THE ROLE OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) IN ELECTORAL PROCESS MANAGEMENT IN BUNGOMA COUNTY, KENYA.

BY

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DECLARATION

Declaration by the Student

This thesis is my original and has not been presented for any award of Diploma or conferment of Degree in any other University or Institution.

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DEDICATION

This work is dedicated to the Independent Electoral and Boundaries Commission Officials and the Government of Kenya as well as the voters of Kenya.

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ABSTRACT

The application of information and communication technologies (ICTs) in elections is getting increased consideration. Technology in electoral process is seen as a remedy for numerous electoral challenges ranging from establishment of an accurate and reliable voter register, streamlined voting and result tally to quicker transmission of election results. However, the electoral exercise in Kenya through technology has confirmed that the application of ICTs comes with some jeopardies, for instance failing of equipment, the disputed integrity of machines and even exposure to hacking as it was alleged in 2017 disputed presidential elections resulting to continuous incredible elections conduct in Kenya. This study sought to assess the role of Information Communication Technology in Elections Management in Kenya with a specific reference to Bungoma County and its influences towards transparent and democratic elections. The specific objectives of this study were to analyse the types of information communication technologies used in elections management in Bungoma County Kenya, to establish the benefits of using information communication technology in elections management in Bungoma County Kenya and lastly to investigate the challenges faced in using information communication technology in elections management in Bungoma County, Kenya. The study utilized adaptive structuration theory and Diffusion of Innovation Theory to guide the study. The study adopted descriptive survey research design to outline the characteristics of the study variables. The target population of the study was 240 respondents who included politicians, non-governmental organizations and Independent Electoral and Boundaries Commission (IEBC) officials. The sample size of 150 was obtained using Slovin's (2004) formula. Questionnaires and interview schedules were used to collect data from purposively selected respondents. The study established that electorates were aware of the role of technology in election management in the country whereas 105 representing (70%) of the 150 respondents knew Biometric Voters Register (BVR) while Ballot marking devices were known by 45 respondents representing (30%) of the respondents. The study further revealed that the benefits of the information communication technology use in electoral management was at average level representing 86 (57%) of the respondents and 72 of the respondents felt it was a failure compared to the 38 of those who considered it a success. The common challenges reported included lack of familiarity with the use of technology in election management, lack of awareness of voter registration process, poor infrastructure and facilities such as electricity and network, and manipulation of the technology systems used in election management representing 21%, 20%, 18% and 13% of the respondents respectively. The study recommends that the government should provide adequate financial support to facilitate continuous electronic voter registration exercise. The voters and election officials should also be continuously trained on the use of new technology in election management. A study on appropriate technological devices and their suitable settings for relevance in applicability is recommended for further study. Studies to better understand technology adoption theories are also suggested, as they can provide a better understanding of factors that may influence voters' acceptance of these technologies, as well as issues that are likely to affect adoption and use of ICT in electoral processes, such as preparation, recruitment, training, and the physical characteristics of polling places, which are determinants of voter behavior.

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OPERATIONAL DEFINITION OF TERMS

Biometric Voter Identification (EVID): this an electronic poll book. It verifies and confers voters electronically as registered by BVR. The EVID system was used for the first time during the 4th March 2013 General elections in Kenya.

Biometric Voter Registration (BVRS): this is a system that uses computer finger-print scanners and digital cameras to capture the bio-data of an applicant. Such personal details of finger-prints and face photo technology are used to verify the authenticity of the voter, and to ensure greater transparency and credibility in the election process.

Democracy: governance model that allows competition among individuals and political group's leadership recruitment and existence of a regime of civil-political rights.

Electorates: the registered voters who have attained 18 years of age and are in a position of national identification card.

Election management: According to the International Foundation for Electoral Systems (IFES), election management entails effectively organizing a high-quality election process.

Electoral system: a complex of rules and regulations that govern the selection of officeholders.

Information and communications technologies (ICTs): is the term used throughout this study to cover all technology used in electoral administration in Kenyan scenario, including, but not limited to, both computer hardware and software; communications technology such as mobile phones and SMS applications; internet applications; and sensors capable of enrolling biometric data of citizens.

Kenya Integrated Elections Management System (KIEMS): This is the integrated electronic electoral system designed to integrate the biometric voter registration (BVR); the biometric voter identification (EVI); the electronic results transmission (RTS); and the candidate registration systems (CRMS).

Results Transmission System (RTS): This a module that is part of the KIEMS used to capture and transmit election results from the various polling stations to the tallying centre. The RTS has a feature that is used for tallying the results, validating the results and displaying them in all constituencies tally centre and at the national tally centre.

LIST OF ABBREVIATIONS

AST: Adaptive Structuration Theory

BVI: Biometric Voter Identification

BVR: Biometric Voters Register

CRMS: Candidate Registration Systems

DRE: Direct Recording Electronic

ECK: Electoral Commission of Kenya

EMBs: Electoral Management Bodies

ERT: Electronic Results Transmission

IEBC: Independent Electoral and Boundaries Commission

ICT: Information and Communication Technology

IDT: Innovation Diffusion Theory

IT: Information Technology

KIEMS: Kenya Integrated Elections Management System

MCAs: Member of County Assemblies

U.S.A.: United States of America

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CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Introduction

This chapter presents the background of the study, statement of the problem, the study objectives and research questions, justification, scope and limitations of the study.

1.2 Background of the Study

Throughout the world, election is regarded as the central way of any representative democracy. With an effort of meeting demands of citizens and stakeholders for better management of elections, many countries around the world have introduced information and communication technologies (ICTs) to improve the management and administration of elections and to increase electoral integrity. Consequently, increasing reliance on ICT-based technical interventions to improve election administration has become a prominent feature of modern-day elections. According to International IDEA, as of 2016, electoral management bodies (EMBs) from 93 countries incorporated ICT in voter registration (Wolf 2017), ensuing in substantial impacts on election administration in terms of voter registration, voter identification and verification, votes casting, and the processing and publication of election results. A credible election not only confers legitimacy on political leadership, it is also crucial to the sustenance of democratic order. Election confers citizens the freedom to choose their rulers as well as decide on public policy. In any democratic system, citizens who are legally qualified to exercise franchise get opportunity to choose political alternatives and to make decisions deemed to express their preferences. In a multi-party dispensation, the choice is made out of the several parties and candidates

competing in the electoral process. The use of technologies, particularly ICTs is enabling developing countries to realize and set new levels of transparency, facilitating engagement and giving their citizens the advanced democratic tools that they demand and deserve. In the majority of African countries, the application of Information Communication Technologies in electoral processes has been due to response to past experiences where election management has repeatedly been branded with rigging assertions and violence. According Schlozman and Verba (1987**:**3), election is viewed as a "legitimizing institution, functioning to give elected leaders the wherewithal to govern." This can only be true if the Election Management Bodies (EMBs) worldwide put more effort in increasing and relying on ICTs to improve the accuracy, security and integrity of their electoral processes.

