on the effect of job-related demands and resources on service employees' willingness to report complaints in Germany and China found similar findings. Supervisor support had a positive significant influence on work engagement of frontline employees at Gelian hotel. Likewise, it was the most significant predictor of work engagement among frontline employees at Gelian hotel. Results corroborated those of Karatepe (2016).

4.2 Practical Implications



The findings of the study present sound practical implications. First, Gelian hotel management needs to understand that role stress (role conflict and role ambiguity) and job insecurity have negative effects on work engagement of frontline employees. Second, the management of the hotel needs to minimize the effects of the factors leading to role stress. Thus, the management of the hotel needs to perform job analyses within the organization and recruit employees on the basis of the information acquired. To cope with role stress, training new and existing employees in the organization in techniques for overcoming stress, time management and teamwork may tip the scales in hotel's management favour with regard to role stress. Hotel management to focus on developing training programs for the supervisors of frontline employees. These trainings can focus on how to form relationships with subordinates and help them grow and succeed. Also, the hotel management needs to develop strategies that would address work policies and guidelines thus making clear the responsibilities and duties of frontline employees. Last but not least, the hotel managers to focus on staff development and develop mechanisms for instilling staff confidence and security of their jobs.

4.3 Recommendations for Future Research

The study focused on one hotel. A similar study to expand this scope. The current study investigated the influence of role stress, supervisor support and job insecurity on job engagement of frontline employees. There is need for further studies that would include more determinants such as self-efficacy to offer more insights. Lastly, future studies to replicate and extend this study using larger samples of employees in different hospitality settings in Kenya and in other countries.

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Aspects of Service Quality and Student Satisfaction at Gretsia University Cafeteria Thika Kenya

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Abstract

Service quality and customer satisfaction are important concepts that companies must understand if they want to remain competitive and grow. In today's competitive environment delivering high quality service is the key for a sustainable competitive advantage. Customer satisfaction does have a positive effect on an organization's profitability. Satisfied customers form the foundation of any successful business as customer satisfaction leads to repeat purchase, brand loyalty, and positive word of mouth. The aim of this exploratory research was to apply aspects of service quality model in the context of service quality in the University Cafeteria in order to describe how customers perceive service quality and whether they are satisfied with services offered by the Gretsia University Cafeteria staff. A structured questionnaire was developed from the SERVQUAL model and was randomly distributed to the students at Gretsia University to determine their satisfaction with service delivery in the Gretsia University Cafeteria. From the analysis carried out, the results show that the overall service quality perceived by the customers was unsatisfactory, that expectations were higher than perceptions. The results and findings will provide extra information concerning customers' needs, wants and their satisfaction. It will also contribute to research as it sets the ground for further research in measuring service quality in the service industries in other areas.

1. Introduction

The trend of world markets has changed noticeably from agricultural to service markets (Asian Development Outlook, 2007). All of the service businesses are trying their best to improve their service quality in order to make customers satisfied with their services, especially the hotel industry. Hotel operators now focus more on the quality standards in order to meet the basic needs and expectations of the customers. Once customers' requirements are clearly identified and understood, hotel operators are more likely to anticipate and fulfil their customers' needs and wants (Juwaheer & Ross, 2003).

The more satisfied the customers are, the more likely they are to return or prolong their hotel stay (Choi & Chu, 2001). The hotels have increased their competition and currently, instead of offering only a nice room to draw customers in, they offer high quality staff as an amenity as well. Guest satisfaction is the highest priority for owners and managers competing with hundreds of others, and personal service is at the top of the travellers list of the most important things when considering a hotel to stay in (Wipoosattaya, 2001). Service quality was determined as the subjective comparison that customers make on their expectations about a service. Parasuraman et al. (1985) defined service quality as a function of the differences

between expectation and performance along ten major dimensions. In later research, Parasuraman et al. (1988) revised and defined the service quality in terms of five dimensions: tangibility, reliability, responsiveness, assurance, and empathy.

As Reisig & Chandek (2001) discussed, different customers have different expectations, based on their knowledge of a product or service. This can be implied that a customer may estimate what the service performance will be or may think what the performance ought to be. If the service performance meets or exceeds customers' expectation, the customers will be satisfied. On the other hand, customers are more likely to be dissatisfied if the service performance is less than what they have expected. As mentioned earlier, a greater number of satisfied students will make the cafeteria business more successful and more profitable.

Student food service is a big market today, competing fast foods, and even hotels. As students are more preference on high variety of foods; thus, the wants and needs must be met so that school food service can be successful and maintain a sound customer base and financial stability (Student cafeteria in NHH, investigations of student satisfaction in food service). In this study three aspects were considered i.e.: tangibility, responsiveness and reliability. *Tangibility* is the physical feature of the service being provided, such as cleanliness of the facilities, appearance of the personnel. *Reliability* is the ability to perform the promised service dependably and accurately. *Responsiveness* is willingness to help customers and provide prompt service. The study was guided by the following research questions:

- (i) What is the influence of tangibility on students at Gretsia University Cafeteria?
- (ii) What is the influence of responsive service on student satisfaction at Gretsia university cafeteria?
- (iii) Is there a relationship between reliable service and students' satisfaction at Gretsia University Cafeteria?

Figure 1 illustrates the study conceptual framework.

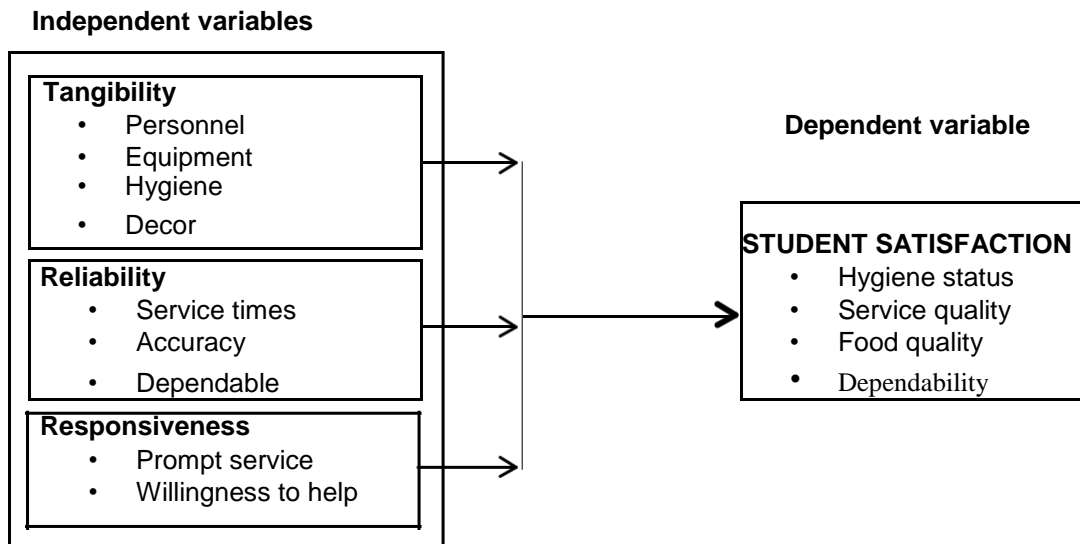


Figure 1. Conceptual framework for the influence of service quality on student satisfaction

2. Methodology

The research design used was descriptive cross-sectional survey design because it cuts across all departments. The study was conducted in Greta University Cafeteria located south of Thika–Garissa road in Kiambu County, Kenya. Target Population comprised of students' residents as they are regular "customers", they are able to provide relevant information regarding the cafeteria. The total population is approx.300 but 90 selected through random sampling. Forty (n=40) students were selected for inclusion in the study sample. Mugenda and Mugenda (2003) have suggested that 30 cases or thereabout are enough for data collection for research that are based on the descriptive research designs.

The study used previously used and tested constructs to measure the study independent variables (tangibility, reliability and responsiveness) and dependent variable (student satisfaction). Items previously used in other earlier studies will be adapted to the current study context.

Self-administered questionnaires were used to collect data. The tool was pretested and validated after which it was administered. Once the questionnaires were collected, they were organized and coded. The data was analysed using descriptive statistics such as means, standard deviations, and %ages.

3. Findings and Discussions

The Response Rate was at 97.5%. Out of the 40 questionnaires distributed and received, 1 was incomplete however, 74.4% of the total respondents were male and 25.6% were female. On the Tangible Service variable most respondents were not well decided thus neutral. This can be evidenced from the means of 3.32 and standard deviations obtained. On Responsiveness the findings show that the rate of responsiveness is quite low. Reliability is of low quality as the mean is 2.41 and SD is 1.21. Students' Satisfaction analysis results indicate that students are not satisfied with the cafeteria services. The results from the mean, show that, students are not satisfied with the services offered at the cafeteria.

4. Conclusions and Recommendations

In conclusion, the cafeteria service, reliability and responsiveness are below customer expectations. The management should therefore come up with strategies that shall see an improvement on the areas of weakness.

The student's satisfaction level is low which means that the service quality offered at the cafeteria is below expectations.

The university should take appropriate measures to improve on services rendered at the cafeteria.

Further research should be conducted using the other aspects of the SERVQUAL model.

The research may also be carried out in other University cafeterias.

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Comparison of Transportation Aspects and their Influence on the Performance of Selected Logistics Firms in Nakuru County, Kenya

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Abstract

The purpose of the study was to establish the influence of Transportation aspects on the performance of logistics firms in Nakuru County. The objectives of the study were: To establish the influence of road network on the performance of logistics firms; To investigate the influence of shortest routes on the performance of logistics firms; To determine the influence of road safety on the performance of logistics firms. The study employed a comparative analysis of the effect of Transportation aspects on the performance of logistics firms. The researcher used a descriptive research design for this study. Data was collected using a semi-structured questionnaire. Quantitative data collected was analysed using descriptive statistics and Analysis of Variance (ANOVA). On average due to poor road network, all the firms exceeded delivery times by 56 minutes, with a standard deviation of 21 minutes. The firms also saved an average of sh. 385693 with a standard deviation of sh. 65703. T-tests revealed that there was a significant difference in cost savings among the firms. There was also a significant difference in delayed deliveries among the firms. Transportation aspects have been found to be of benefit to logistics firms. The study concluded that the government should ensure that the road network is improved as this will improve the movement of goods across the country. With this information and the analysis undertaken, it will be easier to advice transport and logistics firms in Kenya whether to adopt the tools.

1. Introduction

Transportation involves the physical movement or flow of goods. The transportation system is the physical link that connects customers, raw material, suppliers, plants, warehouses and channel members. These are the fixed points in a logistics supply chain. The basic modes of transportation are water, rail, motor carrier, air and pipeline (Gale, 2009). On the other hand logistics was defined by Council of Supply Chain Management Professionals (1991) as part of the supply chain process that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers' requirements. Thus, transport and logistics service companies are companies which are involved in the movement of goods, raw materials and parcels between customers, suppliers, plants and warehouses, while ensuring efficiency in the process (Winston and Goldberg, 2004).

Transport and logistics services companies have been on the rise over the past decade. Peter Drucker (1960) identified logistics as a growing concern within business operations. This may be attributed to the continued need for

transportation of materials as a result of the increase in the number of manufacturing, wholesale and retail businesses and sending of parcels amongst people. This has triggered stiff competition among the companies in this industry as each one of the competitors jostles for customers with other industry players, with the objective of staying ahead of competition (Fulani & Abumere, 1993)

Transportation entails the whole process of moving items between suppliers and consumers so that the total cost of the transportation is minimized. It is hinged on finding and following the route that will cost the least of all the possible routes and thus help to minimize on the cost or routes that will take the shortest time possible to settle clients' transportation services demands.

Transportation aims to minimize the cost of shipping from a number of sources to a number of destinations was first proposed in the 1930s. An article by Tolstoy (1930), transportation problem was studied where a negative cycle criterion was developed and applied to solve a large-scale transportation problem to optimality. A study by Hitchcock (1941): The distribution of products from several sources to numerous localities was proposed to minimize the cost of shipping. Koopmans (1949) independently produced the second major contribution in a report entitled "Optimum utilization of transportation systems" (Barry, Render and Ralph M. Stair Junior, 2002).

1.1 Objectives of the Study

- (i) To establish the influence of road network on the performance of logistics firms.
- (ii) To investigate the influence of shortest routes on the performance logistics firms.

2. Methodology

2.1 Research Design

The study adopted a quantitative descriptive research design. This is because; it aimed to describe the transportation aspects on performance of the selected logistics firms.

2.2 Target Population

The study focused on logistics firms in Nakuru County. The study population was narrowed down to include managers and supervisors.

2.3 Sample Size

Convenience sampling was used to select the respondents. Managers and supervisors were the key informants, and since their number was relatively small, the questionnaires were administered to them all.

2.4 Data Analysis

Quantitative data was analysed using descriptive statistics; frequencies, %ages, means, and standard deviations. Analysis of Variance (ANOVA) was used to compare the three studies



3. Findings and Discussions

3.1 Number of Hours that the Firm Exceeds Deadlines

DHL exceeds customer deadlines by an average of 15 minutes with a standard deviation of 4.8 minutes (*Table 1*). Wells Fargo on the other hand exceeds customer deadlines by an average of 1 hour 35 minutes, with a standard deviation of 40 minutes. G4S on the other hand exceeds customer deadlines by an average of 58 minutes, with a standard deviation of 17 minutes. The increased delivery time can be attributed to poor road network.

Table 1. Number of hours the firm exceeds deadline

Logistics Company	N	Mean	Standard Deviation
DHL	3	0.25	0.080
Wells Fargo	6	1.58	0.665
G4S	8	0.97	0.281
Aggregate		0.933	0.342

3.2 Cost Savings

DHL saves an average of sh. 783333.30 with a standard deviation of sh. 171,998.06. Wells Fargo saves an average of sh. 215 000 with a standard deviation of sh. 18708.30. On the other hand, G4S saves an average of sh. 1587500 with a standard deviation of sh. 6408.70 (*Table 2*). These cost savings can be attributed to the usage of the shortest routes in the delivery of their products.

Table 2. Cost Savings

Logistics Company	N	Mean '000'	Standard Deviation '000'
DHL	3	783.33	171.998
Wells Fargo	6	215	18.703
G4S	8	158.75	6.408
Aggregate		385.693	65.703

3.3 T-test for the Difference in Cost Saved

3.3.1 Between G4S and Wells Fargo

H₀: There is no significant difference between the cost saved by G4S and that saved by Wells Fargo when they use the shortest routes

H₁: There is a significant difference between the cost saved by G4S and that saved by Wells Fargo when they use the shortest routes

Table 3. Difference between G4S and Wells Fargo

Logistics Company	N	Mean '000'	Standard Deviation '000'	T test
G4S	8	158.75	6.408	-7.0606
Wells Fargo	6	215	18.703	

At 5% level of significance the null hypothesis was rejected. Calculated t value of -7.0606 is less than t table value of -2.70606. There was a significant difference between cost savings between G4s and Wells Fargo when the shortest route was used.

3.3.2 G4S and DHL

H₀: There is no significant difference between the cost saved by G4S and that saved by DHL when they use the shortest routes.

H₁: There is a significant difference between the cost saved by G4S and that saved by DHL when they use shortest routes

Table 4. Difference between G4S and DHL

Logistics Company	N	Mean '000'	Standard Deviation '000'	T test
G4S	8	158.75	6.408	-6.288
DHL	3	783.33	171.998	

At 5% level of significance, the null hypothesis was rejected. Calculated t was less than -2.179 (-6.288 < -2.179). There was a significant difference between the cost saved by G4S and that saved by DHL, when the shortest route was used.

3.3.3 Between DHL and Wells Fargo

H₀: There is no significant difference between the cost saved by DHL and that saved by Wells Fargo when they use the shortest routes.

H₁: There is a significant difference between the cost saved by DHL and that saved by Wells Fargo when they use the shortest routes.

Table 5. Difference between DHL and Wells Fargo

Logistics Company	N	Mean '000'	Standard Deviation '000'	T test
Wells Fargo	6	215	18.708	5.706
DHL	3	783.33	171.998	

At 5% level of significance, the null hypothesis was rejected. T calculated was more than t table. There was a significant difference between cost saved by DHL and that saved by DHL when the shortest route was used.

3.4 T test for the Difference in Delayed Deliveries

3.4.1 Between DHL and Wells Fargo

H₀: There is no significant difference between delayed deliveries by Wells Fargo and DHL

H₁: There is a significant difference between delayed deliveries by Wells Fargo and DHL

Table 6. Difference in Delayed Deliveries between DHL and Wells Fargo

Logistics Company	N	Mean	Standard Deviation	T test
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		'000'	'000'	
Wells Fargo	6	0.25	0.08	-3.451
DHL	3	1.58	0.665	

At 5% level of significance the null hypothesis was rejected. T calculated is less than the t table (-3.451 < -2.179.)

3.4.2 Between G4S and Wells Fargo:

H₀: There is no significant difference in delayed deliveries between G4S Wells Fargo

H₁: There is a significant difference between delayed deliveries by G4S and Wells Fargo

Table 7. Difference in Delayed Deliveries between G4S and Wells Fargo

Logistics Company	N	Mean '000'	Standard Deviation '000'	T test
G4S	8	0.97	0.08	-2.234
Wells Fargo	6	1.58	0.665	

At 5% level of significance, the null hypothesis was rejected. -2.234 < -2.179. The conclusion was there was a significant difference between delayed deliveries between G4S and Wells Fargo.

3.4.3 Between G4S and DHL

H₀: There is no significant difference in delayed deliveries between G4S DHL

H₁: There is a significant difference in delayed deliveries between G4S and DHL

Table 8. Difference in Delayed Deliveries between G4S and Wells Fargo

Logistics Company	N	Mean '000'	Standard Deviation '000'	T test
G4S	8	0.97	0.281	6.572
DHL	3	0.25	0.08	

At 5% level of significance, the null hypothesis was rejected. T calculated 6.572 was greater than 2.179. It was concluded that there was a significant difference in delayed deliveries between DHL and G4S.

3.5 F-TEST for the number of hours the firms exceeded delivery time

Table 8. ANOVA results (a)

F-Test Two-Sample for Variances (DHL & Wells Fargo)		
	DHL	Wells Fargo
Mean	0.25	1.583333333
Variance	0.0064	0.441666667
Observations	3	6
Df	2	5
F	0.014490566	
P(F<=f) one-tail	0.01434485	
F Critical one-tail	0.051823112	

F test is positive 0.0145, with a p value of 0.01. The p value is significant indicating that enough evidence exists to show that there is a variance between the two firms in terms of delays in their deliveries.

Table 9. ANOVA Results (b)

F-Test Two-Sample for Variances (Wells Fargo and G4S)		
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	Wells Fargo	G4S
Mean	1.583333333	0.96875
Variance	0.441666667	0.079241071
Observations	6	8
Df	5	7
F	5.57370892	
P(F<=f) one-tail	0.021823144	
F Critical one-tail	3.971523151	

F test is positive at 5.57, with a p value of 0.02. The p value is significant indicating that enough evidence exists to show that there is a variance between the two firms in terms of delays in their deliveries.

Table 10. ANOVA Results (c)

F-Test Two-Sample for Variances (DHL & G4S)		
	DHL	G4S
Mean	0.25	0.96875
Variance	0.0064	0.079241071
Observations	3	8
Df	2	7
F	0.080766197	
P(F<=f) one-tail	0.076743705	
F Critical one-tail	0.051670995	

F test is positive at 0.08, with a p value of 0.07. The p value is significant indicating that enough evidence exists to show that there is a variance between the two firms in terms of delays in their deliveries.

3.6 F-Test for Cost Savings

Table 11. F-Test Two-Sample for Variances

	DHL	Wells Fargo
Mean	783.3333	215
Variance	15833.33	350
Observations	3	6
Df	2	5
F	45.2381	
P(F<=f) one-tail	0.000628	
F Critical one-tail	5.786135	

F test is positive 45.23, with a p value of 0.00. The p value is significant indicating that enough evidence exists to show that there is a variance between the two firms in terms of cost savings.

Table 12. F-Test Two-Sample for Variances for cost (Wells Fargo and G4S)

	Wells Fargo	G4S
Mean	215	158.75
Variance	350	41.07143
Observations	6	8
Df	5	7
F	8.521739	
P(F<=f) one-tail	0.006882	
F Critical one-tail	3.971523	

F test is positive 8.52, with a p value of 0.06. The p value is significant indicating that enough evidence exists to show that there is a variance between the two firms in terms of cost savings.

Table 13. F-Test Two-Sample for Variances cost (DHL & G4S)

	DHL	G4S
Mean	783.3333333	158.75
Variance	15833.33333	41.07142857
Observations	3	8
df	2	7
F	385.5072464	
P(F<=f) one-tail	6.90854E-08	
F Critical one-tail	4.737414128	

F test is positive 385.507, with a p value of 6.91. The p value is not significant indicating that there is no evidence to show that there is a variance between the two firms in terms of cost savings.

4. Conclusions and Recommendations

Transportation models have been found to be of benefit to logistics firms, and thus other firms in the business should employ there to help them realize the benefits of cost savings and timely deliveries. The government should ensure that the road network is improved as this will improve the movement of goods across the country.

4.1 Further Research

The research should be replicated to other firms in similar businesses to confirm the state of affairs and whether they employ the use of transportation models.

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Evaluation of the Current Security Standards within the Hotel Facilities: A Comparative study between Nairobi and Mombasa Counties, Kenya

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Abstract

In Kenya, tourism has been recognized as one of the key drivers of economic growth and poverty reduction. This is because tourism has a great multiplier effect that is able to catalyse growth in all sectors of the economy. The decline could be attributed to the euro zone crisis coupled with perceived insecurity in the country. Kenya is ranked 135 out of 140 countries globally by the Travel and Tourism Competitive Index on safety and security concerns. Therefore, the purpose of this study was to examine the effects of insecurity on performance of the hotels. The study was guided by the following specific objective to find out the current hotel standards of security within the hotel facilities. The study employed both quantitative and qualitative methods of data collection. The study used questionnaires and interviews to collect data. The study adopted a cross-sectional analysis using a sample of 160 respondents. The age of the hotel did not affect security levels of the establishments; security is a multiplicity of factors interaction and not a single consideration; The quality, security, age and occupancy rate of hotel are potential factors affecting the security standards for operating and maintaining the hotel. There was significant difference in training across the two regions with Mombasa doing it more frequent compared to Nairobi (p value < 0.001). There was a gap between the training and the application of the security procedures. As the hotel invested more in security devices, there was an increase in the occupancy rate. However, this was not statistically significant, as there was an inverse correlation in some of the hotels for the two regions. For instance, higher stars (4 & 5) had a negative relationship of -0.87 and 0.05 respectively. The higher the occupancy rate the lower the investment of security in the hotel industry; none of the factors significantly explained the security investment among the hotels (p value > 0.05). The three factors (occupancy, star rating and region) explained only 17% of the total security investment in the hotels, leaving 83% of the investment unaccounted for. This indicates that investment in security among the hotels is explained by factors other than occupancy, star rating or region. The study recommends that hotel staff needs to have specialized training on security matters at higher levels to be able to respond to different threats in hotel industry. Training should commensurate to the needs of the hotel industry.

Key Words: Hotel security standards; security perceptions; hotel facilities; Terrorism and crime

1. Introduction

In Kenya, Tourism has been recognized as one of the key drivers of economic growth. According to UNWTO (2014), Tourism is one of the economic factors for



development and poverty reduction. This is because tourism has a great multiplier effect that is able to catalyse growth in all sectors of the economy namely agriculture, manufacturing, energy, transport and financial services. Therefore, it has a positive impact on the local economy due the demand that it creates for employment, food supplies and other consumables. It also has a multi-faceted approach and therefore its economic dimension derives inputs from the social, cultural and environmental aspects. Furthermore, it leads to spontaneous increase in value of real estate within the proximity of the hotel. However, its success is dependent on safety and security of the guests at the tourist destinations which is a prerequisite for tourist growth and development. Traditionally, Kenya's major international tourist market has been from the western countries mainly Europe (43%) and USA (13%). China, South Asia and the Far East are the new emerging markets with great potential. The country receives 23% international tourist from the Africa region (UNWTO, 2014).

According to Kanold (2011), cases of Hotel insecurity globally have indicated commonalities between the lack of a unified hotel security standards as well as a policy framework on safety and security within the hospitality sector. Regionally, the East African Community guidelines on hotel standards fail to address some of the critical issues such as insecurity (Kanold, 2011). There is need to develop regional, national and local policy interventions, and measures that mitigate and address these impending threats such as terrorism and travel advisories which affect room occupancy in the hotel industry. Significantly so, there is need to contribute to this policy development process through empirical research. This study sought to contribute to the policy development process by developing a framework for policy development in this area.

Kenya's hospitality sector is a key investment hub for East Africa estimated at Kshs 39.2bn or 7.2% of total FDI capital investment in 2011 (World Tourism Trade Centre (WTTC), 2011). Further, the Hospitality sector in Kenya directly supports 245,000 jobs (3.8% of total employment) in 2011, and is expected to rise substantially by 27.2% in the next 10 years (WTTC, 2011; GoK, 2010). Kenyan Hotels cater for a diverse market base comprising of leisure travellers 68% in 2010 and the business travellers 32% in 2010 (UNWTO, 2011).

Despite tourism's significant growth over the last five years, the sector continues to face a number of challenges which need to be addressed in order for the sector to attain its full potential and thus contribute effectively to the country's development goals as envisaged in Vision 2030, (GoK, 2007). These include insecurity in major tourism destinations, following acts of terrorism, such as the bombings of the United States Embassy in Nairobi in 1998, and the Paradise Beach Hotel in Mombasa in 2003 among other undocumented incidents (WTTC, 2011).

Consequently, the hotel industry in Kenya continues to deal with the negative effects of travel advisories (WTTC, 2011). These advisories have heightened safety and

security issues in the minds of international travellers globally (WTTC, 2011). According to Kenya Tourism Board (KTB) (2009), due to Post Election Violence in 2008, Kenya lost at least Sh15 billion due to the ban on flights to the country imposed by travel advisories (GoK, 2010). The loss represents about two per cent of the country's Gross Domestic Product and had a negative impact on almost every sector of the economy (WTTC, 2011). The tourism industry alone lost up to Sh12.5 billion in 2008 while the Government lost at least Sh7 billion in levies from tourists in that period (GoK, 2009).

The Kenyan National Tourism Policy (GoK, 2008) contends that some of the hotels in Kenya, especially those at the Coast are cheap and characterized by downward spiralling of revenue, poor security standards, erratic occupancy levels, inadequate service standards and poor-quality accommodation. The policy further acknowledges that some of these elements might lead to insecurity in the hotel industry. The erratic occupancy levels particularly need to be singled out since Kenya has a distinct low tourism season when the occupancy levels plummet especially in Mombasa (GoK, 2007).

The tourism policy notably paints Kenya as having a 'tired' hotel infrastructure including insecurity (UNWTO, 2012). This policy however acknowledges that if security was drastically improved and sustained, Kenya has enormous potential for increasing its overall earnings to become the top ten long haul destinations globally (UNWTO, 2012). Bed occupancy is one of the inputs used to generate revenues in the hotel business (UNWTO, 2012).

Despite regional efforts by the US-EAC partnership in combating tourism security issues and local efforts by the Kenyan Government to deploy a Tourist Policing unit as well as community policing as a matter of national policy, there are rampant incidences of reported criminal activities within hospitality facilities which are viewed as vulnerable/soft targets to terrorism (Kanold, 2011). Therefore, this study sought to establish the Manager's perception towards security factors by comparing the security status of 3-5-star hotels in Nairobi and Mombasa.

Insecurity continues to pose a huge threat on local and international investors in East Africa, with some firms spending up to 7% of total revenues, or 11% of total operational costs on security infrastructure and personnel (GoK, 2008). However, it is not recorded how much hotels in Nairobi and Mombasa spent on security. This study therefore, determines the indicators of vulnerability of hotel facilities.

The security situation in Kenya remains a major hindrance towards sustainable tourism development in Kenya. In fact, Kenya is ranked 135 out of 140 countries globally by the Travel and Tourism Competitive Index on safety and security concerns (WTO, 2013). The porous borders between countries in the region as well as the extensive coastline make it difficult to accurately monitor and mitigate security threats (WTO, 2007). Tremendous benefits to be accrued if the security situation is

contained such as more hotel occupancy and high revenue will be realized. Therefore, the study establishes the effects of insecurity on hotel performance.

This study therefore sought to evaluate the current security standards within the hotel facilities between Nairobi and Mombasa Counties with a view to guiding policy on hotel security standards as well as providing long-term intervention measures to curb this vice.

Specifically, this study sought to address the following hypotheses:

H₀₁: There is no significance difference between the investment in security management systems and high guest turnover in the hotel industry by region.

2. Literature Review

In a study by Gill, Moon, Seaman, & Turbin (2002) hotel managers are aware of the potential dangers on their properties. They are also aware of the need to provide for a hospitable and secure environment. The problem for managers is that the two concepts of safety and security seem to disconnect with hospitality and friendliness. Managers believe that there is an inherent dilemma in attempting to adequately provide for both sets. If there is a strong and ubiquitous security presence, managers worry that this may impinge upon guests' peace of mind because this may make an impression upon the guest that an attack is imminent, thus producing feelings of anxiety for the guest (Gill et al., 2002). Theoretically, criminals will feel discouraged by a highly visible security presence. Through this deterrence effect upon criminals, hotel guests should actually feel empowered, comforted and relaxed (Gill *et al.*, 2002).

According to Gill et al., 2002 crimes at a hotel can be committed by hotel guests, employees, or any third party, and that these same groups can be victims of it. A hotel's reputation and success are largely based upon the comfort and safety it provides to its guests; he insists. Failure to provide for a safe and secure environment will damage the hotel's reputation, and this may result in serious financial loss and damages (Hymanson, 2013).

In another study by Clifton (2012) argues that because the hospitality industry has always adhered to a policy of having an open and welcoming atmosphere, its properties has become soft targets. Hotels fail to succeed in this safety endeavour because they do not employ the most fundamental step of security, which is performing a risk assessment (Clifton, 2012). A study claims that a simple risk assessment can be performed here, on the spot, by a guard weighing the possibility of an observed person attacking him (being a threat), and the potential harm that person might cause (severity of it) (Clifton, 2012). The study recommends managers to expand upon this calculation for its various potential threats, and then formalize this for the purpose of creating a documented security plan (Clifton, 2012). Mansfeld & Pizam (2006) states that a negative relationship is one where higher crime rates

make for fewer tourist visits, and a positive relationship is one where an increased visible presence of uniformed police and security officers makes for an increased feeling of personal security upon guests (Mansfeld & Pizam, 2006).

Buzby & Paine (1976) argues that a security department's objective is to have a proactive program in place for the prevention of hazards which can hurt, injure, or destroy lives, or property. It is for this purpose alone that laws are passed and security measures are taken. Ellis & Stipanuk (1996) agrees that a security program should stress the prevention of security problems, and that it is far more desirable to keep security incidents from happening than it is to catch a criminal after a crime has been committed. Beaudry, (1996) states that there are no established security standards for the various-sized hotels. The security departments typically consist of a manager, assistant manager, a shift supervisor, and officers (Beaudry, 1996). For a hotel with 300 rooms or less, he recommends 2 to 5 security staff members, and one manager; for hotels with 301-500 rooms, 5 to 10 members, and one manager; for hotels with 501-800 rooms, 10 to 20 staff members, and one manager, one assistant, and some supervisors; for a hotel with 801-1200 rooms, 20 to 30 members, and one manager, one assistant, and one investigator; for hotels with 1201-4000 rooms, 30 or more members, and one manager, one assistant, and one investigator, and for hotels that have over 4,000 rooms, the staff numbers will depend upon the various amenities offered at the property, such as a casino, theatre, theme park and nightclub (Beaudry, 1996)

3. Research Methodology

3.1 Target Population

The study population consisted of Hotel Managers, Hotel Security Managers, and Division Room Managers in 3-5 hotels in Mombasa and Nairobi, which are approved by hotels and Restaurant Authority within the Ministry of East African Affairs, Commerce and Tourism, the (Kenya Gazette, 2003). These cadres of respondents have critical, useful and confidential security information in the hotel industry as they make decisions concerning security issues. A list of all the hotels rated from three, four to five was compiled and this formed the sampling frame. In this case, the criterion was the star rating. Star rated hotels are luxurious hotels with exceptional modern and technical amenities and offer the highest standards of accommodation, service and comfort. Tourists frequent these hotels because they are believed to offer high standards security (GoK, 2007).

3.2 Sampling Procedure and Data Collection

Nairobi and Coastal regions were purposely selected as study sites because they possess a pride no other towns in Kenya does and the main activity is tourism particularly the coastal area. Nairobi hosts business and transit travellers. Stratified Random Sampling (SRS) was used to select the key respondents in 3-5-star hotels. These included; Hotel Managers, Hotel Security Managers, Front Office Managers,

Accountant and Division Room Managers. Other stakeholders included Kenya Tourism Board; Kenya Police Tourist Unit, Kenya Hotel Keepers Association, Provincial Security Committee, Ministry of Tourism and Information, Kenyan Navy. One key respondent in each stratum in both regions was selected. The main stratum was the major job categories in the hotels. Further, the stratification of a proportionate allocation to size was extended to adjust the number of respondents for stratum. Security managers, Hotel managers, Front Office Managers and Division Managers because of their few numbers were purposively selected to allow each sub-group to be adequately represented (Kothari, 1999).

Table 1. Stratum and Respondents in the Study Area

City	Star Rating (Stratum)			N	Weight	Nh	Est. Respondents (5 respondents per hotel)	Others
	III	IV	V					
Nairobi	5	n/a	7	12	0.375	12	60	5
Mombasa	7	11	2	20	0.625	20	100	6
Total	12	11	9	32	1	32	160	11

The Security Managers provided information on crimes histories, if any, in the establishment. They also provided information on whether there are any variances on security crimes committed and the corrective actions taken. The Hotel Manager provided information on security strategies applicable in their establishments. The recruitment of security personnel's qualifications required and the forms of security available. Division Rooms Manager provided information on the acts employees might be doing to defraud the guests and their employers. Their level of training provided an insight in their competence or lack of it in understanding and interpreting security procedures and policy. Other stakeholders provided information on security policies in place, mechanisms to tackle crimes particularly those affecting the hotel industry. The collaborations between these stakeholders and the hotel industry, the challenges they encounter and pro-active strategies in place to curb cases of insecurity in both regions.

3.3 Data Collection Instruments

After ascertaining the validity and reliability of the data collection tools. Approvals for data collection were given by respective managers of 3 to 5-star hotels that were sampled out for inclusion in the sampling frame. Upon receiving confirmation for approvals, self-administered questionnaires were hand delivered to security managers, head - chef, and security guards. Drop and pick later method was used to collect the filled questionnaires which was done after three weeks. Several e-mails reminders and follow-up phone-calls were made to enhance chances of a high response rate and accurate sampling without bias. In-depth interviews were carried out on hotel general managers and security managers. This was done to gather more information on the security status of the facilities and gain more insight on the quantitative data. Observation checklists were used to discern the availability of security facilities within the premises. They were administered in the hotels by the research assistants during the time of data collection.

3.4 Pre-Testing

Before the actual study was done, pre-testing of instruments was done in one hotel in each of the stratum that is Nairobi and Mombasa. The hotels used for pre-testing were not among those which were used to establish reliability and validity of research instruments.

3.5 Validity and Reliability

In assessing the reliability of the research instrument, Cronbach's alpha test (1951), which is a common model used to measure reliability and validity of a research instrument was used. The reliability analysis results are exhibited in Table 2. The table reveals that alpha coefficients for room manager, front office and accountants' responses were 0.968, 0.948 and 0.780 respectively. From the findings it can be concluded that the constructs measured had the adequate reliability for the subsequent stages of analysis since all the Cronbach values were greater than 0.67 (Aiken, 1997). This indicated that the tools and responses used for assessing the security concerns in the hotels were consistently reliable and valid within the departments.

Table 2. Reliability

Component	Cronbach's Score	n
Room Manager	0.968	20
Front Office	0.948	14
Accountants	0.780	11

3.6 Data Analysis

The questionnaires were coded for easy data entry. After cross checking the questionnaires for any missing entries, a data base was designed in MS Access which allowed the researcher to set controls and validation of the variables. The entered data was cleaned before the onset of actual data analysis. Exploratory Data Analysis (EDA) was utilized in the evaluation of the outliers and any missing data points were addressed. Descriptive statistical data analysis methods were used at the initial stage and the findings presented in summary tables and graphs where applicable. Inferential statistics were used to analyse the data and to test the hypotheses. On establishing the distribution functions (normal/non-normal) for the variable an independent sample t-test for the continuous variable in the hotel industry were undertaken while for variable with non-normal distribution were used. Factor analysis using Principal Component Analysis (PCA) with varimax rotation was used to assess the relative significance of various factors relatable to security and safety issues in the hotels. Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity were both used to measure the sampling adequacy and to test the level of significance. P-value less than 0.05 were considered appropriate for factor analysis. For factor analysis with PCA, all variables are required to have communalities greater than 0.5. Therefore, all items in the scales with communality less than 0.5 were excluded from the overall factor analysis. Odds Ratios (OR) and associated 95% confidence interval (CI) was calculated to identify the factors that are more likely to explain the explanatory variable. The p value of less than 5% (p value < 0.05) was considered statistically significant. Qualitative data analysis was used in the study. Qualitative methods sought to develop a systematic analysis of qualitative responses from Questionnaire. Qualitative data was organized according to themes.

4. Results

4.1 Factor Analysis on Room Division Manager on concern for Security Issues

The factor analysis was conducted on the intra -hotel vulnerabilities to establish the concern of the division room managers towards safety and security issues. Both the Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity addressed the sample adequacy and the level of significance (KMO measure of sample adequacy = 0.353; Bartlett's Test: $\chi^2 = 588.85$, $P < 0.001$). Based on these findings, factor analysis was appropriate. Factor analysis results in Table 4.6 indicate that the five components accounted for 87.548 per cent of the total variance in the level of concern of security and safety issues at an eigenvalue equal to or greater than 1

Table 3. Factor Analysis on Room Division Manager on concern for Security Issues

Component	Initial Eigenvalues			Rotation		Sums of Squared Loadings	
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
Intra-hotel factor	10.907	54.536	54.536	5.111	25.555	25.555	
Robbery and Burglary	2.261	11.304	65.841	4.441	22.206	47.761	
Injury and Fraud	1.793	8.963	74.803	3.293	16.464	64.225	
Theft and Carjacking	1.508	7.539	82.343	2.946	14.729	78.954	
Facility Default	1.041	5.206	87.548	1.719	8.594	87.548	

Table 3 indicates that intra-hotel component explained 25.555% of the total variance in the hotel's vulnerability to safety and security issues. This component comprises of on-premise injury, injury caused by employee, fire caused by machine failure, money laundering, information security breach that affects the guests, perpetuating a scam on a guest and employee theft, and collusive theft amongst the staff. This finding implied that hotels were more vulnerable to safety and security issues emanating within the hotel premises but not from external factors. The hotels therefore should worry more on internal security mechanisms including monitoring all the activities conducted from within.

In addition, robbery and burglary accounted for 22.206% in the total explained variance. This component was as a combination of destructive action of walk-in thefts, robbery of the hotel, robbery of the guest, burglary of the hotel, and burglary of the guest. This finding indicated that most hotels had security gaps which allowed these vulnerabilities to take place. The implication is that hotels should take stringent measures to ensure that its premises are safe for both guests and staff.

The third component (Injury and fraud) accounted for 16.464% of the total explained variance and comprised of injury in recreational facilities and credit card fraud in the hotel industry. The hotel floorings and finishing should be ideal and usable to the users to avoid instance of injury from within. This appeared to suggest failure in the hotels' security internal systems.

4.2 Managers' Perception on Current Security Standards within the Hotel Facilities

The objective of this study was to find out the current standards of security facilities within the hotels in 3-5-star hotels in both Nairobi and Coastal region of Kenya as a way of assessing the security facilities, employees' security training and the hotel security policy. The managers' perception on current security standards within the hotel facilities is presented in table 4.

Table 4. Manager's Perceptions on the Security Status of their Hotels

Perceptions	3-Star	4-tar	5-Star
Average	30		30
Above Average	70	100	70
Below Average	4-	-	-
Total	100	100	100

Table 4 shows the security rating by hotels. The respondents were asked to gauge their security status. Amongst five -star hotels, 70% of the hotels were above average while 30 % were average. While 70% of the respondents in 3-star hotels indicated that they were average, whilst 30 % were above average. In four-star hotels all the hotels studied stated that they were above average in terms of security measures in place.

The implication of these findings is that most hotels were not willing to portray any security weaknesses in their premises. However, most of them may have security measures in theory without executing them and this may lead to a major security lapse which may be a challenge in the hotel industry. Interestingly, most hotels were non-committal to state their security status for fear of losing their business. Security of the hotels is confidential as it deals with guests' privacy; safety and protection within the hotel premises. However, there are more elaborate security systems in chain affiliated hotels than sole proprietorship. Chain affiliated hotels have centralized and uniformed security systems that are applicable in their premises.

4.3 Distribution of Security Measures in Place by Region

Analyses of the collected data show that Nairobi region has generally put in sufficient security measures in the hotel industry. In Nairobi 66.7% of the hotels have surveillance cameras to record the flow of human traffic in and outside their premises. Mombasa region had 33.3% of surveillance devices in their premises. Few of the hotels have not installed functional surveillance devices. Both regions had 50% each for the application of private security services in their premises while 57.9% of the hotels in Nairobi had emergency evacuation preparedness plans, coastal region had 42.1%. In Nairobi 52.9% of the hotels had access control security in place, whilst 52.9% in coastal region. The implication of these findings is that hotels in Nairobi have better functional security devices and preparedness than hotels in the coastal region.

Power and Barrows (2006) argues that the largest technical commitment on the part of hotel operators has been the replacement of the metal key with electronic or card-based locks, a practice that is now being mandated by many franchise systems. The majority of the hotel Managers interviewed concurs that a new combination is electronically or mechanically encoded on the key card with each guest registration. The card contains a magnetic strip that allows it to work. The lock in the guest room door is reset electronically by the first entry of the electronic or card key. In the case of an outline system the door is reset from the front desk at the time of registration where installation of new key system is not economically feasible. The implication is that most hotels were employing the services of security firms to beef up its internal security arrangements. This outsourcing of security services has its own challenges to both the hotel staff as well as guests. It is common knowledge that most of these private security firms employ unprofessional security personnel who have no security details required in the hotel industry.

The in-house training they are offered is very basic which does not add any value to the hotel industry. Since the hotel industry is an assembling of augmented players, the standards of security are not universal. This results in hotels having dis-enactment of security policies in their respective hotels which are not universally similar in its application (Power & Barrows, 2006). Most of these private firms have no legal policy regulatory framework to make their operations measurable. The level of educational status of these security agents is wanting (Power & Barrows, 2006). Most of them are school dropouts while fewer others are ex-police or military personnel who may have been dismissed due to some misconduct in the course of their duty. These are the people who are being entrusted to secure the hotel property and safety of guests. Their criminal background is rarely sought to establish their credibility status. These findings concur with a similar study carried out in United Kingdom by (Samantha, 2004) which indicated that a massive 74 % of the major UK hotel groups are failing to carry out in-depth security checks on potential employees.

The hotel Managers were interviewed on whether they screen their security personnel to establish their criminal records. Majority of these hotels do not check their workers as they rely on recruitment agency, however, hotels rarely took notice of what the screening discovered but goes ahead to employ an applicant even if negative results came back, hotels rarely take notice of what the screening discovers and usually go ahead to employ an applicant. The managers interviewed stated that hoteliers were paying too much attention to personal references, absenteeism and academic qualification and too little to criminal records and court judgment checks. Majority of hotel chains conduct security checks on all staff they employ directly but added that the onus was on recruitment companies for any agency staff they employ. This has some security implications on those hotels which fail to screen new employees because of high staff turnover within the industry. Power and Barrows

(2006) argues that many hotel chains have measured security with the elevated terror. The government of United Kingdom issues alert measures to hotel including increased security in the entrance, lodging docks, and in hotel garages and more scrutiny of unattended bags and cars at the highest alert level. Some of the hotel Managers interviewed stated that guests today do not get alarmed by security measures taken by hotels. As hotels strive to provide high level comprehensive security, there are technical components that must be addressed. The matter of security can be approached as a technical problem as well as a management problem.

4.4 Frequency of Security Training in Hotels by Region

The hotels in Mombasa region indicated that 100 of hotels perform their security training on a weekly basis. The hotels 66.7 % in Nairobi undertake their security training fortnightly. On the quarterly and monthly training, Nairobi and the Coastal region had 50% respectively. However, on bi-annually and yearly training, Coastal region had 66.7 % and 25 % respectively while Nairobi had 33.3% bi-annually and 75% annually. There was significant difference in training on security issues across the two regions with Mombasa doing it more frequent compared to Nairobi (p value<0.001). The implication of this finding is that hotels in the coastal region are constantly under security threat than hotels in Nairobi. The frequency of security training on personnel is more prominent in the coastal region owing to its location on the Indian Ocean making it accessible by Sea. The implication of this disparity is that high rated hotels have a security structure which is more effective and operational.

The managers' perception on frequency of security training shows a comparison between Nairobi and the Coastal region on frequency of feedback on security matters In Nairobi 75 % were classified as having a high feedback on security matters from guests in the five star hotels while 25 % on the same category of five star hotels in Coastal region stated that they receive feedback from guests on security matters. The four-star hotels in the Coastal region,63.7 % indicated a medium feedback on security matters from guests while 66.7 % of the hotels in the Coastal region indicated having a low feedback on security matters from guests. The 3-star hotels in Nairobi indicated 33.3 % a low feedback status (p value<0.001). The implication of this finding is that hotels in the coastal region are constantly under security threat than hotels in Nairobi. The frequency of security feedback by both the guests and hotel personnel is more prominent in the coastal region owing to its location on the Indian Ocean coast which is porous and accessible by Sea.

The security managers were asked how they handle security incidences in the hotel industry. Majority of the security managers concurred that all security incidences are reported first to the relevant department, then to the security department and finally to the Kenya Tourist Police deal with a tourist/guests' issues. The incident has to be reported to the nearest police station for thorough investigations to take place. The

Managers revealed that depending on the gravity of the matter, sometimes internal investigations begin as the matter is referred to the Police. The hotel security managers further clarified that they work closely with the police officers. When probed further, the Security Manager said that there are clear security procedures to be followed on how to handle all security incidences in the hotel industry. The security manager also revealed that they do have pro-active strategies in place to prevent an incident from occurring. However, with the glaring of terrorism acts, stringent measures are being instituted to ensure that such cases are avoided. These include the beefing up the number of security personnel both in plain clothes and uniformed armed security personnel. It also revealed that all the hotels that were sampled on apply the use of private security services in their respective hotels. In the higher rated hotels, about 40% of the hotels engage the services of private investigators alongside the police and the in-house security. Security Aspects in the hotel industry.

Some respondents said that the government should implement the overall national security in the country to enable the hotel to cut down the huge security investment which not only disrupts their core business but also depletes their resources. The researcher observed that international tourists, who have bookings in hotels, are not subjected to thorough security screening process. Most hotels especially the higher rating hotels have a mutual agreement with reputable tour operations that they trust. This practice is inconsistent with the hotel security policy and procedures for screening all guests' luggage when checking in.

The managers were asked how security incidents are handled and managed in the hotel industry. Almost all the hotel managers stated that they have a universal method of recording. Any incident is recorded in the security occurrence book. The same information is computed and documented for future references. The incident report is also in the form of the hard copy at least to ensure that it is not tampered with. If the incident involves the guest, the incident forms are filled by the affected guests giving all the personal information required and the description of the lost or stolen item(s) along with its costs. This information given by the guest is verified before it is acted upon by all the parties involved. The hotel managers concurred that sometimes guests' cheats expecting that the hotel will be sympathetic enough and pay the guest in fear of loss of business and image of the establishment. If the hotel management are not convinced by guests' responses investigation begins immediately depending on the gravity of the matter.

4.5 Correlation between Security Training Versus Security Measures in the Hotel Industry

The correlation between security training versus security measures in the hotel industry is presented in table 5.

Table 5. Security Training Versus Security Measures in the hotel

industry	Training Frequency				chi-square	p value
	Often	Not Often				
	Freq.	%	Freq.	%		
Security Measures						
Increased Surveillance	5	45.5	2	14.3		
Perimeter Wall	1	9.1	1	7.1		
Screening	0	0.0	4	28.6	6.1	0.198
Awareness Creation	1	9.1	3	21.4		
Enhanced Security	4	36.4	4	28.6		

Table 5 indicates that there was no significant association between the training on security aspects and the measures used by the hotels (p value = 0.198). Therefore, the hypothesis is accepted. Therefore, there was a gap between the training and the application of the security procedures in the hotels. The hotel managers interviewed on this issue revealed that they do not subject their security checks to their guests" for fear of losing business in their operations. They have trusted on few selected tour agents who pick up their guests from International Airport and take them directly to hotel premises. An observation made by the researcher confirms this important security lapse that hotel staffs rarely screen the guests" luggage to establish its authenticity despite stringent security policy whereby all guest are supposed to be screened without discrimination.

5. Discussions, Conclusions, Implications, and Recommendations

5.1 Discussions

A correlation was tested between security management systems and high guest turnover in the hotel industry. The result was that there was a positive correlation between security investment and the guest turnover (occupancy rate) in both regions. This indicates that the cost of investment among the hotels has other indicative factors which dictate the amount to be invested on security matters.

The study revealed that city hotels are more vulnerable to security threats than hotels located at the Airports and resort areas. On hotel ownership, majority of hotels are owned by foreigners which has revenue leakage outside the country. Thus, their security checks and structure are more organized than security in individual ownership hotels. The study found that age of the hotels does not affect the security levels; other factors such security guest procedures and personnel training showed a weaker evidence to infer that age of the establishment affects the levels of security in the hotel working.

To safeguard tourists from harm and army security threats some chain affiliated hotels have responded by offering them of all-inclusive resorts with year full complement of onsite, However, this has also triggered a new wave of resentment from other stakeholders who feel shut out and resort to other illegal activities such as drug trafficking and prostitution to begin a living. On the distribution of security

measurement, the hotel industry, most hotels in Nairobi were found to have security surveillance cameras than the coastal hotels.

The security managers revealed that they do have pro-active strategies in place to prevent any incident from occurring. Most hotels are beefing up with more security personnel both in plain clothes and uniformed. Majority of the hotel managers interviewed indicated that they enforce more security concerns on their weak points, enabling them to increase the security staff or apply more security screening methods.

5.2 Conclusion

The hotels in Nairobi were less vulnerable than hotels in Mombasa. This implied that investors have invested more in high- end establishments in Nairobi than Mombasa due to favourable conditions such as safety and security of guests; The age of the hotel did not affect security levels of the establishments; other factors might be the cause of deteriorating security factors. The implication is that security is a multiplicity of factors interaction and not a single consideration.

The hotels that are safe and secure are those less than 7 years old and worst security rating are those over 20 years old. However, older hotels would require higher costs of operation and maintenance; the quality, security, age and occupancy rate of hotel are potential factors affecting the costs for operating and maintaining the hotel premises. It is worth noting that most of the sampled hotels were 20 years and above.

The outsourcing of security services has its own challenges to both the hotel staff as well as guests. This could be attributing to the impression that most of the hotels employ unprofessional security personnel who have no formal security details required in the hotel industry.

The hotels in Mombasa region indicated that 100 % of hotels perform their security training on a weekly basis. There was significant difference in training on security issues across the two regions with Mombasa doing it more frequent compared to Nairobi (p value <0.001).

The security managers revealed that they do have pro-active strategies in place to prevent an incident from occurring. However, with the glaring of terrorism acts, stringent measures are being instituted to ensure that such cases are avoided. These include the beefing up the number of security personnel in plain clothes and uniformed armed.

Nairobi and Mombasa regions had a positive correlation between occupancy and security investment. This indicated that as the hotel invested more in security devices, there was an increase in the occupancy rate. However, this was not statistically significant;

Within the star hotels for the two regions, there was an inverse correlation in some of the stars. For instance, higher stars (4&5) had a negative relationship of -0.87 and 0.05 respectively. The higher the occupancy rate the lower the investment of security in the hotel industry;

None of the factors significantly explained the Security Investment among the hotels (p value > 0.05). The three factors (occupancy, star rating and region) explained only 17% of the total security investment in the hotels, leaving 83% of the investment unaccounted for. This indicates that investment in security among the hotels is explained by factors other than occupancy, star rating or region.

Hotel staff needs to have specialized training on security matters in high levels to be able to respond to different threats in the hotel industry.

The overall national security in the country is insufficient particularly in the hotel industry. Hotels therefore engage private security firms however; this increases the cost of business in the hotel industry.

5.3 Implications

- This research established that majority of the hotels do not screen their workers and guests as they rely mostly on recruitment agency. The implication to this laxity is that managers are paying too much attention to personal references, absenteeism and academic qualifications and too little to criminal records and court judgment checks.
- There was no significant association between the training on security procedures and the measures applied by the hotels. This implies that there was a gap between the training and the application of the security procedures in the hotels. Therefore, the null hypothesis that states security training does not significantly influence security measures taken in the hotel industry was acceptable.
- The hotels in Mombasa had the highest concerns of prostitution in their premises which compromises security in the hotel industry. Due to the weak regulatory framework on prostitution in the Kenyan's constitution, coastal beach hotels experiences highest number of sex workers due to tourism especially during the high season when there are high disposable incomes from tourists. This implies that Mombasa is more vulnerable to security threats than Nairobi.
- In self-evaluation of the hotels, most of the managers indicated that their hotels were above average in terms of security measures in place. This appeared to suggest that most hotels were not willing to portray any security weaknesses in their premises. The majority of the hotels were employing the services of security firms to beef up its internal security arrangements;
- There was a gap between the training and the application of the security procedures in the hotels. The hotel managers interviewed on this issue revealed that they do not subject their guests' to detailed security checks for fear of losing business in their operations;

- There are few hotels that have attempted to use biometrics to improve room security, improve customer convenience, control access to restricted areas, and limit access to customer data
- The frequency of security training on personnel is more pronounced in Mombasa region than Nairobi owing to its location and extensive coastline which makes the region porous. The implication of this finding is that hotels in Mombasa region are constantly perceived to be under security threat than hotels in Nairobi

5.4 Limitations and Future Research

- Despite the majority of hotels being twenty years and above, there is need for the hotel industry to continuously refurbish them not only to make them aesthetic but also to comply with internationally security standards.
- There is a fundamental gap between hotel businesses and the Kenyan police security, therefore the training should commensurate to the needs of the hotel industry.
- There is need to capacitate the security guards to be able to expand their scope of security within the hotel industry.
- There is need for the hotels to continually develop security strategies to meet the evolution of security challenges in the hotel industry.
- There is need to legalize special security agencies within the hotel industry to deal with terrorism acts and all arms of the security needs to work in sync.
- There is need for a uniform platform of security procedures in the hotel industry to be consistent with stipulated internationally security standards.
- The government should put more security measures at the coastal region as the hotels feel vulnerable. It's the mandate of the government to provide adequate security to the public.
- There is need for the hotel industry to comply with the use of biometrics in all hotels to improve security as a long-term solution to some terrorists who may check into hotel rooms as guest.
- This study used data on the hotel's performance in 3-5-star hotels. A similar study needs to be carried out to establish the security standards on hotels performance in other towns and recommend accurate intervention measures.
- A similar study also needs to be carried out on other accommodation sectors that include lodges and tented camps located in National parks and game reserves.
- A study needs to be carried out on the safety of guests in the hotel industry.
- A study needs to be done on the recruitment and selection of security personnel in the hotel industry.
- The study used descriptive cross-sectional survey designs in sampling and data collections. The research was interested with the status quo of hotel security. Therefore, another study needs to be conducted using longitudinal design to establish the security dynamism over a period of time.