Election represents the lifeblood of any modern democracy; defined by fairness and openness of such election. The extent to which election advances democratic order depends in large part on the existing electoral system, its nature and its acceptance by the stakeholders in the electoral process. Electoral system refers to a "complex of rules and regulations that govern the selection of officeholders" (Nnoli, 2003:230).

Democracy determines the choice of a particular electoral system. It also distributes costs and benefits to political actors like political parties and candidates. Designing a credible and inclusive electoral regime is a necessary enterprise in all democracies whether transitional or consolidated. Designing an electoral regime that suits social and historical conditions is a real challenge especially in the strife to align them to respond to new political realities and challenges.

Technology is essential tool to the conduct of modern elections. Technology is used at all stages of the election process that range from compiling voters lists, drawing

electoral boundaries, employing and training staff, printing ballot papers, conducting voter education campaigns and publishing election results. The appropriate application of technology to elections can increase administrative efficiency, reduce long-term costs and enhance political transparency. Technologies that are used for elections can be “old” ones simulated by printing presses, ball-point pens, manual typewriters, electronic calculators and radios, or “new” technologies such as computers, optical scanners, digital mapping and the internet. Without access to technology, the logistics of modern large-scale elections would be beyond our abilities. ‘Technology’ can be defined as anything that involves the application of science and engineering. This is a very broad definition that could cover any manufactured item.

Technology has a long history associated with the evolution of computers (Hahn and Buckland, 1998). Technology plays an essential role in all operational functions in the organization (Muhammad 2009, Asgarkhani 2010). Technology has the ability to enhance, coordinate and control the operations of an organisation. It increases efficiency and cost effectiveness (Spanos et al., 2002).

There is increased use of technologies in elections in the recent years. Today, almost all electoral processes make some use of new technologies ranging from voter registration to tabulation of results. New technologies have been utilized in the voting and counting of votes in some countries. This has raised certain questions about the extent to which such applications are in line with Organization for Security and Co-operation in Europe commitments and other international good practices for democratic elections. Several European participating States have for instance implemented or tested new voting technologies during their elections. This has

involved the use of electronic voting machines, ballot scanners, and Internet voting or other electronic means. Some of the states continue to use New Voting Technologies while others have stopped using them and have returned to paper-based electoral methods. Given the considerable amount of discussion currently underway regarding potential advantages, as well as challenges, related to the use of New Voting Technologies in elections, the European Office for Democratic Institutions and Human Rights for instance has given increased attention to this issue in the context of its election observation mandate (Alvarez *et al.*, 2010)

Voting has changed over the years globally. Americans for example once made their selections for office through voice vote. Today, voters use optical scan and direct recording electronic (DRE) voting systems to cast their ballots. The new voting options have provided accessibility, security, and privacy for the voter. The technology used to administer elections outside the physical act of voting has changed as well. States have for example implemented state-wide voter registration databases used to manage their voter rolls. Many states have incorporated new technologies into their processes and procedures to administer elections more efficiently and affordably. Election law continues to evolve. For example, some jurisdictions are implementing online voter registration which is a technology that allows voters to register and update their registrations on line as long as they have a valid State identification. Technology usage has helped Americans overseas guided by the enactment of the Military and Overseas Voter Empowerment (MOVE) Act of 2009 that required changes to State laws on the transmission of ballots for Federal elections. In addition, a few States have gone a step further and allowed uniformed and overseas citizens to submit completed absentee ballots via e-mail and facsimile (National Defense Authorization Act, 2010).

Away from the United States of America, technology has changed electoral process in several countries and in different ways. A number of countries today use technology in monitoring their election. For example, countries such as Brazil and Chile have successfully deployed voting machines in the election process. The use of voting machine has resulted in fast voting and the counting of votes. This has reduced disputes in results declaration since political parties can check the machine and be satisfied with its performance or output (Darkwa, 2011).

Election observers across the world have continued to advocate for the use of electronic technologies in the electoral process because of the potential to make elections more efficient, transparent and responsive to the needs of the electorate. For instance, technologies can assist election administrators to store and search huge amounts of data, easily identify multiple registrations in voters register and prevent voters from voting in more than one polling station. Election guided by technology prevents multiple voting, speeds up the tabulation of results and expedites boundary delimitation exercises (Davis and Chelsea, 2010).

Information and Communication Technology (ICT) is today seen as indispensable means for enhancing effectiveness and efficiency in almost every aspect of human activities. It has become very critical part of many organisations in the world as it plays a strategic role in modern management. Many organisations if not all rely heavily on technical solutions in their everyday work. Quite a number of organisations have integrated Information and Communication Technologies into their procedures, products and services (Robert, 2010, Asgarkhani and Young, 2010). Rabindra (2012) notes that effective use of ICT allows organisation to increase productivity, cut costs, improving efficiency, as well as providing better customer

services. Furthermore, it is well acknowledged that employees work effectively if they are exposed to the use of modern office technologies. ICT also facilitates information systems which help to make internal processes of organisations more efficient (Boody et al, 2005). ICT thus, provides an opportunity for organisational transformation through efficient management.

The modern election administration involves many processes and procedures. The enormity and complexity of modern electoral process and procedures require critical investments and application of Information Technology (IT) to electoral administration. There are basic elections technologies that include office automation tools such as word processing and spread sheets. There are also more sophisticated tools, like optical scanning, biometric systems and geographic information systems (EKN, 2012).

Technological tools have been used in many countries for the compilation of the voters register, drawing constituencies and electoral boundaries, voter education, printing ballots, conducting voter education and publishing results of election (Osei, 2012). Most Electoral Management Bodies (EMBs) around the world use IT aimed at general improvement of electoral process in their respective countries. It is used at every stage of the electoral process. Therese (2001) asserts that the application of IT to elections do increase administrative efficiency to reduce costs and enhance transparency. This view is supported by News Africa (2012) affirming that IT can promote and instil confidence in the electoral system thus reducing elections induced conflicts.

There is increased supply of computers today in the world with continuous improvement in its features and accessories. This has led to advocacy in the use of

biometric system in place. It has been thought that technology would result into effectiveness and efficiency in the registration of voters and processing of documents. However, the causes of such problems remain uncertain. Several countries including Nigeria and Togo have extensively embraced technology in their recent elections. Ghana in 2012 introduced Biometric voter data capturing of eligible voters from 18 years and above in its exercise by deploying laptops, digital cameras and thumb scanners. This is the case in Kenya as was the case in the 2013 general elections. The use of verification devices with back-ups was and is to make elections more transparent and to prevent impersonation and make results acceptable by party agents. The success of biometric registration of voters and introduction of verification devices in the 2013 general elections is a clear example of application of technological tools in elections.

1.3 Statement of the Problem

The existence of a viable electoral system in any country is crucial to the survival of democracy. Consolidating Kenyan democracy through credible elections conduct has remained a challenge. The history of Kenya's democratic elections demonstrate that elections and electoral politics have generally generated so much animosity which has, in some cases, threatened the corporate existence of the country such as the case of 2007 and 2017 presidential elections. At the heart of the electoral crisis in Kenya is the question of credibility for the official results of elections frequented by rejection of the results. To alleviate this, the country employed new technology and the innovative uses in existing technology to increase the efficiency of elections. Basic tasks of elections such as voter registration, records and content management, chains of custody as well as outreach have been simplified by technology. However, technology is yet to be to be seen to be successful in instilling confidence and

ensuring transparency and successful management of election. In as much as it has been a success in the well-developed states like the United States (although even in the recent U.S. elections it was perceived that there was Russian interference), it is yet to reflect simultaneously on other states like Kenya. Despite the use of biometric means to enhance voting, there were still several obstacles therein. Looking at the persistent problems associated with elections management in Kenya, there is doubt whether technology has been of any significance. A good example is during the Supreme Court presidential petition 2017 where it emerged that the electoral technology servers were hosted in the United Kingdom and the IT experts were asleep at the time a request to scrutinize the servers was sought. This necessitates the need to evaluate the effectiveness of using Technology in elections Management in Kenya to avoid future conflicts associated with elections.

1.4 Research Objectives

The general research objective of the study was to assess the role of information communication technology in elections management in Kenya with specific reference to Bungoma County.

The specific research objectives were to;

1. Analyse the types of information communication technologies used in elections management in Bungoma County, Kenya.
2. To establish the benefits of using information communication technology in elections management in Bungoma County, Kenya.
3. To investigate the challenges faced in using information communication technology in elections management in Bungoma County, Kenya.

1.5 Research Questions

1. What are the types of information communication technology used in elections management in Bungoma County, Kenya?
2. What are the benefits of using information communication technology in elections Management in Bungoma County, Kenya?
3. What are the challenges encountered when using information communication technology in elections management in Bungoma County, Kenya?

1.6 Justification of the Study

The policy-based justification for this study is that the research findings, conclusions and recommendations will fill gaps in the use of technology in conducting elections and associated problems in Kenya. The research will inform policy makers and election managers on how to make effective use of technology with a view of

reducing the tensions and suspected malpractices in future elections. Effective management of elections will ensure sustainable democracy for posterity.

1.7 Scope of the Study

The study was confined to the use of technology in the management of elections in Bungoma County, Kenya and therefore the researcher avoided discussing the politics and historical electoral malpractices in the County which are beyond the scope of the study. The study covered only those issues relating to the types of technology used in election management, the role of technology in election management and challenges encountered with the use of technology in election management. To this extent therefore the study left out any other issues in election management that were not related to the use of technology.

1.8 Limitation of the Study

The researcher encountered challenges of limited collection of data. These were attributed to the research instruments like questionnaires as some of the respondents were not willing to answer the questions while others failed to return the answered questionnaires. The data collected through interviews were limited as some of the respondents had little time for the researcher. The researcher overcame the challenge concerning the questionnaire distribution by doing follow ups.