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Service Climate and Job Commitment among Employee of Quick-Service Restaurants in Nairobi City, Kenya

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Abstract

The purpose of the study was to investigate the influence of service climate on employee job commitment in quick-service restaurants in Nairobi city of Kenya. Specifically, the study sought to determine the influence of customer orientation and work facilitations as predictors of employees' job commitment in quick-service restaurants. The study targeted all quick-service restaurants in Nairobi city. A descriptive cross-sectional survey research study of 384 employees through self-administered questionnaires was conducted. The convenience sampling technique was used to select participants for data collection. All variables in the study were measured using adapted and modified constructs from previous researches. Both descriptive and inferential statistics were used to analyse collected data in line with the study objectives. For descriptive statistics, means and standard deviations were used to describe the patterns exhibited by the study constructs. With regard to inferential statistics, simple linear regression analysis was used to establish the influence of each independent variable on the study dependent variable (employee job commitment). The study results revealed that customer orientation and work facilitation were significant positive predictors of employee job commitment and both could account for 51.5% of the variation in the job commitment of employees. The study recommends restaurant managers to develop strategies that would address; a) provision of clear ideas about customer needs, b) development of products and services that would clearly address the needs of customers, c) informing staff about external customer evaluations, d) responding to customer suggestions in a prompt manner. Also, the study recommends restaurant managers to focus on developing ways of supporting employees adequately, recognizing employees for work well-done and provide them with work manuals.

Keywords: Quick-service restaurants, employee job commitment, service climate, customer orientation, work facilitation

1. Introduction

Employees are one of the key elements for the success of any hospitality business, and even the core drivers of gaining a competitive advantage in the hotel sector (He, Li, & Lai, 2011). Having the right employees can have a great effect on the success of any firm (Karatepe *et al.*, 2009). In order to ensure that employees work to the best, organizations must create and maintain a climate for encouraging employees to effectively deliver quality service. Thus, creating an enabling environment is the first priority for most hotels. It is worth noting that employees' satisfaction or dissatisfaction with the organization may also cause customer satisfaction or dissatisfaction with the services provided (DeFranco & Schmidgall, 2000).



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Employee commitment is one of the key components for the success of any firm, yet many organizations have registered increased employee turn-over and dissatisfaction by external customers. In particular, the hotel industry has been characterized by a high turnover rate (Carbery, Garavan, O'Brien, & McDonnell, 2003; Choi, 2006; Osman & Ronate, 2012). Organization commitment is considered to be an important component in understanding employees' behaviour and has proved to be a more stable predictor of turnover intention and job satisfaction (Mowday, Steers, & Porter, 1979). Previous research in the service industry indicates that service climate has a positive influence on quality that is perceived by customers and employees (Liao & Chuang, 2004), and on customer satisfaction (Davidson *et al.*, 2002). However, most researchers have examined the direct relationship between service climate and customer satisfaction in hotels and restaurants. Even, many studies are mainly located in western developed nations. Thus, the more empirical evidence is required to analyse the importance of service climate in a non-western context. Thus, the purpose of the study is to examine the influence of service climate among employees of quick-service restaurants in Nairobi central business district (CBD). Specifically, this study sought to examine the influence of customer orientation and work facilitation on job commitment of subordinate employees working in quick-service restaurants. Figure I illustrate the study conceptual framework showing the interrelationships among the study variables.

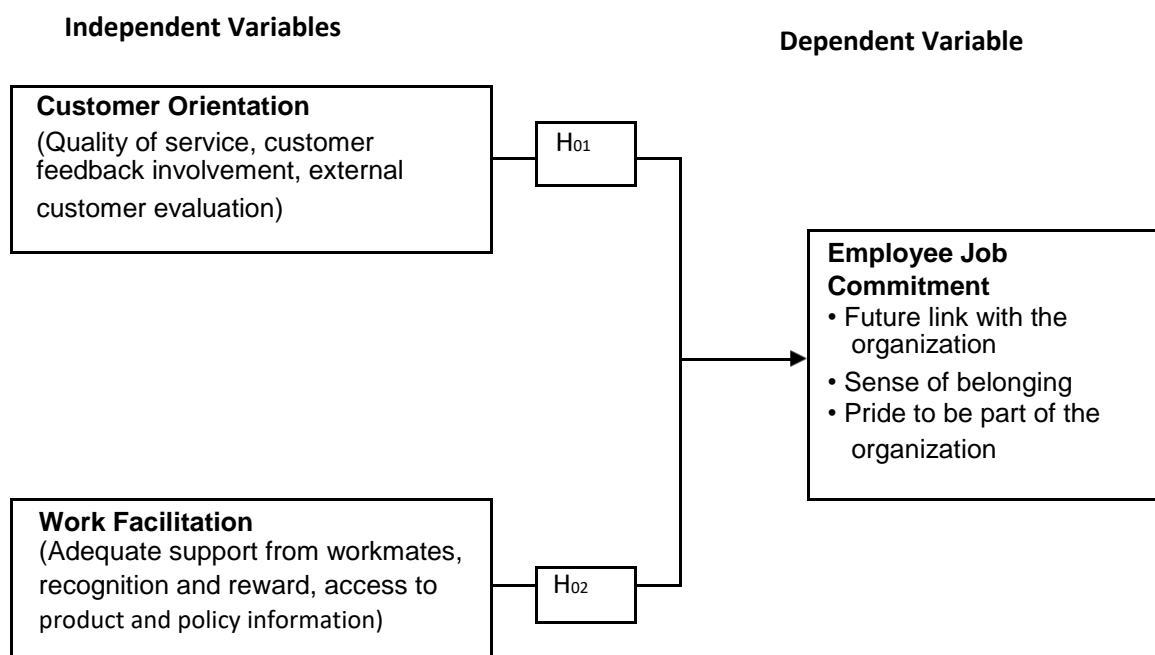


Figure 1. Conceptual framework for determining the influence of service climate on employee work commitment

2. Abridged Literature Review

2.1 Service Climate

Service climate may be referred to as how employees perceive the organizational policies, practices, and procedures, which create an environment that expects and rewards customer service. Schneider *et al.* (1998) argued that a climate for service relies on the cardinal support given by organization through resources, training, managerial practices, and assistance required to perform effectively. Therefore, service climate may be seen as an individual, rather than an organizational characteristic, measured in terms of perceptions that are psychologically meaningful and important to the individual, rather than in terms of material organizational features. Hence, service climate is anchored on the perceptions of individual employees, which affects the individuals' behavior (Bagozzi, 1992).

Schneider and Bowen (1993) in their study investigating the service organization: human resources management is crucial argued that service climate may include some practices which encourage delivery of high-quality service and creating supportive conditions, such as efforts toward removing barriers to work and other human resource policies. Additionally, Shainesh and Sharma (2003) study examining linkages between service climate and service quality focusing on Indian banks provided other aspects of service climate, including customer orientation, managerial practices, and customer feedback. One aspect of customer orientation is customer feedback. The present study is composed of two major components of service climate: *customer orientation* and *work facilitation*.

Customer orientation refers to placing the needs of the customers at the far front of organization operations, gathering and using information about customers, and creating systems and strategies to act on the information collected, which includes the component of customer feedback suggested by Shainesh and Sharma (2003). Work facilitation means providing good and conducive working environment that encourages and supports delivery of quality services to customers. This may include developing sound human resource policies, giving employees direction, and encouraging collaboration amongst co-workers.

2.2 Employee Job Commitment

Employee job commitment is manifested in the expansive field of organizational commitment – an area that has attracted scholars from varied perspectives (Macedo *et al.*, 2016). Organizational commitment is considered as the fundamental organizational issue that is faced by managers and supervisors (Reade & Lee, 2012). By definition, organizational commitment is the degree to which employees are willing to put their energy and feel pride in being part and parcel of the organization (Mowday *et al.*, 1979). According to Thomsen *et al.* (2016), three forms of organizational commitment exist, that is an affective commitment, normative

commitment, and continuance commitment. Following Mowday *et al.*'s (1979) conceptualization, organization commitment in the present study is considered as affective commitment that consists of employees' personal attachment to, involvement in, and identification with their organization. Moreover, affective commitment is considered to be an emotional attachment to the organization. In literature, it is the most predominant approach to organizational commitment. Continuance commitment is associated with the perceived cost of leaving a job, whereas normative commitment is defined as a belief about one's responsibility to the organization (Allen & Meyer, 1990).

Affective commitment has been linked with positive employee behaviour, such as being less likely to quit their job and encouraging them to exert extra efforts into their allocated job for the betterment of the whole (Powell & Meyer, 2004). Thus, it is of paramount importance to the hospitality industry. Affective commitment is positively related to a whole host of work-related outcomes which are of benefit to the organizations. Riketta (2002) pointed out that affective commitment is negatively associated with employee turnover and positively associated with employee job performance. This means that employees with high levels of affective commitment are so committed to their organizations and always want to stay with the organizations as a result of positive feelings.

2.3 The Relationship Between Service Climate and Employee Commitment

Climate determines how individual employees behave, as it influences how they think and feels about their environment (Salancik & Pfeffer, 1978). Particularly, employees depend on prompts from their immediate work environment to interpret the meaning of happenings, develop appropriate attitudes and behaviours, and the consequences (Salancik & Pfeffer, 1978). In a service climate, employees understand that superior service is anticipated, preferred and rewarded. This means that they are more likely to offer good service to customers (Liao & Chuang, 2004). One of the components of service climate is customer orientation, which could lead into a sense of belonging and pride to an organization where every employee work toward the accomplishment of one goal.

2.4 Theoretical Model

The study is anchored on Social Exchange Theory (SET). This theory goes back to Thibaut and Kelly (1959) and Kelly and Thibaut (1978). SET is a model for interpreting society as a series of interaction between people that are based estimates of rewards and punishments that are evaluated using a cost-benefit analysis model. Key to SET is the idea that an interaction that provokes approval from another person is more likely to be repeated than that which provokes disapproval. From this view, then it is possible to predict whether a particular interaction will be repeated by calculating the degree of reward (approval) or

punishment (disapproval) resulting from the interaction. According to Cropanzano and Mitchell (2005), SET suggests that when two parties fulfil the rules of exchange, a social relationship built on mutual trust and commitment will be created. It then goes that employees who strongly identify with the organization of employment will perform their allocated duties better than those who merely work because of contractual obligations (Malhotra *et al.*, 2013). According to SET, employees will exhibit a greater affective commitment to the organization when it meets their expectations regarding the fulfilment of their individual needs (Haar & Spell, 2004). On the tenets of SET, favourable service climate will result in increased affective commitment thus resulting in better performance and delivery of quality service to customers.

3. Research Methodology

3.1 Research Design, Sample and Data Collection

The study utilized a descriptive cross-section survey design and employed quantitative approaches in to address the study objectives. The study was conducted in Nairobi CBD and focused on 23 licensed quick-service restaurants. The researchers distributed 384 self-administered questionnaires to employees working in quick-service restaurants. The questionnaires were accompanied by a cover letter which explained the purpose of the study. The total number of the questionnaires received was 364, but 24 were eliminated because of missing data, leaving 340 useable ones.

3.2 Validation of Measures

The reliability of the scales used in this study was measured using Cronbach's α for internal consistency of items. In this study, all Cronbach's α ranged from 0.712 to 0.831 (see Table 1). These values were above the cut-off of 0.70 indicating the internal consistency of items in the scales (Bagozzi & Yi, 1998; Hair, Black, Anderson, & Tatham, 2006). In addition, the study constructs were adopted from previous studies and thus could be considered to have content validity.

Table 1. Reliability statistics

Variables	Items	Cronbach's α
Customer orientation	6	0.712
Work facilitation	4	0.895
Employee commitment	5	0.831

3.3 Data analysis

The study used both descriptive and inferential statistics to analyse the collected data. descriptive statistics comprised means and standard deviations. To test the study hypotheses, Pearson correlation analysis and linear regression analysis were used.

4. Results

4.1 Sample profiles

Data for this study were collected from employees in quick-service restaurants using a self-administered questionnaire. The sample participants included slightly more females (52.3 %) than males (47.7 %). The mean age of the employees was 28.4 years (SD = 9.0). participants in this study had been working at their current organization for an average of 1.5years (SD = 1.52).

4.2 Descriptive statistics

4.2.1 Customer orientation

Table 2 presents the means and standard deviations of customer orientation construct. as indicated, the means ranged from 2.85 to 4.16 indicating that participants agreed with some items and disagreed with others. Participants rated the highest 'the restaurant has a clear idea about internal customers and their needs (M = 4.16, SD = 0.82). However, results reviewed that participants disagreed with 'the restaurant always respond to the customers' feedback and suggestions quickly (M = 2.85, SD = 0.81).

Table 2. Customer Orientation

Statements	Mean	SD
The restaurant has clear ideas about internal customers and their needs	4.16	0.82
Quality service is emphasized as the best way to keep customers	4.01	0.71
The restaurant defines its products and services from customers perspectives	4.36	0.75
The restaurant does a good job of keeping customers informed of changes, which affect them	3.78	1.02
We are informed about external customer evaluations of the quality of service delivered	3.85	0.99
The restaurant always responds to the customers' feedback and suggestions quickly	2.85	0.81

Notes: All items measured on a scale of 1 to 5 (1=SD to 5=SA)

4.2.2 Work facilitation

Table 3 presents the results of the work facilitation construct. As shown, employees agreed with the items of this construct. specifically, they indicated that they received adequate support from workmates to do their job well (M = 4.12, SD = 0.85).

Table 3. Work facilitation

Statements	Mean	SD
I receive adequate support from workmates to do my job well	4.12	0.85
If I perform the job well, I receive appropriate recognition and reward	3.15	1.15
I have the manuals I need to provide services	4.05	0.76
I have access to the product and policy information when I need to do my work in my business	4.11	0.99

Notes: All items measured on a scale of 1 to 5 (1=SD to 5=SA)

4.2.3 Employee job commitment

Table 4 presents the means and standard deviations of employee job commitment. Results indicated that employees in this study felt a strong sense of belonging to their organization (M = 2.45, SD = 0.98), felt part of the family (M = 2.71, SD = 0.85) and were emotionally attached to their organizations (M = 2.96, SD = 0.82). moreover, they would be happy to spend the rest of their career with their organizations (M = 4.20, SD = 0.91).

Table 4. Employee Commitment

Statements	Mean	SD
I do not feel a strong sense of belonging to my organization	2.45	0.98
I do not feel like 'part of the family' at this organization	2.71	0.85
I would be happy to spend the rest of my career with this organization	4.20	0.91
I do not feel 'emotionally attached' to this organization	2.96	0.82
This organization has a great deal of personal meaning to me	4.01	0.89

Notes: All items measured on a scale of 1 to 5 (1=SD to 5=SA)

4.3 Hypotheses Testing

To test study hypotheses, multiple linear regression analysis was performed at 95% confidence level. Both customer orientation and work facilitation were simultaneously entered in the regression model and results are presented in Table 5.

Table 5. Regression Coefficients

Model		Unstandardized		Standardized	t	Sig.
		Coefficients		Coefficients		
		B	Std. Error	Beta		
1	(Constant)	1.223	0.417		2.142	.000
	Customer orientation (CO)	0.272	0.092	0.212	1.760	.000
	Work facilitation (WF)	0.372	0.072	0.253	1.861	.000

Notes: Outcome Variable: Employee Job Commitment (EJC); ANOVA F -test (2, 337) = 1.381, p -value < 0.001, $R = 0.718$; Coefficient of determination (R^2) = 0.515 (51.5%)

Unstandardized regression equation:

$$EJC = 1.223 + 0.272*CO + 0.372*WF$$

As indicated, the regression model constant ($B = 1.223$) was statistically significant ($t = 2.412$, $p < 0.001$) indicating that the regression model with customer orientation and work facilitation could be used to predict changes in job commitment among employees working in quick-service restaurants. The regression model coefficient of determination ($R^2 = 0.515$) demonstrated that 51.5 % of the variation in job commitment could be accounted for by the regression model with customer orientation and work facilitation. In addition, results revealed that both customer orientation ($B = 0.272$, $t = 1.760$, $p < 0.001$) and work facilitation ($B = 0.372$, $t = 1.861$, $p < 0.001$) were both statistically significant predictors of job commitment. These results corroborated well with Malhotra *et al.* (2013) who argued that employees who strongly identify with the organization of employment will perform their allocated duties that those who merely work because of contractual obligations. Therefore, H_{01} and H_{02} were not supported. However, work facilitation accounted for more weight on job commitment when compared with customer orientation. The overall regression equation was:

$$EJC = 1.223 + 0.272*CO + 0.372*WF$$

4.4 Managerial Implications

Analysis has shown that customer orientation is a significant positive contributor to

employee commitment in quick-service restaurants. These results could help managers of quick-service restaurants to develop strategies that would address the following areas: a) provision of clear ideas about customer needs, b) development of products and services that would clearly address the needs of customers, c) informing staff about external customer evaluations, and d) responding to customer suggestions in a prompt manner. In addition, results have indicated that work facilitation has a significant positive influence on job commitment among employees in quick service restaurants. To this end, managers and practitioners of quick-service restaurants can use the results to develop ways of supporting employees adequately, develop strategies for recognizing employees for work well-done, and provide work manuals to act as employees point of references.

4.5 Limitations and Recommendation for Further Research

This study has several limitations that are avenues for further research. First, the survey was conducted in quick-service restaurants only thus negatively influencing the generalization of the study results. There is a need for a similar research in future that would incorporate more quick-service restaurants and in different geographical locations of Kenya to ensure population representativeness. Moreover, a similar study can also be replicated using employees of other hospitality establishments. Second, this study focused on the direct influence of work facilitation and customer orientation. While the findings have shed light on the influence of these two predictors on job commitment of employees, future research needs to consider incorporating more predictors that define the entire service climate of quick-service restaurants. Moreover, such a study could include the influence of mediators and moderators such as job satisfaction and demographics (age and work experience) respectively. Future research needs to use a longitudinal research design in order to establish changes in job commitment of employees as current stud utilized a cross-sectional approach.

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Strategic Quality Planning, Quality Ambience and Firm Performance: A Research Agenda

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Abstract

Quality management is a recent development in management whose contribution has been widely acknowledged not only in practice but also in academia. Strategic thinkers in industry and academia have embraced it and suggested a number of perspectives in integrating it in work processes. Management of quality is essential in promoting quality performance in organizations. It addresses Strategic quality planning which is achieved through quality vision, quality mission, quality policies and quality strategies. The organization is responsible for creation of an enabling environment for quality systems and structures that enhances quality performance. This area has been studied and documented with few studies addressing the context of the internal organizational environment but not their legitimacy on systems of norms, values and beliefs towards quality. A review of the extant theoretical and empirical literature on strategic quality planning and quality ambience in their contribution to firm performance is presented. A review of relevant theories was done, constructs and their operational indicators identified and compared against extant empirical work and gaps identified. Finally, the paper proposes a theoretical model for advancing knowledge in this area accompanied by implications for future research.

Keywords: Strategic quality planning; quality ambience; organizational characteristics; Firm performance

1. Introduction

The seed that would better give rise to the birth of the quality management and later management as known today are traceable to the principles of scientific management which were in practice in United States of America in 1920s. The scientific management school as proposed by Fredrick Taylor made several propositions among which he emphasized on separation of planning and implementation in most of the businesses. The principles of STQM are followed today by organizations that seek for accreditation in quality awards and in ISO 9000 series. The strategies used by organizations to maintain quality management include strategic quality planning, strategic quality leadership, involvement of all stakeholders and fulfilment of the needs of target customers (Mohammed, Esmaeil 2013). STQM is currently widely used in organizations being an advancement of traditional management with the selection of strategies that impact on the firm quality performance.

Strategic planning basically defines the route between the current position of a firm and the point where it wants to achieve. It focuses on results and outputs by evaluating and checking its services and products through a systematic method. Juran (1988), posits that planning should start by analysing the firm's vision, mission deploying the strategy plan and the expected results. This context brings the definition of strategic planning into four conditions such as the present condition, the projected condition to achieve, the methods and tools that helps achieve that condition, and finally the methods and tools that help monitoring and reviewing its success. In traditional planning, the planners focus on the components of the organisation while in strategic quality planning, the planners attempt to describe the dynamics of the organization (Carmona and Burgess, 2001; Albrechts, 2001; Strelitz et al., 1996).

Performance has been conceptualized differently by scholars. Daft (2012) defined performance as the evaluation of achievement of the firm's target. Quality performance in firms reinforces management towards innovation and quality strategies to remain ahead in competition (Herly & Sisnuhadi, 2011). Firms should embrace the emerging appropriate technologies to improve their operations and advance improvement in their quality performance. Financial performance may not be a good measure of quality because low quality may have good financial performance in goods and services.

1.1 Statement of the Problem

Quality management concepts are being recognized for adoption in driving the strategic agenda in organizations based on the need to remain responsive to changing environments that affect market needs. Some scholars have recommended integration of TQM concepts with strategic management so as to implement TQM concepts in organizations under the broad theme of strategic total quality management (Feruccio B. & Annibal A. N 2009). While the suggestions have been welcomed across the industry and academia, there seems to be a challenge emanating from the fact that these two disciplines of management have evolved in a parallel manner with each proposing useful ideas that stand to benefit organizations.

An examination of some of the previous attempts to study the contribution of Strategic quality planning to organizations under the auspices of TQM indicates that there are no suitable models that have been used. The focus of this study therefore is to determine the effect of SQP and quality ambience on Firm Performance. The study is guided by the following objectives; first to review the extant theoretical literature on SQP, quality ambience and firms' performance. Secondly, the study identifies the emerging theoretical and empirical gaps that form the basis for future research and finally proposes a theoretical model for responding to the identified gaps. The paper adds value to management in organizations by choosing the appropriate quality plans which impact on performance. It guides management in

creating an internal environment that supports quality among the employees. It anchors organizational policies on quality management and quality performance. The paper proposes a theoretical model that is considered relevant for use in guiding future research in the discipline of strategic management.



2.0 Conceptual Review of the Literature

This section reviews various concepts used in SQP, quality ambience, organizational characteristics and firm performance. It shows how different concepts have been operationalized in the study and their indicators. The concepts used in SQP are quality mission, quality vision, quality values and quality policy. Quality ambience is conceptualized using indicators such as teamwork, process orientation, customer orientation and empowerment. Organizational characteristics relate to organizational leadership, operational technology, culture and organizational structure. Firm performance is measured in terms of financial and quality performance. Financial performance is measured by market share and profits growth. Quality performance is measured in terms of product quality and relationship quality.

2.1 Strategic Quality Planning

Strategic quality planning leads to quality management and quality practices. This is achieved through identifying customer needs, customer positioning, predicting the future, analyzing gaps within the organization, devising strategies to close the gaps, aligning the strategies and implementation of the strategies (Juran, 1992). The indicators of SQP are quality mission, quality vision, quality values and quality policies. SQP is the current development that has evolved from traditional planning with inclusion of strategies in management.

Strategic quality management is a product of strategic quality planning. Several researchers have tried to conceptualize strategic quality planning in different views. Garvin (1988) asserts that strategic quality plans are the glue holding together an organisation's quality improvement efforts. He was among the first to recognize the importance of the strategic planning process in formulating quality improvement strategies. Malcolm Baldrige (1992) opined strategic quality planning as setting goals that are concrete as well as highly focused and that which address training, employee development, supplier development, technology evolution and other relevant factors that bear on quality.

2.2 Quality Ambience

Quality ambience is a conducive environment that promotes quality in an organization by addressing customer wants and needs. It is a type of cultural state obtained in an organization that becomes a guarantee towards attaining the desired product quality and organization quality goals. It is explained by an organization's teamwork, process orientation, customer orientation and employee empowerment. Suganthi and Samuel (2004) posits that firms which implement quality systems remain successful.

Quality ambience is a culture where employees focus on quality procedures and systems in the organization providing direction and motivation. According to Armstrong (2006) process orientation involves systematic and planned instruction which improves learning and quality performance. Mwangi (2011) asserts that

process orientation brings personal development and motivation to employees to fulfil their potential. Teamwork is an important factor in an organization which leads to goals accomplishment (Jones, 2007). Mulika (2010) describes teamwork as a precise organizational measure towards achievement of performance. Teamwork enables employees to pursue quality measures like reduction in errors and waste. Customer orientation involves developing action plans that give orientation to customers about the products available in the organisation.

2.3 Organisational Characteristics

Organisational characteristics are the physical and behavioural factors in an organization that effectively contribute to firm performance. These factors include firm age, firm size, culture, operational technology and organizational structure. Wamai and Kilika (2016) suggested that firm size is suggestive of the pool of resources that a firm has in possession. It is also significantly linked to capabilities and resources that are complementary. These factors cause significant differences in performance even in firms which are in the same product line. It is evident that larger firms have a large resource base and are linked to better level of performance than small firms. Verma and Miret P. (2012), suggested that firm performance is dependent on firm size which suggests modern technology and quality resources available in the firm.

Kneiding and Zahid (2011), states that age related factors are based on that, an old firm may have more customers than a young one and these drives economies of scale. Kristiansen, Furuholt, & Wahid (2003) opined that the length of time a firm has been in operation is significantly linked to quality improvement. Organisational structure is a responsibility that is vested on top management. It calls for a clearly aligned structure that is capable of being tracked by auditors and quality checks.

Dauda and Akingbade (2011) posit that investment of an organization in technology results in employees' motivation and morale towards innovations. Today's customers require quick and convenient services which can be achieved by adopting and implementing modern technology at every level of production. For an organization to be competitive and remain in business, it has to adopt new and appropriate technology in its operations (Khajeh, 2011).

2.4 Firm Performance

Reed, Lemak and Mero (2000), characterizes firm performance as the firm's ability to create acceptable outcomes and actions. The overall performance depends on the strategic fit within the firm. Firm performance is measured by how efficient a firm is in converting strategic assets into quality performance as explained in the Resource-Based Theory. Performance of a firm can best be measured using the balanced scorecard which is a management tool that uses financial and non-financial measures according to Kaplan and Norton (1991). SQP leads to better firm performance when evaluated in terms of customer satisfaction, operational

performance and financial performance (Tummala, 1994). Financial performance is measured by market growth and return on investment.

Quality performance is a non-financial measure which emphasizes on quality of goods and services mostly explained by product quality and relationship quality. In the manufacturing sector, most firms measure performance in terms of profitability, industry output, return on investment and labour productivity (Anthony Kryger, 2014). In the service sector, performance is rated in terms of customer repeat business, revenue generation and customer reference numbers (Lisa Mcquerrey, 2017).

2.5 Conceptual Issues

From the literature reviewed, it is clear that strategic quality planning has been operationalized in differing dimensions by different researchers. Juran (1992), claimed that it is a systematic approach of setting and achieving quality objectives in the organization. Deming (1986) viewed it as the ability to consistently meet the requirements of the customer. Bon and Mustafa, (2013) defined it as a set of practices that aim at achieving quality standards in management. These positive contributions by all the authors are aimed at achieving quality performance. Firm performance is operationalised differently by different authors in terms of achieving quality products, profitability, cost reduction, customer satisfaction and employee satisfaction. With regard to the literature so far reviewed, it is clear that the authors had much contribution on the description of strategic quality planning as the independent variable, quality ambience as mediating and firm performance as depended variable.

Scholars in this area are geared towards gaining an understanding of what the phenomenon entails. They provided not only the definition of the concepts but also the operationalization of the concepts in which they are applied in strategic management. The literature provides indicators suitable to the constructs in operationalization. There is consensus on the constructs reviewed though they differ in their operationalization. From the review of literature, it is observable that strategic quality planning aims at satisfying the customer through efficiency and effectiveness. Various authors have not attempted to provide theoretical underpinning for their descriptions and thus scholars in this study should attempt to do so. It is important for new knowledge to be compared against theoretical models to provide direction on certain disciplines.

2.6 Review of Relevant Theories

The study of strategic quality planning, quality ambience and firm performance is supported by various theories. The theories focus on strategic quality planning as a practice by firms which contribute to better firm performance. For purposes of advancing the concepts of strategic quality planning, quality ambience and firm

performance, the following theories have been adopted; Resource based theory, Dynamic capabilities theory and McCall quality model.

2.6.1 Resource Based Theory

The context and processes by which resources are selected have influence on a firm performance. A resource-based view of the firm explains its sustainable competitive advantage. The postulates of the theory are that organizations should strive for internal resources that are valuable, inimitable and non-substitutable to enable them sustain quality performance, (Penrose, 1959). Wernerfelt (1984) asserts that quality performance is as a result of possessing and deploying distinctive resources in the firm. Barney (2007) posits that quality planning and deployment of resources leads to quality performance. Firm's performance depends on specific resources and valuable capabilities within a firm when its culture is geared towards quality.

According to RBV models, an organization is composed of both tangible and intangible resources. Tangible resources are physical which comprise of raw materials and equipment. Intangible resources include organizational values, brand names and product quality leads to quality performance. Firm performance is a product of SQP when the strategic organization resources are acquired through quality planning. The theory provides strategies in planning which managers can adopt to enhance their firm performance.

2.6.2 Dynamic Capabilities Theory

Dynamic capabilities theory was introduced by David Teece, Gary Pisano, and Amy Shuen (1990). It is concerned with strategy development through strategic planning to maintain capabilities that survive the competition among the firms. According to Ludwig, Gregory; Pemberton, Jon (2011), emergence of a new technology forces managers to adapt to their own ways which benefit from the available resources at the same time planning for future changes. With Strategic Quality Planning a firm is able integrate, build, and reconfigure internal and external competencies to address rapidly changing environments, (Teece et al., 1997). Dynamic capabilities attempt to bridge the gaps between firm resources and the changing environment. Dynamic capabilities emphasize on resource development and renewal while RBV emphasize on choice selection of appropriate resources.

Emphasis has been on managerial competences which are a key element for seizing new opportunities and formulating strategies that impact on a firms' performance (Teece 2007). These managerial competences have developed in to dynamic managerial capabilities hence designing and implementing new business models, (Helfat and Martin, 2015). Dynamic capabilities contribute positively to firm performance by creating changes in the market, (Eisenhardt and Martin, 2000). According to Chmielewski and Paladino (2007), they improve the effectiveness, speed and organisational efficiency towards responses of turbulence in the environment. According to Teece (2007), companies need to have the non-imitable

capacity to shape, re-shape and configure resources to respond to changing technologies and markets.

2.6.3 McCall Quality Model

McCall, Richards and Walters (1977) introduced the McCall's quality model which is a software quality model also known as general electric's model. Its aim was to aid the process of system development. McCall *et al.* (1977) were interested in connecting developers and users by pointing out quality factors on the views of the consumers and the priorities of the developers. The model views quality of a plan in different perspectives which include quality factors reflected in several metrics. The three major perspectives in quality are plan revision, plan operations and plan transition.

Plan operation deals with correctness in fulfilling specifications, reliability, efficiency, integrity and usability. Plan transition entails adaptability of the plan to changing environments. The model consists of quality factors which describe the external view of the planned products. Kitchenham (2006) claims that this model provides a picture of quality planning by fixing errors and adapting plans to the changing environment. Deepshikha (2010) argued that quality models are vital because they contribute to improvement in performance which is measured in terms of customer satisfaction and decreased costs. This model is useful to manufacturers in guiding them to focus on consumers' needs so as to produce products that are desirable and match their changing needs.

2.6.4 Theoretical Issues

The conceptual review and basic description highlighted the relationship between strategic quality planning, quality ambience and firm performance. The study however found that descriptions given have not attempted to provide theoretical underpinning that this study can be grounded. The various constructs of this study therefore require wide theoretical perspective. In view of the nature of construct they bring about, the study considered the following theories; Resource based theory, Dynamic capabilities theory and McCall quality model.

The literature reviewed on relevant theories, quality model and relevant constructs reveal that SQP plays a paramount role of driving organisations to realizing their performance. For instance, the Resource-Based Theory by Penrose (1959) went further to show how performance is influenced by the resources the firm possesses. The Dynamic capabilities theory emphasizes on managerial capabilities that are key in strategic planning. These capabilities should enable a firm survive the competition in the market by being able to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments.

Postulates of theories anchored to this study brought out various areas of convergence and divergence on various perspectives on how Strategic quality

planning, quality ambience and firm performance interplay in the field of strategic management. The Dynamic capabilities theory and RBV theory recognizes the role of SQP in influencing organisational characteristics and the impact on firm performance. The theories draw closer by recognizing SQP as a key resource that will determine the performance of a firm. This implies that in most studies the theories are in agreement on the key role of SQP in an organisation. Divergence is noted where the McCall quality model emphasises on creating a strategic fit between producers and consumers which determine the quality performance of a firm.

The theories used in this study have been widely used and a view given on how the theories apply practically in research. For instance, Kriengsak and Thah (2016) anchored their study on quality model to determine the attention of Strategic Quality Management on organisational culture. Siria, Paulo and Pedro studied on the impact of SQP on quality performance which was anchored on the institutional quality practices within the organization, Kiprotich and Cheluget (2017) anchored their study on RBV theory and attention-based theory to determine the effect of Total Quality Management practices on organisational performance in tertiary institutions in Kenya. Some researchers used only financial performance in their studies but looking at the key postulates of the theories there is clear evidence that the theories reviewed in empirical studies can be expounded to enrich the theoretical anchorage of the constructs of the study.

3.0 The Call for A Theoretical Model

The reviewed conceptual, theoretical and empirical literature opened up the linkage between key constructs of this study. Specifically, the study constructs were: Strategic quality planning, quality ambience and firm performance. The study raised three issues as follows; There are notable gaps on how the key constructs have been conceptualized. From theoretical review, it was noted that there was no single theory which addressed the key constructs in this study indicating a gap which needs to be addressed. The empirical studies indicated inconsistency on the relationship between three constructs. Most studies have not tied the three constructs together in one model.

From the stand point of ontology and epistemology, a theoretical framework is necessary to advance knowledge in strategic management. Theoretical framework should support theories in the study, present and define the theory that clarifies whether phenomenon under investigation exists. It explains the relationship between various constructs and how they work (Nachmias & Nachmias, 2004). Theoretical framework allows evaluation of assumptions in a critical way so that the researcher may answer the paradoxes available on the existing knowledge so that the researcher may be in position to describe phenomenon and generalize them to related phenomenon in an intellectual manner.

3.1 The Proposed Theoretical Model/ Framework



The constructs in the study are: Strategic Quality Planning (Antecedent), Quality Ambience (Intermediate), Organisational Characteristics (Contingent) and Firm Performance (Ultimate).



The Proposed Conceptual Model

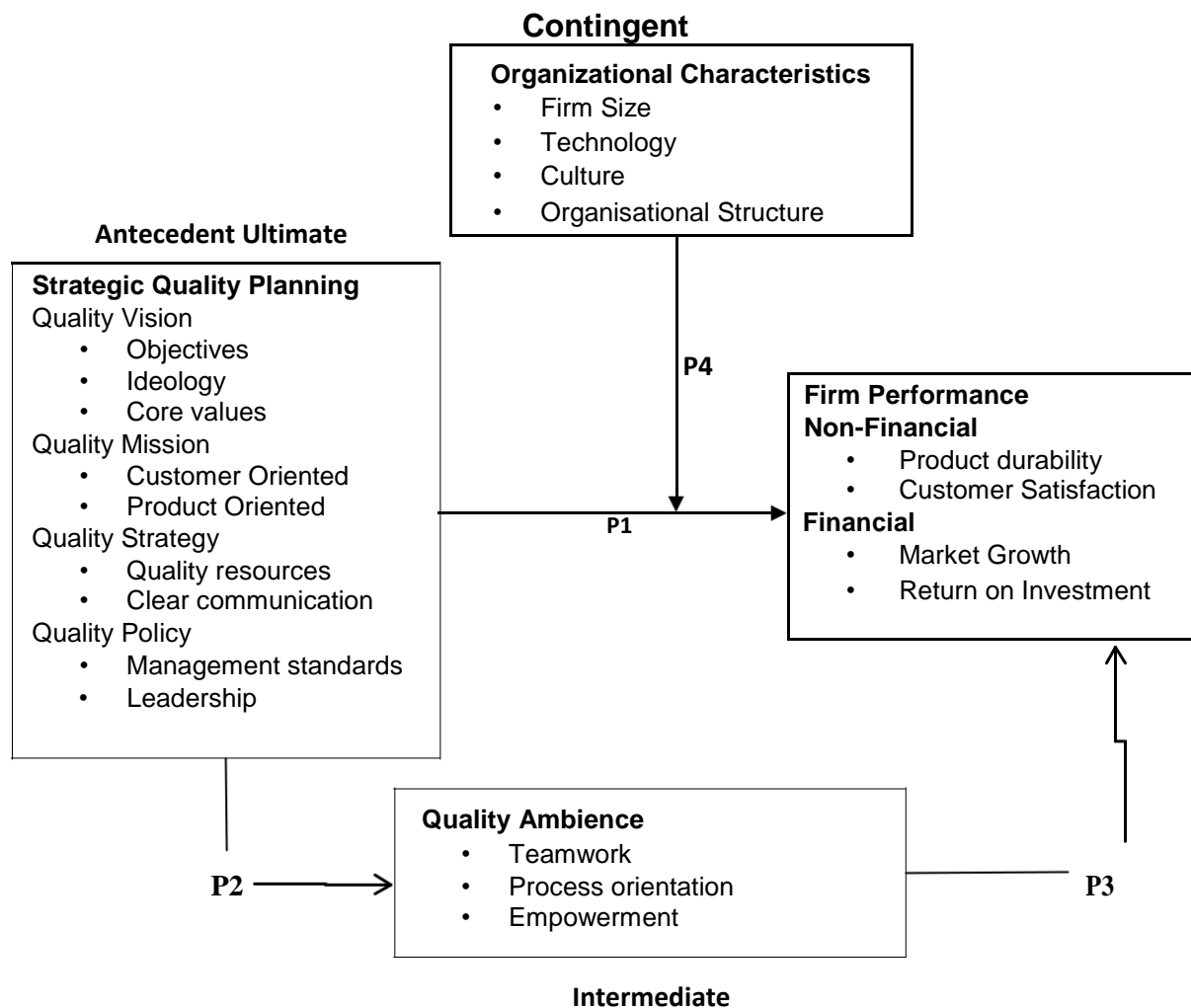


Figure 1: Conceptual framework

3.2 Strategic Quality Planning and Firm Performance

Strategic quality planning as a variable in this study has been argued to have impact on firm performance. It has been operationalized in this study through the following constructs; quality strategy, quality policy, quality vision and quality mission. Quality mission is contributed by interaction between the leaders and their juniors (Northouse, 2010). A strategic leader will choose and employ quality strategies that will impact on the overall performance. Quality policies guide managers on implementation and how goals will be realized. Strategic quality planning employs use of quality strategies and goals that impact on the firms' performance. The quality vision creates a quality culture in the organization which leads to effectiveness, flexibility and competitiveness (Ebert 2005). Strategic quality planning leads to continuous improvement process. Thus, this paper proposes:

Proposition 1: *Strategic quality planning embraced in an organisation will dictate the level of firm performance.*



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3.3 The Role of Quality Ambience

Strategic quality planning contributes to firm performance if there is presence of quality ambience in the organization. This becomes part of the culture where everyone is committed to the norms and values that impact on quality performance. This conducive environment creates teamwork that enhances accomplishment of tasks towards performance in the organization (Mulika, 2010). When quality plans are well implemented and goals accomplished, there is positive impact on firm performance. Process orientation equips the top management and employees with skills, knowledge and the right procedures which guide in selection of the right strategies and processes that enhance firm performance.

Quality ambience contributes to quality performance with employee empowerment on quality practices and innovation. This leads to employee involvement and individual target setting which contributes to improved firm quality performance. To achieve goals, Workforce management is emphasized and recognition of employee quality performance is a prerequisite towards firm quality performance (Kaynak, 2007). An organisation where roles are not well-defined results to a behaviour of laxity which affects firm performance. Thus, this study proposes:

Proposition 2: *Quality Ambience mediates the relationship between Strategic quality planning and firm performance.*

Proposition 3: *The relationship between Strategic Quality Planning and Firm's performance will be moderated by organisational characteristics.*

3.4 The Role of Organisational Characteristics

Organisational characteristic factors moderate the relationship between strategic quality planning and firm performance. Firm size is significantly linked mature operating technology and quality performance. The larger the size of the firm, the more it benefits from economies of scale and hence concentration on employment of the changing technology on production. Firm leadership equipped with the essential capabilities is related with positive effect on firm performance. It is argued that firms with strong leadership have a mature culture in operation as opposed to new firms (Usman & Zahid, 2011). Firms are a reflection of the type of leaders they have. Organisational structures have a great influence on firms' responses to change which impact on firm performance, (Teece 1996). The purpose of organisational structure is to have proper division of work, co-ordination of activities and directing employees towards goals achievement, (Mintzberg, 1979). Thus, this paper proposes:

Proposition 4: *There is a relationship between strategic quality planning and organisational characteristics.*

4.0 Conclusion and Direction for Future Research

The purpose of this theoretical paper was to review both extant theoretical and empirical literature, identify gaps in the area of strategic quality planning, quality ambience and firm performance. It suggests a conceptual model and propositions which help to fill up the identified gaps. The extant literature has identified a relationship between quality ambience, organisational characteristics and strategic quality planning with firm performance (Jones & Grimshaw 2012). From the review of the extant empirical literature, it has indicated that strategic quality planning may not be directly related to firm performance. The mediator of quality ambience and a moderator of organisational characteristics affects strategic quality planning and firms' performance. The results of this study suggest that there is a relationship between strategic quality planning, quality ambience, organizational characteristics and firms' performance.

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The Leading Trends between the Nairobi Securities Exchange Index and the Macro Economic Indicators

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Abstract

The factors influencing the investor's decision to invest in the Security Exchanges is well documented, yet an investor cannot consistently maximize returns and minimize risks. This mainly focuses on the individuals as investors and their reactions to statements from the respective firms or experts or the government projections. A void in the literature on the potential impact that macroeconomic indicators have on the emerging securities market, may not well be documented. In this paper, it postulates that there is a good relationship between the Security Exchange index trend and the Macroeconomic indicators in the country. This relation can be positive, negative, leading, relationship between the two. Importantly, if the relation happens to be leading or lagging such a relationship can inform the investors on increasing their portfolio in the security exchanges. The basis of this perspective is the correlation technique to disclose whether the relationship is positive, negative, leading. The yearly data statistics covered the period December 2012 to December 2017. The secondary data was obtained from the Nairobi Securities Exchange (Daily Market Reports), Kenya National Bureau of Statistics (Statistical Abstracts) and the Central Bank of Kenya (Monthly Economic Reports). The coefficients for the logarithms of Treasury Bills, Money Supply, and Real Exchange rates were positive, while the signs of Inflation Rates and Gross Domestic Product were negative. The 91-Day Treasury Bills and the Inflation rate were the only clear Leading Macroeconomic Indicators on the NSE 20-Share Index. The Money Supply and Real Exchange Rates showed that they were both leading and lagging Macroeconomic Indicators on the NSE 20-Share index. Hence, they cannot be used to proxy the share prices. The Gross Domestic Product showed the weakest relationship with the NSE 20-Share index. The study concluded that the Kenyan security market and the formed significant relationships with all macroeconomic variables identified, except the Gross Domestic Product.

Key Words: Nairobi Security Exchange 20 Share index, Macroeconomic indicators, Leading Trends

1. Introduction

The timing of an equity investment decision is very crucial in determining the performance of the security portfolio. This indicate that one may be required to identify important signals that may inform the investment timing decision. Many security investment advisors are thought to rely on technical analysis (charting) to advise clients as to when to buy or sell. According to Pandey (1979), technical analysis is a strategy where an investor follows a strategy of selecting securities solely on the basis of price patterns or trading volume. However, over time investment advisors have been shown to rely not only on fundamental analysis for investment decisions but also on technical analysis. Well, the use of technical



analysis considers only the price and volume trends hence evaluating the timing of investments. This goes on to show that in a less than strong form efficient market, it is possible to base timing decisions on the trends of the volumes and prices of equity securities.

Based on the above analysis, is it then possible to identify the relationship between the security exchange performance and the major macro-economic variables like exchange rates, interest rates and inflation rates? If yes, can an investor make an investment decision based on the leading and lagging trends among these variables? This study investigated the above questions with the objective of recommending the trends in the local equity market on the basis of which investors and their advisors can make informed equity investment timing decisions.

2. Literature Review

2.1 Security Prices and Inflation

Inflation, along with interest rates are important variables for determining the required rates of return used to derive the value of investments (Reilly, 1994). Thus, one would expect inflation to have some impact on security prices. In this connection, Kaul (1990) notes that research evidence from the four major economies (i.e. U.S, Canada, UK and Germany) show a very significant negative relationship between security returns and changes in the expected inflation. This evidence further revealed that this negative relationship varies systematically depending on whether the monetary authority is using interest rate or money supply as leverage in controlling inflation. The relationship was much stronger during interest rate regime (i.e. when interest rate is used to control inflation) than during money regime (supply is used to control inflation)

Kannianen and Kurikka (1984) supported this theory of negative relationship between security prices and inflation, by noting that generally, inflation is taken as “bad news” for the security market; that is, when inflation rises, security prices should fall since inflation erodes people’s wealth, hence reduces their propensity to invest. Hasbrouk (1984) reached the same conclusion on the negativity of the relationship between security returns and inflation, in his empirical study of the relationships between security returns, inflation and the economic activity.

2.2 Security Prices and Interest Rates

Interest rates act as the cost of the capital to companies. They are also returning on the alternative assets, such as savings accounts and treasury bills. As the cost of capital, interest rates influence the profitability and the value of the quoted companies; for if a company pays a very high interest rate on its debt capital, then its earnings potential will be eroded, hence investors will mark down its value. A report in the fortune magazine November, 1997 analysing the swings in the US security market note that higher interest rates make a company’s potential future earnings to look less attractive, therefore, “the value of the company and the security price

should be adjusted downwards”. Interest rates also reported by the Japan Securities Research Institute 1996 to be among the three most important factors affecting the fluctuations in security prices in the Japanese market. The other two factors being, corporate earnings and business cycle trends.



2.3 Security Prices and Exchange Rates

Ma and Wenchi (1990) on their part examined the reactions of the security prices to changes in the exchange rate. They noted that due to the internationalization of the financial markets, there is increasing risk for international investments, and therefore the choice of the currency denomination was important.

2.2. The Role of the Security Exchange to the Economy

Nairobi Security Exchange (20016) reported that growth of 4.5 to 5.5 % will continue to be supported by tourism, currently, the fastest growing sector of the economy, as visitors arrivals are expected to grow strongly in 2016 and 2017 without the impact of the drought real Gross Domestic Product on the downside, the drought curtailed agricultural productivity and increased inflationary pressure, this could be further exasperated by sustained high international oil prices and a gradually depreciating shilling.

Kenya's security market is the Nairobi Security Exchange, which plays a major role in harnessing the capital development. (An extract of speech by the chairman of NSE on the growth of Kenya's security market 2016) indicated that the security market and its index are the mirror of what is happening in the rest of the economy. In the past three years, Kenya has achieved substantial economic recovery recording a growth rate of 5.8 % and the growth rate this year is expected to be much higher. During the same period, share prices have appreciated to the extent that the NSE market index has increased around 2000 to over 5500 points.

2.3 The Factors Determining Investment Decision for Securities

According to Markowitz (1952) in portfolio selection, a portfolio manager is interested in varying portfolio risk and return, which means that he should vary the asset allocation. Asset allocation involves determination and execution of decisions relating to proportion of wealth that is committed to a given class of assets in the portfolio. According to the World Bank (1990) report taxes that can raise aggregate investment tend to raise a country net financing need and hence increase capital flows. The report comments that taxes can affect aggregate savings and investments in a country and hence have an impact on the net flow of capital in or out of a country. Secondly, taxes influence the composition of portfolio including the form in which individuals hold their wealth, asset mix held and liabilities incurred by financial intermediaries and the manner in which firms or individuals finance their investments, these decisions have implications for gross flow of capital. Finally, taxes affect the location of trading activity in particular financing assets and hence gross flow by providing an incentive for trading to take place in a lower tax jurisdiction. These effects of taxes or capital flow affect investment decisions (World Bank 1990).

How taxes affect stock markets behaviour in Sweden showed that volatility in Swedish stock market declined during high tax periods. In similar case, the index levels fell actually in response to transaction tax increases. Weekly to daily variance ratios during high tax period decline suggesting that taxes induce a great negative auto correlation in returns. Investors were withdrawing from investing in stock and shares, and looking for alternative markets (IMF 2001). Dora (1996) concludes that taxes have distortion substitution effects since it changes the relative cost of goods and services and hence discriminate between economic choices. Heavily taxed firms will have decrease demand of their products, because of price increase. These cause investors to shift from one business another looking for better markets.

Pandey (1992) notes that differential effective tax rates on either capital gains or income from differential financial instruments distorted capital raising and investment decision. The findings revealed that a number of developing countries have tax rates that discriminate in favour of savings and demand deposits as opposed to securities investment. The recommendation made was that for capital market development, these tax differentials should be eliminated. In Kenya, tax rates are in favour of securities as opposed to demand deposits in commercial banks. Kibicho (1978), in the study of NSE and the economic fundamentals found that exchange rate is a decision variable for foreign investors as well as local investors in a liberalized economy.

In 1980, Mexico went through a deep crisis after its Peso depreciated. The country had borrowed too much in the world markets and pressure of high interest rates could not repay it. Capital flight was eminent and investors pulled out their stock fearing that Mexican would undergo a financial downturn. Indeed, the process ended up in a deep economic recession and many observers were just conscious on how destructive it could be to go through to same crisis again (World Bank publication 2001).

Dilip (1995) notes that because of transaction costs becoming unfavourable, share ownership by individuals tends to be confined to those with high incomes who easily spread their risks through diversified portfolio is and hence reducing operations risks. There is no large number of people who could sustain corporation securities market in less developed countries. O Neil (1996) notes that there is scarce information and transaction cost makes it further difficult, with the price uncertainty reinforcing traditional preferences for money over financial assets that fluctuate often in value, with time wasted in delivery and settlement proceeds. The declining performance in investment levels in the market is due to regulations, which bar foreign participation leaving an arguable massive float. In Kenya, the foreign ownership restrictions of holding only up to 20% was increased to 40% in 1995, but which still is considered low to attract substantial foreign investors (Republic of Kenya, 1999). The other factor is the returns the institutional investors may relate the returns from the particular shares with overall in the market. To do this they use the NSE 20 share

index, a geometric mathematical measure of relative value to compare changes in the market performance. It's expected to serve as a benchmark for evaluating investment performance and guides portfolio selection and a tool for monitoring and analysing the market in search of opportunities.

2.4 Empirical Review

Stephen and Gary (1993) held that fundamental analysis focuses on the accounting and economic factors about a company that should determine the true worth of its stock. These include such information as data from financial statements, quality of management, economic and market conditions and view product development. Technical analysis is based on the premise that all information about a stock is reflected in the past sequence of its prices. Technicians argue that only thing the fundamental analyst is trying to discover is already what is contained in the pie chart, and the chart will tell you when it is time to buy, sell or hold the security. Unlike the fundamental analyst who is trying to determine the economic worth of a security, the technical analysts' attempts to predict the future price of a security.

Corporate and personal double taxation discourages the distribution of corporate earnings and reduces the amount of funds available for dividend. This has a bearing on the study because dividend is taxable in Kenya both at corporate and personal levels at rates of 30% and above. It's crucial to consider the importance of taxation in investment decision by the institutional investors. Miller (1977) concluded that investors hold securities for the consumption opportunities they offer and will evaluate them in terms of their yield net of all tax drains and therefore dividend income is very important to investors.

Murago (1993) found that the NSE provides empirical results consistent with weak form of efficiency that is the results do not contradict the weak form of efficient market hypothesis. He concluded that one of the study implications would be that the investors must accept that it's possible to consistently outperform the market, if they use the information contained in past prices of stocks. They should therefore select a well-diversified portfolio instead of spending resources to seek out misplaced securities. Most of the factors under consideration can be considered past information and the results of this study will show to what extent the institution investors rely on past information to make investment decisions.

2.5 The Research Gap

The studies above have failed to uncover leading and lagging trends between the NSE stock performance index and the major macroeconomic variables of exchange rates, interest rates and inflation rates. This study aimed to fill this gap, growth performance of developing countries over the past decades both unsatisfactory and uneven, often accompanied with sharp declines in investments such declining trends in investments have had great effect on the growth of the economy (Jordan, 1991).

3. Methodology

This study was in the form of quantitative type of research with an aim of investigating the relationship between the NSE 20-share index and the macroeconomic indicators. The researcher used survey research design of existing and available data. It is a study on the Securities market using secondary data. The monthly data statistics covered the period January 2012 to December 2017. This data organization gave 72 data points for each of the six variables in the study (i.e. the NSE Share index, the inflation rate, the Treasury bill, gross domestic product, money supply and the exchange rate).

The analysis involved two stages; the first stage establishes the relationship between the stock performance index (NSE-20) and the various individual macro-economic variables of exchange rates, interest rates and inflation rates. This involved the use of simple correlation analysis and simple regression analysis in Microsoft Excel for each of the variables against the NSE-20 index. The next stage involved plotting the index and each of the three macro-economic variables against time to establish any leading and lagging trends of these variables with the trend changes in the stock performance index.

4. Results and Discussion

4.1 Introduction

The purpose of this study was to establish if there is a relationship between the equity index and the macro-economic indicators specifically 91-day Treasury bill rate, exchange rate (Kshs/US\$), and the inflation rate. Further it investigates the leading and lagging trends among these variables vis-à-vis the stock index performance. Statistical Analysis Software (SAS) computer package is used to run the correlation model.

This study aimed at answering the following questions:

1. What is the relationship between equity index performance and the trends in other macro-economic variables specifically exchange rates, inflation rates and interest rates?
2. Is it possible to identify leading and lagging trends between the equity index and the other macro-economic variables?
3. What can be inferred from the identified trends on the timing of equity investment decision?

4.2 Objective One

To find out whether there is a relationship between the stock market index and the macro-economic indicators, correlation was used. Pearson's correlation co-efficient between the equity index and the inflation rate was 0.65, equity index and the 91-day Treasury bill were -0.273 , equity index and the exchange rate were 0.15. This means that there is a positive correlation between the equity index with both the

exchange rate and inflation rate, but a negative correlation between the equity index and the 91- day Treasury bill.

Table 1. Relationship between the NSE 20-Share Index and the Macroeconomic Indicators with a Period Time of Zero

		SE	TB	LIR	LMS	LREXR	LGDP
SE	Pearson Correlation	1	.227	-.064	.618(**)	.913(**)	-.014
	Sig. (1-tailed)	.	.102	.363	.000	.000	.470

** Correlation is significant at the 0.01 level (1-tailed).

4.3 Objective Two

To test the leading variations between the stock index performance and the macro-economic variables, all the trends are plotted on the same graph.

- (i) Stock index performance Vs the exchange rate- there was no visible leading or lagging trend observed. Although there were established fluctuations in the stock returns, the exchange rate was relatively stable over time.
- (ii) Stock index performance Vs the treasury bills- although there were established sharp fluctuations in the stock index performance, the treasury bills showed more gentle fluctuations of the cyclical nature. Hence no visible leading or lagging trends to be reported.
- (iii) Stock index performance Vs the inflation rate - there was some leading trend between the stock index performance and the inflation rate. Fluctuations in the stock index returns trend were loosely followed by fluctuations in the same direction by the inflation rate. Hence the stock index performance was the leading trend while the inflation rate, was the lagging trend. This trend was more established from the January 2012. The leading period was close to one month.

Table 2. Leading Macroeconomic Indicators on the Nairobi Stock Exchange 20-Share index at Time Period One ($S_{(t)} = M_{(t-1)}$)

		LSE	LTB	LIR	LMS	LREXR	GDP
LSE	Pearson Correlation	1	.226	-.114	.579(**)	.910(**)	.002
Sig. (1-tailed)	.	.107	.268	.000	.000	.495	.072

** Correlation is significant at the 0.01 level (1-tailed).

5. Conclusion and Recommendations

5.1 Conclusions

The study failed to reject the null hypothesis that there were no leading and lagging trends on two fronts (treasury bills and exchange rate). However, the null hypothesis was rejected on the third front (inflation rate) where there the stock index performance was established as leading trend. The results of the correlation analysis generally show that inflation and the foreign exchange rate (Kshs /US\$) have an impact on the performance of the stock index. However, the inflation rate was more significant than Treasury bill rate and the foreign exchange rate. This is due to the fact that treasury bills are competing investments to shares and the depreciation or the appreciation of the shilling against the US\$ makes our Kenyan stock and shares is relatively stable over time.