1.9 Study Area

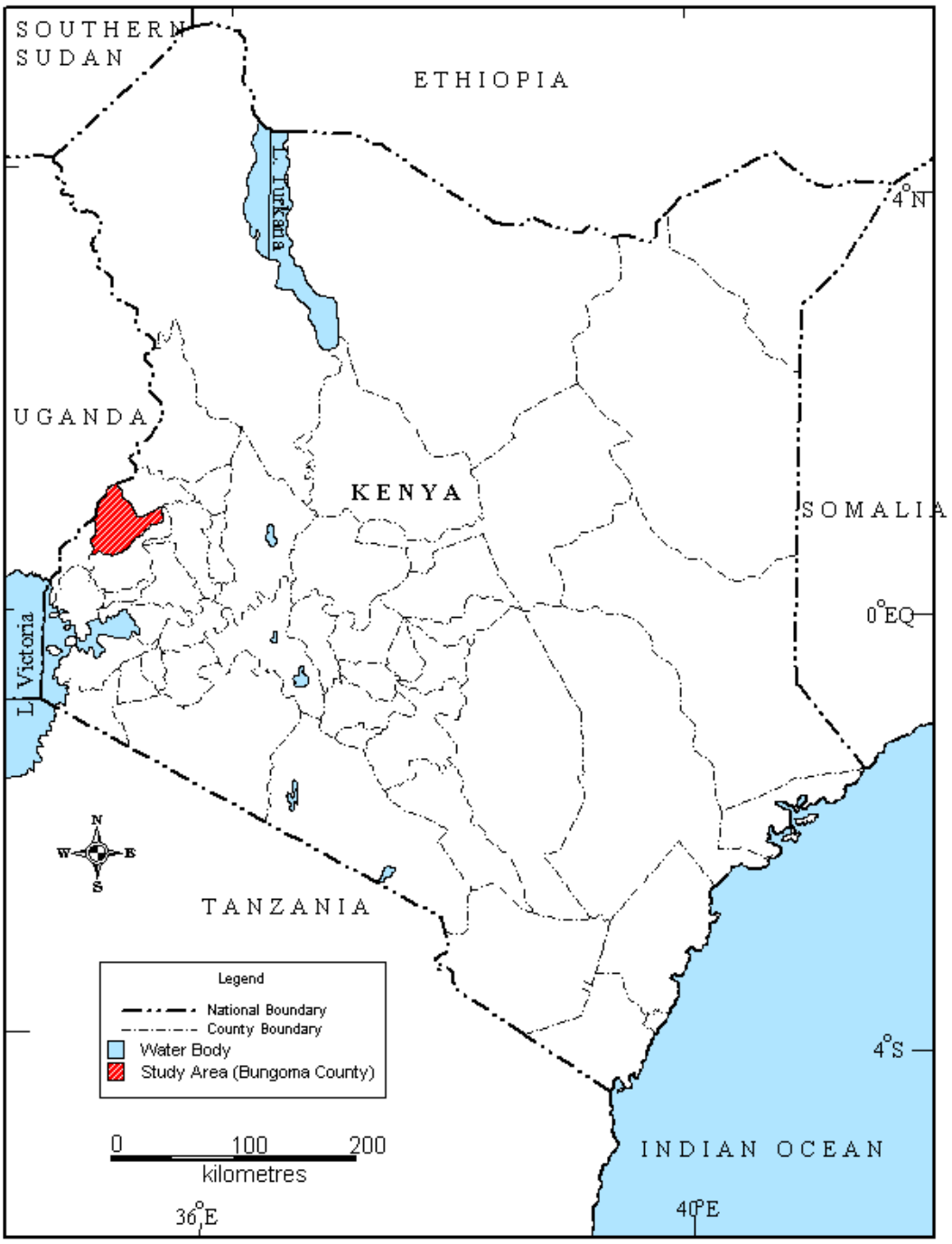

Figure 1. 1: Map of Kenya showing the location of Bungoma County.

Source: Moi University, Geography Department GIS Lab.

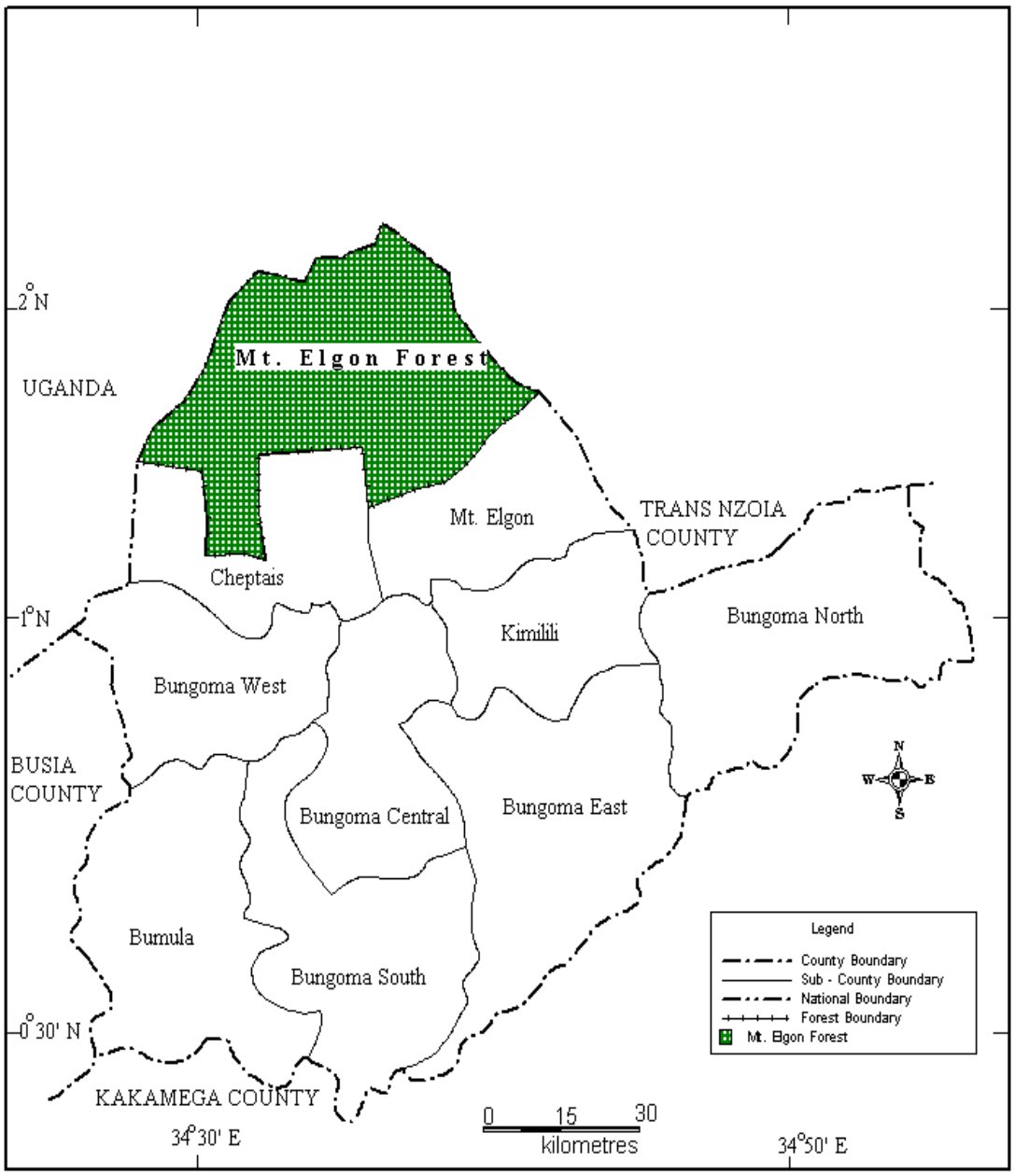

Figure 1. 2: Map of Bungoma County showing electoral commission administrative units

Source: Moi University Geography Department GIS Lab.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the Kenyan constitutional principles and legal framework for Kenya's Electoral System electoral laws with specific interest on technology laws, the various works done by several scholars in relation to the topic of this study. This chapter also lays out the theoretical framework that provides the framework for the whole study.