The study fails to reject the null hypothesis that there are no leading and lagging trends on two fronts (treasury bills and exchange rate). However, the null hypothesis is rejected on the third front (inflation rate) where there the stock index performance is established as leading trend. This implied that an investor cannot consistently beat the market by relying on the leading and lagging trends between the macro-economic

indicators and the time of investment. Although the inflation rate is established as a lagging trend after the changes in the stock index performance, this proved of little use as in investment indicator. It can only serve as an indicator of the overall direction of the inflation rate, once changes in the stock performance have been established. Consequently, assuming the stock exchange is less than strong form efficiency, and then technical analysis may still form a strong basis of predicting the overall direction of the stock exchange performance. More reliable information will however be obtained by carrying out fundamental analysis of the companies that are the candidates for investment.

5.2 Recommendations

The foregoing research findings on the relationship between the stock prices (or the stock market performance) and other variables of the economy, demonstrated that various sectors of the country's economy are interrelated and interdependent as indicated by the coefficients of correlation. What happens in one section of the economy has an impact on other sections of the economy. The magnitude of the impact will depend on the strategic importance of a particular sector. This is explained as follows. When the Kenyan government runs a huge budget deficit, it is forced to borrow from the public through the use of treasury bills and the treasury bonds. By offering attractive returns (high interest rates), these government securities have far reaching effects on the rest of the economy. These effects include;

- A "Crowding-out effect", which means that the borrowers in the economy cannot match the government's interest rates, and are therefore, unable to raise funds for their investments. This results in cutbacks in the economy. In addition, financial institutions usually peg their interest rates on the government rates and thus if the government rates are high, general interest rates in the economy will be high, further curtailing borrowing for the investment.
- The other effect of high Treasury bill rates is to encourage a shift of investment funds from other securities or sectors to the treasury bills. The sector that suffers from this shift is the stock market; because the returns from investment of shares cannot be match the returns from the treasury bills. This is because returns from shares are usually long-term in nature, as opposed to the treasury bills, which give quick returns, like every 3months.

Thus, policy makers, investors and other players in the economy especially within the financial sector) need to understand this relationship between the various sectors of the economy. In particular, the following lessons can be drawn from the understanding the relationship between the stock market and the rest of the economy.

- a) Governments should be careful in applying their policies (monetary or fiscal) to avoid hurting the other sectors of the economy such as the stock market.

Rogalski and Vinso (1977) noted "while monetary policy should not be guided

by the impact on the stock market, such influences should not be ignored due to the influence of the stock market activity”.

- b) Investors in stock exchanges should also understand how share prices relate to the rest of the economy, so that they do not blame company management as being solely responsible for the performance of share prices. They should understand that a share price is a function of many factors, and not the action of the management alone.

Although technical analysis has been used for long to inform investment decisions, there seems to be no consistent trends between the stock performance, interest rates, exchange rates and inflation rates. Consequently, an investor cannot make better decisions by relying on the leading and lagging trends between the macro-economic indicators. Although the inflation rate is established as a lagging trend after the changes in the stock index performance, this may prove of little use as an investment indicator. It can only serve as an indicator of the overall direction of the inflation rate, once changes in the stock performance have been established.

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Service Quality, Menu Flexibility and Price Fairness on Customer Choice of Exotica Restaurant, Gretsia University Kenya

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Abstract

Commercial restaurants that operate within university setups aim at serving the general university community which constitutes of employees, students and visitors. Exotica Restaurant, a commercial restaurant situated in Gretsia University, was setup to serve over 1000 such customers per day. Though the potential customers have not been provided with alternative catering facilities within the university, the restaurant has only been recording sales to an average of 60 customers per day. Therefore, the purpose of this study was to examine influence of service quality, menu flexibility and price fairness on customer choice of Exotica Restaurant, Gretsia University. The population of the study included all customers dining in the restaurant. A descriptive cross-sectional survey study of 50 customers in the restaurant was conducted through self-administered questionnaires. Convenience sampling approach was used to select customers to be included in the study sample from which data was collected. Measurement of independent variables (service quality, menu flexibility and price fairness) and the dependent variable (customer choice) was based on constructs from the past related studies. Cronbach's Alpha coefficient was used to check the internal consistency reliability of the constructs before data analysis. Descriptive statistics used for data analysis included mean and standard deviations. To establish the nature, strength and direction of the relationship between the dependent and the independent variables, correlation analysis was used. Correlation between service quality and customers' choice revealed a moderate positive relationship ($r = 0.510$, $p = 0.000$) while correlation between menu flexibility and customers' choice yielded a strong positive relationship ($r = 0.752$, $p = 0.000$). The correlation between price fairness and customers' choice had the strongest relationship ($r = 0.887$, $p = 0.000$). The study recommended that the restaurant should try and maintain standards of service quality, menu flexibility so that customers can continue visiting it frequently. The study recommended further research can be done in another institution with similar variables or still at Exotica Restaurant with other variables. The demographic characteristics can also be used for further research.

Keywords: Service Quality, Customer Choice, Menu Flexibility

1. Introduction

Customer preferences of restaurants have drastically changed today and this is attributed to diets, diversity and desire for unique flavours by the consumers (Clarke, 2018; Sara, 2016). The 30% of restaurants that are not able to cope with customer preferences close or change ownership within a year (Yi *et al.*, 2017). Service quality has been found to have a significant effect on customer satisfaction which eventually affects customers' choice of restaurant directly (Ishmael, 2018; Muhamad *et al.* 2015, 2016; Sheng *et al.* 2018). Menu design, menu item descriptions and menu

variety are significant predictors of customer satisfaction and contribute to a great extent in attracting customers to a restaurant (Slack et al, 2010; Amy, 2013; Ahmed *et al.*, 2017). Customers perceived price fairness influence the customers' satisfaction and repurchase intentions (Sandariana *et al.*, 2016). In addition to other catering units, Kenyan universities offer a range of catering services in restaurants. Gretsia University has two main food service outlets which include a cafeteria-serving approximately 170 students and the Exotica Restaurant-serving the general Gretsia community and visitors. An average of 1260 students and approximately 50 members of staff – not served in the Cafeteria. Average no. of guests served at the Exotica Restaurant is 60.

H₀₁: There is no significant relationship between the service quality & customer choice of restaurant

H₀₂: There is no significant relationship between menu flexibility & customer preference of restaurant

H₀₃: There is no significant relationship between price fairness and customer preference of restaurant

2. Literature Review

2.1 Service Quality

Service quality is a way of managing business processes to ensure that the customers are fully satisfied with the quality of service provided (Parasuraman, 2013). Service quality has been found to have a significant effect on customer satisfaction (Ishmael, 2018), therefore means that service quality is an important factor to consider when dealing with customer satisfaction. Customer satisfaction eventually directly affects customer choice of restaurant as no unsatisfied customer will choose to return to that particular restaurant that did not offer quality service. The hospitality industry provides services to customers and they are the reason for the success or failure of the industry. It is there important to ensure that the services provided are of quality and cater for the needs of the customers.

Various models have been designed that cater for the customer's expectations and experience. SERVEQUAL (Parasuraman et al., 2013) highlighted five dimensions that are necessary to ensure customer satisfaction. These included responsiveness, assurance, reliability, tangibles and empathy. The researcher intends to carry out a research on three of the dimensions namely assurance, responsiveness and reliability. Parasuraman defines assurance as the knowledge and courtesy of employees and their ability to convey trust and confidence to the customers. It is crucial that customers develop trust and confidence in the service provided by any catering establishment. This will directly affect the turnout of guests and evidently will determine the preference choice of the restaurant for the guests.

Responsiveness has been defined as the availability of the provider to attend voluntarily to customers, providing a service in an attentive manner, with precision and speed of response (Parasuraman et al., 2013). The speed and attention given to customers in a restaurant also demonstrates the quality of service. If the waiters are slow to attend to customers and are not alert to the customers need, then it shows slow responsiveness to the customers and will lead to customers running away from the establishment meaning they will not choose that restaurant again. On the other hand, if the waiters are fast and attend to the customer's needs appropriately and with speed, then responsiveness at that particular restaurant will be rated at a higher level and this directly influences the number of guests visiting the restaurant and thus the choice of the restaurant.

Reliability is defined as the ability of the supplier to execute the service in a safe and efficient manner. This means that the promised service should be performed accurately and well. This is critical because if a restaurant is offering an a la carte menu and the customer is informed that the meal will take 45 minutes to be ready, then the meal should actually take 45 minutes and be served to the customer as ordered. This demonstrates a high level of reliability, in that the customer can rely on the restaurant to provide the meal in the stated time frame in the correct and safe manner.

On the other hand, if the meal is to be silver served and it is a soup which first, should be served hot and be done in an acceptable manner to the customer and not pour and burn the customer in the process. The DINESERVE scale (Stevens et al., 1995) has also been used to measure customer's perceived service quality. Ishmael (2018) used a modified DINESERV scale on 10 restaurants and the results indicated four factors, namely responsiveness-assurance, reliability, empathy-equity and tangibles accounted for 50% of the variance in perceived service quality. This indicates that responsiveness, assurance and reliability are vital determinants of a customer satisfaction and eventually customer's choice of restaurant. This is the area that the researcher seeks to carry out the research as service quality was found to have a significant effect on customer satisfaction.

Muhamad et al. (2015/2016) concurs with the fact that all the five service quality attributes have a positive relationship with customer satisfaction. This therefore puts more emphasis on the importance of service quality in any establishment for the success of the business. Sheng et al. (2018) identifies numerous factors that influence customer's choice of a fine dining restaurant but states that the most crucial factor is the food quality then followed by service and dining motivation. Food quality and service consequently have proven to be very important aspects of service quality in any establishment. This therefore affects the customer's choice of restaurant ultimately.

2.2 Menu Flexibility

A menu is a list of dishes that are offered and served in food outlet with their prices indicated. It is a bill fare. It has been established that a menu is a vital marketing tool and the menu design, menu item descriptions and menu variety are significant predictors of customer satisfaction (Ahmed et al, 2017) which in turn affects the customer choice of restaurant. Matthew also agrees with the fact that menus are the most important factor for customers to make their preference for dining out with almost half (49%) of consumers accepting this fact.

As regards menu design, there are various aspects that influence the consumer to make a decision on where to dine and wine. Colour which is used on the menu should be exotic and have an interesting colour mix to attract consumers as the common saying goes that 'one eats with the eyes first before the mouth.' The calligraphy used on the menu should have mystical styles that attract one to want to read more. This involves an easy to read and understand theme. Fascinating flavours attract customers especially if displayed attractively like displaying steaming coffee mugs, tiramisu cake slices and chocolate cookies. The finished borders and edges of the catalog presented attract attention of the customers. The price also attracts the customers and more so if it is written in letters instead of symbols.

The modern customers are complex beings, who enjoy sampling new menu items that add diversity and excitement to their experiences. This can be attributed to the diets, diversity and desire for unique flavours by the consumers (Sara, 2016). The consumers are more opinionated about their preferences for restaurants as there is the aspect of internet which has empowered them to discover different dishes across the globe. There is the trend of inclusion of ethnic dishes in the menu which has become popular. When a dish is given an ethnic label, such as an Italian name, people usually rate the food as more authentic. If the dish is further described elaborately, it makes the consumer to have a positive image of the dish (Amy, 2013). Menu flexibility is important as it involves the creation of new dishes in the menu to cater for the customers' needs. It therefore attracts customers to an establishment because of flexibility of the menu as routine menu can be boring. (Slack et al., 2010)

2.3 Price Fairness

According to Sungpo Yi et al. (2017) the restaurant business is one of the most competitive business and 30% of restaurants close or change ownership within a year. In the hospitality industry price is a major determinant of customers' behaviour. Price is directly related to the customers' perception of quality and value of product. However, it must be noted that if a product or service has a high price and another of the same quality has a lower price the customers are likely to choose the one with the lower price. For example, blue band is a margarine that is used in the hospitality industry. If a restaurant charges its meat pies expensive because of using blue band which is expensive and another restaurant which produces the same quality of meat pies and uses prestige which is cheaper, thus lowering the price charged by the

second restaurant, the chances are that customers will choose the second restaurant over the first restaurant because of price difference but the same quality.

Price is the amount is the amount of money the customer is willing and able to pay for a service or product. (Irza et al., 2015) price therefore is a very dominant factor that influences customers' choice of restaurant. Price fairness can be defined as a situation where customers feel the difference between the benefits received from the product or service well worth the money paid or the sacrifice given. (Sandariana et al., 2016) this therefore means that if the benefits received by the customer are more as opposed to the price then there is a likelihood that customers will be willing to purchase that product and thus choose that particular establishment to dine and wine. This is because consumers tend to consider the relations between prices and their expectations on the performance of the services and products bought.

According to Slack et al. (2010) cost means doing things cheaply, this benefits the restaurant with cost performance. This leads to low costs of production and reduction of prices for the customers. This attracts customers to an establishment which directly affects customer preference of restaurant.

2.5 Theoretical Model

The study used the Slacks *et al* model to assess the performance objectives which eventually affects customer choice of restaurant and DINESERV model to measure the effects of dining service quality on customer choice of restaurants after Parasuraman *et al* developed the model.

3. Research Methodology

3.1 Research Design

This study used cross-sectional descriptive survey design to describe the relationships between independent variables (service quality, menu flexibility and price fairness) and dependent variable (customer choice). The design allows one to analyse inter-relationships among these variables at the time of research and provides information relating to the degree of relationship between the variables being studied (Mugenda & Mugenda, 2003).

3.2 Study Area

Exotica Restaurant is located in Gretsia University and is sometimes referred to as Roof Top Restaurant. This is due to the fact that when the restaurant started in 2016 it did not have a formal name. It is also on the third floor of the building which is the top most floor of that building. The restaurant has a seating capacity of 100 customers and overlooks the swimming pool of the university. It has a medium sized kitchen that caters for the targeted customers. Initially the restaurant could not cater for that number but more tables and chairs were put thus increasing the capacity. It caters for the staff at Gretsia University and also for students who do not stay in the hostel. It also caters for distance learning students during the tutorial and exam

week. It has a cyclic menu produced by three employees who work at the restaurant and who are substituted by students during training sessions. The restaurant offers snacks, beverages and main meal courses.

3.3 Target Population

The target population refers to the specific relevant group to a particular study. It is that population to which the researcher generalizes the results of the study. This means that they are the ones that exhibit common observable characteristics (Mugenda & Mugenda 2003). This included the customers who frequent the Exotica Restaurant and their basic interest and activity would be to dine at the restaurant.

3.4 Sampling Techniques

A sample is a subset of a particular population (Mugenda & Mugenda 2003). This means that it is a smaller number of the population that is used to make conclusions regarding the whole population. Sampling therefore is the systematic process of selecting a number of individuals for the study to represent the larger population. The researcher used the convenient sampling method. This is the selection of units from the population based on easy availability and /or accessibility. It is also referred to as accidental sampling or volunteer sampling (Mugenda & Mugenda 2003).

3.5 Sample Size

According to Mugenda & Mugenda (2003), when the study population is less than 10,000, a sample size of between 30 and 50 is a good representation of the target population. However, the researcher had a sample of 50 participants. This was to avoid sampling error, which is the discrepancy between the sample characteristics and the population characteristics.

3.6 Research Instruments

The researcher used a self-completed questionnaire designed with close ended questions which were considered easier to analyse since they were in immediate usable form and also easier to administer because they offered alternate answers. The questionnaire consisted of matrix questions as they made comparison easier for the researcher. The questionnaire consisted of three sections. A, B, C and D to address the variables.

3.7 Pre-Testing

A pre-test was carried out to test the design and applicability of the questionnaire. This is to ensure that the respondents understood the questionnaire and are able to answer the questions appropriately and make analysis easier. The pre-test was done in the area of study.

3.8 Validity and Reliability

Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. This is the accuracy and

meaningfulness of inferences, which are based on the research results according to Mugenda & Mugenda, (2003). This is especially with the questions asked and if they get information that will answer the objectives of the study. Reliability deals with the extent to which results are consistent over time and accurate representation of the total population under study. It is a measure of the degree to which a research instrument yields consistent results or data after repeated trials (Mugenda & Mugenda, 2003). This simply asks the question if the results will be the same if a similar study is carried out in the same study area using the same instruments after some time has lapsed.

3.9 Data Collection Techniques

A self-administering method or use of the waiters was used in the study.

3.10 Data Analysis

Data analysis usually involves reducing accumulated data to a manageable size developing summaries, looking for patterns and applying statistical techniques according to Cooper and Schindler, (2014). The data was analysed using both descriptive statistics and inferential statistics. According to Bryman and Bell (2015) a descriptive research approach attempts to systematically describe attitudes towards an issue. In most cases it is used to examine one variable at a time.

On the other hand, Pearson correlation analysis was used to determine the relationships between the independent variables and their influence on the dependent variable according to Cooper and Schindler (2014) This can be used to decide if a difference or relationship can be considered real or just a chance fluctuation.

3.11 Logistical and Ethical Considerations

While administering the data collection instruments the researcher ensured that the rights and privacy of the respondents was upheld at all times. This was done by first introducing oneself to the respondents and telling them the aim and purpose of the research and asks for their permission to administer the collection of data. The researcher informed the respondents that all the information collected was to be used only for academic purposes and would be treated confidentially.

4. Findings and Discussions

4.1. Respondents Demographic Characteristics

A total of 50 questionnaires were given to the customers of the restaurant both teaching and non-teaching staff and also to the students who frequent the restaurant.

4.1.1 Gender

Table 1 reports the descriptive statistics of the participants' gender in this study. As shown in the table the majority (68%) of the total respondents were male and 32% were female.

Table 1. Respondents' gender

	Frequency	%
Male	34	68.0
Female	16	32.0
Total	50	100.0

4.1.2 Age

Table 2 reports the descriptive statistics of the respondents' age in this study. The majority (52%) were between 20-30 years of age while 6% accounted for respondents between 40-50 years.



Table 2. Respondents' age

	Frequency	%
< 20 years	6	12.0
20-30 years	26	52.0
30-40 years	10	20.0
40-50 years	3	6.0
> 50 years	5	10.0
Total	50	100.0

4.1.3 Frequency of Visit

Table 3 reports the descriptive statistics of the frequency of the respondents visiting the Exotica Restaurant. As shown all the respondents had visited the restaurant more than four times.

Table 3. Frequency of restaurant visit

	Frequency	%
Once	0	0
2 times	0	0
3 times	0	0
4 times	0	0
More than four times	50	100.0
Total	50	100.0

This study has not investigated the effects of the participants' demographic characteristics such as gender, age and frequency of visiting Exotica Restaurant. The researcher did not intend to use this information to analyse the effects on customer choice of Exotica Restaurant, but rather to illustrate the overall majority of the respondents who had sufficient knowledge about the context of the study and were therefore suitable participants.

4.2 Descriptive Results of the Constructs Used in the Study

4.2.1 Service Quality

Results of the analysis of service quality dimension are presented in Table 4. As shown respondents agreed with all items other than 'the restaurant maintains speed in service even during busy times' ($M=2.74$, $SD=1.242$). This demonstrates that the restaurant is slow in-service delivery. However, participants agreed that the restaurant serves food as ordered ($M= 4.08$, $SD= 0.829$).

Table 4. Results of service quality

	Mean	SD
The restaurant serves your food as you have ordered	4.08	.829
The restaurant provides an accurate guest bill always	3.70	1.074
The employees are always willing to give you information about menu items, their ingredients and answer any of your questions immediately	3.52	1.182
The restaurant makes you feel comfortable and confident in your dealings	3.36	1.258
The staff at the restaurant are well trained, competent and experienced	3.34	1.287
The service in the restaurant is dependable and consistent	3.26	1.139
The restaurant puts extra efforts to handle your special needs	3.10	1.282
The restaurant provides prompt and quick service	3.08	1.307
The restaurant maintains speed in service even during busy times	2.74	1.242

4.2.2 Menu Flexibility

Results of the analysis of menu flexibility dimension are presented in Table 5. As shown respondents agreed with all items other than 'the menu offers dishes for special needs' (M=2.44, SD=1.327). This demonstrates that the restaurant does not cater for special needs of the customers. However, participants agreed that the menu is easy to understand. (M= 3.48, SD= 1.182).

Table 5. Results of menu flexibility

	Mean	SD
The menu is easy to understand	3.48	1.182
The food served at the restaurant is prepared well always	3.26	1.259
The dishes are clearly written on the menus	3.14	1.294
The menu has a variety of dishes	3.12	1.288
The restaurant changes the menu frequently	3.02	1.332
The menu is well designed and colourful	2.84	1.251
The menu offers dishes for special needs	2.44	1.327

4.2.3 Price fairness

Results of the analysis of price fairness dimension are presented in Table 6. As shown respondents agreed with all items other than 'the prices of food changes frequently at the restaurant' (M=2.86, SD=1.229). This demonstrates that the prices of the foods and beverages do not change frequently meaning they are consistent as agreed by all participants (M= 3.98, SD=1.040)

Table 1. Results of price fairness

	Mean	SD
The restaurant prices are consistent	3.98	1.040
The restaurant prices are reasonable	3.60	1.309
The prices at the restaurant are sufficient for the quality of the services offered	3.40	1.245
The portions served are adequate according to the prices charged	3.28	1.310
The prices of the food changes frequently at the restaurant	2.86	1.229



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4.2.4 Customer Choice

Results of the analysis of customer choice dimension are presented in Table 7. As shown respondents agreed that they will always have their lunch at Exotica Restaurant (M=3.98, SD=1.040). This demonstrates that the respondents will always have lunch at the Exotica Restaurant. However, participants disagreed on the statement 'I prefer restaurant Exotica for lunch than going to other restaurants' (M= 2.44, SD= 1.327).

This means that even though they go to Exotica Restaurants they would prefer other restaurants

Table 2. Results of customer choice of Exotica Restaurant

	Mean	SD
I will always have my lunch at restaurant Exotica	3.98	1.040
I will always encourage my friends to visit restaurant Exotica for their food and beverages	3.60	1.309
I prefer restaurant Exotica for lunch than going to other restaurants	2.44	1.327

4.3 Hypotheses Testing

4.3.1 Relationship between service quality and customers' choice of Exotica Restaurant

Table 8 shows results of the correlation between service quality and customers' choice of Exotica Restaurant. As indicated, the correlation between service quality and customers' choice was found to be strong positive ($r = 0.510$). In addition, the relationship was significant at 0.01 level ($p < 0.01$). Thus, H_{01} was rejected demonstrating that there is a strong positive correlation between service quality and customers' choice of Exotica Restaurant.

Table 8. Correlations between service quality and customers' choice of Exotica Restaurant

		Service Quality	Customer Choice of Exotica Restaurant	Decision on the null hypothesis
Service Quality	Pearson Correlation	1	.510	
	Sig. (2-tailed)		.000	
	N	50	50	
Customer Choice of Exotica Restaurant	Pearson Correlation	.510**	1	Reject H_{01}
	Sig. (2-tailed)	.000		
	N	50	50	

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

4.3.2 Relationship between menu flexibility and customers' choice of Exotica Restaurant

Table 9 shows results of the correlation between menu flexibility and customers' choice of Exotica Restaurant. As indicated, the correlation between service quality and customers' choice was found to be strong positive ($r = 0.752$). In addition, the relationship was significant at 0.01 level ($p < 0.01$). Thus, H_{01} was rejected

demonstrating that there is a strong positive correlation between menu flexibility and customers' choice of Exotica Restaurant.

Table 3. Correlations between menu flexibility and customer choice of Exotica Restaurant

		Menu Flexibility	Customer Choice of Exotica Restaurant	Decision on the null hypothesis
Menu Flexibility	Pearson Correlation	1	.752**	
	Sig. (2-tailed)		.000	
	N	50	50	Reject H ₀₂
Customer Choice of Exotica Restaurant	Pearson Correlation	.752**	1	
	Sig. (2-tailed)	.000		
	N	50	50	

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

4.3.3 Relationship between price fairness and customers' choice of Exotica Restaurant

Table 10 shows results of the correlation between price fairness and customers' choice of Exotica Restaurant. As indicated, the correlation between price fairness and customers' choice was found to be strong positive ($r = 0.887$). In addition, the relationship was significant at 0.01 level ($p < 0.01$). Thus, Ho1 was rejected demonstrating that there is a strong positive correlation between service quality and customers' choice of Exotica Restaurant.

Table 4. Correlations between price fairness and customer choice of Exotica Restaurant

		Price Fairness	Customer Choice of Exotica Restaurant	Decision on the null hypothesis
Price Fairness	Pearson Correlation	1	.887**	
	Sig. (2-tailed)		.000	
	N	50	50	Reject H ₀₃
Customer Choice of Exotica Restaurant	Pearson Correlation	.887**	1	
	Sig. (2-tailed)	.000		
	N	50	50	

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

5.0 Summary, Conclusions and Recommendations

5.1 Summary of findings

The focus of this study was to establish the role of service quality, menu flexibility, price fairness on customer choice of Exotica Restaurant at Gretsia University.

5.1.1. Objective 1: Establish the influence of service quality on customer choice of Exotica Restaurant

Descriptive results on this objective revealed that participants in this study agreed with the items of service quality constructs. In addition, the findings of this research

revealed that service quality has a strong positive significant correlation with the customer choice of Exotica Restaurant. It is therefore clear that service quality could predict customer choice of Exotica Restaurant.

5.1.2 Objective 2: Examine how menu flexibility influences customer choice of Exotica Restaurant

Descriptive results on this objective revealed that participants in this study agreed with the items of menu flexibility constructs. In addition, the findings of this research revealed that menu flexibility has a strong positive significant correlation with the customer choice of Exotica Restaurant. It is therefore clear that menu flexibility could predict customer choice of Exotica Restaurant.

5.1.3 Objective 3: Determine how price fairness affects customer preference of Exotica Restaurant

According to the findings of the study participants showed a high level of agreement with items measuring price fairness with customer choice of Exotica Restaurant. In addition, analysis of the data revealed that price fairness has a strong positive significant correlation with customer choice of Exotica Restaurant. It is clear therefore that price fairness could predict customer choice of Exotica Restaurant.

5.2 Conclusions

On the basis of the study objectives and the findings presented, the following conclusions were depicted:

1. Service quality had a moderate positive influence on the customers' choice of the restaurant.
2. Menu flexibility had a strong positive influence on the customer preference of the restaurant.
3. Price fairness had a very strong positive influence on the customer preference of the restaurant.

The outcome was consistent with the findings from the past research. In regard to the specific aspects of service quality, menu flexibility and price fairness, the respondents were dissatisfied with the following areas of concern:

1. Speed of service
2. Menu design and variety
3. Change in menu prices

As a result, majority of them indicated that they preferred dining in other restaurants other than Exotica. Respondents were satisfied on being served the food as per their order but were neutral in majority of the other aspects of the operation

5.4 Recommendations for Practice

Based on the study conclusions, the following recommendations are made;

1. The management should ensure that service quality is maintained at all times if customers are to continue having their meals at the Exotica Restaurant with emphasis on the speed of service which proved to be slow.
2. The management should also ensure that menu flexibility is maintained at the restaurant. The management should also try and cater for special needs of the customers.
3. The management should maintain the consistency of the prices at the restaurant as this is also an important aspect of customer choice of the Exotica Restaurant.

5.5 Recommendation for Further Research

Several recommendations for further research are made on the basis of the study findings. These include;

1. First, the study was carried out at Greta University only and the findings were specific to the university. A similar study can be carried out in another university to establish if the findings will be similar.
2. Further research can be done to find out why males are more frequent to the Exotica Restaurant.
3. Further research can also be done to find out why the majority of the respondents were between the ages 20-30 years and very few between 40-50 years.
4. Further research can also be done on other aspects that could influence the customer choice of Exotica Restaurant.

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The Relationship Between Earning Volatility and The Dividend Pay-out of Firms Listed at The Nairobi Securities Exchange, Kenya

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Abstract

The research was meant to establish the relationship between earnings volatility and divided pay-out. The objective is to assist the understanding of how earning volatility influence a firm's dividend pay-out. Firms can then make use of such information to implement a dividend pay-out that its shareholders are satisfied with. The firm will also ensure that the dividend pay-out implemented is not negatively affected by the volatility of its earnings since a decline in dividend pay-out for shareholders can be interpreted in terms of worse times ahead for such a firm. The study comprised the years from 2008 to 2012. Therefore, my research comprised the 61 companies registered in the NSE market as of December 31, 2012. The Pearson product moment correlation coefficient was used to measure the strength of the relationship between the dividend pay-out and earnings volatility. This research was based on secondary data. Data on a firms' dividend pay-out will comprise the dividend paid out by company to its shareholders dividend by the earnings per share of the company. The influence of the volatility in earnings was found to be limited however by other factors characterized by the individual firm policies. Some firms that made huge profits ended up issuing a low dividend pay-out in the five years under review. In most firms the years when a high volatility in earnings was recorded also indicated a lower dividend pay-out. This gave an inverse relationship between the two variables. A high Earnings volatility therefore meant a low dividend pay-out for these firms and vice versa.

Keywords: Earnings Volatility, Dividend Per Share, Earnings after Interest and Taxes

1. Introduction

Firms' earnings are basically used for two specific purposes: reinvestment and giving returns in form of dividends to shareholders. The earnings are an important consideration to a finance manager when making the investment, dividend and financing decision. Investment and financing decision entails making choices on how much of the earnings will be used to finance a firm's operations and undertake new investment opportunities. The dividend policy guides the finance manager to decide how much will be paid out to shareholders in form of dividends or returns for their share capital holding in the firm (Pandey, 1997). The finance manager also decides the portion of earnings to be retained by the firm for future expansion and investment of new opportunities.

All earnings belong to the firm's stockholders whether they are paid out as dividends or retained. Retained earnings offer an available source of financing since they are internally generated. It is also less costly since there is no issue cost and there is no required repayment date. Using retained earnings for reinvestment reduces the



amount available to stockholders for dividend payment. This is more so for companies that make use of the residual dividend policy for issuing dividends. The residual dividend policy implies that stock owners will be issued dividends out of the cash residual that remains after investment decision has been made (Lumby and Jones, 2003).

Volatility in earnings refers to the probability that actual earnings will differ from the expected earnings due to certain macro and micro economic conditions (Wolfgang, 2003). Such conditions may include: inflation level, social political instability, firm policies and availability of capital to the firm. Earnings are basically the surplus or profits retained by a firm from its normal business operations. It is what the firm remains with after deducting the firm's expenses from the revenue it earns from its operations. A firm's earnings as shown from its income statement are used to indicate the profitability and viability of a business venture (Lasher, 2008). Various users of financial statements of a firm make their decisions by evaluating the performance of a firm.

Dividends are issued out from the retained earnings of a firm. When a firm earns higher earnings in a given trading period, the firm is able to issue out more dividends to the shareholders. The proportion of earnings distributed is measured by the pay-out ratio which is cash dividend divided by earnings per share. If the amount of the dividend paid to shareholders is stable, the pay-out ratio will fluctuate with fluctuations in earnings. As earnings grow, the firm can increase its cash dividends. However, a firm's management might not immediately increase the level of dividend pay-out unless there is certainty that the firm will continue to make good earnings in the future. This is mainly so because when a firm makes higher earnings in a certain period then declares high dividend, a time when the earnings fluctuate negatively declaring lower dividends would send mixed signals to shareholders. Some might interpret the information as possibilities of bad times ahead for the firm (Brockington, 1993). The objective of the study is to assess the nature of relationship between earnings volatility and the dividend pay-out of firms listed at the NSE market.

2. Methodology

The nature of the study was a correlational research study. A correlational study is a scientific study in which a researcher investigates associations between variables. It attempts to explore relationships to make predictions. It uses one set of subjects with two or more variables for each.

2.1 Population of the Study

The target population consisted of all the 61 firms listed at the NSE as at December 31, 2012 as listed below in appendix 1. Firms listed are suitable for this study due to the availability of credible and authentic data useful for analysing the research question.

2.2 Sampling Design

The researcher used a census. The total companies registered in the NSE market as of December 31, 2012 were to be used in the analysis of data. The study comprised the years from 2008 to 2012. Therefore, the research comprised the 61 companies registered in the NSE market as of December 31, 2012.

2.3 Data Collection

This research was based on secondary data. Data on a firms' dividend pay-out will comprise the dividend paid out by company to its shareholders dividend by the earnings per share of the company. These figures were obtained from the published financial statements of a company. Furthermore, the notes and explanations that accompany the published financial statements will assist in understanding of the dividend pay-out the firm utilizes year in year out. To collect data on earnings volatility, earnings of a company will first be obtained through the published financial statements. Earnings volatility will be measured by the %age change of current year's earnings as compared to the prior year's earnings.

Earnings volatility =

$$\sqrt{E_t - E}$$

Whereby;

E1 = represent current year's earnings at time zero

E0= represent expected earnings taken as the average of the 5 years under review.

2.4 Data Analysis

Linear regression analysis will be used to analyse the data. Regression analysis is used in finding out whether an independent variable predicts a given dependent variable (Zinkmund, 2003). The regression model to be used will be of the form.

$$Y = a + Bx$$

The analysis will show how the volatility in earnings is related to dividend pay-out of firms listed at the NSE. Y is the dividend pay-out obtained by a firm after the volatility in earnings. a, will be the constant dividend pay-out a firm maintains irrespective of the earnings made in a year. It represents the %age of earnings paid out to shareholders in the form of dividends. It represents the Y intercept in the equation.

The regression coefficient B, will indicate whether there is a relationship or not between earnings volatility and dividend pay- out. If there is a relationship, it will be any other value other than zero. If there is no relationship, the regression coefficient will be zero. The sign on the regression coefficient indicates the nature of the relationship. If it's positive, it means that as earnings increase the dividend pay-out ratio will also increase and vice versa. The Pearson product moment correlation coefficient will be used to measure the strength of the relationship. The correlation

coefficient ranges between +1 and -1 inclusive. When the correlation coefficient is between 0.5 and 1, it means that there is a strong positive relationship and vice versa. If it is between 0 and 0.5, it means there is a weak positive relationship between earnings volatility and dividend pay-out and vice versa.

X, will be the earnings volatility of the firm in a particular year period as calculated from the published financial statements. The study will analyse data of the NSE listed companies for a period of five years. (2008-2012). From the literature review, there appears to be a positive relationship between earnings and dividend pay-out. The data analysis aims at establishing the effects and relationship of earnings volatility on dividend pay-out of a firm. The presentation of data will be in tables and visual presentation in order to make it simple and easy to understand.

3. Results and Discussions

The study sought to find out the trend of dividend pay-out and earnings volatility over the five-year period (2008-2012). The table below shows the findings of the study.

Table 1. Descriptive statistics for Dividend Pay-out and Earnings Volatility.

YEAR	2008	2009	2010	2011	2012	μ	δ	N
Dividend Pay-out	2%	23%	3%	28%	33%	17.8%	14.4	5
Earnings Volatility	509	442	438	618	521	505.6	73.3	5

Source: Research data, 2013

From table 1 above, it was observed that the dividend pay-out varied in each of the five years under study. Earnings volatility also varied randomly over the period under study year 2012 at 18%. Market return and return on equity were observed to co move.

3.1 Market analysis of dividend pay-out and earnings volatility

The study sought to examine the relationship between dividend pay-out and earnings volatility over the five-year period for the market. The regression model of the form $Y = \alpha + Bx + \beta$ was fixed to the data. The following tables show the results.

Table 4.2:1

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.472 ^a	.223	-.036	14.66699

a. Predictors: (Constant), Earnings volatility

Table 4.2.2

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-29.159	51.001		-.572	.608
	Earnings volatility	.093	.100	.472	.928	.422

a. Dependent Variable: Dividend pay-out

Source: Research data, 2013.

From tables 4.2.1 and 4.2.2 above, it was found that there is a positive relationship between dividend pay-out and earning volatility. However, the relationship is not statistically significant as the correlation coefficient is below 0.5 implying there is a weak positive relationship. From table 4.2.1 above, earnings volatility account for 22.3% of the dividend pay-out.

3.2 Firm analysis of dividend pay-out and earnings volatility

The study sought to examine the relationship between dividend pay-out and earnings volatility over the five-year period for individual firms. The regression model of the form $Y = \alpha + Bx + \beta$ was fixed to the data. The following tables show the results.

3.2.1 Correlation Coefficient

The Pearson product moment correlation coefficient will be used to measure the strength of the relationship between the dividend pay-out and earnings volatility. The correlation coefficient ranges between +1 and -1 inclusive. A strong positive relationship is indicated by a correlation coefficient that ranges between 0.5 and 1. A strong negative correlation coefficient is indicated by a correlation coefficient that ranges between -0.5 to -1.

5. Conclusions

The research study concluded that earnings volatility to some minimal extent, influenced the dividend pay-out of individual firms. The final correlation coefficient for all industries showed that the relationship between earnings volatility and dividend pay-out was not strong. Earnings volatility could therefore not be used to predict the dividend pay-out of individual firms. The influence of the volatility in earnings was found to be limited however by other factors characterized by the individual firm policies. Some firms that made huge profits ended up issuing a low dividend pay-out in the five years under review. In most firms the years when a high volatility in earnings was recorded also indicated a lower dividend pay-out. This gave an inverse relationship between the two variables. A high Earnings volatility therefore meant a low dividend pay-out for these firms and vice versa

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Determinants of Liquidated Petroleum Gas Usage Among Households in Garissa Town, Kenya

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Abstract

In recent decades, there has been an increasing patronage of Liquefied Petroleum Gas (LPG) throughout the world. Subsequently, the supplies of LPG are growing to meet demand. In 1985, world supply was approximately 114 million tonnes and this was expected to increase to 240 million tons in 2005. This study focused on the key determinants of Liquidated Petroleum Gas (LPG) usage in Garissa Urban Centre. The Specific objectives were, to find out the influence of household size, household income levels, head of household and the influence of formal education levels on Households Liquidated Petroleum Gas (LPG) usage in Garissa Urban Centre. The study adopted a descriptive cross-sectional survey research design. The researcher used questionnaires which were conveniently administered to the respondents during data collection. A sample of 100 respodents was used. The Statistical Package for Social Sciences (SPSS) was used in the data analysis process. Descriptive and inferential statistics were used for data analysis. The former comprised frequencies and %ages that were used to describe the study variables. The latter comprised of Pearson Chi-square (X^2) test of independence was used at 95% confidence level. Results of the study revealed significance relationships between the study independent variables (household size, house income, household head, and level of formal education of household head) and the dependent variable (usage of LPG). The study recommends the need for the County and national government policy and commitment from LPG manufacturers and marketers for the expansion of existing LPG distribution framework to enhance accessibility, availability and affordability to LPG consumers in order to scale up LPG usage. Also, County government in liaison with other stakeholders such as churches and NGOs need to develop and implement a community-wide educational programme that would address the misconceptions regarding LPG usage and increase awareness about the benefits of using LPG as a source of energy. Moreover, there is need for capacity building among households that would promote creation of awareness in LPG usage which could be enhanced through media campaigns cantering on energy issues. Lastly, there is need for involving both genders in energy related matters so as to promote diversity in sharing and implementing of knowledge, skills and ideas that would help in encouraging usage of LPG as a source of energy.

Keywords: determinant, household size, household income, household head, household formal education, household, usage

1. Introduction

In recent decades, there is an increasing patronage of Liquefied Petroleum Gas (LPG) throughout the world. Subsequently, the supplies of LPG are growing to meet demand. In 1985, world supply was approximately 114 million tons and this was expected to increase to 240 million tons in 2005 (Purvin & Gertz, 2000). Marful-Sau (2009) attributed the unreliable electricity supply to low generating capacity, in the midst of increasing national demand. FEMA (2005) suggested energy targets which

included; 50% of inhabitants in rural areas should use modern energy for cooking and 75% of the poor in urban and peri-urban should have access to modern energy. The desired transition from traditional fuels to modern fuels may not be widely achieved unless policy makers understand the factors that determine demand for the various forms of energy and formulate appropriate policies.

This study examines the demand for Liquefied Petroleum Gas (LPG) in Kenya. LPG is a form of modern fuel used for cooking, heating and lighting in households. LPG is also used in industries particularly for manufacturing of ceramic and glass, chemical processes, soldering, welding, flare cutting, medical & laboratory use. The use of LPG is desirable due to its clean burning characteristics and environment friendliness. Commercial energy is an economic good, capable of improving the living standards of billions of people. The critical problem for less developed economies characterized by high traditional energy consumption is to increase use of commercial energy for poverty reduction and economic growth. In Kenya, most households continue to rely heavily on traditional sources of fuel with its attendant socio-economic and environment problems which include massive deforestation and associated problems such as soil erosion, flooding, siltation of dams, loss of biodiversity.

Despite its clean -burning usefulness, versatility and tax waivers to bring down its price, LPG is not widely used in Kenya. The per capita consumption of LPG demand in Kenya has remained below the sub-Saharan average. In the National Energy Policy (Sessional Paper No. 4 of 2004) (GoK, 2004), the Government acknowledge that consumption of LPG, like other petroleum fuels, has been constrained by among other factors, limited supply facilities and inadequate distribution infrastructure which result in high prices. The Government has hence taken the initiative to encourage investment in LPG facilities throughout the country. For the development of appropriate policies and effective planning for investment and infrastructure required for promoting the use of LPG, it is imperative that the relative importance of the factors influencing demand are clearly understood. This study therefore attempted to establish the determinants of LPG usage among households in Garissa town of Kenya with the hope that the findings may give a quantitative insight on interaction of the variables, and suggest direction for future policy.

2. Objective of the study

To establish the determinants of Liquefied Petroleum Gas (LPG) usage among households situated in Garissa town.

2.1 Specific objectives

- (i) To establish the influence of household size on Liquefied Petroleum Gas (LPG) usage among households in Garissa town.
- (ii) To establish the influence of household level of income on Liquefied Petroleum Gas (LPG) usage among households in Garissa town.

- (iii) To determine the relationship between head of household and Liquidated Petroleum Gas (LPG) usage among households in Garissa town.
- (iv) To examine the influence of education of household head and Liquidated Petroleum Gas (LPG) usage among households in Garissa town.

2.2 Hypotheses of the study

- (i) **H₀₁**: There is no relationship between household size and Liquidated Petroleum Gas (LPG) usage among households in Garissa town.
- (ii) **H₀₂**: There is no relationship between level of income Liquidated Petroleum Gas (LPG) usage among households in Garissa town.
- (iii) **H₀₃**: There no relationship between head of household and Liquidated Petroleum Gas (LPG) usage in Garissa town.
- (iv) **H₀₄**: There no relationship between education of household head and Liquidated Petroleum Gas (LPG) usage in Garissa town.

3. Methodology

The study adopted a descriptive cross-sectional survey research design. This design was aimed at providing insights into the research problem by describing the variables of interest as well as providing answers to questions like: Who, What, When, Where, How. The study was carried out in Garissa County, specifically within Garissa Township. Garissa County has a total population of 623,060 (male population of 334,939 and a female population of 288,121) (census 2009). The choice for this area was facilitated by the fact that Garissa town is the largest and rapidly growing urban centre in the former North Eastern province.

The target population of the study comprised all household heads in all households living in Garissa town. This population was considered to have the information necessary to the completion of the study given its topic. A total of 100 households was considered since the total population was more that 1000(Creswell, 2011). The study used a questionnaire for data collection.

Descriptive statistics including frequency distribution, percentages, mean and standard deviations were used to summarize the responses of the respondents from the questionnaire. To test the significance of the relationships amongst the study variables, Chi-square test of association was used at 95% confidence level. The relationships were considered significant at $p < \text{or equal to } 5\%$.

4. Results and discussions

4.1 Household size and LPG usage

The study sought to determine the relationship between the household size and usage of LPG. Results of the analysis of the collected data are presented in the Table 1.

Table 1. Household size and usage of LPG

Household Size (no. of members)	Usage of LPG		Statistics
	Yes	No	
1	6 (75.0%)	2 (20.0%)	$\chi^2 = 14.71, df = 3, p < 0.05$
2-3	25(78.1%)	7(21.9%)	
4-5	20(46.5%)	23(53.5%)	
>5	4(23.5%)	13(76.5%)	

Source: Research Data

From Table 1, majority (75.0%) household heads whose family had only 1 member were using LPG as a source of fuel. Likewise, majority (78.1%) with 2 to 3 family members were using LPG. However, 76.5% of those who had 5 members and above in their families were not using LPG as a source of fuel. The relationship between household size and usage of LPG was found to be significant ($\chi^2 = 14.71, df = 3, p < 0.05$) demonstrating that size of the household size could determine usage of LPG by the household. Therefore, H_{01} was rejected.

4.2 Level of Income and Usage of LPG

The study sought to determine the relationship between the household income per month and usage of LPG. Results of the analysis of the collected data are presented in Table 2.

Table 2. Household income and LPG usage

Household income (earnings per month in Kshs)	Usage of LPG		Statistics
	Yes	No	
< 10,000	5 (23.8%)	16 (76.2%)	$\chi^2 = 23.71, df = 4, p < 0.05$
10,000 – 20,000	10(47.6%)	11(52.4%)	
20,000 - 30,000	14(58.3%)	10(41.7%)	
30,000 – 40,000	20(76.9%)	6(23.1%)	
>40,000	08(100.0%)	0(0.0%)	

From Table 2, majority (76.2%) household heads earning less than Kshs 10,000 were not LPG as a source of fuel. Likewise, majority (52.4%) households earning between Kshs 10,000 to 20,000 were using not LPG. However, 58.3% of those earning between Kshs 20,000 and 30,000 and 76.9% earning between Kshs. 30,000 to 40,000 were using LPG as a source of energy. For those earning above Kshs 40,000, all (100.0%) were using LPG as a source of energy. These results demonstrated that household income was a determinant of LPG usage – the more the household heads earned per month, the more probable they could use LPG as a source of energy. The relationship between household income per month and usage of LPG was found to be significant ($\chi^2 = 23.71, df = 4, p < 0.05$) demonstrating that size of the household income could determine usage of LPG by the household. Therefore, H_{02} was rejected.

4.3 Head of Household and Usage of LPG

The study sought to determine the relationship between the head of household and usage of LPG. Results of the analysis of the collected data are presented in the Table 3.

Table 3. Household Head and LPG usage

Head of Household	Usage of LPG		Statistics
	Yes	No	
Fathers	40(75.5%)	13 (24.5%)	$\chi^2 = 8.23, df = 2, p < 0.05$
Mothers	11(35.5%)	20(64.5%)	
Elder siblings	11(68.8%)	5(31.2%)	

From Table 3, majority (75.5%) households headed by a father used LPG as a source of energy. For those that were headed by mothers, majority (64.5%) were not using LPG as a source of energy. Likewise, those that were headed by elder siblings, majority (68.8%) were using LPG as a source of energy. The relationship between head of household and usage of LPG was found to be significant ($\chi^2 = 8.23, df = 2, p < 0.05$) demonstrating that size of the household income could determine usage of LPG by the household. Therefore, H_{03} was rejected.

4.4 Education Level of Head of Household and Usage of LPG

The study sought to determine the relationship between the education level of head of household and usage of LPG. Results of the analysis of the collected data are presented in Table 4.

Table 4. Level of education of Household and LPG usage

Household income (earnings per month in Kshs)	Usage of LPG		Statistics
	Yes	No	
Primary education	20 (42.5%)	27 (57.5%)	$\chi^2 = 11.75, df = 2, p < 0.05$
Secondary education	22 (78.6%)	6(21.4%)	
College	20 (80.0%)	5(20.0%)	

From Table 4, majority (57.1%) of household heads with primary level qualification were not using LPG as a source of energy. For those households that had heads with primary and college education qualifications, majority (78.6%) and (80.0%) respectively were using LPG as a source of energy. The relationship between education level of head of household and usage of LPG was found to be significant ($\chi^2 = 11.75, df = 2, p < 0.05$) demonstrating that level of education of the household head could determine usage of LPG by the household. Therefore, H_{04} was rejected.

5. Summary of Findings

The study sought to establish the relationship between household size and LPG usage and focused on households in Garissa town. Results indicated that household size and LPG usage were related and the relationship was statistically significant. Level of households' income per month was found to have a statistically significant relationship with LPG usage.

Results on the relationship between household head and LPG usage revealed significant relationship between the two variables.

In addition, there was a significant relationship between education level of households and LPG usage by the households.

5.2 Conclusions

On the basis of the study major findings, the following conclusions are made:

1. Size of household is an important determinant of LPG usage among households. That is, the higher the number of individuals in the households, the less likely they are going to consider LPG as a source of fuel.
2. Income earned by heads of household per month is a catalyst towards LPG usage. That is, the higher the income earned, the more likely the household could consider LPG as a source of fuel.
3. The person heading the household is an antecedent towards LPG usage. That is, households headed by fathers are likely to consider LPG as a source of energy than those headed by mothers or elder siblings.
4. Education level of household head could determine whether the household would consider LPG as a source of fuel.

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Motivation and Role Modelling as Determinants of Academic Excellence among Students in Gretsia University, Kenya

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Abstract

To be motivated means to be moved to do something. A person who feels no impetus or inspiration to act is thus characterized as unmotivated, whereas someone who is energized or activated toward an end is considered motivated. This study sought to determine motivation and role modelling as key factors contributing to academic excellence amongst the students of Gretsia University. The researcher adopted a descriptive survey research. The target population was the fulltime students of Gretsia University. A representative sample was drawn from the population using convenient sampling. The data collection tool was a questionnaire with most questions being structured closed ended and one open ended question. The questionnaires were administered through personal contact where the researcher gave the questionnaire and picked after one day to allow the respondents to fill them. These questionnaires were then coded and the data collected analysed using SPSS. Motivation and role modelling are key factors to ensuring excellence performance. Participation, recognition, rewards, realistic expectation and fairness are key elements that lead to motivated students which leads to exemplary performance. Inspiring, selflessness, commitment and clear values lead to good character. Therefore, for the universities and other institutions of higher learning need to focus on guiding the students to perform well academically as well as having good character in order achieve their goals and to ensure that they release people of good standing to the world and those who can bring economic development to the country. The world has become diverse and it is global. All students must assess themselves with the rest of the world. This study sought to establish those factors which must be carefully considered by universities in order to be sustainable in delivering their mandate of producing all round students who would good citizens with good character and ready to serve the country to economic development. The research was conducted in Gretsia University targeting the fulltime students in the three programs offered, thus certificate, diploma and degree. The target population were fulltime students of Gretsia University. The researcher obtained sixty questionnaires from respondents through stratified and convenience sampling techniques. The primary data was obtained from the respondents while the secondary data was obtained from the registrar office. Data processing and analysis: Data was collected through questionnaires, coded, entered and analysed using Statistical Packages of Social Science (SPSS). The conceptual framework showed that motivation and role modelling were the independent variables and academic excellence was the dependent variable. The finding of this research if followed by Gretsia University and other universities would improve the students' belongingness to the university with positive attitude towards education and with focus on what they want to become in future. Out of the 60 respondents, the results showed that there is a positive relationship between the two independent variables (motivation and role modelling) and the single dependent variable (academic excellence amongst students in Gretsia University). The descriptive statistic showed that role modelling was present as it had a mean of 3 and above on a scale of 1 to 5-point scale. The motivation indicators, 1 had a mean below 2 meaning that strategies should



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put in place to improve on it them. Most students felt that rewards should be introduced as motivation indicator. The regression model had a R^2 of 65.3% meaning that the dependent variable (academic excellence) can be explained by the independent variables motivation and role modelling)

Key Words: Motivation, Role Modelling, Academic Excellence

1. Introduction

The term motivation is derived from the Latin word 'movere' which means 'to move'. The idea of movement in relation to motivation is understandable if we look at some of the definitions of motivation. A person who feels no impetus or inspiration to act is thus characterized as unmotivated, whereas someone who is energized or activated toward an end is considered motivated Ryan *et al* (2000).

Motivation is willingness to do something' Oxford Dictionary (2013), the condition of being eager to act or work, a force or influence that causes someone to do something Merriam Webster (2013). There are two types of motivation: intrinsic and extrinsic motivation. Intrinsic motivation comes from within and is associated with the joy or passion that the task gives the learner rather than any reward it brings Irvin *et al* (2007). Extrinsic motivation is something to do with external factors associated with the task such as assessment.

A role model is someone who other individuals aspire to emulate, either in the present or in the future. As one would suspect, social scientists continue to find the concept of role models fascinating. The term role model comes from sociologist Robert K. Merton, whose work-centred on social groups. Merton discovered that rather than modelling individual behaviours, people tend to model sets of behaviour. These sets of behaviour are demonstrated by people who occupy certain roles in society.

Common role models include well-known actors, public figures such as teachers or other educators, and parents or other family members, Terry Halpin (2015). A role model is a person other people look up to in order to help determine appropriate behaviours. It can be positive or negative. Positive role models offer a range of useful behaviours while negative role models offer examples of harmful behaviours.

2. Objectives of the Study

The objective of the study was to determine how motivation and role modelling of university students may lead to attainment of academic excellence in Greta University in Kenya

3. Methodology

The research adopted descriptive survey design Orodho (2009). This is because descriptive research design is a scientific method which discovers and measures the cause and effect of relationship among variables. The research was carried out in Greta University. The target population was 730 made up of fulltime students. The

sampling method used was stratified random sampling Thomas D. and Mckeown B. (2013). Stratified method was used because of the different categories of students. Thus certificate, diploma and degree. The sample size was 60 calculated according to Kothari (2014). Both primary and secondary data was used. It involved examination of the students' base from the registrar's office in Gretsas University for the last four years and a questionnaire was designed incorporating the measures of motivation and role modelling. The researcher used both quantitative and qualitative data in order to get a representative sample. The researcher assessed the factors that would lead to academic success in Gretsas University by studying the requirement of the students and what needs to be done by the university council, lecturers and administration to improve the academic excellence. Data was collected using structured questionnaire with closed ended questions Creswell (2014). The data was processed and analysed using descriptive statistics and regression analysis $Y=a+\beta_1x_1+\beta_2x_2$. The computer software used was Statistical Packages for Social Sciences (SPSS) version 6.

4. Results and Discussions

4.1 Background Information

The background information for the study was made up of respondents' study program and the age which were likely to influence the degree of academic excellence through motivation and role modelling.

4.1.1 Program of Respondents

Information on program was essential as there three different programs offered: Certificate, Diploma and Degree. The respondents were 60 of which 3(5%) were certificate, 18(30%) diploma and 39(65%) were degree students. These findings show that the degree respondents were more than the categories and hence the opinion of the study carried more weight. This is shown in table 1.

Table 1. Program of respondents

	Frequency	Proportion
Certificate	3	5%
Diploma	18	30%
Degree	39	65%
Total	200	100%

4.1.2 Age of respondents

Most of the respondents were in the 21-30 years age group at 75%, followed by those in the under 21 years at 2% and the 31-45 years age group at 3%. This finding as shown in Table 2, shows that majority of the respondents were pretty young and really the group that requires motivation and role modelling in order to make right choices that would lead to academic excellence and good character.

Table 2. Age group of respondents



Category	Frequency	Proportion
Under 21	13	22%
21-30	45	75%
31-45	2	3%
Total	200	100%



4.2 Descriptive Statistics on Motivation

The indicator used to measure motivation, three of them had a mean of above 3 which showed the students experience them, one element was at the average and one was below 2 meaning it is not practiced. The findings as per table 3 showed that there need to introduce rewards to make the student eager to compete.

Table 3. Descriptive statistics on motivation

Indicator	Mean	Std Deviation
Rewards	1.88	1.059
Recognition	2.68	1.334
Realistic	3.55	1.156
Participation	3.60	1.244
Fairness	3.72	1.250

4.3 Descriptive Statistics on Role Modelling

The indicator used to measure role modelling, all of them had a mean of above 3 which showed the students experience them. The findings as per table 4 showed that these elements are but there is need to keep on monitoring and improving where possible.