2.2 Constitutional Principles and Legal Framework for Kenya's Electoral System

The legal frame work for Kenya's electoral system is contained in Articles 81 and 86 of the Constitution. In addition, Sections 39 (1) (C) and Section 44 (4), (5) and (7) of the Elections Act as amended in 2016 make provision for technology in Kenya's electoral law. Further, Section 44 (A) of the Election Act as amended in 2017 underpins the regime for election technology law. Other provisions of the Election Act provide the regulatory framework for the conduct of elections. Article 81 (e) of the Constitution establishes the principle of "free and fair elections" as the cornerstone of the electoral system in Kenya. The Article constitutionalizes and describes the environment in which elections are to be conducted. The elections must be conducted in a free and fair environment and the voting must be by secret ballot. Free and fair elections is defined to include an election that is free from violence, intimidation, improper influence and corruption; the electoral process must be transparent and administered in an impartial, neutral, efficient and accurate manner. The atmosphere in which the elections are conducted determines the quality, integrity

and credibility of the electoral results. Article 86 makes provision for the method, technique and instrumentalism through which elections are conducted on the voting day -whatever voting method is used, the system must be simple, accurate, verifiable, secure, accountable and transparent. The results of the votes cast must be announced promptly by the presiding officer at each polling station and such results must be openly and accurately collated. In addition, appropriate structures should be put in place to eliminate electoral malpractices and there must be safekeeping of election materials. The above Constitutional Articles represent the legal framework of the electoral system in Kenya (Constitution of Kenya, 2010)

To supplement the human element in dealing with quantitative and qualitative aspects of electoral law, the use of technology is now part and parcel of Kenya's electoral system. This is relevant because the technology adopted may impact on the qualitative and quantitative aspects of the results of the elections (Harrington *et al*., 2015)

2.2.1 Election Technology Law in Kenya

Election technology law in Kenya is contained in Sections 6A, 44 and 39 of the Elections Act as amended in 2016 and Section 44 A of the Elections Act as amended in 2017 as read with Article 86 (a) of the Constitution that requires an electoral system that is simple, accurate, verifiable, secure, accountable and transparent (Kigwiru, 2019)Section 6A (3) (b)of the Elections Act as amended in 2016 require the Electoral Commission to publish the Register of Voters online and in such other manner as may be prescribed by regulations. Under Section38A of the Elections Act, the total number of registered voters per polling station should not exceed seven hundred (700). The definition and contents of the Register of Voters as per Section

4of the Elections Act must be borne in mind. Under the Section, the Principal Register of Voters comprise of:

i) A poll register in respect of every polling station;

ii) A ward register in respect of every ward;

iii) A constituency register in respect of every constituency;

iv) A county register in respect of every county and

v) A register of voters residing outside Kenya.

The requirement to publish the Register of Voters online puts to rest the incessant arguments on where to find the Register of Voters. The on-line Register is critical in an election petition particularly where an allegation is made that the number of votes cast exceed the registered voters (Kenya Elections, 2016)

Section 44 of the Elections Act as amended in 2016 provides that:

1. Subject to this section, there is established an integrated electronic electoral system that enables biometric voter registration, electronic voter identification and electronic transmission of results.

2. The Commission shall, for purposes of subsection (1), develop a policy on the progressive use of technology in the electoral process.

3. The Commission shall ensure that the technology in use under subsection (1) is simple, accurate, verifiable, secure, accountable and transparent.

4. The Commission shall, in an open and transparent manner -(a) procure and put in place the technology necessary for the conduct of a general election at least

eight months before such elections; and (b) test, verify and deploy such technology at least sixty days before a general election.

5. The technology used for the purpose of the first general elections upon the commencement of this section shall (a) be restricted to the process of voter registration, identification of voters and results transmission; and (b) be procured at least eight months before the general election.

Section 44 A of the Elections Act as amended in 2017 provides that: Notwithstanding the provisions of Section 39and Section 44of the Act, the Commission shall put in place a complementary mechanism for identification of voters and transmission of electoral results that is simple, accurate, verifiable, secure, accountable and transparent to ensure the Commission complies with Article 38 of the Constitution. Section 109 of the Elections Act provides that the complementary mechanism ought to be put in place by regulations with the approval of Parliament at least sixty (60) days before the general elections and only with the approval of Parliament to be granted within four (4) months before the general elections (Kenya Elections Act, 2017)

From the provisions of Sections 6 (A) 3 (b); 39; 44 and 44 A of the Elections Act as amended; the election technology established in Kenya is six-fold namely:

(a) Biometric Voter Registration (BVR);

(b) Electronic Voter Identification (EVI)

(c) Electronic Transmission of Results (ETR)

(d) Kenya Integrated Elections Management System (KIEMS)

(e) On-line publication of the Register of Voters.

(f) Publishing polling result forms of presidential elections on an online public portal maintained by the Commission.

For practical purposes, BVR is applied prior to the voting day and EVI is used during balloting/voting day and ETR is used for transmission of results after tallying. A reading of Section 44 (1) of the Elections Act as amended clearly shows that the election technology law in Kenya does not establish electronic voting (e-voting) or electronic balloting (Kigwiru, 2019)

The Electoral Commission is not expected to conduct electronic voting. On the voting day, all that Commission is required to do is to use an electronic voter identification device (EVID) and then to transmit results electronically using ETR. On the Election Day, all the three electronic devices must be integrated through KIEMS (Kigwiru, 2019)

2.3 Types of Technologies used in Elections

In reviewing literature on the various types of technologies used in elections, this study looked at: emerging voting technologies, Paper ballots, Lever machines, Punch cards, Electronic voting, and Remote voting.

2.3.1 New Voting Technologies

The new voting technologies are reviewed as the use of information and communications technologies applied to the casting and counting of votes. The new technologies are widely understood to include the use of electronic voting systems, ballot scanners and internet voting. Electronic voting is widely associated with “new voting technologies”.

The report by the Joint Task Force on Electoral Assistance (2012) indicates that high technology integrated solutions can bring efficiencies and cost savings as well as enhance integrity. Achieving both in a sustainable and nationally owned manner is a rare thing. McCormack, C. B. (2016), observes that with an increasingly tech-literate electorate, many countries especially in the developing world are placing greater faith in the precision of technology simply because technology can mitigate against fraud in polling stations. For example, some electronic voting and counting technologies only allow votes to be cast at a certain speed, thus mitigating ballot stuffing. Similarly, electronic counting of ballots mitigates fraud during the counting process even though it has been acknowledged that electronic voting and counting technologies cannot completely eliminate all aspects of electoral fraud (Goldsmith, B, 2011).

In the European states, the justification for introducing new voting technologies in all their electoral processes vary. Their argument for the use of new voting technologies have been attested to the potential of increasing voter turnout, making it easier to involve citizens living abroad, lower election administration costs, facilitate the conduct of simultaneous elections, reduce human error such as the invalid ballots, improve the accuracy of counting, and increase the speed of tabulation and publication of results. The new technologies may also have the potential to increase access for voters with disabilities as well as voters who speak minority languages.