Table 4. Descriptive Statistics on Role Modelling

Indicator	Mean	Std Deviation
Selflessness	3.28	1.439
Commitment	3.42	1.306
Clear Values	3.93	0.899
Passion & inspiration	4.02	1.097

5. Summary and Conclusions

The data analysis showed that there was positive relationship between motivation and role modelling towards academic excellence. Regression analysis of 65.3% ($R^2 = 0.653$), reinforces the positive influence of motivation and role modelling to academic excellence. The mean of role modelling is above average. Therefore, role modelling is evident, the mean of motivation below average is indicative of low motivation

6. Recommendations and Further Research

This study made the following recommendations:

There is need for motivation to be increased through a variety of motivational activities and the indicators of role modelling were above average, however they were not exhaustive

The research may be carried on as an intervention study on the same students as well as a collaborative study involving students and lecturers to evaluate the effectiveness of motivation and role modelling on academic excellence. There would be need of using a large sample to collect empirical data across different strata

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Capital Structure and Performance of Non-Financial Firms Listed at the Nairobi Securities Exchange, Kenya

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Abstract

The purpose of this study was to investigate the influence of capital structure on performance of non-financial firms listed at the Nairobi Securities Exchange in Kenya for a five-year period (2013-2017). At the start of this research period, numerous companies listed at NSE had embarked on debt acquisition to finance their development projects. However, some companies such as Uchumi Supermarkets and Kenya Airways reported huge loss. Previous research studies indicate that a firm with high degree of financial leverage seems to have an optimal capital structure and thus it leads to better financial performance while others such as seminar paper of the Modigliani-Miller argue that it has no influence on the firm's value. No new research, since 2015, has been done on the influence of capital structure on performance of listed non-financial firms in Kenya. The researcher undertook this study to find out whether capital structure of listed non-financial firms had any influence on performance between 2013 and 2017 and also give recommendations to business managers on capital structure. Specific objectives were to assess the sources of finance of companies and analyse the effect of capital structure employed by firms on profitability (Return on Equity). The population of the study was all the 61 firms listed at the NSE but the study narrowed to a sample of 32 firms using the random selection sampling technique from the 41 firms in the non-financial sector. The study used secondary data. Descriptive research design was employed to achieve the objectives of the study. Bivariate analysis was applied to explain relationship of variables simultaneously as presented in tables and graphs. The researcher carried out statistical analysis facilitated by correlation and regression analysis with aid of Statistical Package for Social sciences (SPSS). The findings obtained showed that capital structure has an inverse influence on the financial performance of non-financial firms listed at NSE. The findings pointed out that, financial performance decreases with the increase in the debt ratio in the capital structure. The research study recommended that firms should decrease the amount of the financial leverage in their capital structure in order to enhance the financial performance and create huge value to its shareholders.

Key Words: Capital Structure, Performance of Non-financial Firms, NSE, Leverage, Liquidity

1. Introduction

Locating the optimal capital structure has been the focus of attention in many academic and financial institutions that probe into this area. Capital structure can be defined as the permanent financing represented by long-term debts and shareholders' equity (Weston and Copeland, 1992). At the company level, capital investment decisions have an effect on firms' profitability. At the national level,

efficient allocation of resources plays a crucial role in improving the general economy of a country which has an impact on firms' future survival.

Capital structure theories and their relationship with firms' profitability and firms' value have been under scrutiny since the seminar paper of Modigliani and Miller (1958) where he stated that, in absence of corporate taxes, information asymmetry, bankruptcy cost, transaction costs and in an efficient market, the value of the firm is not influenced by financing decision adopted by a firm. Universally, limited studies have been done to investigate whether capital structure influences performance of listed non-financial firms in the emerging capital markets.

The information asymmetry proposition of Myers & Majluf (1984) proposes a negative correlation because companies regardless of their market position would rely on the retained earnings for expansion instead of costly external finance.

The general objective of this study was to investigate the influence of capital structure on performance of non-financial firms listed at the NSE. Specific objectives were to assess the liquidity of companies under study and analyse the effect of capital structure employed by firms on profitability (ROE).

The independent variable is the capital structure which is made up of various sources of finance. The capital structure in this case has been measured by debt and equity. Another independent variable is the liquidity. The dependent variable is the performance of non-financial firms listed at the Nairobi Securities Exchange. Performance was measured by profitability ratio.

2. Literature Review

Experimental literature on capital structure begun with the proposition on its irrelevancy (Modigliani and Miller, 1958). Two notable dominant theories of capital structure are the trade-off theory (Myers, 1984) and the pecking order theory (Myers & Majluf, 1984).

2.1 Trade-Off Theory

This theory was proposed by Myers (1984). The theory holds that, there exists an optimal capital structure for every firm, which can be determined by balancing the costs and benefits of equity. As a result, a firm decides on how much debt capital and how much equity capital to include in their capital structure by balancing on the costs and benefits of each source.

Agency expenses results from divergence of interest among the different firm stakeholders and because information asymmetry (Jensen & Meckling, 1976). According to Myers (1984), firms with more tangible assets should have high debt ratios while firms with more intangible assets should depend more on equity capital because they are subject to lose of value in case of liquidation. Under this theory, firms should evaluate the various costs and benefits of each debt level and determine an optimal debt structure that balances the incremental costs and

incremental benefits (debt tax shields against costs of bankruptcy). This further explains why firms are partly financed by equity and also partly financed by debt in their capital structure.

2.2 Pecking Order Theory

According to this theory by Myers & Majluf (1984), there is no predefined optimal capital structure but instead asserts that, firms displays different preference for utilizing internal funds or retained earnings over external capital. It is the one of the most significant theories of company leverage and goes against the firm's idea of having distinctive combination of equity and debt finance, which minimizes the corporation costs of funds.

The theory argues that, as firms becomes more profitable, the lesser they seek external funds since they would have enough internal funds to support their investment projects (Myers, 1984). According to Myers and Majluf (1984), investors places low value on the company stock because of the inability of managers to convey information on the company prospects including the new investment opportunities identified.

2.3 Agency Theory

This theory relates to the relationship that exists among the shareholders as the principal and the company agent (company's managers). An agency association comes into existence when one or many persons, referred to as principals, employ one or many other persons, known as agents, to carry out some service and then give them authority to make decision on his behalf. Jensen & Meckling (1976) suggests that, the best capital structure can be attained by minimizing agency costs which emanates from the conflicting managerial interests with those of debt holders and company owners.

2.4 Empirical Review

Adekunle (2009) did a research study on the impact of financial structure on the firm's profitability in Nigeria for the period 2001 -2007. He sampled 30 non-financial companies quoted in Nigerian stock exchange and collected secondary data from company's financial statements. The study used debt ratios as the independent variables and ROA and ROE as the dependent variable. The study employed ordinary least square estimation approach and established that debt ratio has a significant negative relationship with the performance of the firms.

Langat et al. (2014) assessed the effect of debt financing on the profitability the Tea Development Authority processing factories in Kenya. The study used ROE and ROA to measure firm performance. The study found both long-term debt and total debt have a positive effect on firm's performance at 1% and 5% respectively. Short-term debt on the other hand was found to have a negative relationship with the firm

profitability. The study then concluded that sourcing finances through short-term debts by tea processing factories does not lead to profitability.

3. Research Methodology

The study used descriptive design to explain conditions as they are (Kothari, 2004). Data is collected and analysed in order to describe current conditions or relationships concerning a certain specific problem (Mugenda and Mugenda, 2003).

The design enabled arrangement, summarization and presentation of data and also observation of trends and relationships between variables under study. The target population was 41 non-financial firms quoted at the Nairobi Securities Exchange for the years 2013 to 2017.

The researcher chose listed firms due to data availability and reliability as they are required by law to provide end of year financial reports. The sampling frame was the list of quoted firms that was obtained from latest NSE records to ensure currency, completeness and consistency. Secondary data was collected from published reports of quoted non-financial firms for the period 2013-2017. The extracted data provided information to compute the relevant means and ratios in this study.

Collected data was analysed and summarized using quantitative approach notably descriptive statistics. Frequency distribution tables and graphs were used to tabulate data. Correlation analysis and regression analysis was also be used to establish the relationship between debt capital and the performance. Also, ANOVA analysis and the t-test will also be performed to establish the relationship that exists between the variables of the study.

To ascertain the effects of capital structure on the financial performance of non-financial firms quoted at NSE, regression analysis was conducted using the following analytical model:

$$Y = a + B_1X_1 + B_2X_2 + B_3X_3 + e$$

Where:

Y = Financial performance measured by ROE

a = Constant value of performance without the independent variables

B1 to B3 = Shows the coefficients of the model

X1 to X3 = represent the independent variables of the study

e = error term

When testing statistical significance of regression analysis between capital structure and financial performance, all statistical calculations were done at 95% confidence interval with a p-value of 0.05 or less being considered sufficient for a statistically significant correlation. The goodness of fitness of the regression model was tested using Analysis of Variance (ANOVA). F critical value and a p-value of 0.05 or less will be used as indicators of the regression model's reliability.

4. Findings and Discussions

Out of the total population of 41 non-financial companies quoted at the Nairobi Securities Exchange, secondary data for the 32 firms was gotten representing 78% response rate which was viewed reasonable for the subsequent statistical analysis. The secondary data was subsequently analysed by aid of regression analysis.

4.1 Descriptive Statistics

The descriptive statistics covers the mean, minimum, maximum and the standard deviation. Descriptive statistics shown in Table 1 covers the non-financial firms from 2013 to 2017.

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ROE	32	-0.159	0.250	0.061	0.094
Leverage	32	0.011	6.687	1.896	1.567
Liquidity	32	0.146	1.231	0.609	0.218

4.2 Inferential Statistics

Correlation analysis, regression analysis and the analysis of variance was employed in facilitating data analysis in order to meet study objectives.

4.2.1 Correlation Analysis

It measures the extent to which research variables are related. Correlation was employed to establish the strength of the relationship which exists among dependent and independent variables whereby debt ratio and liquidity were utilized as independent variables while the return on equity was used as the dependent variable. Pearson correlation varies from -1.00 to +1.00 with positive values indicating positive relations while negative values suggest negative relations among study variables.

Table 2. Correlation Analysis

VARIABLE	ROE	LEVERAGE	LIQUIDITY
ROE	1		
LEVERAGE	-0.439	1	
LIQUIDITY	0.441	-0.456	1

All the research study variables are perfectly correlated with themselves as revealed by the correlation coefficient of positive one (1). Performance as measured by ROE has a negative correlation with leverage as measured by debt ratio (-0.439). Liquidity has a positive correlation with firm performance (0.441).

4.2.2 Regression Analysis

Table 3. Model Summary

MODEL	R	R Square	Adjusted Square	R Std. Error	Estimate
1	.563	.317	.301	.0515	

Independent variables=Leverage and Liquidity

Dependent variable=ROE

Table 3 indicates that the r-squared for the was 0.317, which shows that the independent study variables can be applied in explaining about 32% of the total variations in the financial performance of non-financial firms quoted at NSE.

4.2.3 ANOVA

Table 4. Model Coefficients

Model	Sum of Squares	Df	Mean Square	F	Sig.
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Regression	.126	3	.042	6.658	0.001
Residual	.240	35	.0069		
Total	.366	38			

The research study determined that all the variables were significant at their significance level which was lower than 0.05. The predictor variables were regressed against the financial performance of firms listed at NSE.

The debt ratio has a negative effect on the financial performance. Firm's liquidity was found to have a positive relationship with the financial performance while the asset tangibility has a negative effect on the firm value. The significance value of .001 from the ANOVA results of the study shows that the model was significant at 5% significance level with an F-ratio of 6.658.

Similar findings were found by Adekunle (2009) who did a research study on the impact of financial structure on the firm's profitability in Nigeria for the period 2001-2007. He sampled 30 non-financial companies quoted in Nigerian stock exchange and collected secondary data from company's financial statements. The study used debt ratios as the independent variables and ROA and ROE as the dependent variable.

5. Conclusions

The study concludes that there is a strong relationship between capital structure channels and firm financial performance of non-financial firms listed at Nairobi Security Exchange and that 35% of the total changes in financial performance of the non-financial firms listed at NSE can be attributed to changes in the debt level in the capital structure and firms liquidity.

From the ANOVA statistics, the study concluded that the regression model derived is reliable and has goodness of fit. The research study concludes that the capital structure as measured by the debt ratio has a significant influence on the financial performance of non-financial firms listed at NSE. This is denoted by the negative correlation between the debt ratio and the financial performance.

Finally, the study concludes that asset tangibility is negatively correlated with the financial performance of firms listed at NSE. Adekunle (2009) findings also support this conclusion and argue that capital structure has a negative correlation with the financial performance. However, the findings contradicted with the research findings of Masiega *et al* (2013) & Jensen & Meckling (1976).

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CLUSTER 3	Sub-Theme 5: Education
	Sub-Theme 6: Community Development
	Sub-Theme 7: Communication
	Sub – Theme 8: Health Sciences

Moderators:

1. **Dr. Judith Jefwa:** University of Nairobi
2. **Dr. Justus Osero:** Kenyatta University
3. **Prof. Wabuke Bibi:** Grets University
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Effects of Teaching through Problem-Solving on Students' Performance in Mathematics in Secondary Schools in Murang'a County, Kenya

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Abstract

Research has shown that problem-solving supports meaningful learning experiences that encourage Mathematics achievement. Students' poor performance in Mathematics at Kenya certificate secondary education (KCSE) in Murang'a County has been of the concern to people including parents, teachers and other stakeholders. This is because performance in Mathematics determines student's participation in science oriented programmes at tertiary level. Science programmes have been targeted by the country (Kenya's) to support their development agenda as described in the current vision 2030 on social, economic, technological and industrial development. This study examined the effects of teaching through problem-solving on students' Mathematics performance in secondary schools in Murang'a County. The study was guided by the following two objectives to: compare students' performance in Mathematics for those taught using problem-solving strategies with those taught using conventional strategies; and to determine whether problem-solving is better approach to teaching Mathematics in secondary schools in Murang'a County. The study employed quasi-experimental design. The Solomon Four - Group design in which 16 schools were sampled according to the category in their previous four years KCSE performance. The target population was 104562 students and 1365 Mathematics teachers in 340 secondary schools in Murang'a County. Accessible population was from three students comprising 28,475. Four schools randomly sampled represented each category where two schools were experimental and two schools were control comprising a sample size of 544 (2%) students and 16 teachers. Eight schools participated in pre-test and all 16 schools received post- test Mathematics performance tests after intervention. Data from the research instruments were coded and analysed using Statistical Package for Social Sciences (SPSS) version 22. Analysis of Variance (ANOVA) was used test hypotheses where more than three or more, independent t-test was used to test hypotheses at 0.05 level of significant where



two variables were involved and Cohen's d was to determine the effect of power test. Analysis of data generated from students pre-test revealed that, the effect of problem-solving performance was insignificant ($t(273) = 0.924$, Cohen's $d = 0.17$ which is small, $p > 0.05$). This revealed that students' performance was the same before the commencement of the treatment. Post-test results from the study on the effects of problem - solving on students' performance indicated a significant difference ($F(540) = 2.537$, $p = 0.0025$, $\alpha < 0.05$). This implies that intervention strategy has significantly improved students' performance. The overall improvement in Mathematics performance benefits students' in secondary schools in Murang'a County to pursue their future careers choices.

Keywords: Mathematics Learning, Problem-Solving Teaching, Academic Performance

1. Background to the Study

Mathematics teaching involves the learner, teacher and the society. To achieve the intended aims and goals, the three must be involved (Lesh & Zawajewki, 2007). This study involved learners and teachers through problem – solving to obtain meaningful solutions to mathematical problems. The learner was involved directly in solving real life problems. This was done using problem - solving strategies in specified learning conditions in schools. These conditions provided different learning situations under controlled classrooms.

In Plato's division of the liberal arts trivium which included Mathematics, Literature and Gymnasium. This historical perspective has shown that mathematical knowledge occupies the highest status in form of cognitive knowledge. These early fathers of Mathematics considered it to be most essential subject because it teaches students how to think, how to be creative and resourceful by providing them with tools to use (Microsoft Encarta, 2009). According to these early Philosophers, Mathematics is the subject that takes a significant position in developing the individual logical reasoning and plays a significant role in enhancing the country's socio - economic development. This means that social functions in our daily activities involve Mathematics. These social functions include merchants, economics, technology, engineering and biological sciences (Uchechi, 2013).

According to Singer and Voica (2013), in ordinary life, people naturally solve problems in order to satisfy their various needs. Problem-solving is a long life process which is

practised in and out of school. The main objective of secondary school education is to equip students with skills for solving problems to a pertaining variety of areas. Christy and Lima (2007), problem-solving involves higher cognitive skills organised in a systematic order applying an approach of collecting information in order to make a synthesized educated decision. A supportive teacher who engages students in a classroom environment is important to help in developing students' self-confidence in understanding mathematical concepts (Christy & Lima, 2007).

In Nigeria, good performance in Mathematics is one of the basic requirements for admission into tertiary institutions (Adeyemi, 2011). Candidates with distinction and good credit grades in five subjects including Mathematics and English language possess the required grades for admissions into Nigerian universities. Emaikwu (2012) in his research 'Effectiveness of three teaching methods in the measurement of students performance in Mathematics in Nigerian secondary schools' there has been drastic drop in the achievement level of learners in Mathematics for the past decades. Uchechi (2013) proposed that students' poor performance in Mathematics in Nigerian public examinations is traceable to lack of content coverage and poor teaching methods by teachers.

In Kenya, the language instruction in learning Mathematics at secondary schools contributed to low outcome in Mathematics curriculum. The students need to learn mathematical language to be meaningfully able to interpret Mathematics problems (Benson & Miheso- O'Connor, 2015). This could be provided by exposing learners to problem - solving. The resultant effect is the poor performance and low retention level in learners' achievement at the national examinations. In view of this observation, there is a serious and great concern among the educational stakeholders and parents. Mathematics is compulsory in Kenya secondary schools curriculum despite the difficulties in the teaching and learning. The poor curriculum outcome in Mathematics may affect individual future career development (Ministry of Education, MoE, 2002). Low performance in Mathematics in Murang'a County would affect future generation on career choices.

During the past four years KCSE results in Murang'a County have exposed that more than 70% of students succeeded to obtain grades D, D- and E, which are weak grades as assessed by Kenya National Examination Council (KNEC). This achievement has been similar to National Mathematics performance according to KNEC results analysis. According to Kenya Educational system, Mathematics learned in form one and form two have adequate content for students to gain a desired grade C or better since form one and form two syllabus covers paper one and papers two about 60% of national

examination. The results of Murang'a County have been on decline, although from one and two work is sufficient for someone to perform better than grade C.

Mathematics skills could be effectively passed through concentrated Mathematics instructional teaching strategies which promote learners retention and understanding (Hull, Balka & Miles, 2011). Therefore, in this study, the researcher focused on teaching Mathematics through problem - solving strategy to students in Kenya. The study found that Mathematics performance was improved in secondary schools in Murang'a County through intervention in problem-solving. This study weighed the importance on teaching Mathematics through problem-solving in context and enquiry - oriented environments in which was characterized by teacher "helping students to construct mathematical ideas while given profound opportunity in learning process"

1.2 Statement of the Research Problem

Students' poor performance in Mathematics at Kenya certificate secondary education (KCSE) in Murang'a County has been of the concern to people including parents, teachers and other stakeholders. Therefore, because increasing weak performance in most secondary schools in Mathematics in Murang'a County, there was need to study the instructional strategies preferred by practising teachers and the prominence of problem-solving teaching strategy to improve students' performance in Mathematics. Secondary schools students being unsuccessful in Mathematics might have caused by misuse of instructional strategies in which problem - solving strategy was not correctly applied.

1.3 Purpose of the Study

The purpose of this study was to examine the effects of problem-solving approach to teaching Mathematics on students' performance in secondary schools of Murang'a, County, Kenya.

1.4 Objectives of the Study

The study was guided by the following objectives:

1. To compare students' performance in Mathematics for those taught using problem- solving strategies with those taught using conventional strategies in secondary schools in Murang'a County;
2. To determine whether problem-solving is better approach to teaching and learning Mathematics in secondary schools in Murang'a County.

1.5 Research Hypotheses

The following null hypothesis was formulated to guide the study, this included:-

H₁: The problem-solving approach for teaching and learning Mathematics has no statistical significant effect on the students' performance in secondary schools in Murang'a County.

1.6 Justification of the Study

According to Vision 2030 where national ethical values for education aims, objectives and philosophy for good governance in quest for economic, social and political aspirations were articulated through problem - solving. This sustains the Kenyan nation through her commitment to democracy and the rule of law by achievement of national goals of education (Kenya Vision 2030, 2010).

1.7 Significance of the Study

The study attempted to contribute to the knowledge of problem-solving as teaching and learning Mathematics through exploration, discovery and creative thinking. This strategy can happen in a classroom environment where learners are allowed to interact. The teachers enhance their pedagogical skills on content delivery through problem-solving. The students adapted learning practices of anticipating, monitoring, selecting, sequencing and connecting, through problem – solving in a classroom environment.

1.8 Scope of the Study

This study was conducted in Murang'a County which is one among forty – seven counties in Kenya. The study covered all public secondary schools which are stratified according to their KNEC examination previous performance. The participants were Mathematics teachers and form three students. The study investigated the effects of teaching Mathematics through problem – solving strategies on students' Mathematics achievement in secondary school Mathematics.

2. Literature review: Theories of Learning Problem Solving

What are some best practices for instructional Mathematics? Generally, the best practice is action taken as a way to produce the desired Mathematics achievements. Typically, people think that the best practice is a strategy organized in a lesson to promote deep understanding of student ideas in Mathematics. The following list has been recognized as instructional strategies which are considered to be best practices in Mathematics teaching. The instructional strategies identified must ensure that activities taken are well thought to be learner-centred with emphasis on inquiry in problem – solving in Mathematics. Cooperative learning is social learning method that makes real – life connections through probing questions and scaffolding to make connections to concepts, processes and thoughtful techniques used. The problem - solving need to allow other conventional methods of teaching rather than considered to be only one programme among many strategies for teaching Mathematics.

Polya (1957) suggested that problem-solving should be the foundation of Mathematics teaching. The learner would be helped to grow in critical-thinking skills. This can promote the collaborative teaching where ideas are shared and use modified strategies and social interaction in Mathematics. Polya's studies highlighted the process of discovery, which led to his famous four step process for solving problems. Polya's book, presents four phases of teaching of mathematical problem – solving: understanding, devising plan, executing and reflection on the problem (Polya, 2004). The study investigated whether learners share in a cooperative approach to solve the problem by actively participating in thinking independently about question, issue, situation, and idea and so on, and then share their thoughts in confidence with one another. Did Murang'a County teachers allowed students to work individually?

The first phase the student attempts to understand the problem through asking questions fluently in his/her own words. The student will reframe problem in his\her own words and pointing out the unknown, given data and condition (Singer et al., 2011). Do you identify what is given and the goal? Is there enough evidence? Check whether similar problem you have solved? When applicable, the student will then illustrate the problem using a diagram and point out the unknown conditions, and underlying the statistics. According to Polya, problem-solving first phase involves interrelated applicable complementary processes of creativity and critical thinking (Polya, 1957). This will engage advanced intelligent abilities including both the construction and generation of ideas. The processes involved use experiences in problem – solving to evaluate problem solution.

The second phase is devising plan, in which the student is required to choose applicable strategy best learned and gained by solving several problems (Singer et al., 2013). You will find appropriate connections between the unknown statistics. They may ask themselves whether they have seen similar problem before. Also, they have seen the same problem in a slightly different form. Do they know related problem, which they may use directly or indirectly in reasoning? You may be obliged to consider auxiliary problems before immediate connection can be found to solve current problem. If you obtain similar problems you will eventually plan the solution accordingly. If there is no immediate connection of solution found, between what is given and the problem, the teacher asks leading questions to help the student capture a bright hint (Polya, 1957). These hints prepare student to fairly make the problem clearer.

The third phase is when the students implement proposed plan using the strategies that she\he has suggested consequently solving the problem (Singer et al., 2013). The process is carried out until a new course of action is suggested when reasonable

solution is not obtained. The student attempt to solve a given problem enough amount of time to obtain a sensible solution. If she\he is not successful, she\he will seek further hints from others in their classroom community. Otherwise she\he shelve the problem aside for a while. During this phase student accepts responsibility and ownership of their accountability for decisions and professional growth and development in order to become a life-long Mathematics learner through problem -solving. The teacher ensures that student carry out the plan encouraging checking each step. Main reason for learning Mathematics is to become better problem solvers in all aspects of life. The student asks him/herself exactly what type of information was being provided is adequate to determine all the answers being required by question (Polya, 1957). Since when learner clearly understand the answers to those two questions, learners are then ready to devise your plan and execute obtain solutions.

Finally, fourth phase will be looking back where the student examines solution obtained and reflects on it (Singer et.al. 2013). Do the answers obtained satisfy the statement of the problem? Can the solution be use data glance in different problem? Can the approach be applied to some other problem? Can the student able to extend his\her solution to a more general case? This final phase the teacher encourage student to examine their result and find out whether they can improve it differently (Polya, 2011). This process of reflecting back by reading problem carefully again and again; decide whether method used to solve the problem has been successful. Then check the work done to make answer create sense and that you have used the same term and explain their answer (Polya, 2004).

Polya (2011), Mathematics teachers allow students struggle with the problem, make it clear, comprehensible and easy for students as possible by giving hints. Teachers are tempted to provide answers, instead of describing clearer path to illuminate way of problem-solving. This is because they think demonstrating the working makes students pass the course and the final examination without fighting hard. Teachers' compassion use demonstration method ease students work since they may pass without much straggle.

It had been observed that through problem-solving, students were able to build, assess and polish their own models about Mathematics and compare with other models. In many countries different, social groups instructors were engaged since 1980s in order to teach Mathematics through problem - solving (Brown, 2007), but in Kenya, these did not happen because of Presidential directive in 1981 which directed that modern Mathematics must not be taught to the Kenyan secondary schools students (Daily Nation, 1982). Therefore, the new curriculum was developed eliminated those topics

which could have been taught using investigative methods. This was a setback for problem – solving in Kenya.

3. Methodology

The purpose of this study determined how teaching Mathematics through problem–solving strategies influenced students’ attitude and improved performance in Mathematics. This study applied quantitative methodology. The questionnaires for students, pre-test and post-test were administered to collect data. The experimental classes were provided with worksheet and taught in their respective schools using problem-solving strategy (Creswell, 2014). This study was conducted in real classroom environment where students’ behaviours were normal in both experimental and control groups.

3.1 Research Design

The quasi-experimental method in which, effects of independent variables were used in class moderated by intervening variable to improve the dependent variables (Creswell, 2014). The researcher was interested to find out whether teaching Mathematics through problem-solving strategies in classroom environment would manipulate to change students’ performance, improve achievements and promote collaboration (Trochim, 2006). The researcher preferred quasi– experimental design because it dealt with students in a school setup whose arrangement the researcher has no control. The study specifically used Solomon Four - Group design where the participants can be part of the treatment group or control group but cannot be part of both (Creswell, 2014). The Solomon Four Group design is also a way of avoiding some of the difficulties associated with the pretest and posttest. This design has had two control groups which served to reduce the influence of confounding variables. This was accomplished by randomly assigning four schools per category to two experimental groups and two control groups. Schools were stratified depending of their four previous years KCSE performances. The design also allowed the researcher to test whether pretest itself has an effect on the participants. The study established that there is significant effect on student achievement scores when problem–solving used comparing the scores of control groups and experimental groups after pretest and posttest.

Further, reasons for using Solomon Four Group design was able to combat many of the internal validity of the research. It allowed the researcher to exert complete control over the variables. The 4 x 2 x 2 factorial designs were applied where all groups received post-test in each category whereas two groups one experimental and one control groups were administered pretest. The effect of treatment X is also reflected in four different fashions as compared to other experimental designs. The design provided the

researcher with confidence about the results obtained from the study. Table 1 shows the Solomon Four Group Matrix described earlier.

Table 1: The Solomon Four Group Design Matrix

Category	Data	Intervention	Post-test
E1	Pretest	X:treatment	posttest
C1	Pretest		posttest
E2		X:treatment	posttest
C2			posttest

Source: Researcher, March, 2018

E1 and C1 are pre –test and post - test for experimental and control groups, respectively X stands for treatment.

E2 and C2 are post –test only groups in both experimental and control.

3.2 Ethical Issues and Permission Allowing Access to the Study

Ethical issues may stem from the kinds of problems investigated as the students and teachers were in their respective secondary schools in Murang’a County. The methods which were used to obtain valid and reliable data and the concerns of respondents were addressed. The study was conducted where a strict code of conduct was upheld. This includes assurance to respondents’ confidentiality and their cooperation as important. The respondents’ real names were protected by using admission numbers only for students and codes for teachers. The consents were sought from all respondents in this study.

Introduction letters were sought from National Commission for Science, Technology and Innovation (NACOSTI) to carry out research. Permission from the parents through the principals to conduct an experiment on their students was obtained before commencing research. This supported the main respondents who were students for involvement. Obtaining consent and cooperation of Mathematics teachers whose classes were sampled was important. The teachers’ assistance in investigations and using their classroom facilities was consented.

4. Findings

4.1 Students Mathematics Performance

The first objective of the study was to compare performance of students in Mathematics for those taught using problem - solving strategies with those taught using conventional method in secondary schools in Murang'a County. These are considered as being conceptual and cognitive growths were determined by the achievement test using pre-test and post-test questionnaires. The students' were expected to learn Mathematics through problem - solving strategy or other conventional strategies. This study suggested that the students' conceptual understanding was developed better using problem – solving than on procedural knowledge using conventional methods in secondary schools in Murang'a County.

The four schools were drawn from same stratum according to their standards. The pre-test involved experimental, E1 and control, C1 groups. The results are shown in Table 2.

Table 2: Pre – test performance per category

Category	No of respondents	Mean	Standard deviation	No of respondents	Mean	Standard deviation
A	33	54.67	6.79	45	50.44	8.79
B	35	44.94	11.09	35	42.57	10.74
C	40	28.75	13.36	40	30.48	7.71
D	20	25.55	15.15	27	14.70	9.65
Combined	128	39.36	16.39	147	36.57	15.79

Source: Field data, 2018

Table 2, shows that there is no difference between groups except from the categories which are due to entry point at secondary school from primary schools to their respective category. The first hypothesis was that there was no difference in performance to Mathematics achievement (performance) test between the experimental group and the control group. This hypothesis was tested carrying out a two – sample t – test on the mean scores of the pre –test between the combined experimental group and the control group and the results as shown in Table 3.

Table 3: Pre-test performance per group

Combined group	NUMBER	MEAN	VAR	STDEV	Standard error	95% Confidence	T–value
E1	128	39.36	268.66	16.39	1.454	36.52 - 42.20	1.43
C1	147	36.57	249.22	15.79	1.307	43.02 - 39.12	
Combined	275	37.87	259.26	16.10	0.969	35.97 - 39.77	

Difference		2.79					
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Pr (T > t) = 0.17; VAR: Variance; STDEV: Standard Deviation

Source: Field study, 2018

Table 3, shows the computed mean scores and standard deviation of the two groups (E1 and C1). The students' from experimental group E1 performed slightly better than students from control groups C1 in the pre-test Mathematics performance. This was affected by the mean score of schools in category D, since mean is usually affected by extreme values. To test whether there was a significant difference on effect on students' performance between experimental group E1 and control group C1 in the pre-test, a t-test was computed. In table 3, the independent t -test reveal a statistically insignificant difference in the mean scores of pre - test for the experimental (E1) and control groups (C1) at $t(274) = 1.43$, $p = 0.0233$ at $\alpha = 0.05$ where $p > 0.05$. Table 3, also shows that there was no means difference between groups. The slight mean difference was not statistically significant at $\alpha = 0.05$ as $t = 1.43$ with a small effect size of $d_s = 0.17$ from Cohen's power test interpretation. This clearly indicated that students' performance in the pre - test was similar and their level of understanding in problem - solving is the same. The study employed the Solomon Four - Group design. These had enabled the researcher to have two groups in each category to sit for pre- tests as recommended by Borg and Gall (2003). The two groups were Experimental group (E1) and Control group (C1). A pre-test was conducted before commencement of the treatment therefore; it was administered to schools involved in groups E1 and C1 prior to the experiment. The pre-test contained 20 items that sought to test students understanding of numbers, number patterns, basic algebra, geometry, measurement and arithmetic which were the focus of this study.

The hypothesis which stated that, there was no significant difference on the effects in students' performance for those taught using problem - solving approach and others taught using convention method was retained. This finding agrees with Hull et al. (2011), who in their study found that there was no statistical significance between experimental and control groups' difference in the pre - test Mathematics achievement test before commencement of the intervention on Cooperative learning strategy.

The researcher employed the Solomon Four Group designs where all groups experienced the post - test. The comparison between the post–test results of groups E2 and C2; allows the researcher to determine if the actual act of pre – testing influenced the results. To further investigate the stated objective number one and hypothesis one. The post - test was administered to the same categories of students in their schools. The post-test contained 20 items which were based on topics set in the pre -test. The



topics discussed during intervention were similar to both pre- test and post -test. The post – test topics included the similar topics that were used during the intervention period and further practice given using textbooks. Analysis of the post - test results were shown in the following tables, which give the mean score of students’ performance in the post-test of groups E1, C1, E2 and C2. To find out whether there is significant difference in the performance.

Table 4: Statistics for Mathematics Achievement assessment paired differences

Post - test experimental group E1 and control group C1

Variable	Mean	Standard deviation	Standard error	95% confidence interval		T	Degree of freedom
				Lower	Upper		
PosttestE1	48.91	15.42	1.368	46.24	51.58	5.334	274
PosttestC1	38.15	16.26	1.346	35.52	40.78		
Combined	43.53	15.82	1.245				
Difference	10.76						

Pr ($|T| > t$) = 0.68

Source: Field data, 2018

Table 4, shows that if there is effect in achievement after treatment of experimental group E1 and control C1 both groups received pre - test before intervention was commenced. The two groups also received post - test immediately after intervention. The claim is that there is no significant difference in Mathematics between students Mathematics using problem-solving approach and those taught using conventional strategies in secondary schools in Murang’a County. There can be seen that a significant improvement in students’ who used problem-solving performance after the intervention period. It is obvious that problem - solving can enhanced students’ problem – solving performance in Mathematics. There was a significant difference, since $5.334 > 1.967$. The mean of experimental group was significantly higher than that of control group at post - test. The Cohen’s d is 0.68 which shows that there is moderate positive effect size of the means difference. Table 5, shows the post - test of experimental group E1 and control C2.

Table 5: Statistics for Mathematics achievement assessment paired differences post - test Experimental group E1 and control group C2.

Variable	Mean	Standard deviation	Standard error	95% confidence interval		T	Degree of freedom
				Lower	Upper		
PosttestE1	48.91	15.42	1.368	46.24	51.58	T = 7.663	
PosttestC2	34.92	14.53	1.219	32.54	37.30		
Combined	41.92	14.90					
Difference	13.99						

Pr ($|T| > t$) = 0.94

Source: Field data, 2018

Table 5, shows there was statistical difference in the mean scores between the two groups as $p > 0.05$ and $t = 7.663$. The hypothesis that problem - solving strategies in teaching and learning Mathematics have no significant effect on the students' performance in secondary schools in Murang'a County. The table 5, has shown that $7.663 > 1.96$, reject the null hypothesis on the basis that differences are significant that there evidence that the means are not equal. The Cohen's d of 0.94 which shows that there is large positive effect size of the means difference which shows that the pre - test has slight effect compared with table 4, where C1 had received pre - test.

Table 6, shows the two experimental groups E1 and E2. The groups' commenced treatment at the same time, but E2 did not receive pre - test.

Table 6: Statistics for Mathematics Achievement assessment paired differences Post – test experimental group E1 and experimental group E2

Variable	Mean	STDEV	Standard error	95% confidence interval		t	Degree of freedom
				Lower	Upper		
Posttest E1	48.91	15.42	1.368	46.24	51.58		127
PosttestE2	45.80	14.24	1.274	43.31	48.29		125
combined	47.37	14.90	0.937	45.54	49.20	T= 1.67	252
difference	3.11						

Pr ($|T| > t$) = 0.2087

Source: Field study 2018

Table 6, was to test the hypothesis is that there is no significant difference in means of the students' Mathematics achievement after the post - test when the two groups underwent treatment. The critical value t at 95% confidence limit in degree of freedom DF = 252 is 1.967 by interpolation. When $t = 1.67$ ($1.67 < 1.9670$), the hypothesis is accepted and there is enough evidence that the means do not have any difference. The Cohen's d of 0.21 which shows that there was small effect size of the means difference which might have affected by the pre - test.

Table 7, shows the post - test of control group C1 and control group C2.

Table 7: Statistics for Mathematics Achievement assessment paired differences Post - test control group C1 and control group C2

Variable	Mean	Standard deviation	Standard error	95% confidence interval		t	Degree of freedom
				Lower	Upper		
PosttestC1	38.15	16.26	1.346	35.52	40.78	1.775	288
PosttestC2	34.92	14.53	1.219	32.54	37.30		
Combined	36.26	15.49	0.911	34.48	38.04		
Difference	3.23						

$Pr (|T| > t) = 0.2085$

Source: Field data, 2018

Table 7, has shown that the two post - test for control groups C1 and C2. The groups did not receive any treatment at the same time, and C2 did not receive pre - test. The hypothesis was that there no statistical difference between mean of C1 and mean of C2 on the students' performance in Mathematics in secondary schools in Murang'a County after post - test. The critical value t at 95% confidence limit in degree of freedom DF = 288 is 1.968 by interpolation. When $t = 1.775$ ($1.775 < 1.968$), the hypothesis is accepted and there is enough evidence that the means do not have any difference. The Cohen's d of 0.21 which shows that there is small effect size of the means difference which might have affected by the pre - test.

Table 8, shows post - test performance per group and ANOVA hypothesis testing is applied. It also shows the tabulated values for ANOVA.

Table 8: Post – test performance per group

Combined group	Number	Mean	Standard deviation	Standard error	95% C-I	T –value
E1	128	48.91	15.42	1.368	46.24-51.58	

C1	147	38.15	16.26	1.346	35.52-40.78	
E2	126	45.80	14.24	1.274	43.31-48.29	
C2	143	34.92	14.53	1.219	32.54 -37.30	
Total	544					

Source: Field data, 2018

Table 8, shows that there are significant differences between the post - test experimental groups mean scores and the post - test control groups mean scores, with ($t = 1.967$) and ($t = 1.96$) and small effect size of $f = 0.18$. This shows that a problem – solving strategies to teaching and learning Mathematics can assist students to reason and help them to develop creative and critical thinking which improves their understanding of Mathematics concepts and hence improvement in performance. Students' achievements and understanding are significantly improved when teachers are aware of how students construct knowledge familiar with the intuitive solution methods that students use when they solve problems. Teachers should utilize this knowledge when planning and conducting instruction in Mathematics allowing students' collaborative interactions.

Table 9, gives the result of the ANOVA of the difference in the post test scores.

Table 9: ANOVA Post – test performance on four group

	Number	Mean	Variance	Between groups	Within groups
E1	128	48.91	237.72	583.17	229.82
C1	147	38.15	264.39		
E2	126	45.80	202.80		
C2	143	34.92	211.03		
Combined	544	41.95			

Source: Field study 2018

S_B^2 : The between group Variations

S_W^2 : The Within group Variations

Table 9, shows that there was a significant mean difference in the student performance in the post - test between the 4 groups, $F(540) = 2.537$, $p = 0.01$, $\alpha = 0.05$ where $p < 0.05$. This was to test hypothesis one (H1) which states that, there is no statistically significant means difference in the effect using problem - solving approach in teaching Mathematics on secondary schools students performance on those taught using conventional strategies. Analysis of variance (ANOVA) was carried out on post - test scores. The study concluded that using problem - solving in teaching and learning increases students achievement (performance) in Mathematics. Therefore, the hypothesis (H2) which states that, there was no significant difference in students' performance in Mathematics taught using problem - solving approach and those taught using conventional strategies in pre - test and post - test in secondary schools in Murang'a County was rejected. Since this result was statistically significant, the acceptance of that teaching through problem – solving improves the student Mathematic achievement agreed with Kirtikar (2013). Kirtikar reacted on the criticism that conventional teaching did not trigger critical thinking. The cognitive skills and holistic learning environment for students through problem-solving. This study had shown that teaching through problem-solving the students improved the Mathematics achievement. The tables 8 and table 9 had shown that it existed in the categories and with or without pre - test respectively.

5. Conclusion

The data collected were analysed using mean, standard deviation, t –test, ANOVA and Cohen's d. The result from observation rating scales of problem-solving and students showed the changes of students' behaviour. Observation of results showed an average ability of students in experimental who could read the problem carefully throughout the intervention period. But she\he used different strategies to persevere with problems and never checked solutions. During intervention period, the learner tried problem better and better getting closer to solution while peer partners gave her/him opportunities to see the different ways to approach mathematical problems. The hypothesis is rejected that the mean scores of post - test for both experimental group E1 and control group C1 are the same.

It was found that there was a significant difference between the Mathematics performance of the students taught through problem-solving approach and those taught through conventional method. On the basis of these findings in this study, the following conclusions were drawn:

- Students taught through problem-solving method achieved better performance than those taught by conventional method.

- There exists a significant difference in the performance of students taught through problem solving strategies and conventional strategies.
- The difference between the achievement levels is due to problem-solving approach since both groups have equal basic knowledge of Mathematics.
- The students taught using problem-solving changed their attitude towards Mathematics since they improved their understanding.

5.1 Recommendations

The following recommendations were made on the basis of the findings of the study:

- This study proved that problem solving is more effective method of instruction for teaching and learning mathematics as compared to traditional (lecture) method of teaching. Therefore the teachers of Mathematics should embrace using problem-solving method to improve the academic achievements of the students.
- Government through Kenya institute of curriculum development (KICD) should transform the textbooks of Mathematics in problem based learning form. The traditional Mathematics textbooks do not meet criteria for applying problem-solving strategies.
- Government through KICD develop curriculum which is problem-solving oriented in order to improve students achievement in Mathematics in secondary schools.
- Extensive training program, seminars and workshops should be organized for Mathematics teachers in secondary schools to employ problem-solving method in the classrooms.
- Mathematics student teachers should be trained using problem-solving learning approach.

5.2 Suggestions for Further Research

- Teachers take a critical role in teaching and learning Mathematics. A study should be done to investigate the teacher role in supporting students' problem-solving strategies.
- Studies should be done on specific conventional strategies support to problem-solving the relationship of enhancing students' Mathematics achievement may be investigated.

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Impact of Massification on Internal Efficiency in Universities: A Comparative Study of Public and Private Universities in Kenya

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Abstract

Massification is a significant enrolment of students in universities over available resources. Kenya has expanded universities and student enrolment in universities beyond available resources. Previous studies and stakeholders opinions raise pertinent issues touching on the quality of education in the Kenya universities. Quality of education enhances efficiency in university education and the economy. The study aimed at establishing the impact of massification on internal efficiency between public and private universities. Specifically, the study was to investigate the impact of massification on lecturers' and students' academic participation between public and private universities in Kenya. The study adopted a causal-comparative survey research design. The population of the study was 194,852 respondents consisting of 190,674 students and 4,178 lecturers in the eight randomly sampled universities in Kenya. A sample of 437 respondents consisting of 409 students, 12 lecturers from four public and four private universities in Kenya were proportionally derived at and 16 heads of academic departments selected for the study through simple random sampling technique. Student Questionnaire was used to collect data. Chi-square test was used to analyze the data. The study showed that there is no significant statistical difference on the impact of massification on internal efficiency between public and private universities in Kenya. Specifically, the study showed that there is no significant statistical difference on the impact of massification on Lecturers' and Students' on Academic Participation between public and private universities in Kenya. Public and private universities are equally adversely affected on students and lecturers' academic participation. The study recommends that university managers employ additional academic staff to enhance students' and lecturers' academic participation. Thus, internal efficiency would be improved in universities.

Keywords: Education Impact, Faculty Academic Participation, Massification of University

Education

1. Introduction

Statistics show that there has been massification of students in universities all over the world outstripping the available resources; a phenomenon described as massification (Mohammedbhai, 2008). Underdal (2010) asserts that the term massification in the context of higher education system to refers to the rapid increase in student enrolment in

the latter part of twentieth century. The UNESCO Institute for Statistics (2010) indicates that African countries have experienced rapid enrolment of students in their universities. In Kenya, the demand for university education has grown beyond the capacity of existing public universities and has led to the establishment of private universities (Abagi, Nzomo & Otieno, 2012). Table 1 presents the student enrolment in Kenya universities from the year 2011 up to 2015.

Table1: Students’ Enrolment in Kenya Universities 2011-2015

University	2011	2012	2013	2014	2015
Public	157,916	172,356	227,623	245,527	287,423
Private	40,344	40,823	47,899	95,023	89,839
Total	198,260	213,179	275,522	340,550	377,261

Source: Kenya Universities and Colleges Central Placement Services (2016) and Individual Universities Enrolment.

The data in Table 1 show that enrolment in public universities almost doubled in the year 2015. Records from the Commission for Universities (CUE) indicate that the number of students obtaining the minimum qualification for university entry has increased. The study sought to compare the impact of increased enrolment of students to lecturers’ and students’ academic participation. The double intake that was affected in the academic year 2011/2012 and 1990/1991 has raised concerns over the quality of education in public universities (Gudo et al., 2011). The ratio of faculty staff to students’ is low (Gudo et al., 2011; Mbirithi, 2003).

Studies have been carried out on the effect of massification on universities in Kenya. However, a concern over the quality of university graduates from universities in Kenya persists. Innovations to improve quality in private universities can be adopted in public universities in Kenya and vice versa. There are few studies on the impact of mass enrolment of students on lecturers’ and students’ academic participation. It is imperative therefore, to understand the impact of mass enrolment of students on lecturers’ and students’ academic participation. Thus, the present study sought to compare the impact of massification on lecturers’ and students’ academic participation in public and private universities in Kenya.

1. 2 Statement of the Problem

Kenya Government aims at transforming Kenya into a new industrialized “middle – income “country providing a higher quality of life to all its citizens by the year 2030. The

critical players in a achieving Kenya Vision 2030 are the universities which provide high level technological and managerial leadership. Although, studies have been done on the effect of massification on quality of university education, no comparative study has been done on the impact of massification on the lecturers' and students' academic participation in public and private universities. Considering the high government and individual interests in university education, there is urgent need to evaluate how effectively universities are being managed by examining students' and lecturers' academic interactions. In light of this, the study focused on comparing the impact of massification on lecturers' and students' academic participation in private and public universities in Kenya.

1.3 Significance of the Study

The study will enable the university managers to come up with strategies of improving students' and lecturers' academic participation in the universities. The study will also form a basis for further research on university training.

1.4 Scope of the Study

The data was collected from private and public universities in Kenya. The universities were: University of Nairobi; Kenyatta University; Catholic University of East Africa; Strathmore University; University of East Africa, Baraton; Moi University; and Egerton University.

2. Literature Review

2.1 Students' and Lecturers' Academic Participation

The students' participation in academic affairs of a university consists of classroom participation in form of access, retention and graduation (Altbach, 2016). Universities in Europe have tried to improve students' and lecturers' academic participation of their universities for example by rising lecturer- student ratios are: Harvard University's 1:4, Cambridge 1:3, Massachussetts 1:9 (Okebukola, 2014). The other way in which students can participation in academic affairs is through class attendance of various types such as student failure in college examinations, student college repetition and student dropout from college and student completion of studies on time (Gupta, 2001). Lecturers' participation in academic affairs of universities is through research, teaching and consultancy. In Kenya, there was lowering of academic standards and de-emphasizing of merit and the need for staff to research and publish (Gudo et al., 2011). The study investigated the nature and level of students' and lecturers' academic participation in both public and private universities in Kenya.

2.2 Theoretical Framework

The theory applied was an evaluation theory. In this theory the researcher chooses his tools of evaluation. The founder of this theory was Chen (2006). The evaluation theory sees a programme existing has a open system with activities (massification) relating to output (quality of graduates) and outcomes (employment of university graduates) and impacts (student-lecturer interactions). This study looks at the summation aspect of evaluation of universities in their current state as they have experienced massification.

3. Methodology

The sub-headings in this section are Research Design; Population of the Study; Sampling Procedure and Sample Size; Instrumentation; Reliability and Data Analysis.

3.1 Research Design

The study adapted a causal-comparative research survey design. Mugenda and Mugenda (2003) states that the purpose of causal-comparative research survey design is to determine opinions, attitudes, preferences and perceptions of groups of interest to the researcher with an aim of exploring the causes or consequences of phenomenon on an individual or individuals for further study. The study sought to compare the impact of massification on students' and lecturers' academic participation between public and private universities in Kenya.

3.2 Population of the Study

The population for this study was 194,852 respondents consisting of 190,674 students and 4,178 lecturers from the eight universities selected for the study.

3.3 Sampling Procedure and Sampling Size

According to Wierma and Jurs (2005), a population of 194,852 has a normal sample size of 384. Thus 384 were shared out among the universities in proportion to the individual enrolments to total enrolments for all the universities sampled.

3.4 Instrumentation

Research instruments used for data collection were questionnaires. Two questionnaires were used; Students' Questionnaire (SQ) and Lecturers; Questionnaire (LQ)

3.5 Reliability.

The Cronbach Alpha Coefficient index for academic participation was (0.737). An Alpha Coefficient of at least 0.7 thresholds is considered adequate for Social research studies (Frankel & Wallen, 2000).

3.6 Data Analysis

The data was analyzed using inferential statistics: Chi-square. The hypothesis was tested at significant level of $\alpha = 0.05$. The quantitative data was analyzed by use of Statistical Package for Social Sciences (SPSS) Computer software version 21. The findings of the study were presented by tables and use of prose narration.

4. Results and Discussion

The objective of the study aimed at finding out the impact of massification on lecturers' and students' academic participation between public and private universities in Kenya. Specifically, the study collected information from students' academic participation such as students' failure in college examinations, students' dropouts from college, students' college repetition and student college completion. Information was sought from the lecturers on academic participation such as lecturers' participation in evaluation, research, examination supervision and teaching. To find out whether there was any significant difference on the impact of massification on lecturers' and students' academic participation between public and private universities based on lecturers' responses a Chi-square test was computed. The results are presented in Table 2.

Table 2: Chi-square Test Results on Lecturers' Academic Participation

Statement	Chi- square	Df	p- value	Interpretation
Large class size has increased exam marking time causing delay in the providing students with feedback	11.352	4	0.023	Difference
Large class size has reduced time for academic research	6.511	4	0.164	No difference
Large class size has compromised the quality of examination supervision	6.511	4	0.171	No difference
Large class size has compromised the quality of Learning as student's concentration is disrupted during class time	6.944	4	0.139	No difference
Overall	7.829	4	0.124	No difference

The finding in Table 2 indicates that there is no statistically significant difference on the lecturers' opinion on the impact of massification on the lecturers' academic participation between public and private universities in Kenya. The information in Table 2 reveals that

there is no significant difference on the impact of massification on lecturers' academic participation between public and private universities. In other words, ($\chi^2= 7.829$, $p= 0.124$, $p > 0.05$). The likely reason for this finding is that there is a shortage of lecturers' in both private and public universities in Kenya.

Similarly, a Chi-square test was performed for students' academic participation. Table 3 presents Chi-square test results on students' academic participation.

Table3: Chi-square Test Results on Students' Responses on Academic Participation

Variable	Chi-square	Df	p-value	Interpretation
Student failure	6.735	3	0.151	No difference
Student dropout	9.098	3	0.059	No difference
Student repetition	11.678	3	0.060	No difference
Student completion	18.514	3	0.085	No difference
Overall	11.506	3	0.089	No difference

The results in Table 3 show that there is no significant difference on the impact of massification on students' academic participation between public and private universities based on students' responses ($\chi^2= 11.506$, $p= 0.089$, $p > 0.05$). The results of the impact of massification on lecturers' and students' responses on academic participation between public and private universities show that there is no statistically significant relationship on the students' and lecturers' academic participation between public and private universities in Kenya. The null hypothesis (H01) which stated that there is no significant difference on the impact of massification on students' and lecturers' academic participation was accepted. A study by Eshiwani (2009) in Kenya University showed that lecturers-student interaction is low.

5. Summary of the Findings, Conclusion and Recommendation

5.1 Summary of the Findings

The study found that the lecturers' academic participation has been hampered by large class sizes. Although, universities have increased hiring of lecturers, the lecturer-student academic participation is still limited due to low lecturer-student ratio. The overall p-value shows that there is no statistically significant difference on the impact of massification on the lecturers' academic participation between public and private universities in Kenya ($\chi^2= 7.829$, $p= 0.124$, $p > 0.05$).

For the impact of massification on students' academic participation, the results indicated that there is no statistically significant difference between public and private universities in Kenya ($\chi^2 = 11.506$, $p = 0.089$, $p > 0.05$).

5.2. Conclusion

The aim of the study was to find out the impact of massification on internal efficiency between public and private universities in Kenya. Specifically, the study focused on the impact of massification on lecturers' and students' academic participation between public and private universities in Kenya. The finding is that there is no statistically significant difference on the impact of massification on students' and lecturers' academic participation between public and private universities in Kenya. This implies that the students' and lecturers' academic participation may be hampered by mass enrolment of students' in the universities. This may affect negatively internal efficiency in the universities.

5.3. Recommendation

The study recommends that more academic staff be employed to improve students' and lecturers' academic participation.

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Assessing the Situation of E-Health Initiatives Implemented in Kenya

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Abstract

With the growth of Information and Communication Technology in Kenya implementation of large number of Electronic Health projects with the aim of solving some of the many challenges faced by health and health system in general. This study provides information on the situation of eHealth initiatives being implemented in the country. The information will include the area of focus and geographical distribution of the eHealth projects in Kenya. Materials to be reviewed will include peer reviewed and non peer reviewed sources of relevant information in relationship to electronic health in Kenya. The projects were examined based on the health purpose and focus and geographical location. A total of 70 citations comprising 55 projects, 30 Mobile Health, 10 Health Information Systems, 8 e-learning and 7 Telemedicine projects. In terms of geographical distribution 20 projects were carried out in Nairobi while about 12 were designed to have a national coverage. In regard to health focus 18 projects were mainly on primary health care, 15 on HIV/AIDS and 10 on maternal child health (MCH). In conclusion the study found out that there is a large number of eHealth projects in Kenya. Majority of this projects are in the mobile health strategic area and most of them focuses on primary health care and HIV/AIDS. Based on the analysis most of the projects were executed in urban areas and only a few were implemented in the marginalized areas and least urbanized parts of the country which has numerous health problems hence more health needs. Despite the fact that adoption of information and communication technology in health care sector should reduce geographical inequalities by enhancing access to health care especially in the remotes parts of the country and consequently contribute the strengthening of the overall health care system, it set goal are far way from being realized in Kenya.

Key words: Electronic Health, Mobile Health, Health Projects

1. Introduction

World Health Organization (WHO) defines eHealth as the use of information and communication technology (ICT) for health. The adoption of ICT in health is in rise in developing countries in Africa, particularly in Kenya with an aim of strengthening the various components of health system. The adoption of ICT in health sector promises a lot of benefits to the health care delivery and health care system in general. Some of these benefits include increased efficiency in health care, improvement in quality of

health care, health care cost reduction, better health care system governance. Through realization of these benefits health care provision will extend beyond the conventional boundaries (Eysenbach, 2013).

ICT adoption in health care sector treats the geographically displaced resources as if they were centralized which plays a role in promoting economies of scale (Kirigia et al., 2017). Therefore, wide use of eHealth initiative will facilitate equitable access and distribution of health care to the marginalized areas and vulnerable population groups. Through use of services such as 'call-a-Doctor' which was initiated by a mobile phone service provider (Safaricom) which has partnered with clinicians to provide a telehealth consultation service, provides patients with a chance of calling a doctor to seek medical attention. This followed a move meant to spur adoption of eHealth services and solutions; the Kenya government has developed a national eHealth strategy through the ministry of medical services in order to help enhance health service and Medicare provision by utilization of information and communications technologies. The strategy is expected to among other things address the country's low doctor to patient ratio which is currently estimated to be 0.14 physicians per 1,000 people while expenditure on health care services takes up about 4.9 per cent of the GDP (GoK, 2012).

In Kenya, the government vision 2030 policy identifies ICT as a key determinant of the attainment of an economic pillar relating to the business process outsourcing. This implies that many Kenyans, especially the youth can provide business services through internet to offshore organization and companies in both the developed and developing countries in an effort to promote Kenya as the top business destination in Africa (GoK, 2007). As a result, the country has experienced great development in ICT sector, particularly in telecommunications, software development and software services which the delivery of application to the end user via the web. For instance, there is increase in investment by both the government and the private sector in developing national fibre optic infrastructure and utilization of mobile devices has enhanced acceptance of ICT leading to economic growth. In the year 2011, it was estimated that 93% of Kenyan

households owned a mobile phone, with at least two-thirds of the population having access to mobile money services (Demombynes, 2012). Actually, Kenya is leading in the growth of ICT in east Africa with Nairobi being referred to the 'silicon savannah'. This is as a result of the role it plays as an information and technology hub. However mobile ownership and usage is strongly associated with gender, level of education, literacy, urbanization and social economic status of individuals in Kenya (Otieno et al., 2013).

This development in Information and Communication Technology, together with the availability of ICT human resource has led to increased adoption and implementation of eHealth initiatives in Kenya. The government of Kenya, through the ministry of health (MoH) has shown great interest and support to the introduction and use of ICT in health sector by developing and launching the first Kenya National eHealth Strategy 2011-2017. This strategy indicates that health care system faces the problem of very high cost and demand for quality and specialized health care services. The eHealth strategy outlines specific strategic areas of focus to help eHealth project implementation in Kenya as follows; telemedicine, health information system, mhealth, elearning, and health information for the citizens. The Kenya National eHealth strategy also precludes that information and communication technology would promote and deliver efficient health services to Kenyans and consumers from other parts o the world.

Since the launch of the Kenya eHealth strategy, the government and private sectors have been implementing eHealth projects on all five strategic areas (Juma et al., 2012, and Qin et al., 2012). However, there is no enough evidence of project being implemented in the country. Specifically, there is lack of a registry of all projects under implementation and documentation of their specific characteristics including contributions to strengthening the Kenyan health system. This review therefore, provides an explanation of the state of eHealth initiatives in Kenya by their area of implementation, project characteristics and strategic area. The evidence from this analysis will provide knowledge and better understanding of the eHealth activities

implemented in Kenya to date, and their impacts in strengthening the overall health system.

2. Methods and Materials

A search of peer reviewed and none peer reviewed sources of relevant information was conducted. The peer reviewed literature was search was conducted in PubMed, MEDLINE, Web of Science, Directory of Open Access Journals, and Google Scholar. The information obtained from the peer reviewed search was not sufficient it was noted that there were many eHealth projects that were no reported in the peer reviewed literature. Therefore, to ensure that all relevant information was acquired, a search was extended to non-peer reviewed sources including web-based portals for eHealth, profit and none-profit organizational websites, and blogs. The search was also extended to government documents and organizations reports such as those of WHO, among others.

The first search strategy was performed on all documents related to eHealth projects under implementation in the country in peer reviewed sources. The search was conducted using terminologies such as Kenya, mhealth AND/OR m-health, eHealth AND/OR e-health, mobile, mobile phone, cellular phone, cell phone, electronic health record, electronic health, internet, telemedicine and e-learning. These search terminologies and key words were used to assist in capturing all the relevant projects in the country. The key words were selected so as to address all strategic areas of implementation. The strategic areas included telemedicine, health information systems (including electronic health records), mHealth (health through the use of mobile devices) and eLearning (including distance education or learning) as defined in the Kenya National eHealth Strategy). All strategic areas of eHealth projects implementation were included in order to develop a comprehensive registry of projects. For the non-peer reviewed and grey papers, a similar search strategy using the same keywords and concepts as in the peer reviewed strategy was used.

Due to the fact that ICT adoption in Kenyan health care sector is a fairly new concept, the time period specification was not necessary, hence all publication on eHealth in Kenya could form part of the study materials (Demombynes, 2012). The publications selected and information included in this study had to have been implemented in Kenya with clear details of the specific eHealth initiative under implementation. The retrieved records from each search were screened for eligibility.

3. Data extraction

Data was extracted from the eligible sources only which involved description of eHealth application, strategic area of eHealth project implementation as defined in the Kenya national eHealth strategy and geographical location of the project. Descriptive criteria such as domain or thematic area, specific health focus and period of project implementation were also considered in the data extraction (Kallander et al., 2013). However, it was noted that due to the sensitive nature of this information, some projects were doing could not be disclosed as the information was deemed delicate.

4. Categorization of eHealth projects in Kenya

As a result of many projects being implemented, it was necessary to categorize the eHealth project being implemented in Kenya into various categories. This facilitated the assessment of the extent to which the projects focused on specific aspect of eHealth at the expense of others. Through this categorization the project was put into four categories as follows; First was the strategic area; second, the thematic area; third, the health area of focus; and finally, the geographic location of all the projects being implemented. The strategic areas of the project implemented were adopted from the Kenya National eHealth Strategy 2011-2017. The strategy spells out the strategic

areas to be telemedicine, health information systems, mhealth and eLearning.

The second category focused on the thematic areas and was adopted from prior research work which showed the most common applications of eHealth. According to Labrique (Labrique, 2013) the 12 most common applications of mhealth projects provided a frame work that was used in this study to categorize eHealth projects in Kenya. This included; client education and behaviour change communication; sensors and point of care diagnostics; registries and vital event tracking; data collection and reporting; electronic health records; electronic decision support such as information, protocols, algorithms, checklists; provider to provider communication such as user groups, consultations; provider work planning and scheduling; provider training and education; human resource management; supply chain management; and financial transactions and incentives (i.e. use of mobile money transfers and banking services to pay for health services and incentivize patients).

The health focus category entailed the specific health areas of projects focus including malaria, HIV/AIDS, tuberculosis, primary care, health care financing among others. Whilst the project geographic location category adopted, details the specific setting in which the project was executed. Most eHealth projects were designed to be implemented in specific geographical locations with a few projects implemented nationally. Geographical categorization led to two categories; projects implemented in the marginalized areas and those that were implemented in nonmarginalized parts of the country. Geographical categorization was informed by categorization of counties in marginalized or nonmarginalized by the Commission on Revenue Allocation (CRA). According to CRA marginalized counties should be identified based on the county development index (CDI)

(CRA, 2012). CDI is a composite index consisting of indicators that measures the state of health such as, health, education and infrastructure are all weighted at 28%, and the level of poverty in a county indicator at 16% (CRA 2012). Based on these different criteria, the following fourteen counties are classified as marginalized with CDI ranging from 0.27 to 0.52. The counties are Turkana, Mandera, Wajir, Marsabit, Samburu, West Pokot, Tana River, Narok, Kwale, Garissa, Kilifi, TaitaTaveta, Isiolo and Lamu.

5. Results

The search strategy identified 463 citations through the peer reviewed and non-peer reviewed sources of information. An additional 50 publications were retrieved through hand searches of organizations websites, relevant documents, and blogs from web searches. 163 records were removed since they were duplicates. A further 110 publications that did not meet the criteria were excluded during the screening of titles and abstracts. Those that were excluded had not described the eHealth project clearly, and/or were not implemented in Kenya or lacked the relevant information. Of the remaining 240 records fully screened, 185 were excluded after applying exclusion criteria. These comprises records which were either, not relevant, correspondence letters, lacked intervention of interest, opinion pieces, reviews and those that were not executed in Kenya. The search concluded with 70 citations reporting 55 eHealth projects.

5.1 Geographic Location of the Projects by Urbanization and Marginalization

Data obtained from the searches indicated that out of the 47 counties in Kenya 35 counties had at least one eHealth project that was implemented or was under implementation. It was also noted that most of the projects (n=41) were implemented on more than one county. The capital city Nairobi had the highest number of eHealth projects (n=22). EHealth projects were also common in well developed urban centers such Busia (n=8) and Kisumu (12). The least urbanized counties such as Turkana (n=1), Warjir

(n=1) and Garissa (n=2). This shows that there are a least number of eHealth projects implemented or under implementation in the least urbanized counties. However, the other least urbanized counties such as Samburu, Marsabit and Mandera had no eHealth project being implemented. In Kenya a total of fourteen counties are classified by the commission on revenue allocation as marginalized (CRA 2012). Out of these 14 counties 10 had at least one eHealth initiative under implementation with Kilifi county (n=5) having the highest number of initiatives followed by Kwale County (n=3).

5.2 Strategic area of implementation

Projects implemented in Kenya covered all eHealth strategic areas with majority (38; 69%) of them delivered through mHealth, less commonly focusing on health information systems (7;13%), eLearning (6;11%) and telemedicine (4; 7%)

5.3 Health focus

In terms of health focus, this study found that 15(28%) projects focused on primary care followed by HIV/AIDS (13; 25%), then maternal and child health (9; 16%) and malaria (5; 10%). 13 projects were designed to target multiple conditions and diseases. Majority of these (n = 15) innovations were used to collect and report health information within the primary care (15; 27%), while two projects concentrated on both HIV/AIDS and either TB or malaria. The remaining two projects were designed to address both HIV/AIDS and maternal and child health.

5.4 Thematic areas

Among the 55 projects, innovations focusing on client education and behavior change communication were the most common (17; 32%). For example, use of mobile SMS communication to influence patients' adherence to medications. Data collection and reporting (10; 19%) involving the use of SMS and mobile applications to collate data. Electronic medical records (EMR) systems used to record and report patients' data. Other thematic areas were training, education, financial transactions and incentives. These thematic areas were represented by (4, 9%) projects in each of the respective

domains. Similarly, (3, 7%) projects were classified under electronic medical health records and provider to provider communication domains. Finally, three thematic areas applying sensors and point of care diagnostics, registries and vital events tracking, and electronic decision support were each represented by two innovations.

6. Discussion

The study was set out to explore and report on the situation of eHealth initiative implementation in Kenya; therefore, it was an exploratory study. The analysis of the literature and categorizing of the projects according to the different criteria, helped to explain the information and communication technology advancement in Kenya. The findings of this study indicated that most of the eHealth project were implemented or piloted in the main towns and peri-urban areas. This kind of distribution can result from several factors such availability of basic infrastructure such electricity connection, good penetration of mobile telecommunication and network, ICT human resource and a high population of educated people. It was also noted that these actors were not unique to Kenya but were common in almost all of the developing country in Africa, particularly in sub Saharan Africa. Going by the witnessed increment in development of ICT and use of mobile devices to the entire population, it is predictable that in a near future the country is going to witness an escalation in eHealth solutions. However, the growth does not automatically lead to improved accessibility of eHealth in the entire country especially, in the arid and semi-arid and remote areas which are inhabited by the marginalize groups. Based on this study analysis, a relatively small number of eHealth projects are implemented in marginalized regions in Kenya where most of the vulnerable population groups reside. The marginalized areas have limited have the highest disease burden yet they have limited access to health services. It is also evident that maternal child health and communicable diseases such as malaria, TB and HIV/AIDS are the main health problems of concern. Despite the mile stone that the country has made in health of the population this the marginalized regions are still lagging behind, therefore one of the objectives of the eHealth project should be to strengthen health care system so that people residing in these regions can have

access to health care services. This can be achieved through ensuring that the hard to reach parts of the countries and community receives effective and high-quality health services (Alvarez, 2010). ICT treats geographically displaced resources as if they were centralized thus promoting economies of scale. Therefore, embracing eHealth can indeed lead equitable distribution of healthcare to the marginalized areas and vulnerable population groups. The study found out that little have been done towards implementation of eHealth project in these regions in Kenya to enable them communities that reside here benefit from improved access to health services like other Kenyans residing in the urban centers and other non marginalized regions. Although the marginalized parts of the country have got some eHealth projects being implemented, out of all the strategic areas, mhealth was the most pronounced. This can be attributed to the high geographical coverage of mobile network and low cost of the mobile devices. Also, the cost of setting up a mobile health initiative is also low as compared to other eHealth initiatives. The most commonly used features of mhealth are short message service (SMS), and software applications. Mobile health SMS entails a simple short message on behavior change targeting a particular population group or a message to remind people on clinical information message to healthcare providers. These types of intervention have been proven to be effective as evidence shows that SMS communication had positive effects on patient behavior, health outcome and it is also found to be cost effective and reliable.

According to this study eHealth projects are on the rise in Kenya. The possible reason for this could be the recent growth in ICT and political support and willingness to advance investment in the ICT sector. In fact according World Health Organization National eHealth strategy toolkit, the Kenyan eHealth sector falls in the developing and building up phase. In this phase eHealth projects are usually driven by the need to improve quality and accessibility of health care in the country involved.

The fact that most of the eHealth projects undertaken in the country were funded by various development agencies and international nongovernmental organizations was a finding of this research which raised the issue of ownership of the project. The government, through the ministry of health did not own the projects but were owned by the funding agency or nongovernmental organization. This led to the problem of duplication of eHealth projects being implemented. The study also found out that most of the eHealth projects being implemented in Kenya are fragmented and are not integrated with the national health information system, therefore creating a problem of interoperability. This defragmentation has come about due to lack of eHealth standards and regulatory framework to guide and support eHealth innovation. Buy-in acceptability of the eHealth project by the government through the ministry of health is paramount as it will ensure sustainability of the projects in case scaling up is required. Therefore, the policy makers are urged to develop the required policies in an effort to solve some of the problems that are arising due to the huge growth in information and communication technology in Kenya. This should have both private and public stakeholder on board so as to cultivate successful public- private partnership in the sector.

As demonstrated by this study, the projects that are being implanted are not in line with the ministry of health needs and priority but most of them have their focus on various diseases and population groups of interest to the implementers or the funding agency. This is evident as most of the project focus on maternal child health and HIV/AIDS at primary care. Most of these projects were designed to offer health education and influence the behavior of the clients. Projects for patients' data collection were also common. It was noted that the main contributing factor to the popularity of this project was the source of funding. This due to the fact that most of international

development agencies focus on their country's development assistance strategic direction while international nongovernmental organizations focus on the most popular disease as a way of attracting funding. Focus on specific type of disease and source of funding could explain why it is very costly to scale up some of the eHealth projects to the national level due to lack of economies of scope. As health systems are interconnected, it is important that eHealth projects be integrated to the overall health system as this will enhance the opportunities of a single eHealth project to be used for addressing more than one health issue or disease which will in turn ensure that they are economical and can be scaled up to the entire population.

7. Conclusions

This review concludes that there is a myriad of eHealth projects being implemented in urban centers rather than marginalized areas where geographical inequalities and inequities in access to health care exist in Kenya. Due to lack of government stewardship and leadership, eHealth initiatives are not aligned to the Ministry of Health needs and priorities hence projects location is often determined by implementers. The lack of relevant policy and regulations including insufficient monitoring and evaluation to ascertain the impact or even the cost-effectiveness contributes to most projects inability to be scaled up. The implication being that the benefits arising from eHealth adoption are often not passed on to patients or beneficiaries. It is therefore imperative that government buy-in is pursued prior to the implementation of eHealth initiatives including rigorous testing coupled with cost effectiveness and benefits analysis to ensure suitability, appropriateness, scalability and sustainability of eHealth project. This will minimize wastage of scarce economic resources and enhance the integration of the eHealth projects into the overall health systems.

8. Limitations

This study has got certain limitations. The main limitation is the fact that some projects may have lacked documentation or externally shared reports, probably due to the profit

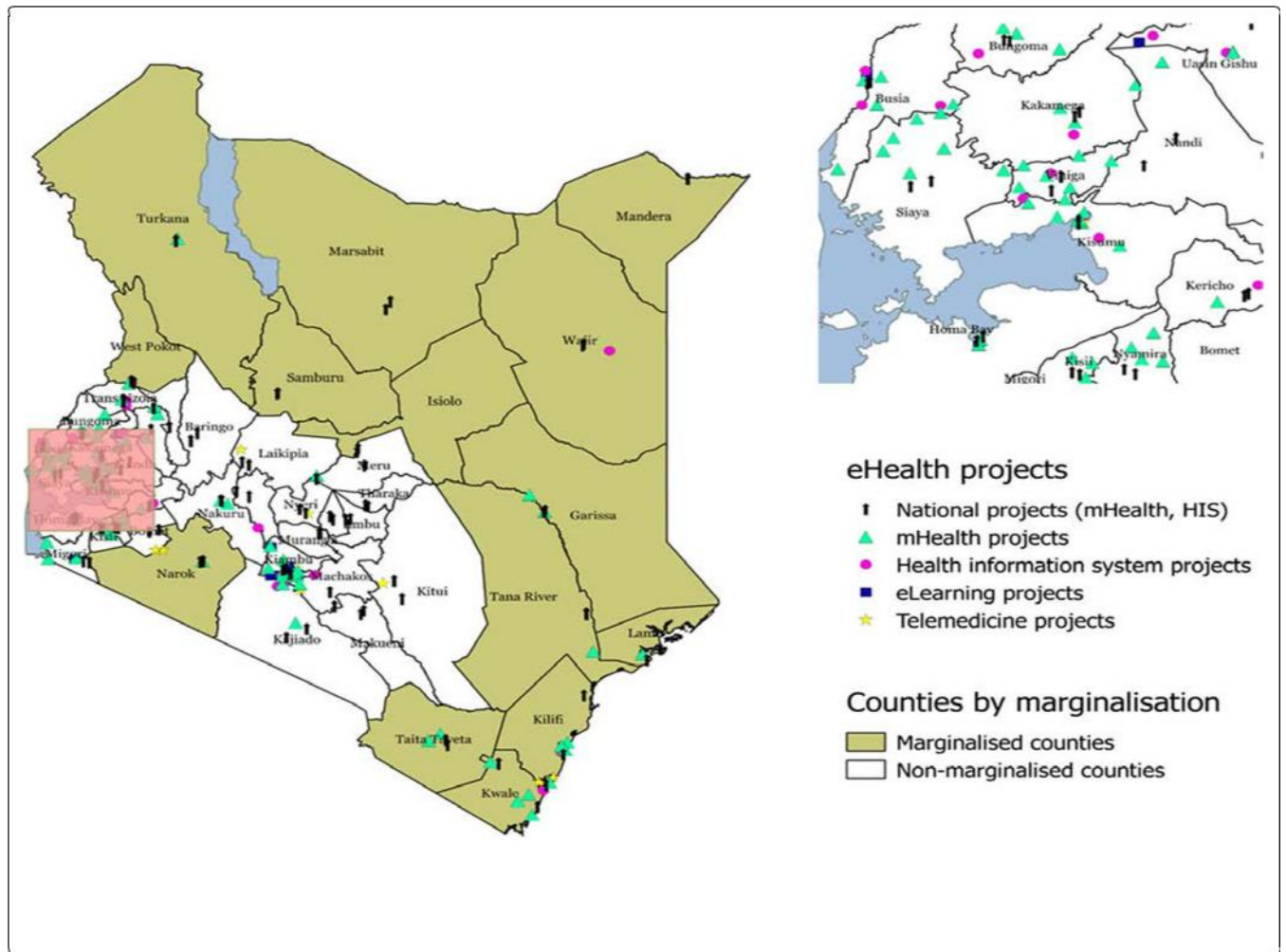
driven or aid funded nature of the eHealth projects whilst some projects were proprietary in nature and thus business ventures. Therefore, information from some of these types of innovations could not be shared and there might be projects that have been implemented after the systematic literature review and data collection had been concluded implying that this study may not be an exhaustive inventory of all eHealth innovations implemented in Kenya.

9. Recommendations for further research

Further research is required to provide evidence on evaluation status of the eHealth projects being implemented in Kenya.

I would also recommend a more inclusive research on assessing the situation of eHealth projects being implemented in Kenya. This study should reach out to all eHealth projects including the unreported ones and those that are implemented after my study.

Appendix: Distribution of eHealth projects in Kenya by marginalization



Source: Adopted from Njoroge et al. (2017)

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Determinants of Dental Health Problems and its Prevalence Among Adults in Kinangop Sub-County, Kenya

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Abstract

The global chronic diseases challenge arises from peoples' lifestyles and polluted environments which include excessive consumption of high sugar diets, excessive consumption of alcohol and wide spread tobacco use. Most dental problems are closely related to these problems and thereby a major public health concern. Integrated approaches are being undertaken to promote health and prevent diseases. Given the magnitude of the dental health problems in Kenya, a study was carried out to assess the point prevalence of dental health problems among adults aged 18 years and above living in Kinangop Sub County, Kenya. The aim of this study was to investigate point prevalence of dental health problems, behavioral factors leading to the prevalence and the level of knowledge of the respondents regarding dental problems. The study was a descriptive cross-sectional study, which was carried out in 384 households in the three wards found in the southern part of Kinangop Sub County. Simple random sampling method was used to select the respondents. Structured questionnaires were used to collect data. Data analysis was performed using the SPSS version 20. Chi-square tests were used to determine the significant factors associated with dental problems among the respondents. Data was presented in form of frequencies, percentages, bar graphs and pie charts. The study findings revealed that the point prevalence of dental health problems was 77.9%. Chi-square tests were carried out and significant factors associated with dental problems were found to be the level of formal education on dental health practices and behaviours such as brushing of teeth, type of food eaten, smoking and alcohol consumption. The study recommended that health education on dental health should be carried out to people especially those living in the rural areas.

Key words: Dental Health Problems, Dental Point Prevalence

1. Introduction

Oral health is a key indicator of overall health, wellbeing and quality of life. WHO defines oral health as “a state of being free from chronic mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal (gum) disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual’s capacity in biting, chewing, smiling, speaking, and psychosocial well-being. For many years, people have viewed the mouth organ separately from the rest of the body. This should cease because oral health affects general health through various ways which include causing pain and suffering and lowering the quality of life and well-being of an individual in terms of changing people’s diets and hindering people from enjoying benefits of full oral health. The psychosocial impact of oral disease has detrimental effects on an individual’s quality of life (WHO, 2005). Commonwealth Dental Association (CDA), “good oral health is an essential and important component of general health and it is a birth right of every individual in the world” (NOHS 2002).

Oral diseases are the most common of the chronic diseases and are important public health problems because of their prevalence, their impact on individuals and society, and the expense of their treatment (Sheiham *et al.*, 2009). The determinants of oral diseases are known – they are the risk factors common to a number of chronic diseases: diet and dirt (hygiene), smoking, alcohol, risky behaviors causing injuries, and stress – and effective public health methods are available to prevent oral diseases (Sheiham *et al.*, 2009).

Despite great achievements in the oral health of populations globally, problems remain in many communities around the world. This is particularly among underprivileged groups in both developed and developing countries. Dental caries and periodontal diseases have historically been considered the most important global oral health burdens (WHO, 2003).

2. Literature Review

2.1 Global perspective on dental health problems

Dental caries is one of the most common chronic diseases worldwide (Pitts *et al.*, 2011), and leads to millions of lost days of schooling for children and absenteeism from work in adults, resulting in both short- and long-term impacts on economic productivity. This effect is most marked in low- and middle-income countries, where ineffective prevention and limited access to dental treatment mean that much of the demand for care is not met.

Severe periodontitis affects 5-20% of most adult populations worldwide, and it is a major cause of tooth loss in both developed and developing countries (Petersen *et al.*, 2005; Pihlström *et al.*, 2005; Jin *et al.*, 2011). As with dental caries, there is a marked social class gradient in the distribution of periodontal disease (Jin *et al.*, 2011). Oral cancer is the eighth most common cancer worldwide (Johnson *et al.*, 2011) and the most common in men in Southeast Asia. Tobacco use is a major risk factor for oral cancer as well as for cancers in other body sites. Heavy consumption of alcohol and diets poor in essential minerals and vitamins and sugary foods are also important causative factors and it is now clear that infections with so-called high-risk types of human papillomaviruses make a significant contribution.

2.2 African perspective on dental problems

Oral diseases appear to be increasing in the African Region, as does associated morbidity. The most prominent characteristics of oral health in Africa are few oral care personnel and an imbalance between personnel types and population needs; and rural and peri-urban communities without basic care or with emergency care only, due to the high cost or unavailability of other treatment (Volpe, 2008).

In Africa, prevalence and severity of dental caries is rising rapidly (WHO, 1999). In Uganda the DMFT rate increased from 0.4 to 1.5 between 1966 and 1982, 0.2 to 1.6 over 17 years in Ethiopia and in Kenya 0.1 to 7.1 over 21 years. There is overwhelming evidence that refined sugars, especially sucrose, are the principal cause of dental caries (WHO, 2000).

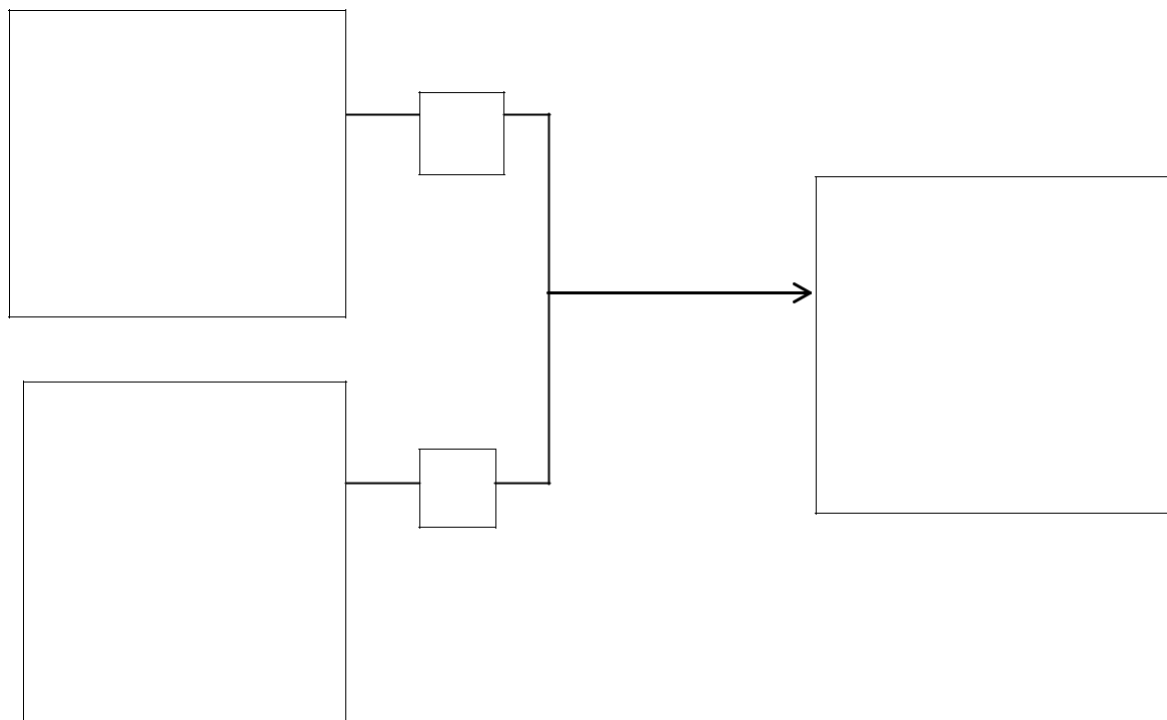
2.3 Kenyan perspective of dental disease

Kenyan government is committed at providing dental health services all over the country in public hospitals such as Kenyatta National Hospital (KNH). Dental services are also provided in private hospitals. Government of Kenya also supports training of dental doctors, dental auxiliary personnel (dental technologist and community oral health officers) at undergraduate, postgraduate and diploma levels respectively. However, there has never been any National Oral Health Survey in Kenya (NOHP, 2002) hence; it

has not been possible to determine the distribution pattern and magnitude of oral diseases in Kenya.

In Kenya, oral health has traditionally been segregated from the general health and there is lack of appreciation of the importance of oral health to general health and welfare (Kaimenyi, 2010). Some of the known factors that may be influencing utilization of dental-care practices are the high poverty levels among many Kenyans and inadequate resources in the provision of oral health care services and non-involvement of the public in their oral health care (NOHP, 2002).

2.4 Conceptual framework and hypothesis



3. Methodology

3.1 Research design

The study used a descriptive cross-sectional study design.

3.2 Study area

The study was conducted in the Southern part of Kinangop Sub County which is comprised of three wards namely Njabini, Nyakio and Magumu.

3.3 Study population

The study population were the adults (people above 18 years) living in the Southern part of Kinangop Sub County.

3.4 Sample size determination

Sample size was determined using the Fisher et al. formula (1998)

$$n = \frac{z^2 pq}{e^2}$$

z= Normal deviate 1.96 which corresponds to 95% confidence.
 p= Proportion of the population estimated to have dental health problems.
 q= 1- p
 e=error margin usually 0.05

$$n = \frac{1.96^2}{0.05} \times 0.5 \times 0.5$$

3.5 Sampling technique

Kinangop Sub County has three wards namely Njabini, Nyakio and Magumu. Stratified random sampling method was used to get the sample size for each ward. The following formula was used to calculate the number of respondents in each ward. Sampling size (k) = $\frac{\text{number of households in the ward} \times 384}{\text{Total number of households}}$

Individual representatives from each ward were randomly selected per Table 3.1

Table 3.1: Sample for study respondents

Ward	Number of households	Sample size
Nyakio	8,571	132

Njabini	8,402	129
Magumu	7,952	123
Total	24,925	384

3.6 Research Instruments

The research instruments included structured questionnaires for collecting data from household respondents

3.7 Data collection method

Primary data collection method was used.

3.8 Data analysis

Descriptive statistics and inferential statistics were used.

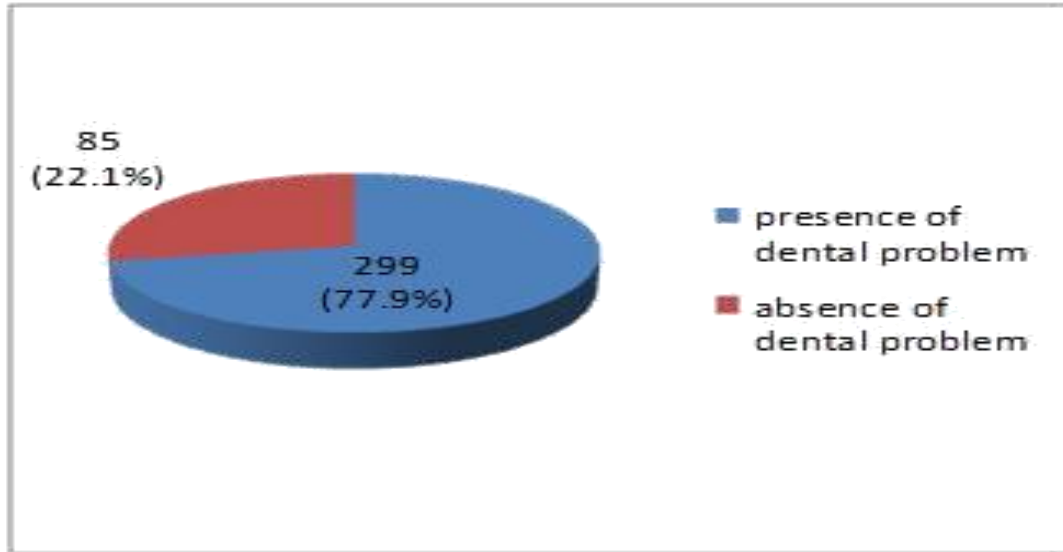
3.9 Ethical consideration

Consent was sought from the respondents before administering the questionnaires
Data was also kept confidential.

4. Results and Discussion

4.1 Point prevalence

As many as 299 (77.9%) of the respondents were diagnosed with dental problems during the study as shown in the following diagram.



Point prevalence is the number of persons with disease in a time interval divided by number of persons in the population. Point prevalence in this particular study was:

$299 / 84,393 \text{ by } 1000$

3.5 per 1000 people in the population

Table 4.1: Level of knowledge

Level of knowledge	F	%
Inadequate	252	65.5
Marginal	102	26.6
Adequate	30	7.9
Total	384	100.0

Notes: **Inadequate** =an individual who practiced between 0 to 3 best dental practices

Marginal = an individual who practiced between 4 to 7 best dental practices

Adequate = an individual who practiced between 8 to 10 best dental practices

Table 4.2: Level of knowledge and point prevalence

Level of knowledge	Point prevalence		Statistics
	Presence of dental problem	Absence of dental problem	
Inadequate	221 (87.6%)	13 (12.4%)	$\chi^2=115.6$, $df=2$, $p<0.05$
Marginal	88 (86.3)	14 (13.7%)	
Adequate	6 (20.0)	24 (80.0%)	
Total	384	100.0	

It was evident that inadequate level of knowledge on dental health practices led to very high number of dental health problems (87.6%) while those with adequate level of knowledge led to the low number of dental health cases (20 %).

Table 4.3: Behavioral factors

Behaviour	Findings
Smoking	Three hundred and twenty three (84.1%) of the respondents did not smoke.
Alcohol consumption	Two hundred and seventy nine (72.7%) of the respondents did not take alcohol.
Food Eaten	Majority of the respondents preferred moderately sugary foods 218 (56.8%).
Brushing of teeth	Two hundred and thirty eight (61.7%) of the respondents brushed their teeth.

Table 4.4 Behavioral factors and point prevalence

		Point prevalence	

Behaviour			Presence of dental health problem f (%)	Absence of dental health problem f (%)	statistics
Smoking	Smoking	323	301 (93.2)	22 (6.8)	$X^2=17.676$, df=1, p<0.05
	Not smoking	61	11 (18.0)	50 (82.0)	
Alcohol consumption	Alcohol consumption	105	88 (83.8)	17 (16.2)	$X^2=17.669$, df=1, p<0.05
	No alcohol consumption	279	12(4.3)	267 (95.7)	
Type of food eaten	Sugary	218	195 (89.4)	23 (106)	$x^2=29.252$, df=1, p<0.05
	Non sugary food	166	29 (17.5)	137 (82.5)	
Brushing of teeth	Brushing	238	14 (5.9)	224 (94.1)	$X^2=44.409$, df=1, p<0.05
	Not brushing	148	118 (80.8)	28 19.2)	

It was evident that those who smoked contributed to the highest percentage of dental health cases (93.2%) compared to those who did not (18.0%). Those who consumed alcohol led to the highest percentage of dental health cases (83.8%) while those who did not smoke contributed the least that is (4.3%). The study also showed that those who consumed sugary foods led to the highest percentage of dental cases (89.4%) while those who took non -sugary foods contributed the least percentage that is (17.5%) of dental cases. Again, the research showed that those who brushed their teeth contributed the least of dental health cases (5.9%) while those who didn't brush contributed the highest (80.8%).

These research findings compare to a study done by Matee in Dar-el salaam, Tanzania that showed alcohol consumption and smoking as major causes of dental health problems (Matee et al., 2006).

5. Conclusions and Recommendations

5.1 Conclusions

The study concluded that point prevalence of dental health problems in Kinangop Sub County was high therefore indicating that majority of the people suffered from dental health problems.

Significant factors that contributed to the high prevalence included inadequate and marginal level of knowledge on dental health practices, foods mostly eaten and certain habits such as smoking and alcohol consumption.

5.2 Policy Recommendations

- The Ministry of Health and other stakeholders should ensure that the community members are informed of the factors that contribute to dental problems.
- The Ministry of Health should ensure increased public health education on dental health.

5.2 Recommendation for further research

- Conduct similar study but on wider geographical scope
- There is need to research on factors influencing accessibility of dental health care services in Kenya
- A research should be conducted to investigate further on how dental problems affect the quality of life among individuals.

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Ubainikaji wa Toni Katika Mashairi ya Kiswahili

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Ikisisri

Utafiti huu ulinuia kutathmini Ubainikaji wa toni katika mashairi ya Kiswahili. Uchanganuzi huu uliangazia namna toni hubainika, umuhimu wake na nafsineni katika utunzi wa mashairi ya Kiswahili. Malengo ya utafiti yalikuwa; kuonyesha ubainikaji wa toni, nafsineni na umuhimu wake kwa utunzi wa mashairi ya Kiswahili. Utafiti ulifanywa maktabani ambapo data ilikusanywa maktabani kupitia usomaji wa kina wa mashairi teule. Mtafiti pia alizingatia matumizi ya mtandao kupata ujumbe zaidi, kusoma makala, majarida na tasnifu mbalimbali ili kupata dhana na maelezo ya kimsingi kurutubisha haswa mada ya utafiti, suala la utafiti, yaliyoandikwa kuhusu mada na misingi ya nadharia. Utafiti uliongozwa na nadharia ya kimtindo ambayo kimsingi huangazia jinsi lugha hutumika katika fasihi kupitisha ujumbe kwa wasomaji na hadhira. Sampuli lengwa ni diwani mbili; Kichomi, ya E. Kezilahabi (1973), na Miale ya Uzalendo, ya K. King'ei (2000). Mashairi yaliteuliwa kimakusudi kwa mujibu wa malengo ya utafiti. Ukusanyaji data ulifanywa kwa kuongozwa na nadharia iliyotuwezesha kutimiza malengo ya utafiti. Aidha, data ilichanganuliwa kwa kuainishwa kwa misingi ya ubainishaji toni, nafsineni na umuhimu wake. Kisha, uchanganuzi halisi ukaongozwa na maswali ya utafiti, malengo ya utafiti na mihimili ya nadharia iliyoongoza utafiti. Matokeo ya utafiti yaliwasilishwa kwa mbinu ya kimaelezo, kutoa mifano mwafaka ya aina za toni katika mashairi teule. Utafiti ulibaini namna toni hujitokeza kwa kupitia maudhui na uteuzi wa maneno. Aidha, toni za aina mbali mbali zilibainishwa kwa mujibu wa suala linaloshughulikiwa na mwisho toni kuwa mtindo mwafaka wa kuwasilisha ujumbe kupunguza mafarakano baina ya wanajamii. Iltarajiwa kwamba mchango wa utafiti ungewafaa wanajamii, wahakiki wa fasihi, wasomi, walimu, wakuza mitaala na wanafunzi kwa kuwapa mwanga zaidi kuhusu ubainishaji wa toni na nafsineni katika utunzi wa mashairi. Vilevile, wangewezesha kuchanganua toni kama kipengele cha kimtindo katika ufundishaji na ujifunzaji wa ushairi.

Key Words: Toni, ushairi, mtindo, nafsineni, maudhui na uteuzi wa maneno

1. Usuli wa Mada ya Utafiti

Fasihi ni sanaa inayotumia lugha kiubunifu. Ni aina ya sanaa inayotumia lugha ili kueleza tajriba za binadamu (Njogu na Chimera, 1999:4). Utanzu wa ushairi umewahi kutungwa kwa mitindo mbalimbali ili kuwasilisha masuala mbalimbali ya kimaisha katika mazingira na nyakati tofauti za watunzi. Utunzi wa mashairi kama zilivyo kazi zingine za kifasihi, mtunzi huhitaji kuchagua mtindo unaofaa wa kuwasilisha kazi yake.

Kuna vipengele vingi vya kimtindo, kimojawapo kikiwa toni. 'Toni' ni neno lililotoholewa kutoka kwa neno la Kiingereza 'Tone' kurejelea mwelekeo na hisia alizo nazo mtunzi au mzungumzaji kuelekea hadhira yake au maudhui anayoyashughulikia (Timpane,2014).

Mtunzi wa kazi za kisanaa huwa na dhamira au funzo kwa jamii. Namna anavyoshughulikia masuala ya kijamii hutegemea matukio ya kijamii, dhamira yake kwa walengwa, imani yake kuhusu masuala anayoyashughulikia na athari aliyonua kwa wasomaji au hadhira yake lengwa. Haya yote hubainika kupitia mitindo aliyoitumia (Masinde, 1992:5).

Ushairi wa Kiswahili una historia ndefu na umewahi kutungiwa masuala mengi kwa njia tofauti tofauti. Wekesa (2008) aliangalia *Taswira katika mashairihuru ya Kiswahili*, Ngolo (2011) akashughulikia *Mabadiliko ya Kimtindo katika Mashairi ya Said Ahme*, naye Ndwiga (2013) akaangazia *Mtindo katika Mashairi ya Diwani ya KarneMpya*. Tafiti hizi zimeshughulikia suala la mtindo katika utunzi wa mashairi na zimeonyesha kwamba vipengele vya kimtindo katika utunzi ni vingi na muhimu katika uibushaji wa ujumbe. Basi, inaashiria kwamba utafiti kuhusu toni ulihitajika kufanywa ili kuelewa namna toni hubainika katika utunzi wa mashairi na umuhimu wake kama kipengele cha kimtindo.

Maelezo ya hapo juu yanaonyesha kwamba kulikuwa na umuhimu wa utafiti kufanywa ili kubainisha namna toni kama kipengele cha kimtindo hubainika katika mashairi ya Kiswahili na umuhimu wake katika uwasilishaji wa ujumbe. Vilevile kulikuwa na haja ya kufanya utafiti ili kubainisha nafsini katika utunzi wa mashairi ya Kiswahili.

1.2 Suala la Utafiti

Utafiti huu ulichunguza ubainikaji wa toni katika mashairi ya Kiswahili. Mtindo ni kipengele muhimu katika uwasilishaji wa ujumbe wa mtunzi. Toni ni miongoni mwa vipengele vya kimtindo vinavyoweza kutumiwa na watunzi wa mashairi kuwasilishia ujumbe. Kila mtunzi huwa na kusudi maalumu anapoamua kutumia mtindo fulani. Hivyo, ilikuwa muhimu kufanya utafiti wa kimtindo katika mashairi teule ili kuelewa toni, nafsini na umuhimu wa kutumia mbinu hii katika kuwasilishia ujumbe katika mashairi. Tafiti nyingi za kimtindo zimefanywa, utafiti wa kuzingatia mkabala husika, malengo na nadharia iliyotumiwa katika utafiti huu haukuwa umewahi kufanywa.

1.3 Maswali ya Utafiti

- a. Toni ni nini na hujitokeza vipi katika mashairi ya Kiswahili?
- b. Ni nini nafsini katika ushairi wa Kiswahili?
- c. Ni nini umuhimu wa toni katika ushairi wa Kiswahili?

1.4 Malengo ya Utafiti

Utafiti huu ulinuia kutimiza malengo yafuatayo:

- a. Kufasili maana ya toni na kuonesha namna toni inavyojitokeza katika mashairi ya Kiswahili.
- b. Kueleza nafsineni katika mashairi ya Kiswahili.
- c. Kuonyesha umuhimu wa toni katika mashairi ya Kiswahili.

1.5 Sababu za Kuchagua Mada

Kuna sababu kadha zilizopelekea mtafiti kuichagua mada hii. Kwanza ni visa vingi vinavyochipuka kila kuchao vya mafarakano katika jamii kupitia vyombo vya habari na kwenye mitandao ya kijamii. Familia nyingi zimezozana, kuuwana, kutiana makovu na hata kuishia kutengana kwa sababu za ukosefu wa mbinu za mawasiliano mwafaka miongoni mwao. Kwa mujibu huu basi, toni imeteuliwa kama mbinu mwafaka nuiwa katika kuwezesha kufanikiwa kwa mawasiliano baina ya wanandoa na wanajamii kwa jumla kwa madhumuni ya kupunguza uhasama huu katika jamii za leo.

Pili ni kuwa, wengi wa wanafunzi na wasomi wamekuwa na mtazamo hasi kuelekea ushairi kuwa ni mgumu kwa sababu ya lugha inayotumiwa (Mwangi, 2005). Kutokana na mtazamo huo hasi, watahiniwa pamoja na wanafunzi wa shule za upili wanafanya vibaya katika somo la Kiswahili na hasa sehemu ya ushairi; wamekosa kumakinika katika uchambuzi wa vipengele mbalimbali katika mashairi kikiwemo kipengele cha toni na utambuzi wa nafsineni.

Tatu ni kwamba, suala la toni katika mashairi ya Kiswahili limetiliwa mkazo na mtalaa wa masomo na shirika la mitihani nchini kwa sababu sehemu hii imekuwa ikitahiniwa. Katika miaka ya hivi karibuni, sehemu hii imekuwa ikitahiniwa kila mwaka ingawa wahakiki, walimu na wanafunzi hawajafahamikiwa vyema na dhana ya toni. Hii inaashiria kuwepo umuhimu wa kufanya utafiti huu ili kubainisha namna toni hujitokeza katika mashairi ya Kiswahili pamoja na kutambua nafsineni pamoja na umuhimu wa toni. Utafiti huu ulinuiwa kuwa wa manufaa kwa wanajamii, wasomi wa Kiswahili hasa wa kitengo cha ushairi, wanafunzi na walimu wa shule za sekondari, vyo na hata wapenzi wa mashairi kwa jumla ili kuboresha uelewa wao katika utunzi na uhakiki wa mashairi hususa kipengele cha toni na ubainikaji wake katika mashairi ya Kiswahili.

1.6 Upeo na Mipaka

Katika utunzi, kunavyo vipengele vingi vya kimtindo vinavyotumiwa. Hata hivyo, utafiti huu ulizingatia kipengele cha toni. Kipengele hiki kimetumiwa na watunzi kuwasilishia ujumbe katika mashairi ya Kiswahili. Kama ilivyotajwa awali, kipengele hiki hakijafanyiwa utafiti katika mkabala ulionuiwa. Mashairi mawili yaliteuliwa kimakusudi kutoka diwani mbili ambazo ni:

1. *Kichomi* - (1973) E. Kezilahabi.
2. *Miale Ya Uzalendo* - (2000) Kitula King'ei.

Vitabu hivi vimeteuliwa kwa misingi ya masuala yanayoikumba jamii sasa, hasa mashairi yaliyotungwa baada ya uhuru. Vilevile kwa misingi kwamba kimoja kina mashairi ya kiarudhi na kingine mashairi huru ili kuonyesha namna toni hujitokeza katika aina hizi zote za mashairi kama kiwakilishi tu cha mashairi hayo. Utafiti ulishughulikia watunzi wa Kenya na Tanzania ili kuona namna mazingira hayo yamechangia katika utumiaji wa toni katika kuwasilisha ujumbe.

Mashairi haya teule ni:

- 1) '**Afrika na watu wake**'-kutoka diwani ya *Kichomi-E. Kezilahabi*(1973)
- 2) '**Mnafiki**'-kutoka diwani ya *Miale Ya Uzalendo* - (2000) Kitula King'ei.

Vipengele vya toni vilivyozingatiwa katika utafiti huu ni:

- i) Maudhui
- ii) Uteuzi wa maneno

Mashairi mawili yaliyoteuliwa kimakusudi yalishughulikia suala moja ambalo ni changamoto ya kimawasiliano katika jamii ambalo lilisaidia katika ubainishaji wa toni katika mashairi ya kiswahili. Suala hili limejadiliwa kwa mujibu wa vipengee viwili ambavyo ni; maudhui na uteuzi wa maneno.

2. Yaliyoandikwa kuhusu Mada

Tafiti kadha zimeshughulikia utanzu wa ushairi katika kuhakiki matumizi ya mtindo. Baadhi ya wahakiki ni kama vile Williams katika Topan (1975) aliyachambua mashairi ya Mathias Mnyampala katika diwani yake ya *Waadhi wa Ushairi*, vilevile mashairi machache yake Mnyampala yaliyochapishwa katika magazeti ya zamani akizingatia maudhui na lugha. Williams anabainisha kuwa Mnyampala alitumia mtindo pekee lakini yeye alizingatia maudhui kando na mtindo (Ndwiga, 2013). Utafiti huu utazingatia mtindo kwa kujikita katika suala la toni huku ukiangalia vipengele vya kuibainisha toni kwa mujibu wa maudhui kadhaa kama, siasa, uchumi na jamii.

Gibbe (1980) vilevile alihakiki mashairi yake Shabaan Robert akizingatia maudhui, muundo na tamathali za usemi ambapo alibainisha kuwa Shaaban Robert alifuma mashairi yake kifani ili kufanya mawazo yake kugusa hisia za hadhira. Hii kazi yake ilifaa sana utafiti huu kwa sababu kupitia matumizi ya maneno teule ndipo mtunzi huweza kuibusha hisia fulani kuigusa hadhira yake ili kujinasibisha na maudhui au hali anayoisimba katika shairi lake huku ujumbe wake akiufikisha kwa hadhira yake.

Chacha (1980; 1987) alihakiki ushairi wa Abdilatif katika kiwango cha maudhui akizingatia *Sautiya Dhiki* na *Utenzi wa Adam na Hawaa*. Utafiti wake ulilenga kuibua maudhui na vilevile akatumia mtazamo wa Kimaksi huku akihakiki vipengele vya kimtindo kwani ni vigumu kutenganisha mtindo na maudhui.

Aidha Senkoro (1988) amehakiki maudhui na mtindo katika mashairi ya watunzi mbalimbali kwa kuongozwa na nadharia ya Umaksi. Ameshughulikia vipengele kadha vya mtindo huku akionyesha jinsi mtindo unavyosaidia kuwasilisha mawazo ya msanii. Vilevile katika utafiti huo amebainisha kuwa mtindo ni namna ambayo msanii huipa kazi ya fasihi sura ya kifani na kimaudhui kwa namna ambavyo msanii mwingine asingeweza kufanya hata kama jambo linalozungumziwa ni lile.

Wafula (1989) alishughulikia istiara na akazingatia dhana ya majazi. Kimsingi aliangazia kipengele cha kimajazi jinsi kilivyoshughulikiwa na Shaaban Robert kama mtindo wa kupasha ujumbe wake kwa hadhira. Kazi hii imetufaa katika utafiti huu kwa upande wa kuchanganua data yetu ambapo mashairi teule yaliyotumia mbinu hii yataweza kufasiriwa na kuchanganuliwa vyema ili kuweza kubainisha toni inavyojitokeza.

King'ei (2000) katika utangulizi wa diwani yake *Miale ya Uzalendo*, ameangazia dhana ya mtindo katika mashairi ambapo amebainisha kuwa mashairi ni sanaa inayotumia lugha ya mukhtasari na iliyochaguliwa kiufundi ili kuleta athari kusudiwa. Uchambuzi wake ulikuwa na umuhimu sana kwa kazi hii kwa sababu ulielekeza kuhusu bahari mbalimbali za mashairi, ambazo zinatokana na mtindo wa kupangilia maneno kama vile; pindu na kikwamba ili kuangazia vyema suala la toni tukijikita katika uteuzi wa maneno kwa lengo la kuibua hisia kwa hadhira. Pia, ili kuliona shairi kuwa na aina fulani ya toni na vilevile kuelewa vizuri kwa kujinasibisha nalo. Aidha, data yetu ya uchanganuzi ilipatikana katika diwani hii ya *Miale Ya Uzalendo* (King'ei, 2000) na kwa hivyo ilifaa.

Vilevile King'ei na Amata (2001) wameshughulikia uchambuzi wa mashairi wakizingatia vipengele kama vile maudhui, dhamira, tasnifu, fani na muktadha. Pia wameshughulikia muundo na mtindo huku wakibainisha na kueleza istilahi mbalimbali za kimtindo katika *Taaluma ya Ushairi* (King'ei na Amata, 2001) ambazo kwa mujibu wa kazi hii zilifaa pakubwa katika kuelewa istilahi kadhaa za kimtindo.

Mwangi (2005) katika kazi yake ya 'Ufundishaji na Ujifunzaji wa Ushairi katika Shule za Upili' aliangazia 'ugumu' wa ushairi kwa wanafunzi na walimu. Baadhi ya matatizo aliyoangazia ni ugumu wa lugha ya kishairi. Suala letu lilishughulikia uteuzi wa maneno

na namna yanavyotumiwa kupasha ujumbe huku yakiibua hisia fulani kwa hadhira. Aidha, utafiti huu ulichangia pakubwa katika kuangazia sababu za kuchagua mada ambayo ndiyo mojawapo wa msukumo wa kuangazia kipengele cha toni katika mashairi ili kurahisisha uelewa kwa wanafunzi na walimu katika viwango haswa vya sekondari.

Ndwiga (2013) ambaye alichunguza mtindo katika mashairi ya *Diwani ya Karne Mpya* ambapo utafiti wake umechanganua vipengele vya kimtindo katika kuwasilisha dhamira na maudhui kwa hadhira. Vipengele vilivyoshughulikiwa ni pamoja na mpangilio wa maumbo ya shairi; yaani urudiaji wa sauti, maneno na vifungu vya maneno na pia tamathali za usemi au matumizi ya ndani ya lugha katika mashairi ili kubainisha kuwa upekee umo katika kunga za lugha zilizotumiwa. Kazi hii ilitufaa pakubwa sana kwa upande wa Nadharia ya Uhakiki wa Kimtindo na vilevile katika vipengele vichache vilivyoangaziwa katika kurutubisha kazi hii kama: maneno na tamathali za usemi katika kubainisha toni kwa kuzingatia jinsi uteuzi wa maneno na viakifishi ulivyofanywa na mtunzi.

Mwangi na Wamalwa (2016) kaitika *Miali ya Ushairi* wameangazia suala la toni kama kipengele kinachohusishwa na usikikaji wa sauti wakati wa kulisoma au kuimba shairi. Kwao, maana inayokusudiwa au hata kupatikana kwenye shairi lolote lile hutegemea toni inayojitokeza ikiwa ni chungu, ya hasira, ya furaha au hata ya ucheshi. Kando na hayo, wanaichukulia kuwa dhana ya kidhahania inayohusishwa na utungo/shairi na iliyofumbatwa na utungo wenyewe kam kiini cha utungo huo.

Wamitila (2016) anaangazia toni katika kuihusisha na hali/mazaji vilevile kama sauti inayoelekeza msikilizaji au msomaji wa shairi kwa mkabala fulani kwa mujibu wa shiri husika. Yaani, kwake yeye toni ni mkabala anaouchukua msemaji katika shairi kuhusu mada fulani.

3. Misingi ya Nadharia

Utafiti huu uliongozwa na Nadharia ya Uhakiki wa Kimtindo. Nadharia hii inaeleza kwamba kazi ya fasihi haiwezi kueleweka bila lugha. Hivyo, jinsi mtunzi atumiavyo lugha husaidia katika kutoa ujumbe uliokusudiwa kwa wasomaji na wasikilizaji. Lugha huwa chombo cha kimsingi katika kufanikisha mawasiliano.

Kwa mujibu wa nadharia hii, lugha ina dhima kubwa katika kufanikisha kazi ya fasihi. Kulingana na wanamtindo, lugha ni chombo muhimu ambacho ni tekelezi kwani husaidia katika kuelewa ujumbe au maudhui kusudiwa. Aidha, wanasema kuwa vipengele vya kiisimu hutumika katika kueleza jinsi lugha hutumika. Mathalan, kutokana na mtindo wa kazi ya fasihi, inakuwa vigumu kubadili sentensi au neno katika kazi hiyo bila kuabadili mtindo wenyewe. Katika nadharia hii, mitazamo ya wanamtindo mbalimbali kuhusu kipengele cha toni kama kipengele cha kimtindo katika kuwasilishia ujumbe kiliangaziwa.

Mwanzilishi wa nadharia hii ni Buffon (1930) anayeshikilia kwamba mtindo ni mtu mwenyewe. Licha ya jinsi mwandishi afanyavyo uchaguzi wake kimakini, mtindo wake ndio unaomtambulisha kuwa mwenye tajriba na anaweza kutegemea uwezo wa tabia ya uchaguzi wa sauti, maneno na hata ruwaza za kisintaksia kuasilisha mtazamo wake.

Mwasisi mwingine ni Coombes (1953). Yeye anadai kwamba ili kuchagua mtindo katika kazi fulani, lazima vipengele vinavyofanya kazi hiyo ivutie vizingatiwe. Anaendelea kuzungumzia vigezo kama vile, matumizi ya taswira, hisia zinazoibuliwa, uteuzi wa maneno, urari wa vina na mahadhi ya shairi. Kulingana naye, mahadhi katika utunzi huwa suala la 'mbinu za kiwakati' na msisitizo wa kiufundi wa maneno unaoletwa na msukumo na ubora wa hali na fikra kutokana na maneno.

Hisia za mwanadamu zenye wingi wa utata usiokoma na shughuli za kiakili hudhihirisha safu ya uambishi-kati na toni isiyokoma katika maongezi ya kila siku. Mwelekeo na hisia zinazoamua aina ya toni ya mazungumzo aghalabu pia huamua namna ambavyo maneno yanatiliwa mkazo. Vilevile kiwango cha mwondoko, toni, mkazo na mwendo huunganishwa pamoja.