However, the new voting technologies have led to numerous potential challenges. For example, secrecy of the vote stimulated by the desire to ensure there is integrity of the results. Technology has thus far proven difficult for electronic voting processes especially internet voting with respect to both the fundamental democratic principles

and validity of results. The new voting technologies have introduced additional complexities into the electoral process, such as the need to amend legislation as well as to plan how New Voting Technology can be acquired, tested, evaluated, certified and secured and lastly to provide voter education and training of election officials and the general concerns about the transparency of the process and the access for observers. The use of new voting technology does not necessarily build confidence but largely requires pre-existing confidence in the election administration in order to see into a successful implementation (Thematic Workshop on ICT and Elections, 2012).

The new approach of voting is deemed to be the most appropriate in controlled environments like the polling stations and other remotely uncontrolled environments such as voting from a home computer or a smart phone. The new approach has been characterised by the following trends;

1. **Ballot Scanning Technology**: This is one of the elements of new technology that uses a ballot paper that is either marked by a voter with the aid of a ballot marking device in a polling station. This is then inserted into a scanning device and counted by electronically "reading" the voter's mark on the ballot. Such devices can be located in polling stations or counting centres, which are considered at controlled environments (Thematic Workshop on ICT and Elections, 2012).
2. **Direct recording electronic (DRE) voting systems**: This is another technological system that has the ability to record the voter's choice in the polling station that is usually through touch-screen or push-button devices and

then count the votes electronically. Similar to ballot scanners, this system is usually located in controlled environments.

3. **Internet voting**: This is also embraced today because of its capability to allow voters to vote anywhere, in an uncontrolled environment. Votes are stored and aggregated electronically in a centralized location. The Internet is therefore the primary voting channel currently in use in remote electronic voting systems. Hybrid forms of New Voting Technologies combine the controlled environment of the polling station with the centralized recording and counting of Internet voting. These systems, voters must vote on a computer in a polling station and the votes are then transmitted electronically to a central server.

The new machines are considered good and effective method that can provide for the sum of the votes to be verifiable while simultaneously preserving the secrecy of each individual voter's choice. It has been noted that the standard practice of conducting a random, manual recount can be an effective means of verification. However, a manual recount requires the use of paper in the system which is only possible for New Voting Technologies installed in controlled environments. The Ballot scanning technology does offer the possibility of a manual recount. The ability of such devices to scan the voter's choice depends on the voter marking the ballot properly and is subject to the devices' margin of error and reliant on a legal definition of a valid ballot (Office for Democratic Institutions and Human Rights, 2011).

2.3.2 Paper Ballots

This is the oldest type of voting adopted across the world. For example, in the first 100 years of the Republic of the United States, only one voting technology was available being paper ballots. The first major technological change to those ballots

came with an invention of the Australian secret ballot in 1856. Prior to its adoption, U.S. voters obtained printed ballots containing the names of the candidates for whom they wished to vote and placed those ballots in the ballot box. Such a ballot was well known as a proxy or ticket that was printed by each political party or other faction that had candidates in the election. This is still used in a few countries. The basic ballot that was used in the United States is the Australian or mark choice ballot that lists the names of all candidates and Voters mark their choices on the ballot. The most common form of this ballot type lists candidates by office. One variant gives voters the option of choosing an entire slate with a single mark or choosing a slate with exceptions. The Australian ballot was adopted in the United States beginning in the 1880s, after a series of scandals involving vote-buying and other problems. Paper ballots are still used in about 3% of precincts, mostly in less populous areas. The percentage of voters using paper ballots has declined by half since 1992. The voting technologies used in federal elections employ ballots with the basic characteristics of the Australian ballot displayed possibly by choices (Kevin J. Coleman "*et al*"., 1995:65).

2.3.3 Lever Machines

The next technological advancement in voting came with the introduction of a lever voting machine in 1892. In this technology, there is no document ballot. In this case a voter enters the voting booth and chooses candidates listed on a posted ballot by pulling a lever for each candidate choice. The votes are recorded then advanced in counting mechanisms that are made when the voter leaves the booth. The lever machine therefore eliminates the need to count ballots manually. This was seen as an advanced level that would yield appropriate results. For instance, poll workers read

the numbers recorded by the counters and because there is no document ballot, recounts and audits are limited to review of totals recorded by each machine. The write-in votes, however, have to be recorded on separate document ballots. That percentage has declined substantially since 1992 and is expected to continue to decrease, because the machines are no longer manufactured, although parts are still available (S.J. Ackerman, 1998).

2.3.4 Punch Cards

This was the first technological approach utilizing computers to count the votes introduced in 1964. In this system, the voter records choices are done by punching holes in appropriate locations on a paper computer card that is later fed into a computer reader so as to record the vote. The piece of card that is punched out is called a *chad*. The computer card serves as the document ballot in which the votes are recorded. Just like other document ballots, punch cards can be recounted manually and audited. There are two basic kinds of punch card system. In one, the numbered boxes are printed on the card each box corresponding to a particular ballot choice. The choices corresponding to those numbered boxes are indicated to the voter in a posted ballot in the form of a booklet attached to a voting machine, with the appropriate places to punch indicated for each candidate or other ballot choice. A voter has to slip the card into the "throat" of the voting machine where it rests on a set of rubber strips under the ballot book. A simple stylus is used to punch out the chad for the box(es) corresponding to the candidate(s) chosen for each race or other item on the ballot. The other page of the booklet exposes another set of boxes on the card that correspond to another set of ballot choices (CRS Report, 1995:69).

2.3.5 Electronic Voting

This technology got into use in the 1970s. It was called direct recording electronic (DRE) technology. It was somewhat analogous to the lever voting machine. Rather than marking a paper ballot, the voter can choose candidates from a posted ballot. Depending on the equipment used, the ballot may be printed and posted on the voting machine or it may be displayed on a computer screen. Voters make their choices by pushing a button, touching the screen, or using a similar device. The voter submits those choices before leaving the booth. For instance, by pushing a "vote" button and the votes are directly stored in a computer memory device such as a removable disk or non-volatile memory circuit. If the voting equipment has a keyboard, write-in votes could be recorded electronically. Otherwise, they must be recorded separately on a document. Approximately 7% of precincts use Direct Recording Electronic (DRE) voting systems (Peter A. Schocket, 2015).