Leech (1969) akiwa mwasisi mwingine wa nadharia hii, anazungumzia kinaya cha toni ambapo ni suala la sajili. Kulingana naye, toni ya kejeli yaweza kutumika japo pasipo kumlenga anayekusudiwa moja kwa moja. Yaweza kulengwa kwa nafsi ya tatu. Kwa mfano, "mwenye enzi anataka nini?" Kejeli katika mazungumzo ya kila siku aghalabu hurejelewa katika hali ya kubeza kuliko uovu. Vilevile katika fasihi, kudhihaki ushujaa huwa kidogo zaidi ya utaratibu huku kukileta burudani staarabu kwa mtunzi pamoja na msomaji. Kwa mfano, mshororo, 'Kijakazi Mfidhuli! Makininifu'. Hapa kuna hitilafu katika usawa wa ubora uliochanganyika na toni ya kishenzi au yenye kukosa adabu.

Vilevile Leech (1969) katika uchanganuzi wa nadharia ya kimtindo, anasisitiza mshikamano wa kisarufi na kimsamiati ambao mshairi huchukuwa kutoka kwa lugha sanifu ili kuunganisha shairi. Mjadala huu ulimpelekea kuchunguza namna mshikamano wa ruwaza tofauti huhusiana na 'vipengele tangulizi' (tafsiri yangu - Foreground elements) katika shairi. Basi kutokana na hayo yote, Leech anahitimisha kuwa, vipengele vyote ambavyo ni tangulizi katika 'ruwaza shikamani' (cohesive patterns) huongoza katika uchambuzi wa shairi zima.

Kuhusu 'mshikamano,' Leech (1969) anarejelea namna ambavyo sifa za kisintaksi, kimsamiati na kifonolojia huungana katika na katikati ya sentensi kwenye matini. Uhusiano wa aina za kimatini wa kimsamiati na kisarufi huunganisha sehemu za matini kuwa nzima. Mshikamano waweza kujitokeza katika uradidi wa maneno. Basi uchanganuzi wa mshikamano husaidia msomaji kueleza sababu za kiisimu kuhusiana na maana ya matini. Hii inamfanya msomaji kufuatilia maana inayojitokeza katika matini kwa urahisi.

Katika mbinu ya semantiki, kuna viwango mbalimbali na miongoni mwavyo ni kiwango cha 'semantiki-neno'. Katika kitengo hiki uchaguzi wa maneno au msamiati wa mtunzi huzingatwa. Maneno yanaweza chaguliwa hususa maana halisi, maana kimatilaba au kwa mitazamo mingine ya maana. Kwa mfano, '*But tomorrow cannot be consoled*' kwa maana ya 'Lakini kesho haiwezi kufarijika.' Hapa kufariji ni sifa ya binadamu tu lakini imetumika kimatilaba ili kuwasilisha hoja fulani na hivyo kuleta msisitizo fulani na mtunzi. Ngara (1982) anashikilia kuwa fasihi huandikwa na lugha hutumia vipengele kama toni, mafumbo, maelezo na maongezi.

Kutokana na maelezo hayo, tunapata mihimili ifuatayo:

- a) Muundo wa kazi za kubuni ndio hutumiwa na msanii kutoa ujumbe wake. Huu ni mkondo anaoufuata msanii katika kuifuma kazi yake (Leech, 1969). Mhimili huu ulitufaa katika kuangalia mtindo uliotumiwa na mtunzi katika kuwasilisha ujumbe wake, vilevile ulituwezesha kueleza toni ya mtunzi katika mashairi teule.
- b) Mtindo ni tabia ya mtu kuhusu matumizi yake ya lugha, yaani namna mtu anavyotumia lugha kuwasilishia ujumbe (Coombes, 1953). Mhimili huu ulituwezesha kuangalia kipengele cha uteuzi na mpangilio wa maneno ya mtunzi katika mashairi teule ili kubainisha toni na nafsini.

- c) Binadamu ana kipawa cha lugha na anafaa aitumie lugha ili kuhamasisha jamii yake. Wanamtindo husisitiza umuhimu wa lugha kama chombo tekelezi kinachosaidia katika kuelewa ujumbe uliokusudiwa (Leech, 1969). Mhimili huu ulitusaidia kuchambua kipengele cha maudhui katika mashairi teule.
- d) Kazi ya fasihi husaidia kuwasilisha mwelekeo, hisi na tajriba za mtunzi ambazo huamua aina ya toni kwa wasomaji na wasikilizaji (Coombes, 1953). Huu mhimili ulituwezesha kutambua mwelekeo, hisia na tajriba za mtunzi pamoja na aina za toni kupitia nafsini katika mashairi teule.

4. Mbinu za Utafiti

Sehemu hii inahusu mbinu zilizotumika katika utafiti ambapo inajumuisha muundo wa utafiti, mahali pa utafiti, sampuli, ukusanyaji wa data, uchanganuzi wa data, uwasilishaji wa matokeo na hitimisho.

4.1 Muundo wa Utafiti

Utafiti huu ulikuwa wa kimaelezo. Maelezo yalikusudiwa misingi ya nadharia, yaliyoandikwa kuhusu mada, mbinu za utafiti, ukusanyaji wa data, uchanganuzi na uwasilishaji wa matokeo.

4.2 Mahali pa Utafiti

Utafiti huu ulifanywa maktabani ambapo mtafiti alisoma yaliyoandikwa kuhusu mada, misingi ya nadharia, mbinu za utafiti na tahakiki za mashairi mbalimbali.

4.3 Sampuli

Sampuli lengwa kwa minajili ya utafiti huu ilikuwa mashairi mawili teule ambayo ni huru na ya arudhi. Mashairi hayo yaliteuliwa kwa mbinu ya kimaksudi kwa mujibu wa masuala yanayoikumba jamii na vilevile kuonesha uteuzi wa maneno na maudhui kuelekeza katika ubinishaji wa toni.

4.4 Ukusanyaji wa Data

Data ya utafiti huu ilikusanywa kupitia usomaji wa kina na unukuzi wa sehemu za vipengele vilivyotafitiwa katika mashairi teule. Aidha, mtafiti alinukuu mifano ya mashairi kwa mujibu wa data iliyohitajika.

4.5 Uchanganuzi wa Data

Uchanganuzi wa data ulifanywa kwa kuainishwa kwa mashairi kwa kuzingatia vigezo vya maudhui na uteuzi wa maneno. Kisha uchanganuzi ulifuata kupitia ubinishaji wa toni, nafsini kwa kuongozwa na mhimili ya nadharia, malengo ya utafiti, maswali ya utafiti, pengo la utafiti pamoja na kueleza maana ya toni, umuhimu wa toni katika utunzi wa mashairi ya Kiswahili na maana ya nafsini katika mashairi haya ya Kiswahili.

4.6 Mifano ya Data Iliyonukuliwa na kuchambuliwa

Sehemu hii ilishughulikia mifano miwili hususa data iliyonukuliwa ili kuonesha namna maudhui pamoja na uteuzi wa maneno huelekeza katika kubaini maana ya toni, aina ya toni, nafsineni na umuhimu wake katika mashairi ya Kiswahili. Mashairi mawili yamenukuliwa kama sehemu ya data teule kwa mujibu wa utafiti huu.

5. Kipengee cha Maudhui

5.1 Shairi la ‘Afrika na Watu Wake’

Shairi hili linahusu bara la Afrika ambapo watu hawa ‘waafrika’ ni wagonjwa kwa sababu ya kudungwa na miiba. Miiba hii ni ya ukoloni mamboleo ambao ni pamoja na ufisadi, ukabila, uhasama, umwinyi, ‘ulimbukeni’ n.k. Kwa mujibu wa shairi, ugonjwa huu ulikuwepo enzi za ukoloni na hata baada ya kujikomboa kutokana na utumwa huu bado hali hii ingalipo kwani imekolea sana hadi kukithiri mipaka na kulemaza maendeleo kama ya kiuchumi katika bara zima. Ili kuumaliza ugonjwa huu, mshairi ananasaha kuwepo kwa mikakati ya kimakusudi kwa serikali na uongozi ili kuukabili ugonjwa huu na kuwezesha mataifa kujijenga tena kimaisha kama uchumi wa nchi n.k

Aina ya toni inayojitokeza hapa: Ni toni ya kutamausha, kuchosha na kukata tamaa kwa sababu ya hali inayoonekana kuzorotesha bara letu.

5.2 Shairi la ‘Mnafiki’

Shairi hili nalo linahusu aina ya rafiki ambaye ana tabia za kupe. Mshairi anatahadharisha jamii kuepukana na rafiki aina hii. Anamweleza kuwa ni rafiki anayejifanya rafiki ila nia yake ni kufaidi tu na wala hamna lolote la msaada analokupa. Afikapo kwingineko anakusema vibaya na kukupaka tope, kutoa siri za kwako na arejeapo ni uwongo tu kukutilia na kwa hivyo wanajamii wanatahadharishwa kuepukana sana na aina hii ya marafiki ambao si wakweli, wanavalia hulka mbili tofauti na mwishowe ni kukuletea balaa na hasara tupu.

Aina ya toni inayojitokeza hapa: Ni toni ya kutahadharisha, kuhamasisha na kuelimisha.

5.3 Kipengee cha Uteuzi wa maneno

Katika **shairi la ‘Afrika na Watu wake’**, maneno yaliyoteuliwa na mtunzi kimakusudi ili kuibua hisia na kujena mazaji pamoja na toni katika shairi ili kupitishia ujumbe kwa hadhira husika. Maneno haya ni kama yalivyoorodheshwa:

- 1) Mgonjwa bado amelala kitandani-**Kwa kawaida mgonjwa huwa ni muathirika wa maradhi fulani na huwa anahitaji matibabu ili kuepukana na athari zaidi

ambayo inaweza ama kumlemaza au hata kumua. Mgonjwa hapa ni Bara la Afrika

- 2) **Miiba**-Ni sehemu ya kitu chenye ncha kali za kuchoma. Kwa mujibu huu, miiba ina maana ya ukoloni mamboleo ambao ni pamoja na ufisadi, ukabila, uhasama, umwinyi, 'ulimbukeni'. Mambo na tabia ya viongozi na uongozi yanayochoma waafrika na kuwaathiri vibaya.
- 3) **Macho makali**-Kwa kawaida macho hutumika kutazamia mahali, mambo na kwa mujibu huu inarejelea macho yenye upevu zaidi katika kuyachunguza mambo, matukio n.k ili kubaini vianzo na sababu za matukio hadi kufikia kiini chake na kutoa mapendekezo ya kutatua suala wala si kulifunikia zaidi.
- 4) **Mikono isiyotetemeka**-Mikono ni sehemu ya mwili inayomsaidia binadamu kuyatekeza mambo mbali mbali. Kwa mukabala huu inarejelea sharia na vitengo vyote vya kutekeleza haki kama mahakama na serikali kuhakikisha uovu uliopo Afrika umetokomea kabisa.
- 5) **Moyo usiokuwa na huruma**-Kwakawaida binadamu ameumbwa na uwezo wa kuwa na hulka tofauti kama kuona huruma, kuwa katili n.k.Kwa ujibu wa utafiti huu, dhana hii imetumik kurejelea sharia na watekelezaji wa sharia hizi kutolegeza utekelezaji wa sharia bali kuzifuata sharia kwa kutozingatia anayeathirika hapa.
- 6) **Viatu vya chuma**-Chuma ni madini magumu yanayotumiwa kuundia vitu. Kwa mkabala huu, miiba hupatikana sana sehemu za ardhini na humdunga mtu miguuni. Kwa kawaida miiba haiwezi ikapita kwenye chuma na kwa hivyo itavunjika tu. Basi viatu vya chuma hapa inarejelea mikakati kabambe ya kuikabili miiba (magonjwa) isiyolegezwa iwekwe na sharia kali zifuatwe bila kubagua na hapa miiba haitadunga ila itaishia kuvunjika tu.

Aina ya toni: Toni inayojitokeza hapa kupitia maneno haya ni ya kutamausha, kukata tamaa na kuvunja moyo kwani kuwapata viongozi na vitengo vyenye kutekeleza haki imekuwa kama kutafuta barafu ya kukaangwa.

Uuhimu wa toni: Tunapotazama bara letu hususan inci yetu ya Kenya, tunayo miiba mikali sana iliyotudunga hadi mifupani na tunaonekana kukosa tumaini na kutamauka kwa sababu ya kukosa vitengo vyenye macho makali, mioyo isiyo na huruma na mikono isiyotetemeka kutufaa wannchi. Toni hii inatujaza hali yetu ilivyo kama waathirika na kututumainisha tu kuwa iwapo tutafanya maamuzi bora hasa wakati wa kura za kuwachagua viongozi na kusimama kidete kuing'oa miiba hii basi hatutafaidi ila kuedelea kulala kitandani huku taifa likizorota kiuchumi. Ni hamasisho la muamko mpya ambapo wazalendo watajitolea kuupinga uovu huu katika jamii na kuuambaa kabisa. Aidha, uongozi na viongozi wanaweza kukashifiwa kupitia toni ya kuchoka, hamaki na hamasisho kutoka kwa wananchi ili kupata mabadiliko.

Katika **shairi la 'Mnafiki'** mtunzi vile vile ameteuwa maneno yafuatayo katika kuzua toni kusudiwa kwa hadhira lengwa ambayo kwa mujibu huu ni wanajamii wote kwa jumla. Maneno haya ni pamoja na:

1) Nduli-Ni neno linalorejelea adui asiye na huruma. Kwa mkabala huu, mtunzi anamfananisha rafiki huyu na adui asiye na huruma kwani anajifanya rafiki ili afaidi; hana huruma kwani anakutia hasara na hamna lolote wewe unapata

2) Rafiki-Kwa kawaidahuwa ni mtu anayependana na kuaminiana na mwingine lakini kwa mkabala huu anakuwa kinyume cha haya ndiposa kuitwa rafiki mnafiki, asiyeaminika.

3) Ana baa- Baa ni neno linalorejelea tukio la kuleta hasara, balaa, maafa au shida. Kwa mujibu huu ni kuwa huyu ni rafiki wa kukutia kwenye shida na kukuletea maafa kwa hivyo cha mno ni kumwepuka na kutengana naye

4) Muambae-Kuambaa ni neno lenye maana ya kukiepuka kitu na kwa hivyo mtunzi anawahimiza watu wenye rafiki wa aina hii kuwaepuka, kuwakwepa na kutengana nao kabisa kama ardhi na mbingu ili wasije wakawaletea hasara maishani.

Aina ya toni: Toni inayojitokeza hapa kupitia maneno haya ni ya kutahadharisha, kushangaza/kuduwaza, kuelimisha limbukeni na hata kuhamasisha dhidi ya aina ya marafiki kama hawa ili kuepuka hasara.

Umuhimu wa toni: Katika jamii ya leo iliyojaa changamoto chungu nzima, toni hii ya kutahadharisha na kuonya inafaa pakubwa. Inawezesha wanajamii kuishi kwa tahadhari huku wakiwa na ufahamu juu ya aina ya marafiki wanaojihusisha nao. Aidha, kuepuka majanga mengi yanayoletwa na marafiki wanafiki pale ambapo watu wamekosa kumakinika tofauti na wakati wa kale ambapo kila mmoja aliaminika katika jamii. Kizazi cha awali kilikuwa chenye uadilifu zaidi kuliko cha sasa kwa sababu kilithamini zaidi maadili ya jamii husika kuliko kizazi cha sasa kilichoathirika na changamoto zinazokita katika usasa. Hivyo, kuunda mikakati ya kukabiliana na changamoto hizi.

5.4 Uwasilishaji wa Matokeo

Matokeo ya utafiti yaliwasilishwa kwa njia ya maelezo. Aidha, mifano ya sehemu za mashairi teule ilinukuliwa ili kueleza maana ya toni, ubainikaji na umuhimu wake pamoja na nafsini. Vilevile matokeo yaliwasilishwa kwa kuzingatia maswali na malengo ya utafiti, mihimili ya nadharia teule na vipengele vile viwili; maudhui na uteuzi wa maneno vilivyoainishwa kwa kuandikwa kinathari.

6. Matokeo Ya Utafiti

1) Utafiti ulibaini maana ya toni kuwa ni msimamo, mwelekeo na hisia za mtunzi kuelekea hadhira au maudhui anayoshughulikia. Haya hudhihirika kupitia nafsini kutokana na uteuzi wa maneno na matumizi ya viakifishi katika shairi

- 2) Toni hubainika kwa uteuzi wa maneno na maudhui. Aidha, kichwa cha shairi pia kinaweza kudokeza aina ya toni inayotarajiwa na msomaji au msikilizaji wa shairi.
- 3) Kuna toni ya kijumla katika shairi lolote lile na vile vile kuna toni ndogondogo zinazojenga toni ya kijumla na vile vile kujenga mazaji/hali ya shairi.
- 4) Nafsineni ilibainika kuwa ni sauti ya mnenaji katika shairi na wala si mtunzi mwenyewe; anaweza kuwa kiumbe k.m mnyama, mdudu, kiumbe dhahania n.k
- 5) Pia utafiti ulibaini kuwa toni ni mtindo mwafaka katika kupitisha ujumbe bila ya kufarakana moja kwa moja kama katika ndoa ama baina ya viongozi wenyewe ili kuepuka majibizano yanayozua vita na rabsha katika jamii.

6.1 Hitimisho

Utafiti ulinua kueleza maana ya toni, kubainisha namna toni kama kipengele cha kimtindo hubainika katika mashairi ya Kiswahili na hasa ukiwa mtindo wa kuwasilisha ujumbe kwa hadhira lengwa na umuhimu wake. Utafiti uliongozwa na nadharia ya kimtindo katika kuifanikisha kazi hii ambapo vipengele viwili ambavyo ni maudhui na uteuzi wa maneno viliangaziwa kikamilifu kupitia data ya mashairi mawili iliyoteuliwa na kuchanganuliwa ili kuonesha namna toni inaweza kujitokeza katika mashairi ya Kiswahili. Ama kwa kweli toni ni mojawapo ya mbinu mwafaka katika mawasiliano ya kila siku katika jamii zetu. Kuilewa namna ya kuitumia kutafanikisha maelewano na kupunguza mafarakano miongoni mwa wanajamii.

6.2 Mapendekezo ya utafiti zaidi

Utafiti zaidi unaweza kufanywa ili kuchunguza namna mazaji ya shairi huhusiana kwa ukaribu na toni na wakati mwingine kukanganya haswa wanafunzi wanapoulizwa kueleza mazaji ya shairi.

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Intergenerational Caregiving of Orphans and Vulnerable Children: A Case of Nyumbani Village, Kitui County Kenya

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Abstract

The society is increasingly marked by the number of children who are left without parents due to deaths occasioned by diseases such as Acquired Immuno Deficiency Syndrome (AIDS). The AIDS epidemic has yielded a remarkable generational shift pushing the responsibility for child rearing. The present situation is that grandparents are now taking on parenting roles for which they are not well prepared emotionally, socially, legally and economically. In the face of this observation, a Catholic priest, Father D'Agostino envisioned building self-sustaining villages that could house two groups adversely affected by HIV/AIDS pandemic – orphans and the elderly. This is what he called Nyumbani (home) village in Kitui County. The aim was to give care to the Orphans and Vulnerable Children (OVCs) affected by HIV/AIDS, who were left in the hands of the grandparents. The Village which is built on a 1,000 acre of land houses 100 grandparents (female and male) and about 1,000 children. This study sought to assess and document the Nyumbani grandparents parenting approach. The study was important in understanding the roles that the grandparents performed, and the challenges they faced in the course of caregiving. The study used a descriptive cross-sectional research design and was guided by social exchange theory and activity theory. A sample size of 25 grandparents who were the caregivers to the children was selected. The sample size was achieved through first getting information of all the one hundred households and analyzing it critically. Using systematic sampling 25 grandparents were selected and for the households headed by grandfathers purposive sampling technique was used. In-depth interviews were conducted with the grandparents. In addition, three focus group discussions were held. Key informant interviews were held with the administrators and other Kitui county stakeholders who interacted with Nyumbani village. The findings were then presented under various themes as well as using tables. The study findings revealed that having grandparents to take care of the orphans and vulnerable children has its strengths and weaknesses. Great strengths include both the children and the grandparents benefit. For the grandparents, they benefit in that their grandchildren get education, shelter, warm nutritious meals, medical services, spiritual, moral, psychosocial and parental care. The direct benefit of the grandparents: engaging in income generating activities, exposure on dry land farming techniques. For the children, they benefit in that: they still live as a family despite being in a different set-up; they get education, food, shelter and clothing. The study revealed challenges grandparents face like; intergenerational gap, old age and its health-related problems, Based on the study findings it was concluded that grandparents are playing major caregiving roles amidst a multitude of challenges that include limited knowledge, skills, resources and social support.

Keywords: Intergenerational Caregiving, Orphans and Vulnerable Children, HIV/AIDS

1. Introduction

Families are far from being static. They respond to social change in the larger society and they contribute to or accelerate societal changes through the decisions and actions of individuals or family units. Maddox and Lawton (2007) point out that the attention is not on whether groups bonded by affiliation persist but why and how they adapt as successfully as they do in response to social change. Important shifts in grandparenthood have taken place as a result of increased life expectancy. The onset of becoming a grandparent usually begins during middle age, and a large percentage of grandparents survive beyond their grandchildren's adolescence years (Szinovacz, 2008).

Bengtson (1993) noted that prolonged existence has created the emerging potential for four and even five-generation families/households. The advent of the four-generation family was first heralded back in the 1960s (Townsend, 2008). The possibilities for exchanges of support across so many generations raise many questions, such as whether all generations will have some responsibility towards the oldest. Will elderly sons and daughters be able to adequately assist their aging parents?

According to Bengtson (1993), one of the central issues on intergenerational relations is the degree to which the elderly can expect to receive various types of support from their younger relatives or their adult children. However, Townsend (2008) observes that the nature of eldercare as well as the assistance provided by elders to their adult children and grandchildren is beginning to alter these relations. Townsend (2008) views intergenerational relations as an extensive area, encompassing interpersonal and intergenerational family relationships, at micro and meso levels at one end, and generational political and power dynamics, in terms of different generations on the other.

Unlike retirement, being a grandparent is often looked on as an ambiguous role in that there are no clearly defined guidelines or norms attached to grand parenting. A societal expectation exists that adult children will look after their parents in old age, the so called intergenerational contract. In some countries, adult children are legally compelled to provide financial assistance towards the care that their elderly parents may require (e.g. France). In others, notably the Czech Republic, statutory changes in pension rules has made it easier for children to provide for their parents if they wish to do so, through diverting up to one percent of their income towards their parents " pension" (Townsend, 2008).

Botwinick (2010) observes that in some countries, the state plays a more indirect role in fostering intergenerational relations: for example, in Singapore housing policies positively enable adult children to live closer to parents but may serve to disadvantage children who want to live further away from their parents. In Japan, long-term care insurance rules enable older people to afford a range of care options, which could in turn reduce reliance of older people for care from their children, although cultural traditions still lead to higher than expected number of multigenerational households. This suggests that even where options exist to promote external care options, the family may remain the main care provider for elderly parents. Living arrangements and the prevalence of multi-generational households vary in a similar way across many countries. According to Sokolovsky (2009) “ethnicity or culture is identified as a key factor in shaping multigenerational co-residence in several countries (such as Argentina, the Czech Republic, South Africa, the UK, etc.) and can be viewed as an explanatory factor for differences in the number of multigenerational households between countries”. Residence in a rural area or an urban area also largely determines the proportion of multigenerational households in a country (Botwinick, 2010).

In the past, in most societies and cultures, the role of a young female was to stay at home looking after an older parent. In more recent times, however, older women also migrate to urban areas to help their children with household duties while their children go to work, or alternatively, some older women remain in rural areas but assume caring responsibilities of their grandchildren because the parents of these children are engaged elsewhere (Botwinick, 2010). According to Binstock *et al.* (2006), in both scenarios, the flow of care has reversed from older people being recipients of care to their increasingly assuming caring responsibilities.

Townsend (2008) observes that the economic and care situation of people living in multigenerational households can be described through two commonly occurring scenarios. He cites the first as that of a couple with children, where one or both partners have lost their job, or the family can no longer afford housing costs (especially in major cities), and they have to return to their parent’s rural home. He adds that this arrangement is adequate in the majority of cases. The second commonly occurring scenario is that where it is the older parent who has limited means and has to move in with their children, who may themselves be in a difficult economic situation (Townsend, 2008). This second scenario may not necessarily be the case in the present times.

Nyangweso (2008) observes that in traditional African cultures, older persons were accorded high esteem and social status – venerated. According to Nyangweso (2008), caring for the aged was a natural and expected part of life and had its roots in strong cultural beliefs. Nevertheless, modernization in Africa has changed the status and care

of the aged. As younger people have moved to the urban areas, many of the elders remained in their rural areas and have in the process lost valuable family support and involvement (Nyangweso, 2008). The circumstances under which grandparents assume responsibility as caregivers for their grandchildren may present emotional difficulties to many of them. The primary consequence is the inability of the grandparents to provide the basic needs for these children

There is a growing shift, particularly within Africa, where the anticipated and expected roles across generations are shifting. As opposed, to the grandparents being provided with care, there are instances where they are providing care of younger generations, thus prolonging their caregiving roles.

In Africa and Kenya, for instance, the burden of caregiving on AIDS affected children on elderly men and women is a concern (Barnett, *et al.*, 2002; Knodel & VanLandingham, 2002; Schatz & Ogunmefun, 2007; Ssengonzi, 2007). In many cases, grandparents are significantly affected in communities that are deeply affected by AIDS since care for orphans and vulnerable children often falls on the elderly if not in the agencies that care for the OVCs. In the case of Nyumbani Village, the responsibility is borne by both. Cattell (2013) observes that care responsibilities fall to these elderly people because a substantial proportion of young and middle-aged people living with HIV and AIDS move back to their communities of origin at some stage of the illness to be cared for by their parents, and grandparents take responsibility for both their children and grandchildren. He further observes that grandparents have traditionally always had a role in caring for children and the sick in Africa.

In communities that are deeply affected by HIV/AIDS, such as Uganda, care for orphans and vulnerable children often falls on the elderly, especially elderly women. Caring for OVCs can compromise older caregivers' emotional well-being and encroach on time available for involvement in social and economic activities (Ssengonzi, 2007). For example, elderly caregivers in South Africa have reported feeling of little influence on the behavior of youth, sometimes expressing a sense of confusion and hopelessness (Theron, 2007)

In Kenya, Theron (2007) found that children who depend upon elderly caregivers often drop out of school and are expected to complete heavy household tasks and chore at their home. In a study conducted in a rural part of Kenya, Nyambedha *et al.* (2003) found that one out of three children had lost at least one biological parent and one of nine had lost both. Further, the study found out that most orphans were cared for by relatives, and about one out of five caregivers were 55 years of age and older. These elderly caregivers faced difficulties in caring for the orphans in terms of schooling, food

and medical care. The study concluded that there is a major difference between the hardships of elderly caregivers and the traditional position and status of the elderly in the past.

It is evident that older people have been credited for their great efforts in caregiving to those infected and affected by HIV/AIDS. In most cases, the older people do not do caregiving out of their own will but circumstances make them to be in that situation of caregiving. This therefore raises the question; how well are these grandparents prepared for the task of caregiving? What challenges do elders face in the course of caregiving and is there a model that can address the plight of these grandparents who are taking care of the OVCs?

This study was part of a research project funded by Kenyatta University on “Eco-Friendly Dry-Land Agriculture and Water Technology for Improvement of Food Security and Health in Kitui County. The study was riding on the object 3, which sought to assess the social potential and feasibility of replicating Nyumbani model in the larger Kitui County.

1.2 Purpose of the study

To assess the intergenerational caregiving of orphans and vulnerable children in Nyumbani village

1.3 Research Questions

Essentially, this study was designed to answer the following key questions:

1. What is the relationship of these grandparents with their ‘children?’
2. What roles do the grandparents play in Nyumbani village?

1.4 Objectives of the Study

- (i) To describe the Nyumbani village intergenerational approach of parenting including criteria for recruitment of grandparents.
- (ii) To describe the social and parenting roles of grandparents and support systems offered by Nyumbani

2. Literature Review

2.1 Social Exchange Theory

This study was guided by social exchange theory. Social exchange theory was introduced in 1958 by George Homans (Emerson, 1976). Social exchange theory has a basic premise that the exchange of social and material resources, whether tangible or intangible is a fundamental form of human interaction. Homans underlined the individual

behavior of actors in interaction with each other. He summarized human behavior into five propositions. The first premise he called the success proposition. Homans argues that for all the actions a person takes, the more often an action is rewarded, the more likely the person is to perform the action. In Nyumbani Village, if the actions of the grandparents are recognized and rewarded, the more they get encouraged in their roles and responsibilities as caregivers.

The second premise he called “stimulus proposition”. It postulates that “If, in the past, the occurrence of a particular stimulus, or set of stimuli, has been the occasion on which a person's action has been rewarded, then the more similar the present stimuli are to the past ones, the more likely the person is to perform the action, or some similar actions” (Emerson, 1976). The third premise which he called value proposition holds that the more valuable to a person is the results of his/her action, the more likely a person is to perform the action. This is regardless of whether it has a positive or negative value. Grandparents value their grandchildren and thus are likely to do the caregiving with ease than an ordinary caregiver. The main result of caregiving in Nyumbani is to bring up a wholistic, independent adult and therefore this could motivate the grandparents in their roles. Children in Nyumbani could also behave in a certain manner if the results of their action are valuable to them. For instance, if they value education then, they are likely to work hard, if they value games, they are likely to keep practicing.

The fourth premise he called the “aggression/approval proposition”. It proposes that when a person's action receives or does not receive unexpected punishment, he will be angry and is more likely to perform aggressive action. Equally, when there is unexpected reward, or an expected punishment does not occur, he is pleased and more likely to perform complimentary behavior The fifth and final proposition is the Rationality proposition. It states that “In choosing between alternative actions, a person will choose that one for which, as perceived by him, the value (v), of the result multiplied by the probability (P) of getting the result is greater” (Emerson, 1976). This is best explained by a saying by B.F. Skinner that “If it is rational of pigeons to LEARN to take the shorter of two paths, so it is of men and women” (Skinner, 1990).

This theory is relevant to this work because the purpose of this study was to assess and document the Nyumbani village grandparents' parenting approach, understanding the role of the grandparents as well as getting views on the suitability of this approach. Due to the propositions by Homans on success, value, aggression/approval and rationality and given that in our entire life, starting at the infancy stage, we learn and our behavior is always modified to be constant with the goals of the people doing socialization both grandparents and grandchildren influence each other's behavior and their feelings about

their own relationships in Nyumbani. This does not only affect their relationship within Nyumbani but it has great influence on their wholistic development.

2.2 Activity theory

The theory was developed by Robert Havighurst in 1961. It proposes that successful aging occurs when older adults stay active and maintain social interactions. It takes the view that the ageing process is delayed and the quality of life is enhanced when old people remain socially active. This theory posits that in the course of maturing children gain a sense of themselves through their socializing experiences and via responses of significant others to various identities tried on in much the same way adults try on clothing. As adults, people continue to refine and refurbish their self-concepts in their performance of socially valued or at least legitimated, actions, seeking out consensual validation, the affirmation of their personal sense of worth and integrity. Upon reaching that socially prescribed stage of life when they are commonly divested of many roles that have been so central to their lives for years, older people experience a narrowing of their social radius, a reduction in activity levels and consequently a loss or confusion in their sense of who they are. To offset these losses, to preserve morale and to sustain self-concepts, the activity theory of aging presumes that restitution, in the form of compensatory activities must take place. By keeping active, it is presumed that people will remain socially and psychologically fit.

This theory was relevant to this study in that the grandparents involved in Nyumbani Village may seek to be engaged as this offers them social engagement, they require to remain active. Moreover, for these grandparents, the greater the role with which they get to old age, the better they withstand the moralizing the demoralizing effects of exits of their children. Moreover, the grandparents who take care of the grandchildren in Nyumbani village may show what Havighurst et al. 1968, call successful aging which simply means active aging whereby they manage to stay active and resist the shrinkage of their social world by maintaining the activities of their middle age for as long as possible and then finding substitutes for those that had to be relinquished like work, friends and loved ones who died.

3. Research Methodology

This study was part of a larger study undertaken by Kenyatta University in Nyumbani village on “Eco-Friendly Dry-Land Agriculture and Water Technology for Improvement of Food Security and Health in Kitui County”. The study fitted within the objectives of the larger study since the focus was on the social potential and feasibility of replicating Nyumbani grand parenting approach as well as identifying the areas for improvement in case it was to be replicated.

3.1 Research Design

The study was undertaken using a cross-sectional study design to describe the interactions of different variables. This design allowed a situation analysis of Nyumbani village since it takes a sample of the target population and bases its overall findings on the views or behavior of those selected, assuming them to be typical of the whole group (Babbie, 2005).

The study used a combination of quantitative and qualitative methods to capture in-depth information about Nyumbani village. It involved interactions with the respondents; in this study, the researcher interacted with the participants during interviews to collect data. The design allowed deductions to be made by the researcher therefore making it easy to tell how important and successful it is to use intergenerational caregiving of orphans and vulnerable children.

4. Findings and Discussions

4.1 Descriptives on the Study Unit

There are twenty-six clusters in Nyumbani and each cluster has four households except the last cluster (cluster number 26) which has only two households. The youngest child is 2 years old while the eldest child is 25 years. The household with the greatest number of children has 14 children while the household with the least number of children has 5. Having 14 children in a household may be overwhelming for the grandparent who takes care of them especially if they are too young or in their teenage stages. In a study by Mynarska *et al.*, (2015) on vulnerability of families with children, in an ideal family set up, a household with fourteen children would be classified as a vulnerable family likely to face challenges such as social exclusion, lack of stability, stigmatization and economic hardships and for this reason, the family may require more support. Nonetheless in Nyumbani village fourteen children may be irresistible given that the social workers are also involved in helping the grandparents in care giving.

Large families may have both positive and negative effects. One disadvantage of a big family is that there may be a disconnect between the parents and the children as the parents try to fetch for them or even a missed connection with some children, there could also be some financial stress and emotional stress especially when some of the family members are experiencing tough times. On the contrary, children in large families may have stronger connection with other siblings, a source of family labour and more often they tend to be more responsible since duties are divided for each of them.

The total number of children in Nyumbani village was nine hundred and fifty-eight with 484 males and 474 female children. While some households had equal number of boys and girls, some households have only boys (7). Out of the 958 children, majority of them (648) were in primary school, 223 children are in secondary school, 73 of them are in polytechnic and university and 5 children are in special schools while nine children have not joined school yet. This is clear that Nyumbani village focuses greatly on encouraging both school attendance and performance owing to the fact that the village has a primary, secondary and tertiary trade school.

There are 102 grandparents each grandparent taking care of one household. Out of the 102 grandparents, only 7 of them are grandfathers while the rest are grandmothers. In many circumstances especially in the African culture, men do not actively get involved in the role of caregiving. However, under some circumstances men and grandfathers find themselves caregiving. Several factors act as moderators or mediators. For instance, if there lacks any other caregiver or if the grandfather is doing it out of care and concern for his grandchildren or if he sees it as his obligation then it may influence their decision to assume the role. For the grandfathers in Nyumbani village, several factors may guide their decisions like lack of resources to take care of their grandchildren.

Findings show that the grandparents take the children under their care as their own children. A key informant added that this was like any other village in a community where a grandmother may die and leave the grandfather to take care of the grandchildren. In this case therefore, the grandfathers take the role of the father figure in the households and clusters. There are also counseling sessions that are conducted in schools, by the counseling department and also by social workers. Nyumbani village has reactive sessions and preventive counseling sessions. During these sessions, the social workers talk to the children more often, do counseling and regular visits where they talk about topics to do with relationships, sex, and teenage pregnancy among others.

A key informant who is a beneficiary of Nyumbani village recounted that “some grandfathers are better caregivers than grandmothers; their houses are very clean and better in organization. In fact, the grandfathers counsel the children by talking to them as if they were their own biological children”. Grandfathers play significant roles in the lives of their grandchildren. According to Bates & Goodsell (2013), “Grandfathers execute lineage work in response to grandchildren’s needs to be connected to ancestral roots, to know from where and from whom they came, as well as to be acquainted with progenitors”. Grandfathers do this for their desire to connect their grandchildren to their family’s history. In other words, they act as links between the past and present for the grandchildren. Grandfathers also mentor their grandchild (ren) that is they pass their knowledge and wisdom to the next generations (Bugental & Grusec, 2006).

Grandfathers put a lot of time and energy in instructing and teaching their grandchildren in practical and skills (Bates & Goodsell, 2013). From the grandfather's point of view, the skills are important in the development and growth of the grandchild (Mueller et al., 2002). Grandfathers may also offer spiritual guidance to their grandchildren grounded in their firm religious principles and practices.

4.2 Socializing and Parenting Roles of Grandparents and Support Systems Provided by Nyumbani Village

Families undergo transitions, both large and small, including changes in family membership through marriage, divorce, remarriage, birth, or death; changes in living arrangements, including who is living in the household; and changes in health and caregiving needs of individual members, such as a child undergoing treatment for serious illness or requiring care after bereavement by his/her parents. The transitions between stages are marked by changes in roles and relationships within the family, and these are associated with changes in lifestyle (Schaninger & Danko, 2013).

Consequently, family life may look very different and difficult for a child who has seen her/his parents die as a result of a long illness and also for a mother who has lost her/his child and has to bear the burden of taking care of her/his grandchildren. In either way, adjusting in roles and relationships is quiet challenging. These children require people who will show them love and affection. This could be the reason why Nyumbani village uses the grandparents to these children to take care of them.

An interesting finding revealed that in the village, both grandmothers and grandfathers are involved in caregiving. The researcher sought to find out how Nyumbani decides whether to take in a grandfather or grandmother as a caregiver. Findings show that there was no criterion of taking any sex for a caregiver except that they had to be willing to take up the responsibility. It was also found out that in most cases the grandfathers back at home were never willing to take the responsibility hence the reason why, they were fewer in number than the grandmothers.

In view of this, a Sociology scholar would argue that the reason there are more women than men doing caregiving in Nyumbani is because caregiving is a gendered role. Caregiving is still largely women's work. Gender roles that are formed in upbringing permeate throughout life. Even with the increase in women in the employment force, women are still responsible for the majority of the domestic chores and childcare. In spite of the fact that households may divide responsibilities, women have retained the primary caregiver role within familial life. The role of women is still seen as child-bearing,

caregiving and all domestic chores and therefore male grandparents may be fewer for the fact that caregiving is seen as a woman's job.

This can also be considered as feminization of old age. According to Dickerson-Putman (2004b), women constitute more than a majority of the aged population in virtually all parts of the world. She adds that in developing countries, for those over age 60, the gender ratio is relatively big, about 80 men for every 100 women. In these countries, Dickerson-Putman observes that the social worlds of males and females are found to be most socially and culturally divergent. Cool and McCabe (2007) also observe that as women become older, they often assume more authority, become more assertive, tender their advice more frequently and intervene where the activities of any of their kindred are likely to run contrary to the tribal law. This could also be the reason there are more grandmothers than grandfathers in Nyumbani village.

4.3 Relationship Between the Caregivers and the Children

Being raised by a grandparent is an enculturative phenomenon. The cultural conservator role is a contemporary extension of the traditional relationships. In the African context, grandparents live with their grandchildren in order to expose them to their way of life. The use of grandparents as caregivers in Nyumbani Village also serves as an opportunity for the grandparents to instill cultural values on the children however the challenge is that these children are from different backgrounds which make relationship difficult.

Respondent P said *“some of them are very good because they don't favor, they advise us, they are good role models, and some assist us in house chores such as washing utensils and cleaning the house”*

Respondent Z said, *“Mine is good because I see my grandmother treating all children equally like they are hers. She tells us to concentrate on our education, she is not discriminative and she advices us when we are wrong. She guides us well whether we are biologically related or not”*.

Caregivers also have a responsibility to make sure that the children under their care are healthy and safe, to equip them with the skills and resources to succeed as adults and to transmit basic cultural values to them. They should also offer the children under their care with love, appreciation, acceptance, guidance and protection. In fact, grandparents have a role to play in the rearing of healthy and happy children. Literature shows that spending time with a grandparent is linked with better social skills and fewer behavior problems among teenagers which is beneficial to both generations. It goes further to

note that grandparents in many cases act as confidants and sources of comfort to their grandchildren (Bugental & Grusec, 2006).

One of the key roles of the grandparents is to provide guidance to the children and also give security to them. Skaff & Pearlin (1992), note that caregivers have a number of roles and responsibilities which include: to monitor and supervise the safety of children who are under their care, to help them observe hygiene, organize activities so that children can learn about the world and explore interests, help them develop and nurture their talents, provide for their basics like food, shelter and clothing as well as to monitor and keep records of the children under their care. The caregivers of Nyumbani village carry out their roles and responsibilities as required of any caregiver. However, one major role of a caregiver is to help improve children's social skills by having them work together and involving them in creative activities such as art, dance, music etc which could be a challenge to some of the grandparents owing to their ages and illnesses. Nevertheless, this is complemented by the activities carried out in schools. Caregivers also often make detrimental and long term sacrifices in order to provide care for their recipients. Such sacrifices loss of personal time, financial insecurity and deterioration of health (Paul & Moser, 2009).

Literature on the role of grandparents shows that they are involved in enculturation of their grandchildren (Elmendorf, 2006). The grandparents are depicted as story tellers too. Grandmothers were mentors to the girls about to become socially acknowledged as women while grandfathers advised and spiritually supported boys old enough to be men (Gurian, 2006). Therefore, grandparents are depicted as protective, affectionate and tutorial in their interactions with their grandchildren.

Historically, in Kamba culture, grandmothers were teachers to granddaughters and younger grandsons. The youngsters slept in the grandmother's house, where they conversed after supper. Grandmothers were socially recognized as the "owners" of important knowledge who had responsibility of advising the young. Among other things, grandmothers taught girls about sexual and marital behavior. In effect, the old women controlled significant aspects of adolescent sexuality and the intergenerational transmission of knowledge. This could have been the reason Nyumbani uses grandparents in caregiving. However, it is not clear whether the grandparents' cultural expertise and social authority has been eroded by new knowledge in the modern society. The knowledge of books and the knowledge by formal education in languages (Swahili and English) which most grandparents may not know could hinder their relationships.

4.4 The Suitability of the Setup in Addressing the Vulnerabilities of the

Groups

The views of the grandparents as well as the children on the suitability of Nyumbani village in addressing their vulnerabilities showed that such a set up where grandparents take care of the grandchildren both biological and non-biological had its strengths as well as weaknesses as discussed below.

4.5 The strength of the Nyumbani Village Setup

One of the greatest strengths of Nyumbani village is that it was designed to bring out a family set up in a natural environment. Findings show that all the households do practically everything that any household does including cooking one meal, eating together, collecting firewood, washing dishes, fetching water, having their own farms where they are all involved in tilling, planting, watering, weeding and harvesting. They also go to school without any follow up, they have freedom to interact and visit other children in other clusters and they also share a common washing area as well as playing together. This presents what is done in a natural environment and was geared to making the children and grandparents feel like they were in a natural set up.

Besides presenting a natural environment to the children and grandparents, Nyumbani village takes care of the needs of both children and grandparents. The grandparents are enabled to have their grandchildren access education, food, water, clothing and security. Nyumbani also provides an atmosphere where the children grow to be responsible. For instance, at the village, the children have to attend the church service for spiritual nourishment, they also are taught good morals by different departments, their physical growth is also well taken care of and the nutritionist help in monitoring their growth and development while both the social workers and the guidance and counseling department provide psycho social support. Nyumbani Village also provides control measures and restrictions on how the children interact and where they go which is for the better of the children.

In addition, children who join Nyumbani Village, most of them get education to the level they want and they also acquire life skills from the programs offered at the village. Moreover, there is a lot of capacity building done to them therefore as they exit, they are able to take care of them and their children. Findings showed that the grandparents had satisfaction, peace, relaxation, toleration, reflection and the freedom to do what they do. Moreover, the grandparents were happy providing childcare since their greatest expectation was to have their grandchildren taken care of. Naturally, many older people get great fulfillment from looking after their grandchildren, building relationships with them and supporting them.

For the grandparents, each grandparent comes in the village with special characteristics. They have different talents and abilities which they bring to the field. Findings showed that some grandparents were very good in farming and their farms looked very green and had a lot of yields. Other grandparents had skills to make baskets (*ciondos*), while others made beautiful cooking sticks.

Having these children in the village makes assessment and monitoring easy unlike helping these children in their original homes. This is because the concept is a duplicate of a family set up as it provides wholistic growth for the children and there is no discrimination. Also, the fact that these children are taken care of by their grandparents makes them feel more loved unlike if it was social workers who were doing the caregiving.

There are consensual relationships whereby a grandparent helped another grandparent to take care of their children in case of sickness or old age. This is unlike if this was in normal set up where an old grandparent has been left to take care of the grandchildren.

4.6 The Weaknesses of the Nyumbani Village Setup

According to Wenger (2004) grandparents who provide higher levels of childcare experience significantly more depressive symptoms which make this idea of grandparents taking care of both biological and non-biological children questionable. It also needs to be recognized that as a grandparent gets older or their health deteriorates, they are not able to look after young children effectively.

Nyumbani village is different from an ideal family as it consists of grandparents taking care of their biological and non-biological grandchildren. In this set up, it is clear that there exists a generational gap in the two groups. This may present a challenge in that grandparents naturally are known to be very gentle to their grandchildren. They may not discipline their grandchildren as parents would do.

Again, these grandparents often do not come to the village voluntarily but often due to some circumstances and in need of some help. First, they need help to deal with the loss of their children and secondly, they need help for their grandchildren. This means that Nyumbani village has two sets of groups that are vulnerable and needy. Regardless of their vulnerability one is required to take care of the other. In this case, the grandparents come with baggage because they are forced by circumstances. The reason why some of the grandparents have a mindset of going back to their homes after three years or as soon as their grandchildren finish schooling.

In addition, having a houseful of grandchildren is an expected privilege of old age. However, Nyumbani village presents some grandparents who were unprepared to take on the caregiving responsibilities. They are pressured by cultural norms to take care of their grandchildren. When they get to the village and are supposed to take care of ten or more children, it may be overwhelming for them.

From the findings, some grandparents are abusive to the children under their care which could also be looked at as a strategy to get them exited and leave their children to be integrated in other households. This also could be that the grandparents need alternative care. They could be reacting out of depression or even stress from the children since taking care of ten or twelve children is not easy.

Respondent Y, said that *“here the children need a lot of counseling due to suppressed hopes. Their performance in school is very poor; hygiene is also very poor....and therefore if the grandparents who take care of them fail to understand this, we are not helping these children”*.

5. Conclusions

This study indicates that grandparents are playing major caregiving roles amidst some challenges that include limited knowledge, skills, resources and social support. Some of the grandparents who participated in this study were over 70 years of age and they had large numbers of grandchildren under their care. Such grandparents may strain in carrying out caregiving activities, the meaningful subsistence activities and income generating activities in which the younger grandparents engaged in. Some of them appeared to have lost interest in these activities of emotional distress while other grandparents do not have adequate training on how to take care of the HIV infected children under their care.

In general, it can be concluded that intergenerational caregiving of orphans and vulnerable children is a great idea especially in passing down cultural values from one generation to the other. However, it is necessary that the criteria for setting up such a model as Nyumbani Village be critically reviewed regularly to determine the challenges and impact of those children being taken care of. One of the areas that need more attention is the setting of the households in handling the boys and girls, the infected with HIV/AIDS and the affected as well as their ages. This will go a long way in curbing some of the challenges already reported in Nyumbani. Adequate well trained and friendly staff will also help in handling the children’s need as well as in training the grandparents on how to nurture and care for the children. This is important as the findings showed that a

very high number of grandparents did not have any skills or knowledge on how to take care of the children which puts their lives at risk of infection and re-infection.

The Government should consider set ups like Nyumbani to strengthen its programs for elderly caregivers. This includes working with the ministry of health in the counties to train the caregivers on HIV home care and also mobilizing resources to help the OVCs in their education and throughout their lives. It is also important to provide psychosocial support for the grandparents' caregivers and the OVCs.

6. Recommendations of the Study

- i. There should be separation of boys and girls based on their sex. As they grow to adolescence, it becomes difficult for the grandparents to deal with adolescent challenges.
- ii. The age of the grandparents should be considered to avoid generational gap, old age challenges and illnesses. Another challenge of using these very old grandparents is that they may not understand the language used by the generation they are taking care of and therefore they may have great difficulties in their responsibilities. They can consider use of young mothers like the case of SOS village and Mama Ngina children's home.
- iii. Nyumbani village should try and break the culture of dependency by training and encouraging these grandparents adopt the modern farming techniques used in the village. When the grandparents adopt these methods in their quarter acre farms, the children will also benefit with the skills and are likely to use them once they exit from the village.

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Gender and Society: Discrimination in the Workplace

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Abstract

In the workplace, women are frequently subjected to subtle discrimination by male counterparts. Discrimination against women in the workplace is when an employer treats a female employee less favorably than the employer would a male employee specifically because of the employee's gender, for example, when a woman is rejected for employment, when a woman loses a promotion to a less-qualified male employee, or when a woman is harmed in any way because of her gender. Lack of women in directorships is preventing the flow of fresh ideas into boardrooms where the ticket to a seat is often influenced by factors other than merit. Women are also likely to be paid 10 to 30 percent less than men on similar jobs globally and are 30 percent less likely to be rehired following a financial misconduct. Despite protective anti -discrimination laws making gender discrimination illegal, management practices at small, mid-size, and even giant corporations often still favor the advancement of men. Women in the corporate world have an uphill task to get their place and break all the glass ceiling. According to Fortune.com, there were only 27 women at the helm of Fortune 500 companies as at January 2018. Women make up 58% of the American workforce, but when it comes to leadership positions at top companies, they are drastically outnumbered. Kenya is a large and diversified economy with a population of nearly 50 million people (50.1 percent female). The Global Gender Gap Report 2017 ranks Kenya 76 out 144 globally with significant inequalities between males and females in education attainment, health outcomes, representation in parliament and participation in the labor market. A 2015 Study conducted by Institute of Directors (Kenya) highlighted the composition of women on boards. For professional associations' board, women constitute 26 percent, insurance companies (15%); microfinance institutions (26%), while at 12 percent, banks had the lowest women representation. State-owned enterprises outperformed the private sector at 26% women representation largely owing to the constitutional requirement. A more recent study shows that Kenya has the highest number of women serving on company boards in Africa at 19.8 percent, above the global average of 15 percent, according to a report by the International Finance Corporation. It is followed by South Africa and Botswana at 17.4 percent and 16.9 percent respectively. Morocco and Cote D'Ivoire have the least number at 5.9 and 5.1 percent respectively.

Keywords: Gender Equality, Workplace Discrimination

1. Introduction

Research on gender inequality has posited the importance of gender discrimination for women's experiences at work. Previous studies have suggested that gender stereotyping and organizational factors may contribute to discrimination. Yet it is not well understood how these elements connect to foster gender discrimination in everyday workplaces. Men and women experience the world of work quite differently. Wage disparities, occupational sex segregation, and gender differences in authority, for example, are well documented (e.g., Padavic and Reskin, 2002). Despite notable changes in work, meaningful differences in these areas remain persistent features of contemporary society (England, 2006, 2010). The reasons are complex, including explanations on the supply side (related to individual level differences) and the demand side (related to aggregate or organizational factors) (e.g., Reskin, 1993). This research focuses on gender discrimination in the workplace in the World, Africa and Kenya.

Despite news of recent professional successes by women, the reality is that gender discrimination remains a serious problem in the world. According to the World Economic Forum, it will be 118 years before women have the same career prospects as men.

Over the past few years, women have continued to make great strides in the professional world. Although it would be tempting to see these developments as evidence that gender equality is becoming the norm in our society, studies show that gender discrimination in the workplace is still very much a serious problem.

Recently, researchers at Boston University and Brandeis University conducted a survey of studies regarding gender discrimination in the U.S. Their findings, published in the book *The New Soft War on Women*, demonstrate that discrimination against women is just as common now as it was decades ago. There is, however, one important difference: in today's workplace, it is often much more difficult to detect.

1.1 Purpose of the Study

The study seeks to show the current situation on gender discrimination in the workplace and possible solutions.

1.2 Research Questions

The study was guided by the following research questions:

- i) Is there a pay gap between men and women in the same occupation at the workplace?
- ii) What are the trends in women taking up leadership positions at the workplace?
- iii) Are promotions at the workplace granted discriminatively based on gender?
- iv) What causes gender discrimination at the workplace?
- v) What are the approaches that promote gender equality in the workplace?

2. Literature Review

2.1 Theoretical Framework

In this section, we review the major theories informing the gender equality and discrimination in the workplace

2.1.1 Marxist Theory

The main focus of Marxist theory is to analyze the impact of capitalist system on the segregation of the labor force. Marxist feminism seeks to dismantle capitalism in order to achieve women liberation. This method has two major contributions. First, it provides a class analysis, which is important for the study of power. The exercise of power is a main element in generating and perpetuating inequality. Second, it proposes a historical dialectic materialist method to analyze patriarchal relations (Eisenstein 1979: 6-7) The Marxist feminist method was originally used to explain the relationship between production and reproduction. The concept was subsequently expanded to extend our knowledge of gender segregation in the labor market (O'Brien, 1982). Marxist theorists argue that women comprise a 'reserve army of labor' (Bruegal, 1979). They argue that women can enter into paid jobs when there is a shortage of male labour. But they are also expected to leave formal employment, when they are no longer required. Marxist theorists question the conventional notion of creating surplus value by demonstrating how gender inequalities are exploited by capitalists to achieve their greater economic advantage (Lockwood 1986). In the words of Gardiner: "At a time of economic crisis ...when major requirement for capital is held down the level of wages, domestic labor performs a vital economic function and further socialization of housework and childcare would be detrimental from a capitalist point of view. However, other pressures (e.g. the need for women wage workers or the need to expand markets for workers' consumption) might lead to further socialisation of housework and childcare in a period of capitalist expansion" (Gardiner, 1979).

Gardiner's analysis explains how capitalistic systems benefit from sustaining current inequalities in the distribution of domestic duties between women and men. However, the analysis has been challenged by some feminist scholars who argue for a holistic approach towards gender equality within socio-political and economic spheres, both at work and home (Smith, 1982; Foster, 1990; Lips, 1993). According to Marxist labor segmentation theorists, conflict between labor and capital is the main cause of inequality of in organizations (Wright, 1989, Braverman, 1974). Instead of identifying class conflict as the only cause of gender segregation, these theorists argue that employer strategies to use cheap labor and to deter worker resistance tend to uphold gender segregation in employment (Beechey, 1978). Though Marxist theory does not treat women as a class, it treats gender inequality as a result of class conflict. For that reason, radical feminists have criticized Marxist theory for 'trivializing' the issues of gender segregation. Some feminist scholars argue that gender relations and the related issues of gender segregation in employment have been mainly ignored by Marxist writers (Walby, 1988). Some are more emphatic, and argue that the Marxist approach tends to reduce women's issues as a sub-category of 'malestream' articulation of class conflict (Daly, 1978).

Marxist theory has also been criticized because of its supposed neglect of childcare. According to Chodorow (1994), childcare and mothering are integrated with women's work life in industrialized countries. Chodorow argues that women all over the world are mainly responsible for childcare. Capitalist system has been largely ineffective in providing new ways of enabling parents to combine childcare with employment. Chodorow suggests that radical political feminist theory addresses the issue of childcare and women's employment whereas Marxist theory alone cannot deal with effective proposals for the reorganization of parenting, employment and childcare. Furthermore, Marxist perspective of gender segregation seems to have a limited relevance and applicability within non-capitalistic societies such as Islamic society. Islamic countries today such as Pakistan, Iran and Saudi Arabia, represent a society, which may be described as a blend of three major socio-economic systems (i.e. Islamic values, capitalistic market structures, and socialistic preferences). Interest free banking is an example offered by some banks in Pakistan, Iran and Saudi Arabia. Islamic values' system prohibits 'Riba' (interest on the 'idle' wealth) and instead promotes the Islamic institution of 'Zakat' forcing the rich to share a portion of their wealth with the needy and the destitute. The Marxist critique on gender segregation may perhaps not be attributed to class and capitalistic structures in Islamic society. Yet, the role of patriarchy and its 'collusion' with local feudal structures cannot be denied in maintaining and perpetuating the female disadvantage within societal and employment contexts (Syed et al., 2005).

2.1.2 Radical Feminist Theory

Radical feminism originated in the 1970s in the USA (Echols & Willis, 1990). Historically, radical feminism started with the assumption that the sexes are adversarially poised, that men have power over women, and that society and its various social relationships can be best understood in terms of their relationship to that situation (Eisenstein, 1983). Radical feminists argue that all kinds of oppression are derived from a system of patriarchal relations (Walby, 1990). For Marxists, capitalism is the main influence on the relationship between capital and labor. In contrast, radical feminists treat gender segregation as the core concept. Radical feminists consider concept of patriarchy as the basis of oppression in employment. Formerly patriarchy was known as the power of father (head of the family) over his family members including females and younger men (Lockwood, 1986). Today, patriarchy refers to the systems and structures that accommodate the power of men over women (Walby, 1990). In its present form, patriarchy recognizes women as a class and refers to a system where men are privileged and women not suggesting that inequality is legitimately professed. Radical feminists argue that men benefit from domestic labor as a dominant task completed by women in their families. They treat this gender division of labor as the root of patriarchal social relations giving advantages to men over women in employment. Radical feminists argue that patriarchy enforces the lower status of women socially and economically. However, some scholars have challenged the concept of patriarchy to explain the contemporary disadvantaged status of women in the labor force.

For example, Colgan and Ledwith (1996) criticize the biological decision of the concept in its traditional form, which implies that only males exercise patriarchy. According to Wilson (1995), patriarchy is old and it refers to only one kind of male supremacy. Likewise, Lockwood (1986) contends that this idea of patriarchy is not applicable to modern societies since it refers to a specific historical form of domestic relationships; contemporary gender segregation in societies is more complex. In addition to this, patriarchy does not explain other fields of oppression such as race, ethnicity, gender orientation and religion. The domain of radical feminism within Islamic society is not an easy terrain. Religion is a sensitive subject and people of faith have special affiliation towards and respect for their religious beliefs and practices. Yet, the issues of Islamic principles (such as those enshrined in the Qur'an) need to be differentiated from contemporary Islamic practices. Some scholars such as Mernissi (1996) and Hassan (2001) have argued for un-reading patriarchy from the fundamental sources of Islamic principles. These scholars argue that a gender egalitarian ideal of Islamic society can be achieved only when Islamic teachings are liberated from male dominated (i.e. patriarchal) influences and interpretations. Yet, there is some scope to reinterpret but not to challenge the Qur'anic ideals of a perfect man and a perfect woman.

2.1.3 Dual Systems Theory

Some scholars argue that Marxist and radical feminists alone are unable to explain the status of women in employment. These scholars have proposed to join these two mutually exclusive theoretical propositions in a progressive socialist feminist theory of capitalist patriarchy. This new theory endeavors to explain the dual role of capitalist system and patriarchy in producing and sustaining gender segregation in labor force. It treats the two apparently independent systems as actually inter-linked and theorizes them together to demonstrate the patriarchal relations, which would otherwise be obscured by the capitalist system (Hearn, 1987). The idea of capitalist patriarchy can be seen as advancement in the study of gender inequalities in employment. In the words of Walby (1986): "A considerable advance over the 'capitalism alone' and 'patriarchy alone' approaches to explaining gender inequality can be found in the conception of one system of capitalist patriarchy." Socialist-feminist analysis seems to address the criticism faced by Marxist and radical feminists regarding the status of women in employment and domestic life (Hartmann, 1979). According to Hartmann, Marxist theory ignores the role of patriarchy in excluding women from employment on social and historical grounds, seeing the exclusion of women from the labor force as a result of capitalist desires to employ the cheapest possible labor. Similarly, radical feminist theory overemphasized the idea of patriarchy and failed to mention the role of the capitalist system in sustaining and further exploiting the inequalities existing in the workplace and the society. Hartmann explains job segregation by gender in terms of the intersection of the two systems of capitalism and patriarchy, from which dominant groups of each system, capitalists and men, benefit.

Supporters of dual systems theory differ in the theorization of the relationship between capitalism and patriarchy. For example, Walby (1986) argues that both capitalists and patriarchs might have different or similar reasons in maintaining the suppressed status of women in society and employment. However, Eisenstein (1979) and Hartmann (1979) argue that both capitalism and patriarchy are independent systems that blend with each other and both promote the same interests. Although Hartmann's dual systems approach advances our understanding of gender segregation at work, her work has not escaped criticism. The main issue is whether she was able to maintain an analytical separation between capitalism and patriarchy. Young (1981) argues that either dual systems theorists give capitalism and patriarchy the same base where both are analytically inseparable. On the other hand, they may have separate bases where each cannot explain the full range of features of both capitalism and patriarchy. Walby (1986) also points out that Hartmann's analysis of capitalism and patriarchy overstates the degree of harmony between the two systems. Walby suggests a more developed formulation of the dual systems theory. Dual systems theory has also been criticized by post-structuralists, who argue that structural theories ignore the diverse experiences of women and men at work.

2.1.4 Post Structuralist Theory

In contrast with the Marxist approach of treating class as the root cause of segmentation, post-structuralist theorists identify the dominant discourse and the systems of representation as the basis of gender segregation. Their main focus is, for example, the representation of male and females in employment. They argue that, depending on who controls the dominant discourses of representation, women and men can be included or excluded from employment and other societal contexts. The work of French post-structuralist philosopher, Foucault (1979), is largely mentioned by the supporters of post-structuralist feminism. They argue that gender roles and identities are no more than social performances determined by the dominant discourses, which vary between different cultures and communities. According to this approach, theorization based on structural issues is an oversimplification of experiences faced by women in employment. There are a number of studies pertaining to gender segregation at work, which draw on poststructuralist arguments (such as Connell, 1987, Calas and Smircich, 1993). According to these scholars, structuralist analysis of gender segregation has an obsolete focus on the dualistic conflict (patriarchy and capitalism) between males and females. They argue that gender subjectivity is a better approach for conceptualizing the complex and changing nature of gender relationships in employment. The concept of gender subjectivities has been explained by De Beauvoir (1989) as the subjective experience of being a woman or man: "one is not born, but rather becomes a woman." De Beauvoir argues that there is no given feminine nature, but only a feminine situation imposed upon woman. "She is defined and differentiated with reference to man and not he with reference to her; she is the incidental, the inessential as opposed to the essential. He is the subject; he is the absolute-she is the other.

Other scholars such as Collinson and Hearn (1996) have also discussed the exclusive nature of structures analyses of gender relations that "caricature men's power and women's subordination and ignore the analytical significance of the organisational practices through which these categories are constituted." Post-structuralist feminist theory endeavours to recognize male and female diverse, complex, and in some ways conflicting life styles within and outside the employment contexts. Collinson and Hearn mention the role of "gender subjectivities and their ambiguous, fragmented, discontinuous and multiple characters within asymmetrical relations. In deconstructing and decentring the subject, some writers argue that all subjectivities are fragmentally non -rational and frequently contradictory" (1996). The post-structuralist theorists criticise the structural analysis of gender segregation. According to them, structural analysis of gender segregation tends to ignore the variety of experiences of women and men in the labor force, while enforcing basic gender stereotypes. Indeed, at least in the past few decades, the structural analysis of gender relations in employment has been used to

explain the inferior status of women to men. In highlighting the changing gender roles of a small number of 'successful women' within employment contexts, particularly in the industrialized nations, post-structuralist theorists tend to ignore the fact that the majority of women within industrialized nations as well as non-western contexts (such as those in Islamic society) remain restricted to lower levels of 'employment class' when compared to their male counterparts. For instance, in Pakistan, although the proportion of working women in the formal sectors of employment have somewhat increased in the past few decades (Ali, 2013; Syed, 2008), little change in the status and quality of women's employment experiences have been noted. Consequently, life choices for most women remain constrained by poverty and a lack of economic and social capabilities.

Though post-structuralist analysis of segregation at work is of use when it is taken from an individual perspective, it has however some general difficulties. It ignores the maintenance and reproduction of inequality and discrimination at workplaces experienced by most female workers. Because of its predominant focus on the diversity of experiences, the poststructuralist analysis ignores the real-life discriminations faced by a larger proportion of workforce. Instead, the concept seems to produce a seamless web of pure description that ignores the material reality and history of patriarchy and capitalism (Witz 1994).

2.2 Review of Extant Literature

2.2.1 The Global Pay Gap Between Men and Women in the Workplace

The Wall Street Journal explores the pay gap between men and women in 422 US occupations. Despite the fact that full income parity could add up to 26% to world GDP by 2025, women across the world are still vastly underpaid compared with their male counterparts. In the United States, the average woman will earn 78 cents for every dollar a man earns. Globally, that discrepancy is even worse, at only 50 cents to the dollar. At the current rate, closing the pay gap will take another 170 years

2.2.2 Leadership Positions Held by Women in the Workplace Compared to their Male Counterparts

A 2017 study by Grant Thornton shows that globally, women hold an average of 25% of senior management roles and only 12% of CEO roles. Women make up 58% of the American workforce, but when it comes to leadership positions at top companies, they are drastically outnumbered. Only 27 of this year's Fortune 500 companies had women CEOs. The list includes Mary Barra of General Motors, the highest-ranking company with a woman at the helm, and Beth Ford, the newly appointed CEO of Land O'Lakes,

who also became the first openly gay woman to lead a Fortune 500 company. "It concerns me in that we can actually count how many there are, as opposed to saying there are hundreds," PepsiCo CEO Indra Nooyi, who will step down in October, told Fortune. The women on the list run a diverse group of companies in a wide range of fields, ranging from technology to retail to banking. <https://elearningindustry.com/gender-inequality-in-the-workplace-3-ways-stop>

2.2.3 Workplace Promotions Comparing Between Male and Female Employees

In the past, qualified female employees have often been prevented from advancing to management positions in companies because of their gender. This term often used for this artificial barrier is "glass ceiling." If this is the case, it is considered workplace discrimination against women. Corporate America promotes men at 30% higher rates than women during their early career stages, and entry-level women are significantly more likely than men to have spent five or more years in the same role.

2.2.4 Causes of Gender Discrimination in the Workplace

A primary cause of gender discrimination in the workplace is that women are under-represented in many different industries, especially in male-dominated industries such as the auto industry. As a result, men in authority in these industries don't always have an open, progressive view about welcoming women, and that can create conflict, tension, and a negative work environment. Discrimination, however, doesn't exist solely in male-dominated industries; it also crops up in diverse industries in which male executives and male staff employees view women as less capable or less able to perform work tasks at an acceptable level.

3. Approaches to Promoting Gender Equality at Workplace

3.1 Liberal Approaches

The liberal approach towards equal employment opportunity in organizations is aimed at achieving the removal of discriminatory policies and practices in employment. The approach endeavors to create equal terms and conditions of employment for women and men. The proponents of the liberal approach regard men and women as equal in terms of their current socio-economic positions and do not acknowledge any differences between them. They argue that employment practices and policies should be the same for both men and women (Jewson and Mason, 1986).

3.2 Radical Approaches

Radical approaches in contrast to the liberal perspective of EEO, the radical approach differentiates between dominant groups, such as middle class white able-bodied men, and subordinate groups, such as women, ethnic minorities and the disabled (in the context of the USA and Australia for example). The radical approach challenges the existing organizational and social structures, in the quest of equality for such disadvantaged groups based on some ethical and moral principles (Jewson and Mason, 1986). Organizations that seek to implement equal employment opportunity through radical approaches use affirmative action and positive discrimination as a commonly adopted tool. The approach treats men and women as essentially different from each other in terms of their biologically as well as social identities. Radical approaches ensure the noticeable attendance of both women and men at the workplace, and seek the eradication of the barriers to advancement faced by disadvantaged groups. The approach is usually adopted by organizations possessing strong political and ethical considerations and values. Adler and Izraeli (1988: 6) identify three phases of a radical change strategy for women's employment:

- 1) identifying the distinctive contributions of both women and men,
- 2) creating enabling conditions for both kinds of contributions to be made and rewarded within organizations, and
- 3) finding ways in which both contributions can be combined for more powerful managerial procedures and solutions to the organization's problems.

3.3 Transformational approaches

Cockburn proposes the concept of transformational change towards equal employment opportunities as an alternate mechanism. Cockburn treats the liberal radical approaches as being incapable of meeting their equality targets. The liberal approach, she argues, tends to boost the interests of some disadvantaged groups such as women, ethnic minorities and disabled workers, yet it does not challenge gendered hierarchal structures. Her proposed transformational change approach has a two-pronged agenda: short-term and long-term. The short-term agenda is aimed at strangling inequalities in organizational life. The long-term agenda by comparison seeks to change the organizational structures and cultures to form a democratic organization, where equality is sustained throughout the equitable organizational system.

3.4 Multilevel approaches

Previous research suggests that societal and institutional contexts may play a major role in shaping the status of disadvantaged groups, e.g., women in employment (Beller, 1982; Blau and Beller, 1988; Dickens 2007). While in the last few decades, there has been significant progress in many countries regarding legislation on equal opportunity (Kelly and Dobbin, 1999; Leonard, 1986), legislation per se is not sufficient to explain the progress (or lack of progress) on equal opportunity in a society. There are several other factors (discussed next) which need to be considered to develop a holistic view of equal opportunity.

4. Conclusions

Even as female leaders steer multinationals and major economies, the reality is that the working world still excludes, underpays and overlooks half of its available talent. If men continue to take on more caring responsibilities and domestic tasks at home, and employers adopt genuinely flexible attitudes towards their employees, we may see the shift in attitudes needed for there to be real positive change for women at work. For working women to achieve their full potential, the state and organizational policy makers need to recognize and address equal opportunity related issues facing women at multiple levels within and outside the workplace. State and organizations both need to play their role to achieve better equal opportunity outcomes in the workplace. Through increased awareness, cultural transformation and institutional monitoring at multiple levels, it will be possible to realize the lofty dream of equal opportunity in organizations.

5. Recommendations

That so far, efforts to curb gender discrimination at the workplace have not yielded much hence, there is need to change the narrative. The phrases 'women's rights' and 'the girl child' have not helped the matter either and if anything, they have become a cliché. It is the high time we shifted to the man himself by:

- 1) Talking him out of the phobia that a dynamic working woman is a threat. Instead men should view such a woman as a partner in development.
- 2) Accept that since man controls the world economies, we can only engage him, but not confront. For example, for the 2/3 Gender Bill to see the light of the day in the Kenya as the Constitution stipulates, the male MPs must be constructively engaged.
- 3) There is need to do away with the divide into maleness or femaleness, boy child or the girl child and instead more emphasis be put on 'equity' before craving too much on 'equality'.

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Contributors of Early Sexual Indulgence Among Female Students in Secondary Schools in Kibera Slum, Nairobi County, Kenya

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Abstract

Sexual maturity brings noticeable changes in a girl's appearance, which in turn affects the way she regards herself and the way she is treated by her family and the wider society. Adolescence is an extended crisis among adolescent girls in secondary schools which brings either life-changing or life-threatening experiences. The study sought to examine the contributors of early sexual indulgence among adolescent girls in secondary schools in Kibera slum, Nairobi County. The objectives of the study were to: determine the role of poverty in early sexual indulgence among adolescent girls, to explore how peer influence contributes to early sexual indulgence among adolescent girls and to find out ways in which technological exposure lead to early sexual indulgence among adolescent girls in secondary schools. The study adopted descriptive survey design using concurrent mixed method. The Target population was 3500 adolescents and the

sample size was 350 respondents. Questionnaire and interview schedule were used to collect data. Piloting of the research instruments was done to enhance reliability and validity with the use of 20 respondents. Data collected was analyzed by using SPSS specifically descriptive statistics and presented in bar graphs, pie charts and frequency tables. The study found that the major contributor to sexual indulgence was the peer pressure with 79 respondents supporting it. Technological exposure was the second contributor to early sexual indulgence with 69 participants confessing having technological exposure where they had come into contact with pornographic contents and had experimented what they saw in the pornographic contents, 58 participants stated that they were engaging in early sex for monetary values and gifts due to low income of their parents. The study further found out that 44 participants were indulging in early sex out of curiosity and personal choices. The study recommends seminars to be conducted for parents to be enlightened on sexual education of their children and how to handle them at their adolescent stage. The parents are also advice to speak openly about sexual issues with their adolescent children. This will enable them to assess the risk their children face during adolescent stage. The policy makers and educational planners should also consider integration of sex education into the curriculum to create awareness about sexual challenges for the adolescents to make informed choices.

Key Words: Adolescent Girls, Early Sexual indulgence, Slum Secondary Schools

1. Introduction

Early sexual activity and premarital sex is common particularly in developed countries, Africa and the Caribbean. It is less common in Latin America, Asia or Middle East. Between twenty-six to sixty percent of unmarried teens in Ghana, Kenya, Liberia, Togo and other Sub Saharan African countries report being sexually active (Lema, 1990). According to a study done by Centre for Disease Control (CDC) (2007) in the USA, 48% of high school students had sexual intercourse, and 15% had four or more sex partners during their high school life. The study also reported that sexually active high school students had not used a condom during their last sexual intercourse (CDC, 2007). A research done in Tanzania by Budeba and Neema (2014) indicated that secondary school students indulge in early sex due to peer pressure, self-desire, getting monetary benefit due to low household income of their parents.

Sexual maturity brings with it noticeable changes in a girl's appearance, which in turn affects the way a girl regards herself and the way she is treated by her family and the wider world. For girls, sexual maturity takes place closer to twelve. For secondary school girls, is one extended crisis and the situations they face are either life-changing or life-threatening especially when they are in form two (Bruce, 2006). In poor urban enclaves in sub-Saharan Africa about two-thirds of the secondary school girls will report their first

sexual experience as forced or tricked (Bruce, 2006). Many African societies place high value on virginity at marriage especially for females. However, with increasing globalization, urbanization and other social changes, there are destructive changes in sexual values of young people with a general trend towards initiating sexual activity early and increased values on sexual gratification rather than on safer sex (Kelly 2001).

Parents are often reluctant to talk about relationships and sexuality with their children out of embarrassment, lack of accurate information, or fear that they will appear to condone adolescent sexual activity. This makes female students often cite peers and the media as their primary sources of information about sexuality especially after coming across the topic of sexuality in their biology lesson and want to know much about it. Unfortunately, these sources are often filled with erroneous information and myths. With parents unable or unwilling to provide this information, teachers are an obvious alternative for in-school youth. However, teachers may suffer the same shortcomings as parents, and require training and support to fulfil this role effectively (USAID, 2002).

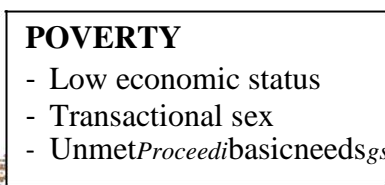
1.2 Statement of the problem

Secondary school girl's student's live double lives of which during the day are students and queens of the night in local pubs with irresistible suggesting dress in the evening. During the day, they are the innocent schoolgirls yet to know the world. They are masters at their game. Like a lioness, they will selectively choose their prey and once identified no man can resist them. To many old men, they bring back the memories of youth and the satisfaction on the cheap (Sarro, 2011).

Sexual exploitation of children continues unabated in a number of societies. Because of their immaturity, vulnerability and inability to fight back, children have been targeted for various forms of abuse and neglect. Kibera slum in Nairobi is one of the settlements where child prostitution is taking root. School girls are exploited sexually for commercial purposes while others intentionally and willingly resolve to engage in commercial sex work for various reasons (Sarro, 2011). A study done by Budeba and Neema (2014) indicated that secondary school students indulge in early sex due to peer pressure, self-desire, getting monetary benefit due to low household income of their parents. Hence the study sought to assess the contributions of early sex indulgence among female students in secondary schools at Kibera slum.

1.3 Conceptual Framework

The study was guided by the following conceptual framework.



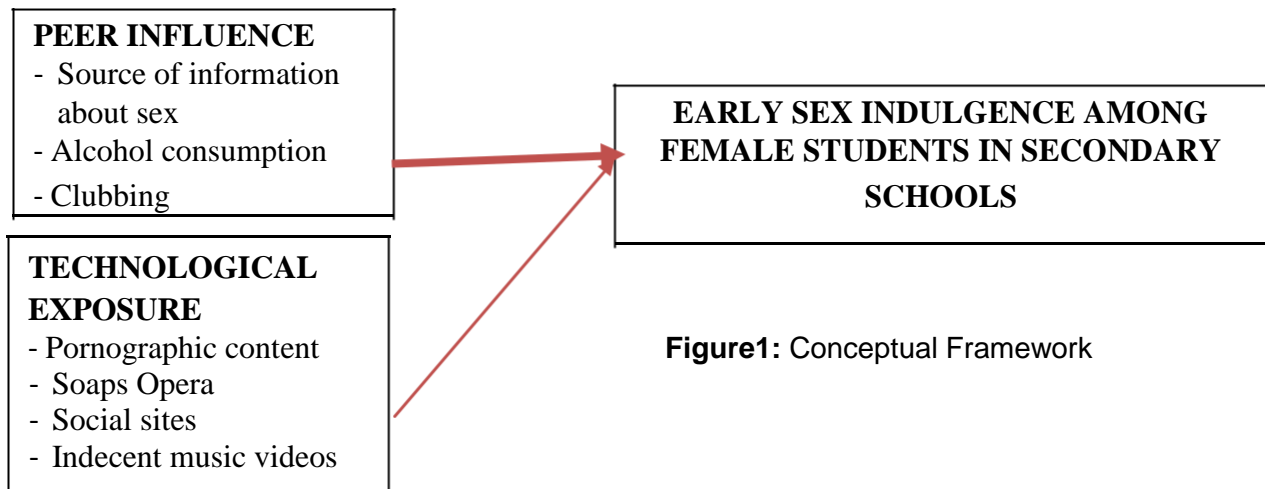


Figure1: Conceptual Framework

1.4 Objectives of the Study

1.4.1 General Objective

To assess contributors of early sexual indulgence among female students in secondary schools in Kibera Slums

1.4.2 Specific Objectives

- i) To examine the role of poverty in early sex indulgence among female students in secondary schools.
- ii) To determine whether peer influence leads to early sex indulgence among female students in secondary schools in Kibera Slums.
- iii) To find out if technological exposures leads to early sex indulgence among female students in secondary school in Kibera Slums.

2. Literature Review

2.1 Early Sex Indulgence

The primary goal of school-based sexuality education is to help students build a foundation as they are mature into sexually healthy adults. Such programs respect the diversity of values and beliefs represented in the community. A healthy feeling of wanting to be admired, touched, loved and cared for by another person is natural and is expected to develop in young people as they grow (Alubo, 2000).

According to study done by Mugisha (2003), children in Kibera face numerous challenges as they transit from adolescence into adulthood. They find themselves in rather hostile slum environment characterized by unemployment, poor housing, large family size, violence crime, drug and alcohol abuse, poor education facilities and lack of recreational activities. This reality subjects adolescents in the slums in Nairobi to early sexual activities to three years earlier and twice more likely to have multiple partners than adolescent who live in non- slum areas.

2.2 Contributors of early sex indulgence among female students

2.2.1 Poverty

The family unit is the most proximal and fundamental social system affecting the development of the secondary school girls. It is therefore seen as a potentially prominent influence of their early sex indulgence. Low social economic status among the families of the secondary school girls have been linked to reduced access to resources and social support networks which may eventually lead to physical and psychological vulnerability and increased dependence. This exposes adolescents' female students to high risk behaviour including early age of sexual indulgence, transactional sex and increased number of partnerships (Marston et al., 2013). Poverty or economic depravity has also been linked with early sexual practice among students. Girls whose parents are economically disadvantaged or less empowered are often times unable to adequately provide for their daughters and thus, their daughters are exposed to seek financial favours elsewhere. In this regard, research has shown that the most likely sources of obtaining such financial favours are from young and older men who in turn ask for sexual favours from such girls. According to Ankamah (1999) observed that some females entered into early sexual relationships ostensibly for financial reward; because their parents could not meet their basic needs such as paying for school and tuition fees.

Parents raising their children in slum settlements often report hardships faced by themselves and their children due to conditions in the slums such as social conditions, financial costs, and lack of resources is often quite high. Slum environments are often perceived by parents to be less than ideal for child well-being and development, particularly with regard to children's sexual health and survival (Meth, 2013).

2.2.2 Peer Influence

Influence of peers on students is so strong as to overpower the influence of parents for students who attend secondary schools because they are spending much more face-to-face time with friends than with parents, even if parents are not without influence (Laulik et al., 2007). Students report more self-disclosure to their friends than to their parents,

including more disclosure about sex-related topics. Secondary school students also report that their friends are the most useful source of information about sexual related topics and that students feel more comfortable talking to peers and find the information from peers more useful than that from parents. According to Inyang (2007) stated that not only is the peer group a primary source of information about sex, it may also create an environment in which peer pressure is exerted on the teenager to indulge in sex because “everyone does it” or because they do not want to “feel out of the group”. Inyang (2007) found out that peer pressure sometimes involves exclusionary practices, as when sexually inexperienced teenagers are sent away when sexual matters are being discussed. As far as the topics discussed between peers are concerned, sexual topics including sexual intercourse and reproductive health are the topics frequently discussed between students.

According to Ongweno (2012), harmful consumption of alcohol among adolescents reduces self-control and increases risky behaviour. In 2012, sexual activity among adolescent girls in Kisumu was at 22% with peer influence and drug abuse being the main predictors of sexual activities. As students begin to socialize with their peers, they tend to shift and values they learnt from home socialization to reliance on their peers. Hammer and Bangers (2010) state that a commonly cited reason for initiating sexual relations among adolescents was pressure from society and their peers. In their quest for a sense of belonging and to avoid rejection by the group the adolescents succumb to this pressure. Alo (2008) observed that students who stated that more than half of their friends had sex were also more likely to have had sex themselves. Yet, others engaged in sexual activity to raise their ego or status among their peers.

2.2.3 Technological Exposures

Students today have more opportunities than before to get sexual information from radio, television, newspapers, books, magazines, etc. Sexually arousing material, whether it is on film, in print or set to music, is freely available to a number of teenagers around the world. Television, films, magazines, video games, and the Internet all contain large amounts of sexual content (Pardun et al., 2005). Television is one of the most common places to find sexual content. Sexual messages are common in television programming and have been for a long time. Over the years, television has become more and more sexually explicit. The behaviors coded in television include kissing, embracing, heterosexual intercourse, homosexual behavior, rape and other sex crimes, touching–aggressive, touching–non-aggressive, flirting and seductiveness, innuendo (with canned laughter), innuendo (no canned laughter), atypical sex roles, and partner seeking. Soap operas are often thought of as containing large amounts of sexual content. Music videos often contain large amounts of sexual content, either through

song lyrics, or the images depicted in the videos (Smith, 2005). While much of this content is not explicit, it still seems to have an impact on viewers.

WWW domain is now the principal medium of accessing and disseminating indecent images of children and the use of the Internet for these purposes is widespread (Negredo & Herrero, 2016). In the beginning of propagation of Internet, Rimm (1995) tried to analyse the pornographic content in Usenets on Internet. Laulik et al., (2007) noted that 15% of pornography on the Internet involved children or young people. Nowadays, according to the 308 Child Exploitation and Online Protection Centre (CEOP), the proliferation of child pornography continues to be on Hidden Internet giving an advantage to offenders (CEOP, 2013). Distribution of indecent images may involve sophisticated paedophile rings or organized crime groups that operate for profit, by selling indecent images of children or setting up websites requiring payment for access (Hernandez, 2000). However, in many cases it is carried out by individuals who seek no financial reward (Wortley & Smallbone, 2006). Even though it is not possible to establish a precise number, in 2012 CEOP calculated that around 50,000 people were involved in downloading and sharing this kind of material. The non-financial reward group has been the most frequently studied. Specifically, their individual characteristics such as employment (Burgess et al., 2008), marital status (Webb et al., 2007), filiations (Reijnen et al., 2009) or personality disorders (Niveau, 2010) have been the most frequent variables considered. Parents have very little control over what their children watch on mass media in a pornified techno maniac growing society (Meth, 2013).

2.3 Theoretical Framework

The study was informed by the Social Cognitive Theory which explains that people have the capability of learning from the various social interactions they engage in their day to day lives. This includes interactions with other people, such as parents and friends as well as interactions with characters and models found in various media, such as music, magazines, and television (Bandura, 2001). The experiences of others often serve as behavior models for unfamiliar situations. People use situations that they have experienced in the past, both real and in the media, as a basis for the actions they choose to take. This is especially true in the sexual arena, because there are few non-media opportunities for young adults to learn what behaviors are appropriate or acceptable (Sutton et al., 2002).

Bandura (1973) argues that there are four steps required for a behavior to become integrated into a person's cognitive map so that it can be used for reference. First, the events must be observed and retained. Then, the viewer must conceptualize the events and create models that will be stored in their memory. The observer must then compare

the new model to similar models already stored in their memory. Last, the behavior is performed; however, not all learned behaviors will eventually be performed. Social cognitive theory states that individuals have four capabilities - symbolizing, self-reflective, self-regulatory, and vicarious - that they use in order to learn and interact with their environment. Through their symbolizing capability, individuals are able to transform day to day interactions into cognitive models that help to guide future behavior. This capability allows for a person to assign meaning to their environment and the events that occur within that environment. The symbols that are created stand for abstract concepts such as success or popularity (Bandura, 2001). For example, television commercials often show beautiful, desirable people in the advertisements because they hope the audience will transfer the concept of being desirable to the product they are advertising. Individuals are able to guide their behavior through their self-regulatory capability. This capability allows people to set goals and then use their resources to achieve those goals. People like to view their behaviors as in-line with their goals, so they tend to adapt their behavior so it corresponds to fit their goals. Additionally, the self-regulatory capability allows people to adopt moral standards and ensure their behavior fits within their moral structure. This means that people do not change what they think is right or wrong from week to week, so they are able to change their behavior so it fits within their views of what is acceptable (Bandura, 2001). For example, if a student sets the goal of getting straight A's during a given semester, the self-regulatory capability is what keeps him or her from going out partying the night before a big test. The self-reflective capability allows people to distinguish between accurate and faulty thinking. People want to verify that their views are correct. They can verify their views either by comparing them to the views of others (social verification) or by examining them for logical flaws (logical verification). However, social verification can sometimes cause faulty thinking, because shared misconceptions are used as the basis of verification (Bandura, 2001).

3. Research Methodology

3.1 Research Design

The researcher applied descriptive survey design to study contributions of early sex indulgence among female students in secondary schools at Kibera slum. The study explored issues and understanding phenomena on early sex indulgence among female students. The survey design was the research instruments which included questionnaires, observations and interviews to answer the research questions.

3.2 Study Area

Kibera slum is one of the largest informal settlements in Sub-Saharan Africa. It is located in Langata Constituency in Nairobi County. It is also known as Kibra. Kibera has

fourteen villages which includes; Lindi, Kisumu Ndogo, Kambimuru, Soweto East and West, Makina, Kianda, Darajani, Karanja, Mashimoni, Silanga, Gatwekera, Laini Saba, and Raila. The poor living conditions in Kibera are coupled with economic hardships which predisposes residents to critical problems relating to sexual behavior and in particular children.

3.3 Target Population

The study targeted female students in secondary schools at Kibera slum. The available source of information from both public and private secondary schools indicated that female students were 3,500 female students at Kibera slum.

3.4 Sample Size and Sampling Technique

The target population was 3,500 female students in secondary schools at Kibera slum. The sample size was 10% of target population according to Mugenda and Mugenda (2003). The sample size was 350 female students. Simple random technique was used and this made every participant to have equal chances of being considered in the study.

3.5 Data Collection Methods

Primary and secondary source of data were used. The primary data was collected from the field of the study. They included questionnaire, interviews and observations. Questionnaires had both open and close ended questions. They were given to the respondents of the study by the researcher and were collected later which gave respondents enough time to respond to the questions posed in the questionnaire. Researcher interviewed respondents on face to face method and each interview took place at free time of respondent with a maximum of 15 minutes. Researcher observed respondents without interfering with their activities. Secondary data was used to review the existing literature on the related topic. It included journals, newspapers, magazines, articles, books and scholarly work of past researchers.

3.6 Reliability and Validity of Research Instruments

According to Nsubuga (2010) reliability is a measure of the degree to which a research instruments yields consistent results after repeated trials. Piloting was conducted with the use of ten respondents and ten respondents for a re-test to ensure the results were consistent and reliable. Questionnaires were first given to 10 respondents and after one week another 10 respondents were given the questionnaires, this was done to compare the data provided. The same applied to the interviews. The researcher sought the expertise of the university supervisor for the content validity. This ensured that the mistakes noted were rectified and appropriate language and words were used to avoid use of ambiguous words.

3.7 Data Analysis and Presentation

Data collected was analyzed qualitatively and quantitatively. Data was first analyzed, then analyzed data was typed based on the themes. After every theme, it was quantified in percentages and frequency and presented either in a bar graph, pie chart or a frequency table.

3.8 Logistical and Ethical Considerations

The study had a research work plan to ensure that research work was done within the stipulated period. Researcher had estimated budget for the study to ensure all costs incurred were budgeted.

Respondents were given an introduction letter from the researcher to notify them the reason for conducting the research. Respondents participated at their own will without being coerced. Researcher got permission from the relevant authority to conduct the research in Kibera slum. The study was conducted in a manner that respected the values and traditions of the society and that of the respondents.

4. Results and Discussions

4.1 Study Field Response

The study field was at Kibera slum targeting female students in secondary schools. The sample size was 350 respondents but only 245 respondents participated in the study. The study effectiveness was 70% (245 respondents participated) while study ineffectiveness was 30% (105 respondents did not participate/ withdrawn from the study) as shown in Figure 1.

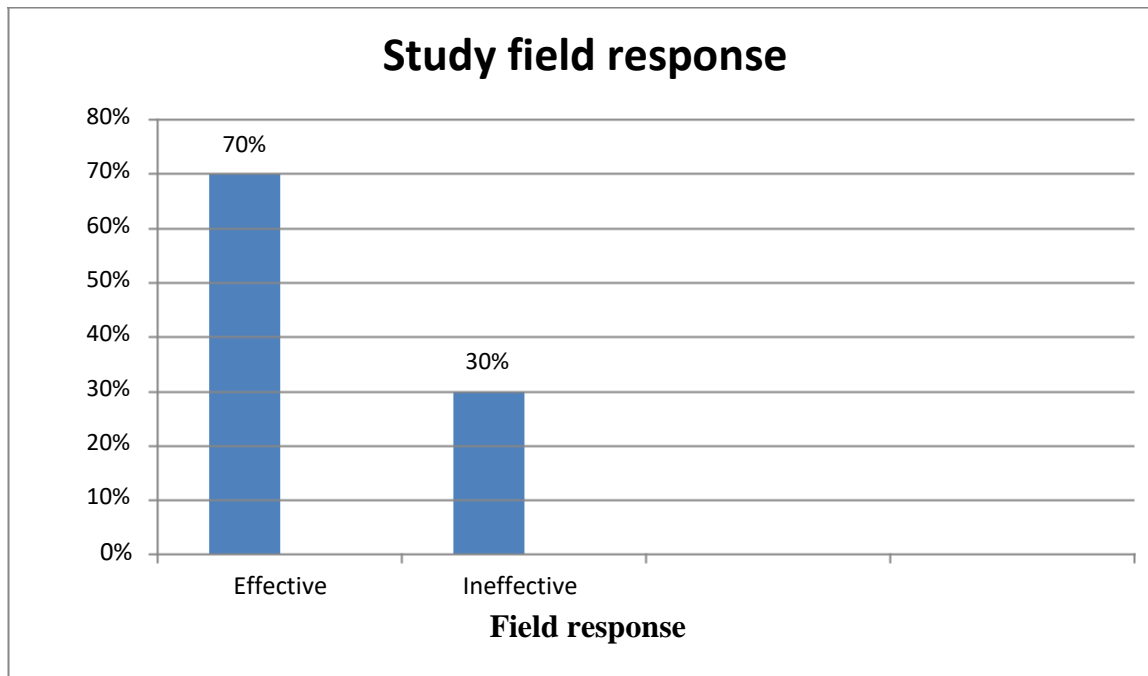


Figure 1: Study Response Rate

4.2 Participants Age

The study wanted to know the age bracket of the respondents. Majority of the respondents (130) were between the ages brackets of 16-18 years. The study also found out that 66 respondents were between the ages of 13-15 years. The study further found out that 49 respondents were between the ages of 19-21 years. None of the respondents were between the age of 21 and above years.

Age bracket	Frequency	Percentage
16 - 18 years	130	53%
13 - 15 years	66	27%
19 - 21 years	49	20%
Total	245	100%

Table 1: Participants Age

4.3 Type of Secondary School

The study wanted to know the method of schooling. According to the findings, 180 respondents (73%) were attending day schools within their locality. The study further

found out that 65 respondents (27%) were in boarding schools. As per the study, respondents from day schools were in mixed schools and had the opportunity to interact with their male students and engage in many illegal activities such as seducing each other while boarding schools would only come into contact with male students in school functions and on holidays.

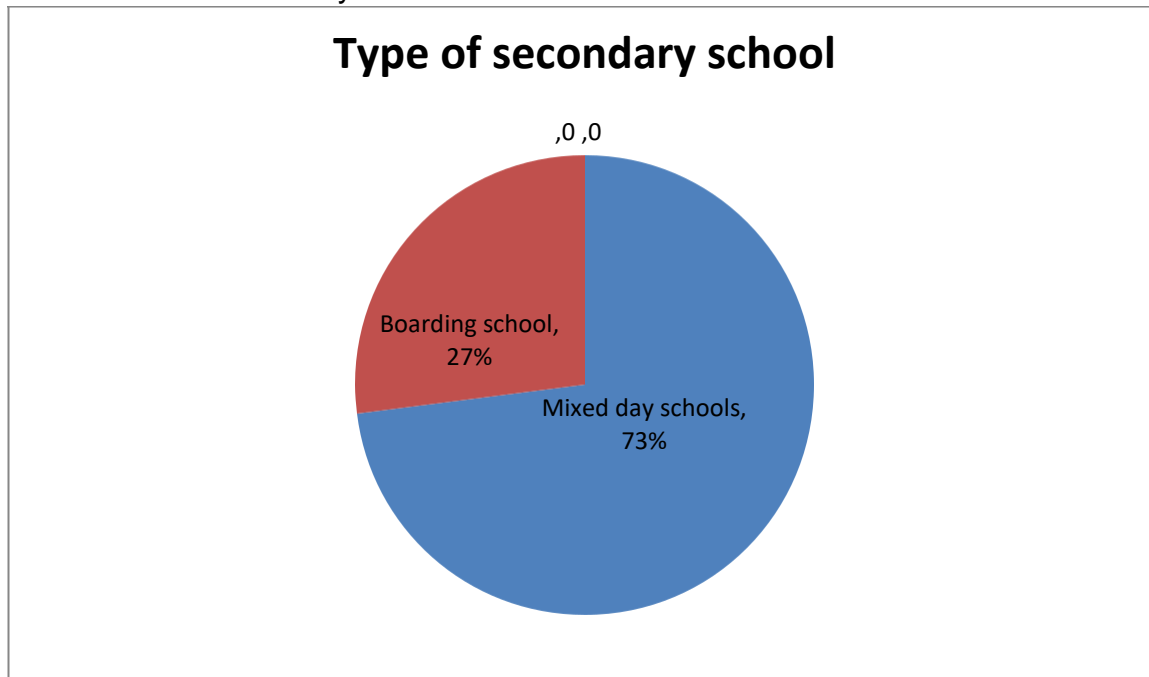


Figure 2: Type of secondary school

4.4 Respondents' Classes

The findings of study showed that 86 respondents (35%) were in form two. The study findings also showed that 75 respondents (31%) were in form three. According to the study, 50 respondents (20%) were in form four while 34 respondents (14%) were in form one. According to the observations, majority of the respondents in form two and three were at their sensitive adolescent stage.

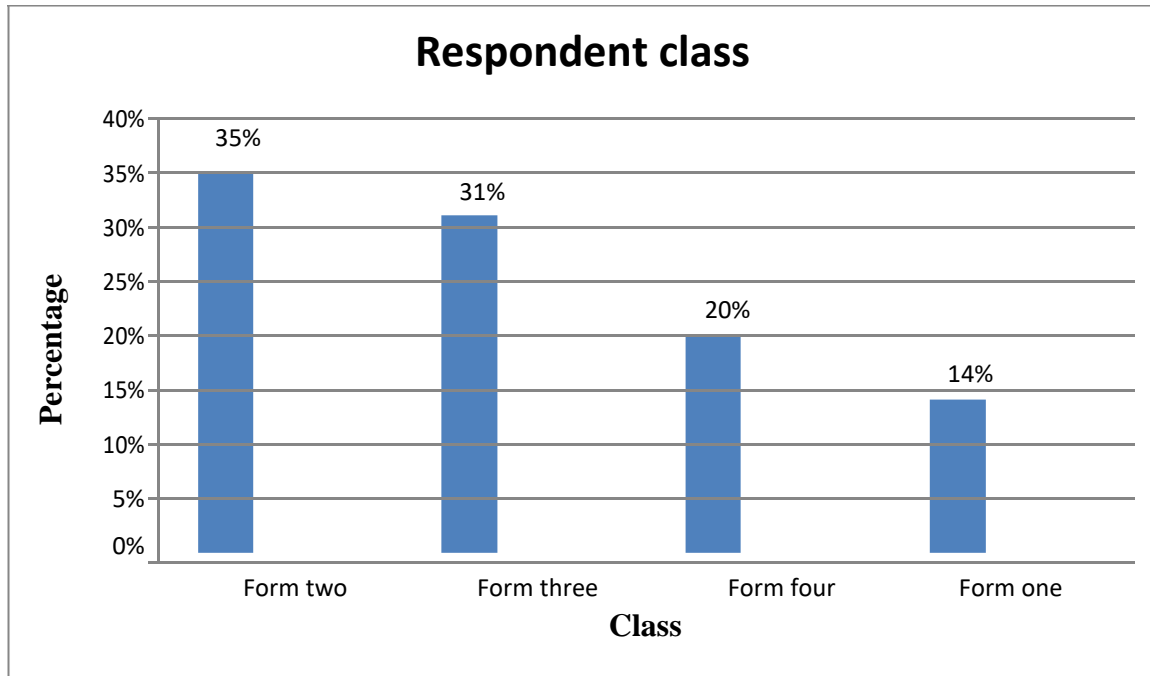


Figure 3: Respondents' classes

4.5 Respondents Family Status

The study wanted to know where respondents' parents earn their income and family size. According to the study, 140 respondents (57%) stated that their parents were casual labourers. Based on the findings, 60 respondents (25%) indicated that their parents were entrepreneurs. As per the study, 45 respondents (18%) indicated that their parents were jobless but work on contracts as they hope to get other places of work on contract basis. The study found out that 156 respondents (64%) were in a family size of 3-4 children while 48 respondents (20%) were in a family size of 4-5 children. The study further found out that 41 respondents (16%) were in a family size of 1-2 children. Table 2 and 3 have details.

Parents Job status	Frequency	Percentage
Casual labourers	140	57%
Entrepreneurs	60	25%
Jobless	45	18%
Total	245	100%

Table 2: Parents job status

Family size	Frequency	Percentage
3-4 children	156	63%
4-5 children	48	20%
1-2 children	41	17%
Total	245	100%

Table 3: Family size

4.6 Payment of School Fees

According to the study, 82 respondents (33%) stated that both the mother and father pays the school fees. As per the study, 68 respondents (28%) indicated that their mothers pay their school fees while 65 respondents (27%) were on boarding school on scholarship. The study further indicated that 30 respondents (12%) had their school fees paid by their fathers. According to the study 165 respondents (67%) stated that their parents were not provided with everything they needed while 80 respondents (33%) indicated that they were provided with everything they needed.

Payment of school fees	Frequency	Percentage
Father and Mother	82	33%
Mother	68	28%
Sponsorship	65	27%
Father	30	12%
Total	245	100%

Table 4: Payment of school fees

4.7 Respondents Relationships Status

The study found out that 144 respondents (59%) had intimate relationships while 40 respondents (16%) were on a relationship but a healthy one and 61 respondents (25%) were not in a relationship. According to the study, 188 respondents were on a relationship and 144 respondents kissed their partner and were touched their sensitive parts. According to the interviews, 75 out of 144 participants stated that their curiosity

based on reproduction system taught by their biology teachers made them engage in intimate relationship and especially touching and being touched their sensitive parts.

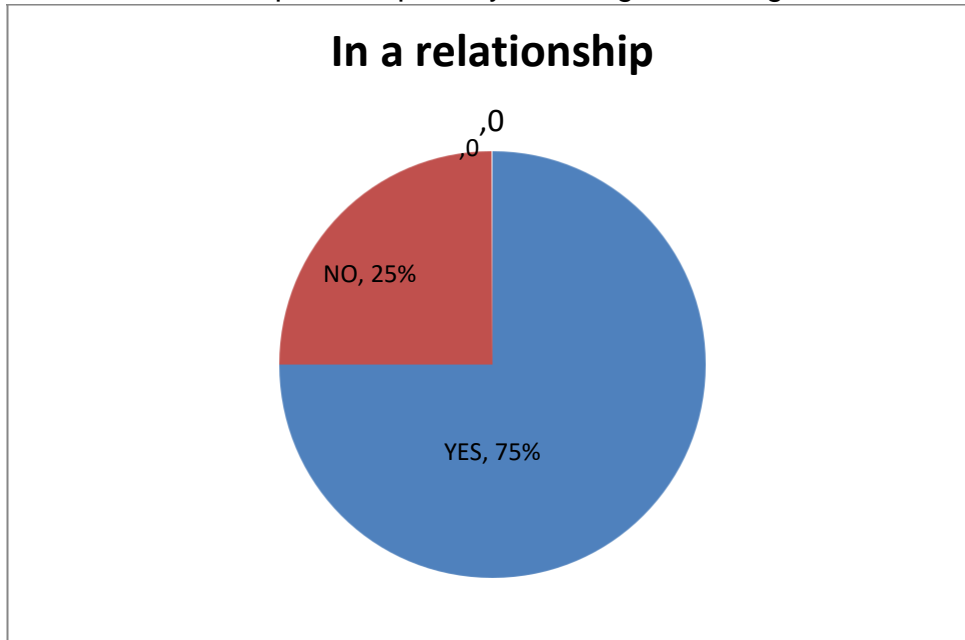


Figure 4: Relationship Status of the Female Students

4.8 Participants Sexual Indulgence

The study wanted to know if the respondents engaged in sex. The study found shocking revelation from the respondents as 127 respondents (52%) had sexual intercourse while 118 respondents (48%) had not involved themselves in sexual intercourse. According to the study, 127 participants involved in sexual intercourse stated that they engaged in sex because of curiosity (36), peer pressure (30), means to get money to satisfy their needs (22), and excessive watch of pornographic content (15), out of alcohol indulgence (13) and to prove their love to their partners (11). According to the interviews, 127 Participants stated that they had sex with their lovers (42), boyfriends (34), classmates (28) and unknown persons (23) to them. Participants who mainly engaged sex with unknown persons were mainly on alcohol indulgence and others because of money. Tables 5 and 6 show the details.

Reasons for Participants sexual indulgence	Frequency	Percentage
Curiosity	36	28%

Peer pressure	30	24%
Money	22	17%
Excessive watch of pornographic content	15	12%
Alcohol indulgence	13	10%
Prove love to their partners	11	9%
Total	127	100%

Table 5: Reasons for indulging in sex

Sex partners	Frequency	Percentage
Lover	42	33%
Boyfriend	34	27%
Classmate	28	22%
Unknown persons	23	18%
Total	127	100%

Table 6: Naature of the Sex Partner

4.9 Exposure to Pornographic Content

According to the interviews conducted, 170 respondents (69%) confessed that they had watched pornographic content through social Medias, in movies and through their friends. From the interviews, 75 respondents (31%) stated that they had never watched pornographic content. According to the study, 130 participants (53%) were aware of social sites where they can get pornographic materials while 115 participants (47%) were not aware of social sites where they could get pornographic material.

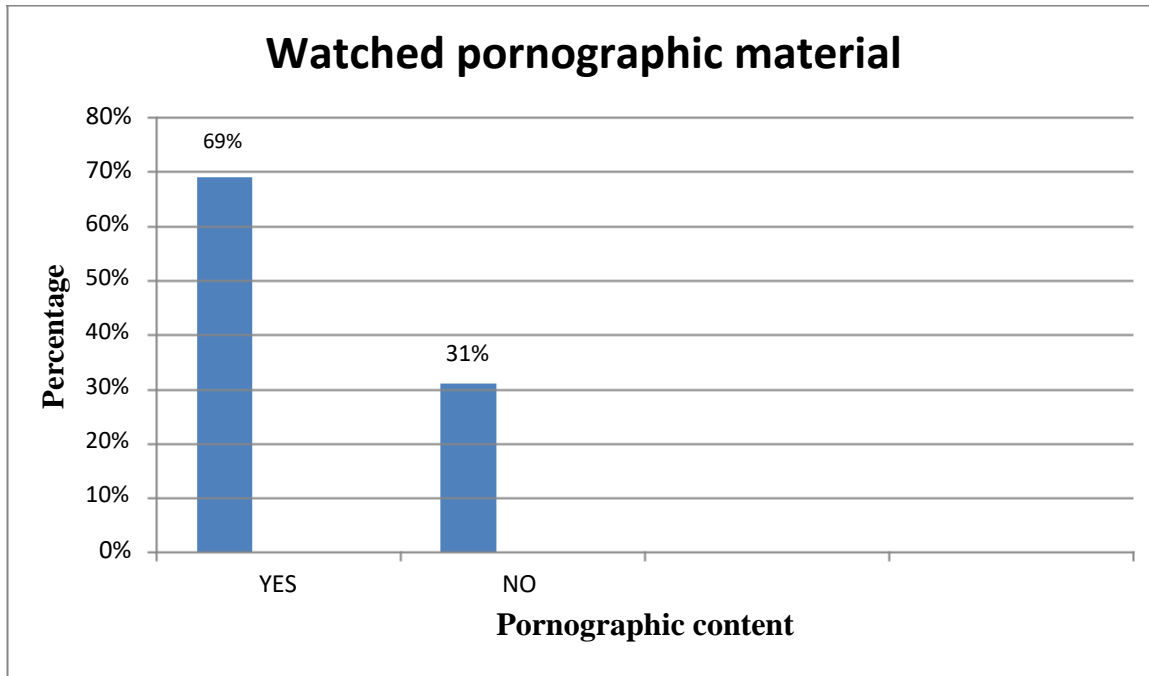


Figure 5: Exposure to Pornographic Content

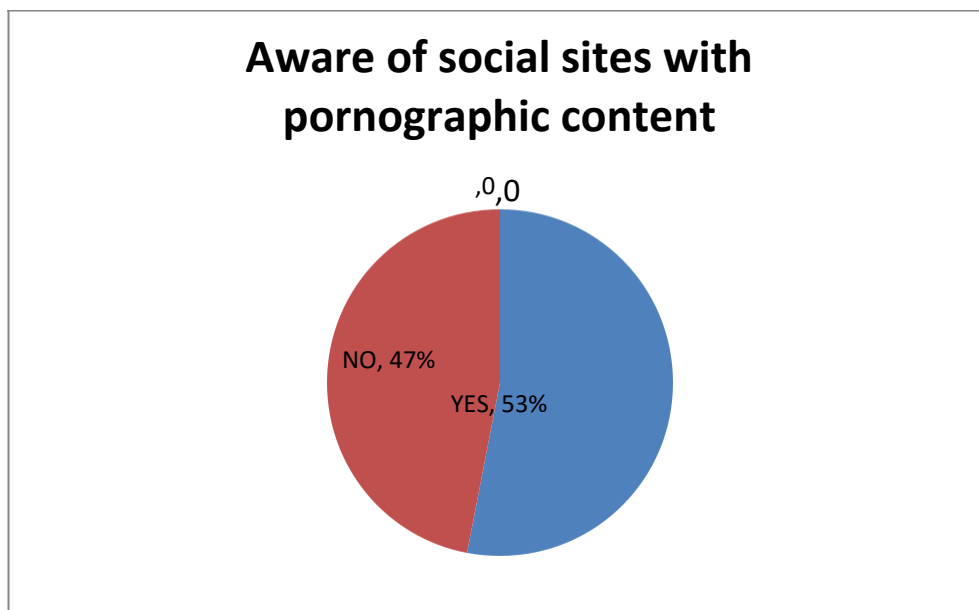


Figure 6: Aware of social site with pornographic content

4.10 Exposure to Sexual Music Videos

According to the study, 140 participants (57%) stated they were sexually aroused when watching music videos due to their sexually oriented acts and dances which had sex

motives. From the study, out of 140 participants, 76 participants (31%) strongly agreed while 64 participants (26%) agreed. From the findings, 105 participants (43%) stated that they were not sexually aroused when watching music videos. The study found out that, out of 105 participants, 58 participants (24%) strongly agreed while 47 participants (19%) disagreed.

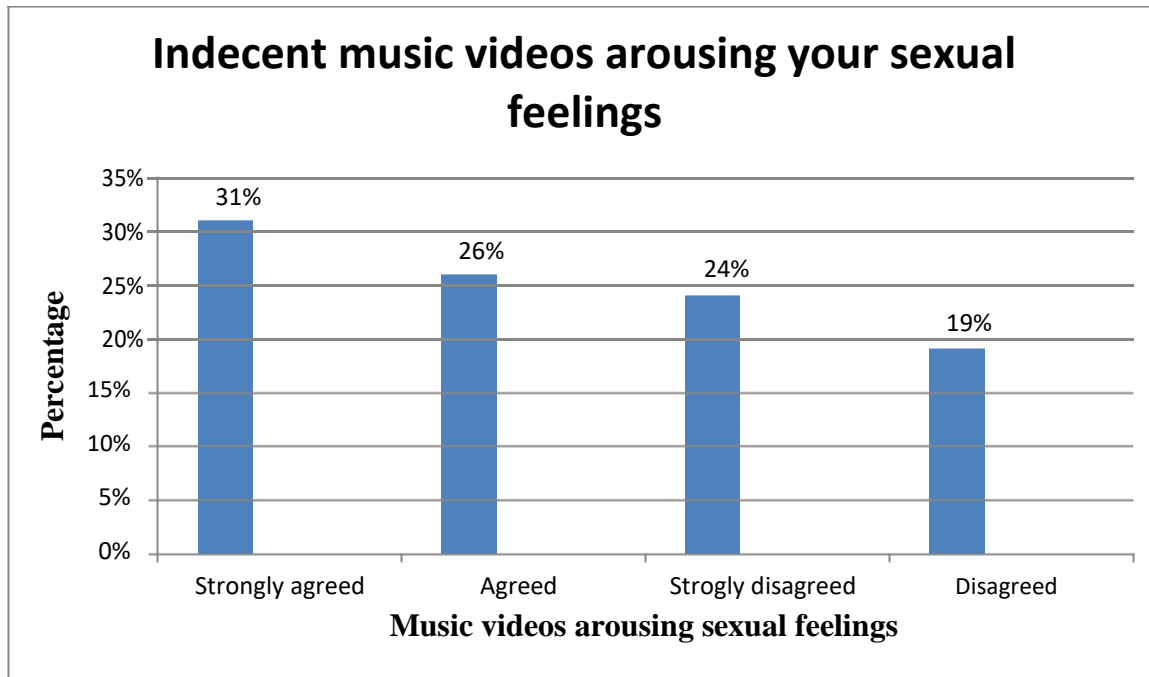


Figure 7: Indecent music videos

4.11 Participants Watching Television

The study wanted to know reasons why participants watch television. According to the study, 80 participants (33%) were interested in watching television because of soaps while 72 respondents (29%) stated that they like watching television because of updating themselves on the moves and dances of various music's and getting to know new and music's which were currently vibrant through its videos on the television. From the findings, 58 respondents (24%) indicated that they watch television to get the latest news and the current affairs of the country and that of the world. According to the study, 35 participants (14%) stated that they watch educational programmes which were linked to what they were taught by their teachers and stated Edu tv which they watch.