One of the latest forms of electronic voting currently in development is internet voting. It allows for choice making to be online. Internet voting is different from DRE systems in several ways. It is done using a general-purpose personal computer rather than a custom-designed voting machine, although such machines can also be used (Richard M. Nunno, 2001).

The results are not accumulated at the polling place but are sent to the tabulating computer when cast. The results are not sent over a direct modem connection or physically transported to the central tabulator, but are sent over the Internet. Those features make Internet voting a promising technology in some ways although they pose special challenges in ensuring authentication, secrecy, and security in larger voting process. The use of Internet voting is currently limited to demonstration

projects. For example, for the November 2000 election in the US, voters in several counties in California casted nonbinding votes online, from online voting machines placed in central locations. In the same election, 84 overseas military personnel cast their actual votes via the Internet through a small pilot project run by the Federal Voter Assistance Program (FVAP) (Neil R. Heighberger, 1992).

2.3.6 Remote Voting

This is another type of technology used in voting designed primarily for use at designated polling places. The systems using document ballots are those that are paper-or card-based that permits remote voting via absentee or other mail-in balloting. Lever-machine and DRE systems cannot accommodate remote balloting, so in those cases a document-based alternative must be used. However, Internet voting could change this. However, it could also provide the possibility of voting from home or another location. If used appropriately it would be analogous to mail-in balloting (Kevin Coleman, 2000).

Remote voting is thought to be very convenient for the voter and it may increase turnout. However, states vary in the circumstances for which they permit mail-in ballots thus increasing percentage of voters that could use such remote balloting. For example, Oregon conducted its November 2000 election entirely by mail-in ballot. In California, the percentage of the ballots cast by absentees increased steadily from 3% in 1962 to 25% in 1998. The Uniformed and Overseas Citizens Absentee Voting Act of 1986 (P.L. 99-410) contains provisions to improve absentee voting for U.S. citizens and military living abroad (Kevin J. Coleman, 2001).

2.4 Effectiveness of Technology in Elections Management

2.4.1 Voter Registration

Voter Registration methodologies are generally categorized in terms of the level of technology employed, for example low tech, medium tech and high tech. There are, however, 'zero technology' options where lists are created and maintained entirely on paper. Under certain circumstances these approaches may be appropriate and is certainly relatively inexpensive. Low-technology methodologies are generally meant to refer to situations in which computers are used at central data-processing entries points to enter either summary data from paper forms, or even where the actual paper form data are entered in order to create an electronic register (Briet Lodewijk, 2012).

The medium-tech paradigm is an adjustment of the continuation of the use of paper forms in the field with high possibilities that enhance usage of such technology as optical mark recognition thus allowing more rapid processing of forms at the central site. There are improved medium-technology voter registration solutions that involve the use of digital cameras to capture voter photographs. This has been used in the South African approach where a barcode scanner that is used to capture the identity and document number for later processing (Briet Lodewijk, 2012).

The high-tech voter-registration methodology is characterised by the deployment of laptop computers at the registration centre. A laptop allows the direct data entry by the voter registration official to enter of the voter's details into a database in the kit. The addition of other peripherals such as printer, digital camera and biometric capture sensor allow rich functionality like the biometric enrolment outlined by face, fingerprint, and iris, among others depending on sensors deployed. It also involves in-kit automated fingerprint identification system that detects and prevents multiple

registration attempts on this kit. The facial photo capture, quality control and enhancement are also other enhancements furthered by scanning of identity document barcodes and subsequent printing of voter identity cards in the field (Briet Lodewijk, 2012).

The high technology solutions do offer more, but cost more in as much as the cost of laptop computers has plummeted in real terms, other kit components have not. The low-cost single-finger digital thumbprint scanners typical of early biometric voter registration kits, for example, have given way to 'industrial-strength' airport-like, multi-finger scanners whose cost, in some cases, make this component the most expensive in the kit. Moreover, it requires highly trained, highly computer-literate registration personnel and other field support staff, as well as bearing the additional operational costs associated with deployment, maintenance and storage of all technology used for this type of Voter Registration. The result is that the high-tech approach challenges financially and operationally, and poses a threat to sustainability and national ownership of electoral budgets. The National Electoral Commission in Liberia for example in its consideration of technology options for its 2011 voter-registration options ended up choosing to harness its existing investment in technology not only in terms of equipment but also due to the commission's field and staff familiarity with it that replaced its obsolete Polaroid cameras with digital cameras and upgrade its existing software and databases. However, it was seen as cost-effective and appropriate solution (ibid).

2.4.2 Transparency in Software Inspection

The software used in electronic voting systems need to be subject to impartial and transparent inspection. However, the inspection of the software should be by an

independent body or by independent inspectors welcomed by the election management bodies. Both domestic and international observers should have access to documentation detailing the inspections. The observers should collect data should collect data through the baseline survey and other forms, to understand the nature of the software inspection, including who conducts the inspection, the conditions under which the inspection takes place, and what the inspection includes.

Voter registration databases do have a very short shelf life. This leads to closure of a voter register paving way for new entries as closure of the register even for one day will already have errors the next day because some citizens will reach the voting age that day. Primarily for this reason therefore periodic registration is the methodology of choice, and elections management boards would seek to conduct voter registration as close to the electoral event as possible. Also, once the final voter list is published, the underlying data begin to diminish in completeness and accuracy due to issues such as the death of registrants, coming of age of young citizens, change of personal status like marriage, change of address and migration.

The 'Voter Registration in Africa' publication states that "population statistics for African countries show that unreported deaths alone can lead to a voters' roll inaccuracy of 10 percent within one electoral cycle of about five to six years" (African publication, 2010:23). In many countries, deaths go unreported, and where reported, no protocols exist for any reliable sharing of information on deaths with the Elections Management Board. Maintaining a voter registers is a significant challenge. Continuous registration is considered the antidote to this problem which is neither cheap nor simple. Establishing a network of offices nationwide and staffing these locations is quite expensive. Continuous registration may simply not be able to keep

pace if the volume of transactions annually does not correlate with demographic shifts (deaths, birth rates from 18 years ago, migration). The typical scenario experienced mostly is that continuous registration is offered in name only and is poorly resourced and, when the next major electoral event approaches, the deficiencies in the voter registry emerge in the political arena. The response is frequently a nationwide exercise aimed to update the register or conduct complete fresh registration. There is low or minimal difference in cost between the two thus many Elections Management Boards opt for a fresh registration in order to exclude deceased voters, which is something an update cannot guarantee. There are mechanisms such as data-driven evaluation of Voter Registration databases, field surveys or audits characterised by list-to-people and people-to-list and comparison with other datasets like census, household surveys, among others (African publication, 2010:23).