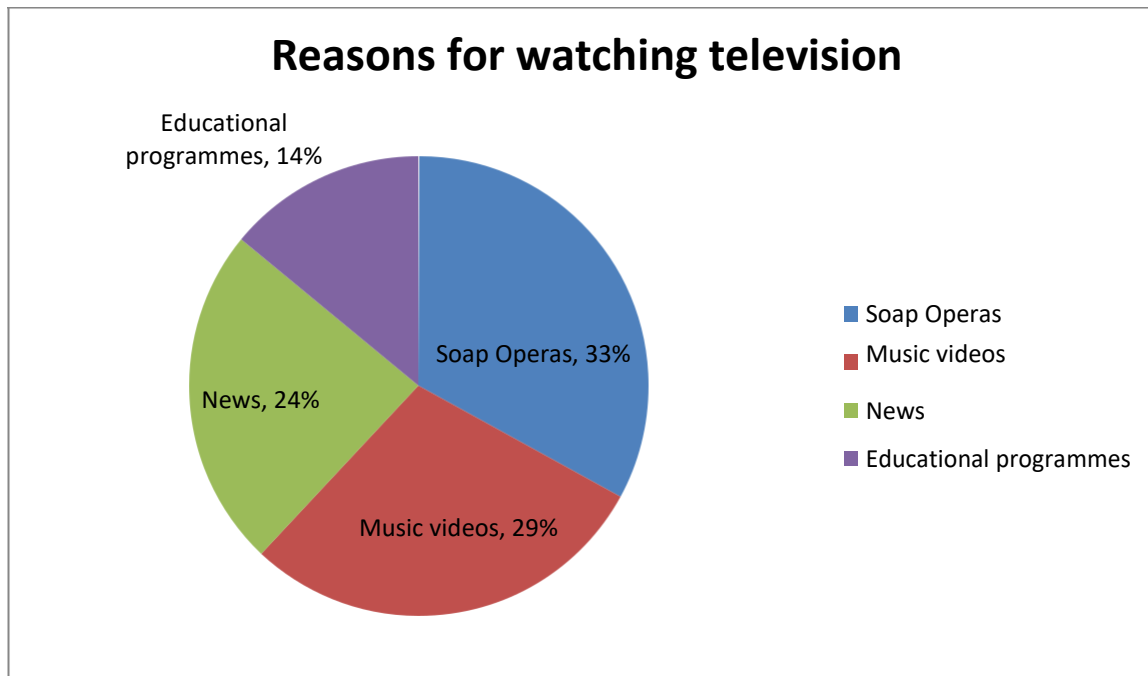


Figure 8: Reasons for watching television

4.12 Participants with Smartphones

The study wanted to know if the participants owned a smartphone. The study found out that 134 participants (55%) had a smartphone while 111 participants (45%) did not own a smartphone. From the findings, 134 participants that owned a smartphone stated that they got their phone through used their savings to buy the phone (53), sexual favours from unknown persons/boyfriends to get their smartphone (44) and from their lovers (37). According to the participants, they use their smartphones for communication purposes especially with their lovers and friends through social media such as WhatsApp, Instagram, twitter and Facebook. According to the study out of 134 participants that had smartphones, 76 participants (57%) stated that they got indecent images and videos from social platforms while 58 participants (43%) stated that they had not received indecent images or videos.

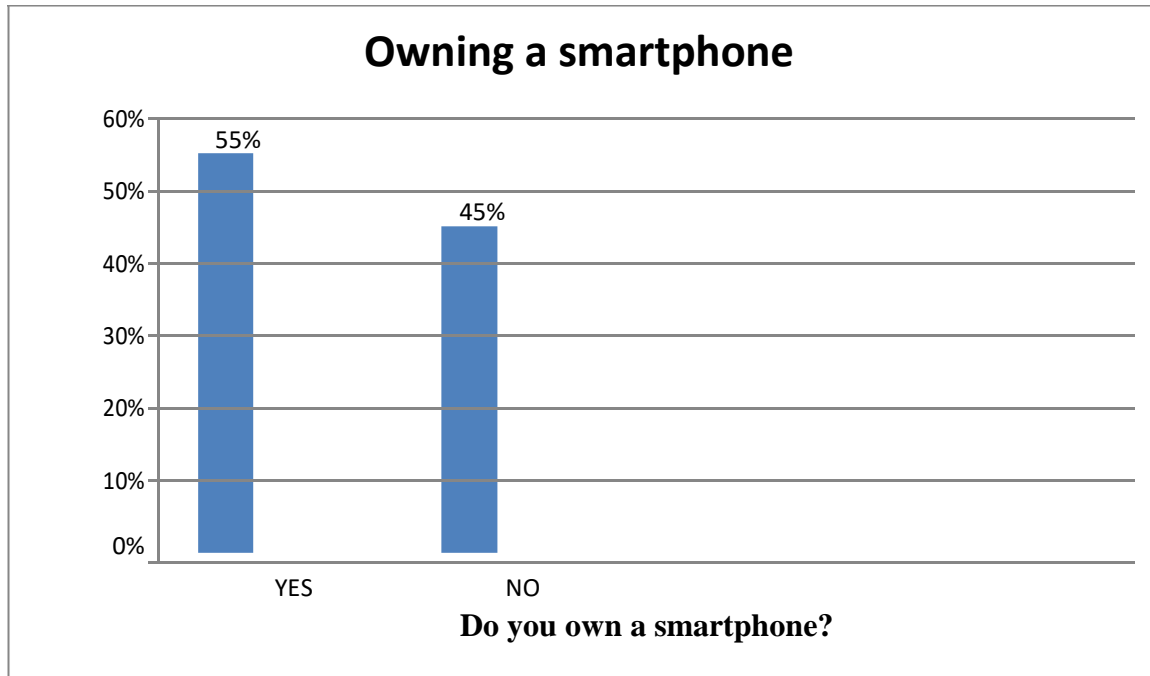


Figure 9: Smartphone Ownership by the Respondents

Means used to get smartphones	Frequency	Percentage
Savings	53	40%
Sexual favours	44	33%
Lovers	37	27
Total	134	100%

Table 7: Ways smartphone was owned

4.13 Reasons for Indulging in Early Sex

According to the study findings, 74 participants (30%) stated that peer pressure was on rise from the students and being in the company of female students pressuring those female students who had not done it to have a taste of sex. The study also found out that 69 participants (28%) had technological exposure where they had come into contact with pornographic contents and had experimented what they saw in the pornographic contents and more so sex chatting with their friends and lovers. From the findings, 58 participants (24%) stated that they were engaging in early sex to get monetary values and gifts due to low income of their parents and sometimes assist their parents to get

food on the table. The study further found out that 44 participants (18%) were indulging in early sex out of curiosity and personal choices. Some the personal choices stated were to show love to their lovers, to satisfy their sexual urge and under influence of alcohol.

Reasons for early sex indulgence	Frequency	Percentage
Peer pressure	74	30%
Technological exposure	69	28%
Monetary values and gifts	58	24%
Curiosity and personal choices	44	18%
Total	245	100%

Table 8: Reasons for early sex indulgence

4.14 Discussion of Sex Openly

The study findings indicated that 110 respondents (49%) discussed sex openly with their peers while giving their experiences and from their indecent images and videos they had viewed. According to the study, 135 respondents (51%) were not discussing sex related matters with their peers. Based on the study findings, 110 respondents who were discussing sex openly, their friends had already indulged in early sex.

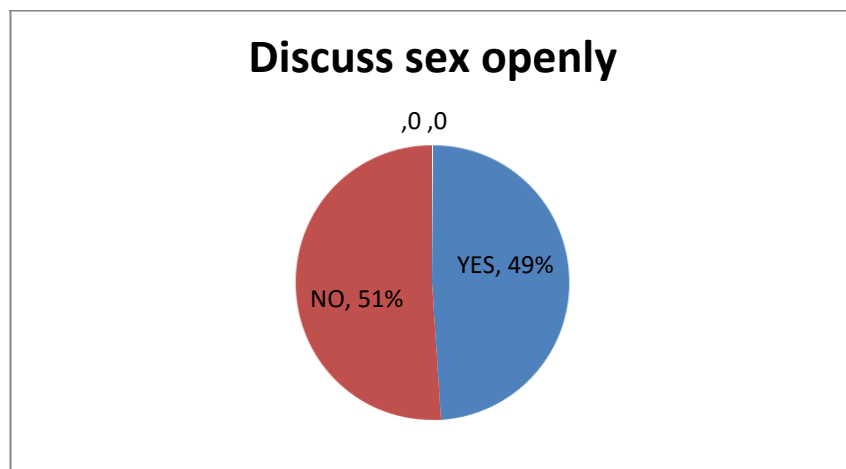


Figure 10: Open Discussion of sex

4.15 Peer Influence

As per the study, 75 respondents (31%) strongly agreed that they were heading in the right direction with their friends while 68 respondents (27%) agreed that they were heading in the right direction with their friends. The respondents who strongly agreed and agreed stated that despite their sex early sex indulge; they were concentrating on their education and used their friendship to assist each other based on their strength and weakness on their academic progress. The study also found out that 54 respondents (22%) disagreed that their friends were heading them in the right direction as they were sex addicts and their academic performances were below the average while 48 respondents (20%) strongly disagreed that their friends were heading them in the right direction since they had not socially and academically benefitted from their friends.

Peer taking you in the right direction	Frequency	Percentage
Strongly agree	75	31%
Agree	68	27%
Disagree	54	22%
Strongly disagree	48	20%
Total	245	100%

Table 9: Peer Influence

5. Summary, Conclusions and Recommendations

5.1 Summary of the Study

The study obtained a response rate of 70% effective and majority of the respondents were aged between 16-18 years. Majority of the respondents were in form two and three respectively and parent respondents were mainly casual labourers. According to the study, 156 participants stated that they were in a family size of 3-4 children. From the findings, 59% of the participants were in an intimate relationship while 52% of the respondents had indulged in early sex.

The first objective of the study was to examine the role of poverty in early sex indulgence among female students in secondary schools. According to the study, 140 respondents stated that their parents were casual labourers, 60 respondents indicated that their parents were entrepreneurs and 45 respondents indicated that their parents were jobless. According to the study, majority of the respondents stated that they were

in a family size of 3-4 and 4 -5 children and their parents could not satisfy their needs and 24% of the respondents indulged in sex to get monetary values and gifts to uplift their status in the society. From the findings, 27% of the respondents were in secondary school through sponsorship.

The second objective of the study was to determine how peer influence leads to early sex indulgence among female students in secondary school. As per the study, 74 participants stated that peer pressure was on rise from the students and being in the company of female students pressuring those female students who had not done it to have a taste of sex. The study findings indicated that 110 respondents discussed sex openly with their peers while giving their experiences and from their indecent images and videos they had viewed. Respondents indicated that they were pressurized to watch pornographic content and drinking alcohol and 10% of the respondents stated that they indulged in sex because of their friends. The study indicated that 42% of the respondents stated that their engagement with their peers was not heading them to the right direction.

The third objective of the study was to find out ways technological exposure lead to early sex indulgence among female students in secondary school. According to the interviews conducted, 170 respondents confessed that they had watched pornographic content through social sites, Medias and in movies. The study found out that participants had technological exposure where they had come into contact with pornographic contents and had experimented what they saw in the pornographic contents and more so sex chatting with their friends and lovers. 134 participants had owned a smartphone and used social platforms such as Facebook, Instagram, WhatsApp and Twitter of which they had come across indecent images and videos through social platforms. Participants watch music videos and soaps in television which had aroused their sexual feelings. 15 participants had indulged in early sex due to excessive watch of pornographic content.

5.2 Conclusions

Based on the findings, respondents had indulged in sex at early age with each participant stating reason for indulging in sex. Peer pressure, technological exposure and poverty respectively had contributed to early sex among female students in secondary schools. The study found out there were foundations and non-governmental organizations to educate girl child at adolescent stage on the need to purify their bodies and to abstain till marriage but they still indulge in early sex as economic hardship and parents not talking openly on sex related matter with girls in Kibera slums has resulted most of them being enticed and lured for sex and more so with soothing words for ill motive individuals.

5.3 Recommendations

- i) Parents to take the responsibilities of sitting down with their girls especially at adolescent stage and openly initiate sexual talks with an aim of trying to let them know the body changes and how to handle them and more so on the necessity of living cautiously with boys.
- ii) Female students to be taught on the need to have a symbiotic relationship with their female friends who can be able to show them the right direction and much help them academic wise while in secondary schools for them to achieve their desired grades in their final exams.
- iii) Teachers to enlighten students on technology and especially on beneficial programs which are academically oriented and teaching students on the effects of watching pornographic content. Parents also need to know the social sites and television programmes their children are visiting, watching and their effects and more so create time with their children and with that they can be able to know more about their children behavior and when they change their behavior.
- iv) Parents to ensure at least they know what their children require and are able to satisfy the needs of their children while schooling. This will enable students to be able to concentrate in school and less participate in early sex as some were engaging in sex to get their needs and assist their mothers to get food on the table and pay rent.
- v) Seminars need to be conducted for parents to be taught on sexual education of their children and how to handle them at their adolescent stage. This will enable parents know the risk their children face while at adolescent stage and what their irresponsibility and not openly talking about sexual matters with their girls causes.
- vi) Teachers to have focused group discussion with girl students on sexually related matters and with that they will be able to know more on how students know about sex and their ideas and contributions on teacher-initiated topic on sexual matters which will help them know on appropriate measures to guide students.
- vii) The society to take responsibility of children in the society and take appropriate measures for all students misbehaving in the streets and not just assume since they are not their children as this will help shape up the future of the children and being vigilant on all hideout where children are known to hide while misbehaving in the absence of their parents.

5.4 Recommendations for Further Study

Given that the study observed that 28% of the respondents were in the care of a single parent and mainly mothers and that the respondents were struggling a lot while meeting their needs and their mother's raising their school fees and other basic needs was a major issue, this study recommends the need for a further study on the role of single parenthood to early sex indulgence among girls in informal settlements.

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Voter Behaviour Patterns and the Role of the Media during General Elections in Kenya

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Abstract

This study sought to establish voter behaviour patterns and the role of the media during general elections in Kenya. In particular, the study aimed at identifying the extent to which media reporting in Kenya influences voter behavior with a view to giving concrete recommendations on the best practices in electoral reporting by the media in Kenya. The study was guided by the following specific objectives: determining the issues that affect voter behavior patterns in Kenya; identifying the patterns of voter behavior in Kenya; investigating whether vernacular FM stations contribute to escalation of conflict during elections and establishing the effect of the contradiction in media reporting during election on voter behavior patterns in Kenya. The study applied descriptive cross-sectional study and targeted key stakeholders (experts) such as the Editors Guild, Civil Society representatives, Kenya National Commission on Human Rights, Media Owners Association, Centre for Multiparty Democracy and the Civil Service, for interview sessions. In addition, the study used questionnaires to collect data from the general population specifically respondents who have proof of being a registered voter. Further, the study used a sample of 299 respondents, comprising, of 4 key stakeholders (experts) in electioneering matters and 295 registered voters. Data collection for the study will be primarily fieldwork and supplemented by secondary data collection methods. The chief data collection methods applied to conduct this study was Interviews and Questionnaires. The study found that voters are weary of how credible and secure an electoral process is and are afraid of violence in case of any disagreements in an electoral contest. The research revealed that record of accomplishment of the candidate's influences voting pattern in Kenya more than 76% of the respondents saying they vote for candidates based on their achievements. However, experts in the media and political processes alluded to the use of the vernacular channels to fun hate speech and ethnic-based voting.

Keywords: Voter Behaviour Patterns, Role of Media, General Elections in Kenya

1. Introduction

The Kenya constitution allows voters to democratically participate in selection of country's leaders. Chapter four of the same constitution provides freedom of media, freedom of expression and freedom of assembly. Media through self-regulation should



report objectively about events that take place in the country. Voters are free to seek, receive or impart information; however, the information should not incite violence. This is a challenge to editors to practice the concept of gatekeeping since the owners are involved in decision-making.

This has forced leaders to form coalitions with other tribes. For instance, in 2007 elections, the whole of western region, some part of Rift valley, coast and part of Northern Kenya was under Orange party while Central, part of Rift valley and part of Eastern was under PNU. 2007 election is well remembered because of its aftermath; violence which was tribal. The most affected tribes being the Kikuyu and Kalenjin and Luo. Historically Kalenjins and Kikuyu's especially in Rift Valley encounter each other in what is commonly known as tribal clashes for instance 1992 tribal clashes.

Kenya code of conduct provides guideline to practicing journalists on how to conduct themselves when performing their duties. Some of the issues heightened are: accuracy and fairness, opportunity to reply, letter to the editor, taste and tone in reporting, paying for news, intrusion into grief and shock, covering ethnic, religious and sectarian conflict, act of violence among others. Code of conduct explains in details about covering of ethnic, religious and sectarian disputes which should be published after proper verification of facts and presented with due caution and restraint in manner which is conducive to the creation of an atmosphere congenial to national harmony and peace. Provocative and alarming headlines are to be avoided. On the other hand, act of violence warns media to avoid presenting acts of violence, armed robberies, banditry and terrorist activity in manner that glorifies such anti-social conduct.

McCombs and Shaw (1972) argued that while informing, educating or entertaining, media does not tell people how to think, it gives people what to think about and this is what triggers reactions from the society as a whole as it gives them what to talk about. The theory exemplifies the way mass media create public awareness and concerns about important issues in the society thus influencing or shaping of public opinion on what is presented (Griffins, 2012).

Different people have different perceptions and interpretation of messages they receive from the media and process it based on their socialization and other factors such as literacy levels, different cultural backgrounds among many other factors. Many researches indicate that Kenya is an ethnically diverse country with over 42 different ethnic groups. This diversity is strength but on the other hand has resulted in political mobilization rooted in ethnicity. The identified gap can be resolved by a better policy and regulatory environment for Kenya, a better civic education, increase in education and better development in the country that will see more focus on pressing issues in our

society. Of ultimate importance, is the media practice of objectivity and factual reporting coupled with ethics and professionalism while reporting events? In light of the aforementioned, this study seeks to find answers to the question on the extent to which conflict reporting by the media in Kenya influences voter behavior.

1.2 Specific Objectives

The study was guided by the following objectives.

1. To determine the issues that affect voter behavior patterns in Kenya.
2. To identify the patterns of voting behavior in Kenya.
3. To investigate whether vernacular FM stations contributes to escalation of conflict during elections in Kenya

2. Research Methodology

The study employed a blend of qualitative and quantitative research methods. The study targeted key experts such as the Editors Guild, Civil Society representatives, Kenya National Commission on Human Rights, Media Owners Association, Centre for Multiparty Democracy and the Civil Service, for interview sessions. In addition, the study used questionnaires to collect data from the general population specifically respondents who had proof of being registered voters.

The study used a sample of 299 respondents comprising 4 key experts from the institutions listed above 295 registered voters obtained as indicated in Table 1.

Table 1: Sample size and response rate

Region	Questionnaires administered	Questionnaires returned
Central	46	46

Nairobi	37	31
Upper Eastern	19	10
Lower Eastern	22	22
Kisii Nyanza	13	10
Luo Nyanza	28	12
Western	30	14
Coast	24	24
South Rift	23	21
Central Rift	22	18
North Rift	22	22
North Eastern	9	0
Total	295	230

Out of the 299 respondents, 45.2% were male and 39.1% were female, where a majority of them were youths aged between 18-34 years.

The study was carried out in Kenya in the 12 regions in the months of July and August 2014.

3. Findings and Discussions

3.1 Issues Affecting Voter Behavior

Figure 1 shows the issues that concern the voters most during election period.

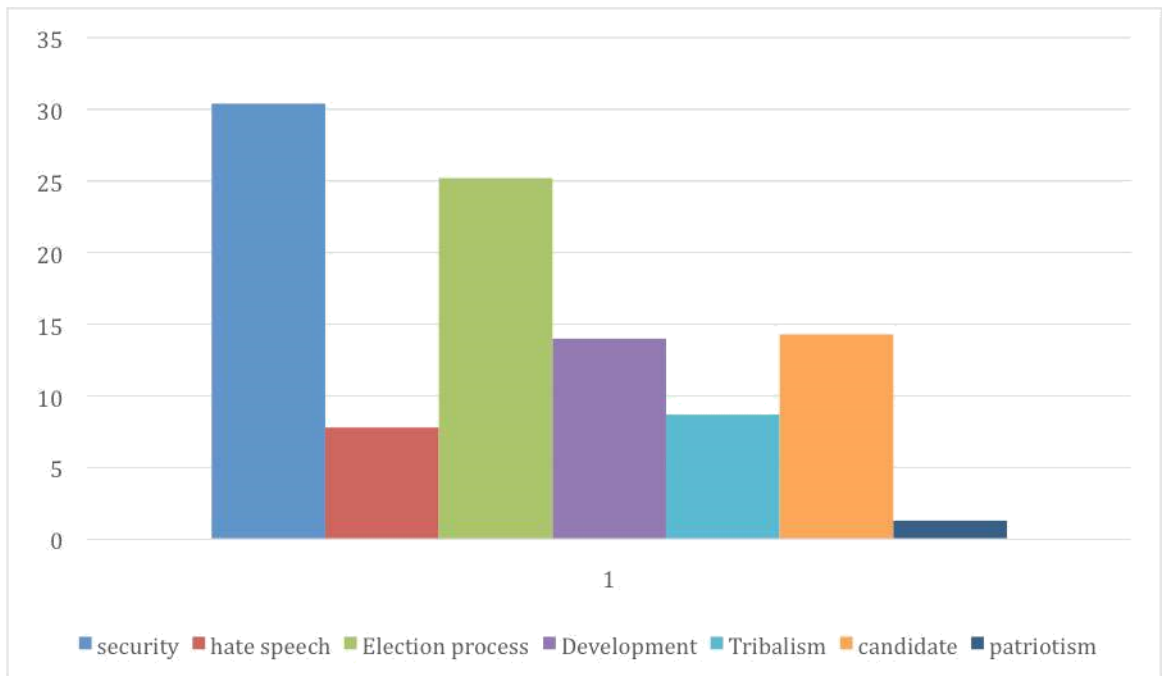


Figure 1: Issues affecting voter behavior

From the responses received, security and election process concerns ranked the highest at 30% and 25% respectively. On the other hand, patriotism ranked as the least concern with the respondents having it at 1%.

3.2 Patterns of Voter Behavior in Kenya

Figure 2 shows the various patterns of voting that the respondents identified with during the time of the research.

As indicated in Figure 2, the respondents indicated that they voted mostly on the basis of track recording with it scoring 76%. A significant number of respondents (44%) seem to hold the ethnicity of a candidate as a key consideration while voting. This is only 4% lower than those who do not pay regard to the ethnic background of a candidate. Interesting to note is that 64% of the respondents had not received a bribe and 69% of them had not received a threat. These findings create an interesting background of study since security and manipulation of the election process is what concerned the respondents the most. On the other hand, respondents from the interviews are of the view that the voting pattern in the country is tribal. The center for Democracy termed ethnicity as the most evident pattern in Kenyan elections. KNCHR puts it clear that our Voting is largely ethnicized, and you can almost predict which region will go which way. Ethnicity is publicized through media houses which tend to side with 'their' candidate

rather than give voters objective information” Due to the tie of ethnicity and politics, the media tends to frame its coverage on the ethnicity lines. Ethnicity is national and evident on presidential election but ‘clannism’ is at the geographical regional levels aggravated by interested groups. However, media, particularly vernacular stations play a crucial role locally too.”

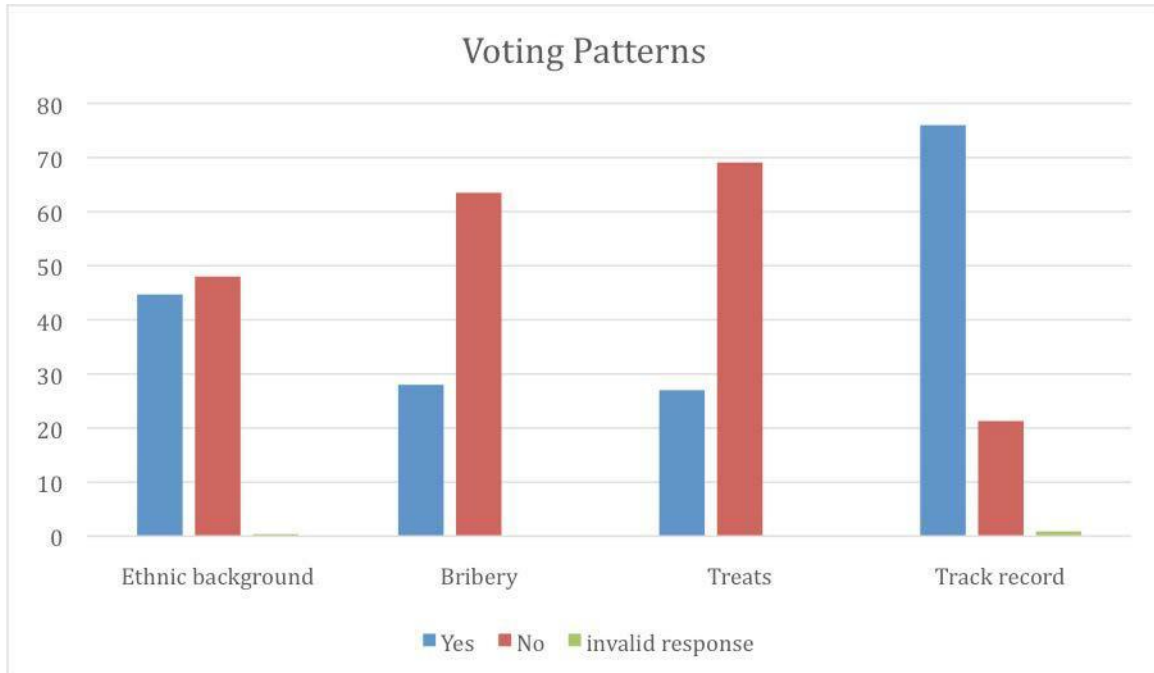


Figure 2: Patterns of voter behavior in Kenya

3.3 Reasons for Voting for a Candidate

Figure 3 shows that out of the 230 questionnaires that were returned, 33% of the respondents had voted on the basis of the party manifesto of the candidate. 28% had voted on the basis of the popularity with the candidate. Other respondents had voted on the basis of party, ethnicity and the integrity of the leader each at 11%, 13% and 10% respectively. However, the education level of the candidate was the least concern of the voters at 1%. Interview data from all experts indicates that voters make their choice based on ethnic background.

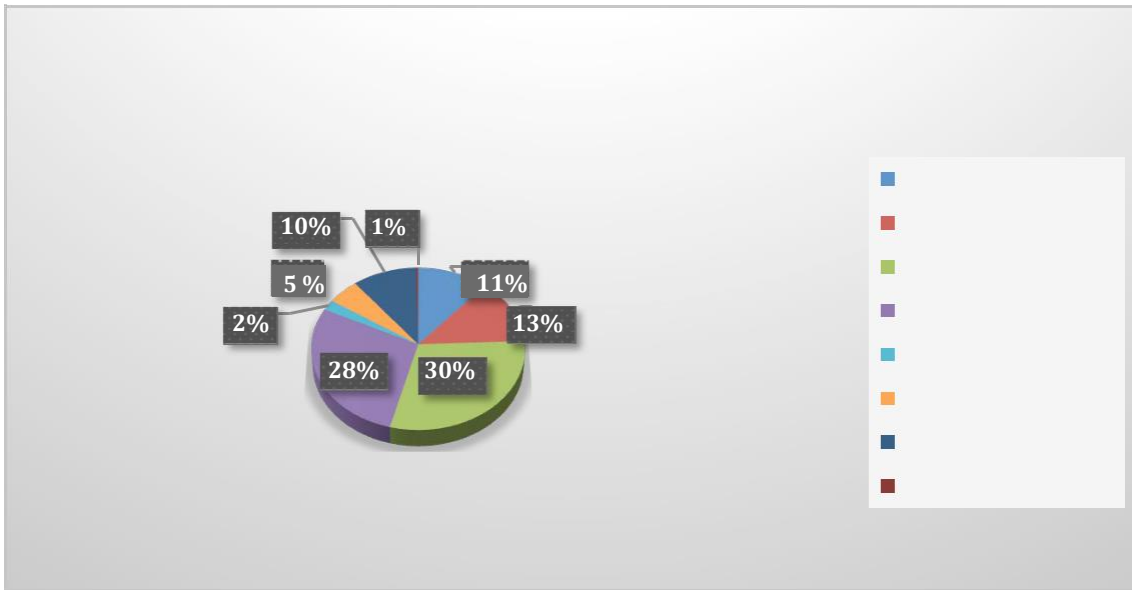
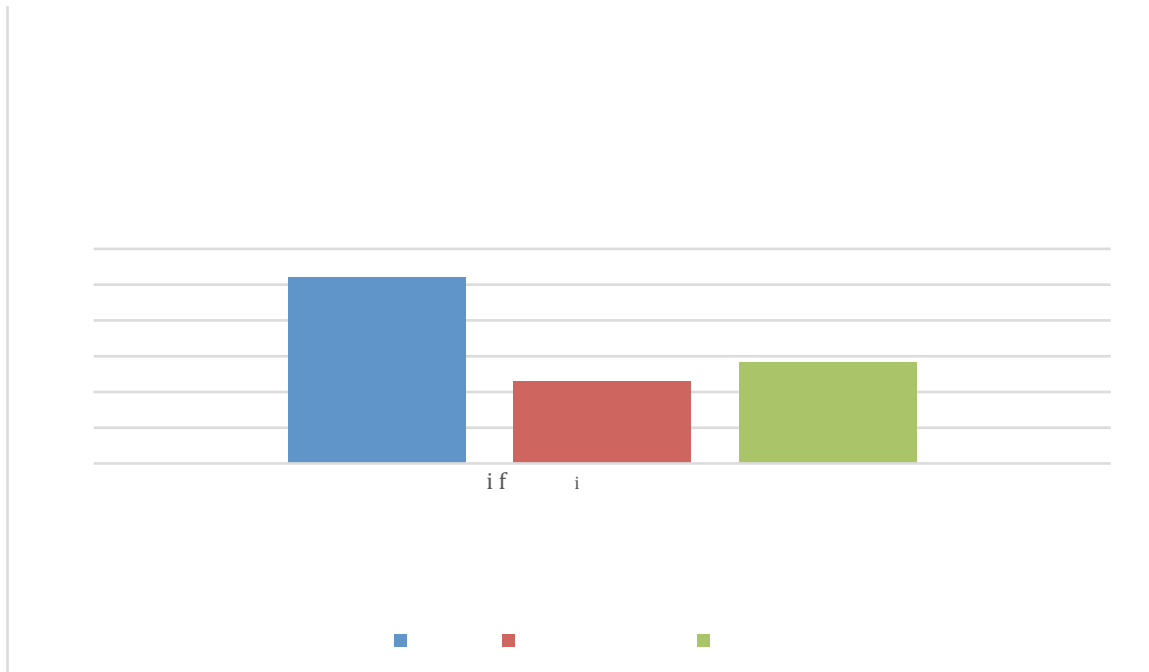


Figure 3: Reasons for voting for a candidate

3.4 Sources of Information About Preferred Candidate



As Figure 4 highlights, more than half the respondents identified media as the main source of having information about their preferred candidate at 52%. However, 28% of them identified the rallies while 23% got to know about their preferred candidate through word of mouth. Out of four interviews conducted, media is arguably the most preferred source of electoral information thus playing major role in shaping opinion hence instrumental in influencing voter behavior. The Kenyan media orientation is political founded and politicians buy media space, thus breeding competition. While different media have different lines of arguments, they are partisan, further practicing irresponsible journalism. Media has calculated ways of packaging information appearing neutral but in essence they are setting the agenda. Push polls questions are selective and not objective as they are intended to acquire certain results.”

3.5 Radio Stations Listened to During Elections

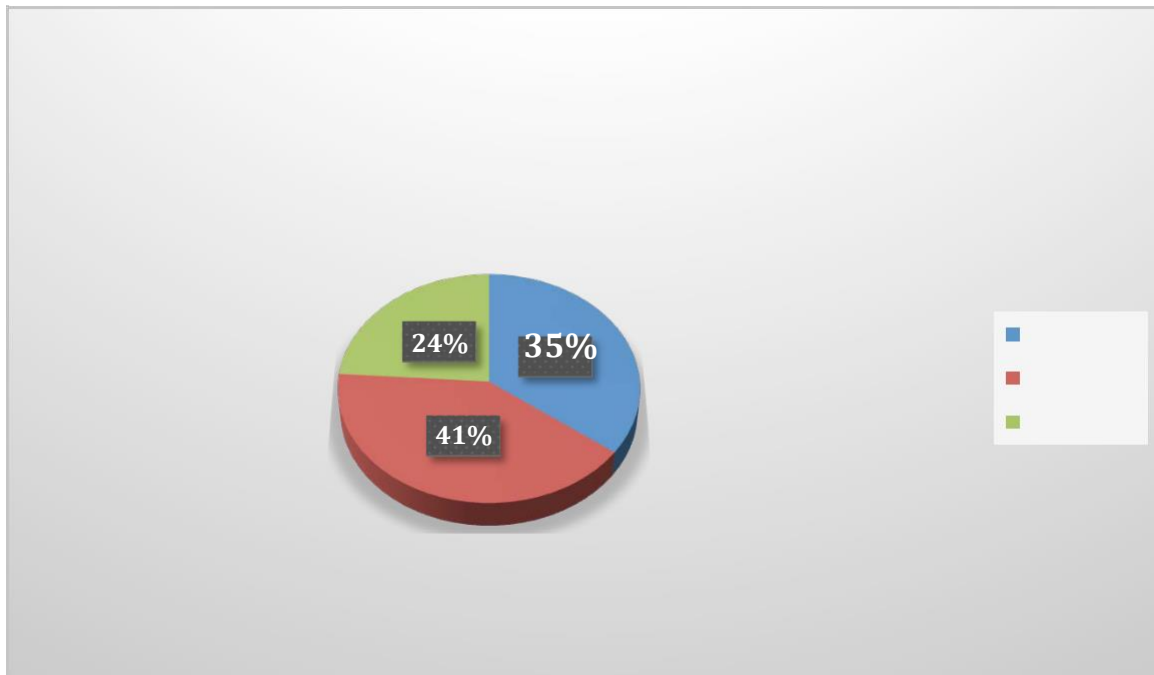


Figure 5: Radio stations listened to during elections

From the findings shown in Figure 5, 41% of the respondents had listened to Kiswahili speaking radio stations while only 35% had listened to English-speaking radio station. Only 24% had listened to vernacular radio stations. The experts differ with voters and their view is that Vernacular radio stations have a large listenership in the country and therefore they could influence voting patterns however; sometimes the issues aired there are not necessarily factual.

3.6 Source of Political programs listened to during election period

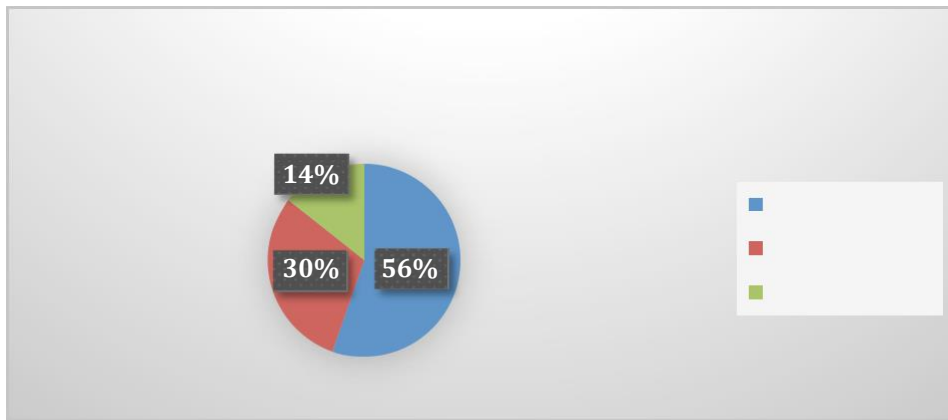


Figure 6: Source of political programs listened to during election period

Figure 6 shows that 56% of the respondents stated that they had watched political programs on TV. This is attributed to the fact that most of the questionnaires were administered in urban and periurban areas. 30% of these respondents had listened to political programs on radio and 14% received their information from other sources.

3.7 Influence of political programs on voter behavior

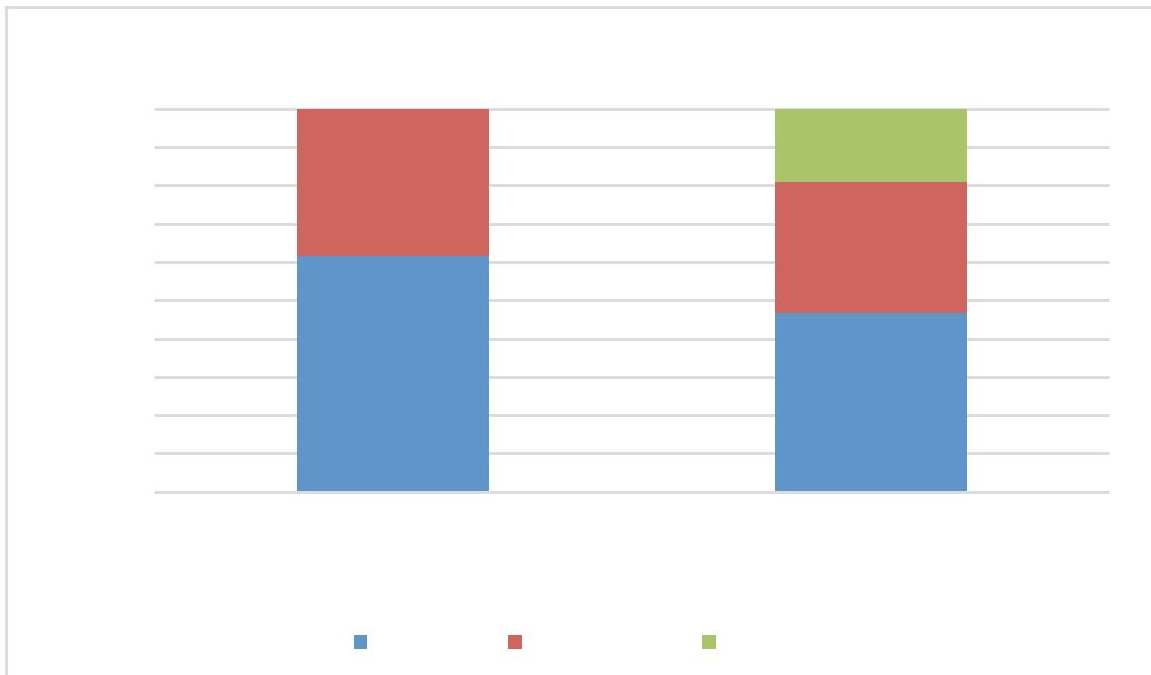


Figure 7: 3.7 Influence of political programs on voter behavior

A significant number of the respondents thought that the political programs had influenced their choice of the candidate. Figure 7 shows that 61% thought that the media is powerful in influencing the voter behavior. Other than the political programs that were aired, the use of push polls during prime-time news was identified as one of the avenues that influenced how the voter voted. 45% of these respondents stated that indeed push polls had influenced how they voted.

4. Conclusions and Recommendations

4.1 Issues affecting voter behavior in Kenya

One of the objectives of this study was to determine the issues that affect voter behaviour in Kenya. The study shows that, security and the electoral process are the top issues that concern voters during elections in Kenya. This therefore means the voters are more interested in finding out how secure they will be before, during and after the election period as opposed to other key issues. The study also found that voters are weary of how credible and secure an electoral process is and are afraid of violence in case of any disagreements in an electoral contest.

4.2 Voting patterns in Kenya

The research has also answered the question of the second objective on identifying the voting patterns in Kenya. This research shows that most of the respondents vote for candidates on the basis of their achievements. A key finding of this research is also that ethnicity remains a critical consideration when voting. This is attributable to the political coalitions formed by parties based on ethnic numerical strengths. The study therefore confirms ethnicity as a key-voting pattern in the country.

4.3 Escalation of conflict through vernacular fm stations

The study did not find tangible evidence to link vernacular fm stations to leading to escalation of political conflict. However, experts in the media and political processes alluded to the use of the vernacular channels to fun hate speech and ethnic-based voting. From the voters' responses, only 24% tuned to vernacular radio stations. Majority of radio listeners preferred the Swahili stations.

4.4 Recommendations

The research recommends the need to replicate the study in a rural setting given that this study was undertaken in an urban setting. Further, the timing of the study ought to be done during the electioneering period or immediately after elections to capture the true voter behavior patten

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Bacteriological Quality Analysis of Bottled Water in Thika Sub County, Kenya

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Abstract

Consumption of bottled water is increasing rapidly in developing countries as it is generally perceived to be pure, clean and of good quality. This has led to the sale of different brands of bottled water in several markets in Kenya. Drinking water should be free of microbial pathogens so as to be regarded as potable water and safe for drinking. This study was conducted to assess the bacteriological quality of bottled water brands available in Thika sub county in Kiambu county, Kenya. Microbiological quality of water is measured by the use of indicator organisms such as total viable colony counts (TVCC), total coliforms (TC) and faecal coliforms (FC) bacteria (Mcfeters, 2013). Drinking unsafe and unhygienic water can cause high prevalence of waterborne diseases like diarrhoea, gastroenteritis, giardiasis, hepatitis, salmonellosis, dysentery, typhoid and cholera. This study will accelerate progress towards provision of safe and clean drinking water to the public and prevent/monitor outbreaks of water borne diseases as well as help policy makers in cracking down the and un safe and unauthorized bottled water. The public will also be cautious on the brand they choose for bottled water. To determine bacteriological quality of bottled waterbrands consumed in thika sub county while the specific objective were: to assess the bacteriological quality of bottled drinking water available in local market in Thika; to determine specific bacterial contaminants in bottled water available in Thika town sub county; to determine the proportion of bottled water that complies with who standards in Thika sub county. Purposive sampling was used where a single brand of bottled water was picked from shops, restaurants and vendors within the area of study. Quality control measures were employed to ensure credibility of the results. The samples were cultured on macconkey media and incubated for 24- 48 hours after which the results were interpreted. The bacteriological results indicated that 9/61 (14.6%) of the samples were contaminated with, with 2 having E. coli bacteria and with the majority of the samples 52/61 (85.4%) having 0 MPN indices. The MPN index for the samples was positively skewed. 85.37% samples complied with the WHO standards. The presence of coliforms and e. Coli in bottled water samples does not only indicate the potential presence of pathogenic enteric microorganisms, but also question the efficiency and integrity of production system.

Key Words: Bacteriological Quality Analysis, Bottled Water

1. Introduction

Water is an essential requirement of all life forms. Satisfactory supply of clean, safe, and hygienic drinking water is imperative for health (Khatoun et al., 2010). Access to safe drinking water is a vital agent for human living. Unavailability of good quality drinking water is widespread and this has serious health implications (Khaniki et al., 2010). Water related diseases continue to be one of the major health problems globally. The high prevalence of diarrhea among children and infants can be traced to the use of unsafe water and unhygienic practices. In developing countries, 80% of all diseases and over 30% of deaths are related to drinking water (Onweluzo et al., 2010). Packaged water is any potable water that is manufactured or processed for sale which is sealed in food-grade bottles, sachets, or other containers and intended for human consumption (Warburton, 2000). Sale of packaged water has exploded all over the world in recent years, largely as a result of public perception that it is safe, tastes better, and has a better quality compared to raw tap water (Fisher, 2015). The increment in consumption globally could also be due to a result of an increase in per capita use as well as population growth (Sallam, 2008).

Even in countries where tap water quality is considered excellent, demand was so high, making packaged water the fastest growing product of the nonalcoholic beverage market worldwide (Doria, 2008). The above situation is not any different in the study area, Kampala, and all over Uganda where water packaged in bottles and polythene bags has become a very common consumer product most especially in the urban centres. The high demand may attract substandard products and counterfeits into the market. With this increase in consumption of packaged water, there is a possibility of producing products that are not fit for human consumption because of monetary interests (WHO, 2010). Access to safe drinking water is still one of the major challenges of the 21st century (Cabral, 2010). Unsafe water is a global public health threat, placing persons at risk for a host of diarrhoeal diseases (Hughes, 2005). Although disease outbreaks due to contaminated packaged water are not common, any possible contamination may lead to widespread epidemic because of the high demand and coverage (Ibrahim et al., 2017). Therefore, access to an adequate and safe water supply

is very important and can result in significant benefits to health. Several studies have shown that packaged water can be contaminated with bacteria at various stages of production (Ibrahim, 2017). Under improper or prolonged storage of bottled water, bacteria can grow to levels that may be harmful to human health (Khatoon et al., 2010). In Kampala, production and consumption of packaged water are increasing at a very high rate. However, continuous surveillance of its quality at retail premises is not being carried out. This may lead to consumption of poor-quality packaged water. There has also been a growing concern about the microbiological quality of the products. Therefore, this study assessed the physical and bacteriological quality of locally packaged water sold for public consumption in Kampala, Uganda.

As a preventive measure, consumption of packaged drinking water has increased in recent years in developing countries (Khaniki et al., 2010). The sale and consumption of packaged drinking water continues to grow rapidly in most of the developing countries of the world (Mgbakor et al., 2011). In order to safeguard public health, it is essential that the available packaged water is of the highest quality (Anunobi, 2006). The continuous proliferation of these packaged drinking water and their indiscriminate consumption are of concern to public health. An understanding of their microbiological quality and safety are therefore pertinent (Muazu, 2012). Several studies have documented the detection of coliforms and heterotrophic bacteria in bottled/ sachet drinking water counts which far exceeded the national and international standards set for potable water for human consumption (Ibrahim et al., 2017). Heterotrophic bacteria are non-coliform species of bacteria that utilizes organic substance for its development. The presence of heterotrophic bacteria in drinking water is not an indication that the water presents the health risk but poses significant health risk in immunocompromised individuals. Similarly, total coliform bacteria may cause health risk for infants, young children, elderly people and especially to the immunocompromised individual, (Timilshina, 2012) The present study was carried out to determine the microbiological quality of bottled drinking water available in Thika Sub county.

Drinking water should not contain any kind of harmful contaminants such as disease-causing pathogens, toxic substances, physical or chemical residue (WHO, 1999). Bottled water can be contaminated with chemical and biological agents (Khaniki, 2010). Presence of coliform bacteria or *E. coli* in bottled water can pose a great threat to the public health. The Kenya Bureau of Standards (KEBS) released the names of the suspended licenses of 368 water bottling firms for failing to meet standard guidelines of which one of the requirements is bacterial quality of the water (Kebs, 2016). The technique has been used for the analysis of drinking-water for many years with satisfactory results. It is the only procedure that can be used if water samples are very turbid or if semi-solids such as sediments or sludges are to be analysed. The procedure followed is fundamental to bacteriological analyses and the test is used in many countries. It is customary to report the results of the multiple fermentation tube test for coliforms as a most probable number (MPN) index. This is an index of the number of coliform bacteria that, more probably than any other number, would give the results shown by the test. It is not a count of the actual number of indicator bacteria present in the sample. Principle Separate analyses are usually conducted on five portions of each of three serial dilutions of a water sample. The individual portions are used to inoculate tubes of culture medium that are then incubated at a standard temperature for a standard period of time. The presence of coliforms is indicated by turbidity in the culture medium, by a pH change and/or by the presence of gas. The MPN index is determined by comparing the pattern of positive results (the number of tubes showing growth at each dilution) with statistical tables. The tabulated value is reported as MPN per 100 ml of sample.

2. Materials and Methods

2.1 Study Site

This study was conducted in Thika sub county, Kiambu County between April – September 2016. Thika subcounty has a population of 139,853 (county archived records 2017). The main economic activities of the area include agricultural processing, particularly in horticulture and pineapple (exported mainly to Europe), coffee (exports

mainly to the United States and Europe), cooking oils (to the rest of Kenya and eastern Africa) and animal feed processing.

Other industries include textile (cotton), macadamia nuts, wheat, tannery, motor vehicle assemblies, cigarette manufacturing, bakeries, packaging and industrial chemicals. About 100 small-scale industries and about 20 major factories exist in and around the town. The service sector is well represented with the establishment and growth of a number of educational and financial institutions. Thika is home or close to three universities, tens of middle level colleges, hundreds of secondary and primary schools and dozens of financial institutions. However, with its growth and development comes an increased demand in basic utilities, infrastructure and most importantly safe and clean drinking water. The main source of water is the municipal water supplied by pipes to household by the Thika water and sewerage company (THIWASCO) service located inside the town. Other sources of water are underground water, springs and commercial bottled water. The municipal water is unable to cater for the needs of growing population thus the town is faced with problems related to availability of quality drinking water.

2.2 Study Design

This was a cross – sectional study, which involved getting a snap shot situation of the prevailing bacteriological standards of bottled water sold in the Kitale town area.

2.3 The Inclusion and Exclusion Criteria

The study used bottled water sample purchased from shops, restaurant and vendors based on the following inclusion criteria that only a single brand of water was purchased. Water Bottles which were un labeled, having broken seal, Expired water or with any other visible damage on the bottle was excluded.

2.4 Sample size determination

The sample size for the bottle water samples was calculated based on Kassenga (2007) study done in Tanzania where the total coliform and faecal coliform organisms recorded were 4.6% and 3.6%, respectively from bottled water collected from shops, supermarkets and street vendors. Mean of 4.1% prevalence was used:

$$Z^2 pq/L^2$$

n= Desired minimum sample size

Z= Standard normal deviation (1.96)

P= Prevalence of condition under study

(0.041)

q= 1-p

L= Allowable error at 95% confidence level

(0.05)

$$1.96^2 * 0.041 * 0.959 / 0.052$$

n= 61

2.5 Bacteriological Analysis

In this study the bacteriological parameter assessed was the number of viable coliforms count as indicators for bacteriological quality of water. Pre analytical, analytical and post analytical quality control measures were put in place in that all good transportation was done, sealed water bottles devoid of any damage on the bottle was collected. Glassware and materials used in this experiment were washed with distilled water and then autoclaved at 121°C for 15 minutes to ensure sterility. The growth Media used was sterilized by autoclaved appropriately also before use to prevent cross contamination. The bacteriological and physical quality of the bottled water was determined by comparing it with the national and WHO standards for packaged water which requires water samples of good quality to be with zero coliforms per 100 mL of water sample. Multiple-tube fermentation method was used and the statistical results expressed as most probable number (MPN) units. This test was carried out in three phases presumptive for coliforms, confirmed and completed phase based on the principle that has the ability to ferment lactose hence producing gas and acid after 48 hours of

incubation. In the presumptive test, all the samples were cultured primarily in a series of MacConkey broth tubes.

Three set of tubes of three dilutions of the water sample to be tested (10 ml, 1 ml and 0.1 ml) were used for the presumptive test. Inverted Durham's tubes were inserted in each tube. The tubes were incubated at 37°C, for 48 hours for presumptive evidence of the presence of coliforms. In the confirmed phase, all the positive presumptive tubes (tubes that showed turbidity, gas production and a colour change indicating the production of acid) were inoculated in MacConkey and EMB agar by streak plate method and incubated at 37°C, for 24 hours to observe the colony morphology. MacConkey and EMB agar are selective media that enhance the growth of the Gram-negative *E. coli* while inhibiting the growth of Gram positive and spore forming bacteria. A positive EMB test is indicated by the appearance of colonies with a green metallic sheen (*E. coli*) and pink to red colonies on MacConkey. The bacteria isolated were subjected to a number of biochemical tests for identification of *E. coli* known as IMViC tests, which stands for indole production, methyl red for acid production, Voges-Proskauer and citrate utilization. Triple sugar iron (TSI) test was also performed to determine the utilization of glucose and lactose or sucrose fermentatively and production of hydrogen sulphide (H₂S). *E. coli* shows a positive indole and methyl red reactions and a negative Voges-Proskauer and citrate utilization tests (APHA, 2012).

2.6 Ethical Considerations

As some information and data from the study were commercially sensitive e.g. poor water quality, all data in this study was purely used for academic purposes and information collected was subjected to strictest level of confidentiality.

3. Results and Discussions

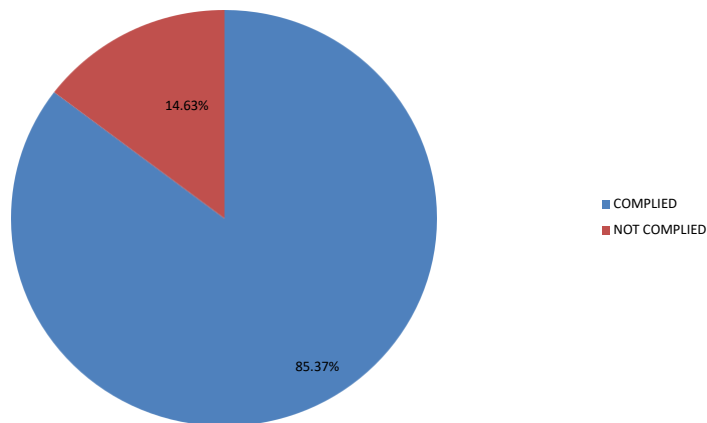
3.1 Descriptive Characteristics of Bottled Water Brands

The sixty-one brands tested in this study were the most widely available on the shelves of many stores in the study area. In terms of the purification method used, 70% of the brands used at least two combination methods while 10% of the brands used only one method, with other 20% not indicating a specific method of purification.

3.2 Bacteriological Screening

Out of the 61 bottles sampled, 9 samples were positive for coliforms, with 2 being positive for *E. coli*. The overall positive tests represented 14.6% of the analysed samples. These samples demonstrated evidence for presence of gas production, growth and acid production on McConkey broth indicating the presence of lactose fermenting coliform. On sub culturing in EMB and MacConkey agar, characteristic colonies with green metallic sheen were produced on EMB and pink to red colonies on MacConkey. Gram stain and biochemical tests (IMVIC) and growth in triple sugar Iron agar conclusive for *E. coli*

TOTAL PROPORTION THAT COMPLIES WITH WHO



3.3 Morphological & Cultural Characteristics of *E. coli* Isolated from the

Brands of Bottled Water

The Gram stain revealed Gram negative nonspore forming rods, while the biochemical tests were positive for indole and methyl red, negative for Voges-Proskauer and citrate utilization tests and acidic butt and slant with cracks and no hydrogen sulphide produced on TSI. The Coliform organism isolated from the positive samples was *E. coli*.

3.4 MPN Index Distribution for the Bottled Water Samples

The bacteriological results indicated that 9/61 (14.6%) of the samples were contaminated with, with 2 having *E. coli* bacteria and with the majority of the samples 52/61 (85.4%) having 0 MPN indices. The MPN index for the samples was positively skewed.

4. Discussions

The results of this study are in line with the studies conducted by, Ibrahim et al 2017, in Kenya, which found that 10% of bottled water sold in Kitale had bacterial contamination. There is Need for policy makers and consumers to act swiftly to arrest the condition before it worsens the presence of coliforms and *E. coli* indicate the potential presence of pathogenic enteric microorganism since bottled water should be pathogen free to be safe for human consumption. The group includes thermotolerant coliforms and bacteria of faecal origin, as well as some bacteria that may be isolated from environmental sources. Thus, the presence of total coliforms may or may not indicate faecal contamination. In extreme cases, a high count for the total coliform group may be associated with a low, or even zero, count for thermotolerant coliforms. Such a result would not necessarily indicate the presence of faecal contamination. It might be caused by entry of soil or organic matter into the water or by conditions suitable for the growth of other types of coliform.

The results indicate that not all the bottled water sold in Thika sub county is of good quality as perceived by the buyers. Although disease outbreaks due to contaminated bottled water are rare or never been reported in Thika subcounty any contamination may

pose a unique hazard because of their widespread distribution. The overall safety of bottled water is a Multifactorial practices that include effective treatment and continuous bacteriological screening, good manufacturing and sanitation practices that must be employed by the manufactures for quality drinking water. There is need for Water bottlers to adhere to the set standards for bottled water to ensure safety to human population. The regulator also needs to scale up surveillance in order to arrest unscrupulous water bottlers. Further research is needed to identify the actual sources of contamination to the bottled water and to be done on atleast 50% of bottled water brands in Kenya so as to rule out all contaminated samples.

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