2.4.3 The Integrity of Data Transmission

There has been tremendous growing need across the world to have democratic elections characterised by freedom of choice of the political leaders without unfair means. There has also been need to ensure the security of the system extend to the transmission of the data from the voting machines in the polling stations to the tabulating computers. There are frequent steps taken to effectively protect the transmission of data and prevent illegal access, or hacking. The election observers should therefore collect data that can help the observation mission assess the extent to which steps have been taken to protect the integrity of the data transmission.

Effective technological use is aimed at ensuring transparency of election. This is seen as the excellent outcome of election results and it day begins with the ballot box and continues, in many countries, with counting at the place of polling in full view of

party or candidate and their agents, observers and the public. Copies of results are normally posted at the polling station. Successful results management systems in countries that have embraced technology are characterized by further continuation of the transparency through each layer of consolidation and aggregation of results. The results that simply emerge from an opaque system or 'cloud', doubts and suspicions may arise thus undermining stakeholder confidence, regardless of whether there are reasonable bases for such questions. The antidote to such speculation and frivolous allegations is managed transparency. Arguably, the greatest return on a technology investment an Elections Management Body can achieve is in the area of results management. This is attributed to the Results Management System that are not capital intensive as, for example, electronic voter registration or electronic voting solutions. Much of the hardware is commercial, off-the-shelf like cell phones, scanners that are even used where significant communications infrastructure like Short Messages (SMS), mobile internet, satellite required for a short period (Thematic Workshop on ICT and Elections, 2012).

The use of Information Communication Technologies for results management is no different from using them in any other aspect of elections management. They are essential to determine the feasibility and requirements, and also to ensure satisfaction as to the appropriateness, sustainability and transparency of any proposed solution. Technology can therefore ne deployed to provide an Elections Management Body with the critical "second channel" for results data that can permit rapid publication of preliminary, partial or provisional results as well as validating results that emerge later on in paper form. However, there are legal prohibitions that exist in some countries despite the "second channel" being created in parallel with, and not as a replacement to the existing system (Ibid).

2.4.4 Public Confidence and Accessibility

The effective use of the new technology in elections management is thought to be the most appropriate way to ensure successful and transparent elections. It has been argued that domestic observation groups, political party agents, and the public should have access to the electoral process, including those aspects that are automated. It is therefore critical means of promoting public confidence. Furthermore, it is often helpful for electoral management bodies and other legislators to include all stakeholders like the civil society organizations, political parties, and voters in the selection and introduction of new electoral technologies. This should include general training for voters, political party agents, domestic observers, and others on the technologies, covering how to use them and how to assess indications of possible technology failures. Public debates about the use of electronic voting technologies should be encouraged for them to feel incorporated in the larger process. The stakeholder participation in the automation of the electoral process, and where possible the steps taken to ensure that there is a high level of public comfort with the technologies in use.

In order to ensure that voters are not disenfranchised by the introduction of electronic voting technologies, election management bodies should take appropriate steps to check that all qualified voters are able to cast their ballots. This is to include those who are disabled, illiterate, or do not speak the majority language of the country. The observers whether national or international should consider the provisions in place to protect the right of the voters to cast ballots, including ballot design covering the minority languages or availability of ballots in larger type sizes. There should be availability of electronic voting machines for disabled voters, and any provisions to

ensure that equality determined by illiterate or disabled voters casting and verifying their votes.

2.5 Challenges in the use of Technology in Elections Management

This review on challenges encountered in the use of technology in elections management covers: Technological policies; the challenge of E-voting; Life cycle of the voting machine; Technical expertise, and; challenges of the Election Day procedures.

2.5.1 Technological Policies

Policy-making is quite important for any work to be a success. Technology has also become a priority for many organisations in as much as it is technically complicated. Technology cannot be ignored because of the importance that it carries with (Souter, 2009). Several electoral bodies have recognised this fact. However, they are faced with the challenges of the technological infrastructure and establishment of acceptable use policy as well as maintenance compliance. In the year 2000 for example, the Electoral Commission of Ghana through their consultants included a policy for Information Communication Technology in its nine-year strategic and modernisation plan of 2000-2009 which ended up being revised in 2005. In the year 2005 therefore, a working group of commissioners and headquarters directors of the Commission provided an updated programme emanated from the modernisation policy that reflected on the implementation of technological programmes that had taken place over the years.

As a way of overcoming this challenge, a number of countries have embarked on training of its staff members. There have been different levels of technological

training characterised by in-service training. The aim has been to assist staff in handling the changes in new technology skills, software and applications within the policy requirement. Training needs of staff across countries are in many cases identified through staff appraisal system. The electoral officials are required to receive training and apply them in their respective departments. However, the appraisal system in most cases does not include all the staff. As a matter of priority, a programme should therefore be revised to ensure training is offered to all categories of staff.

2.5.2 E-voting as a Challenge

There has continued to be increased use of new electronic voting (e-voting) technologies in elections around the world. This has been recognized by the international election observation community as one of the paramount challenges facing election observation today. The international election observation organizations have had relatively little experience in observing elections in which e-voting technologies are used. Moreover, the inherent lack of transparency of electronic voting technologies has continued to discourage easy observation. E-voting systems have posed lots of challenges for election observers. For instance, the election observers have limited access to the workings of electronic systems where the processes of vote counting and tabulation are often invisible. On the other hand, they have continued to pose challenges to the normal traditional aspects of observation thus rendering them irrelevant. It has continued to be a challenge identifying that which should be observed in the automated or e-voting systems.

2.5.3 The Cycle of the Voting Machine

The machine's cycle is an important aspect in any technology used for election purposes. It begins with the invention of the larger voting equipment and ends when the machines are finally retired from use. Ideally, any first election employing a new voting technology is likely to face lots of challenges like an election with a low number of voters because there are almost always significant glitches associated with the first deployment of a technology.

In any case, before the voting machines are used in an election, the electoral jurisdiction need to assess whether the machine meets not only a set of recognized certification standards for electronic voting systems, but also the particular requirements of the election taking place and of the jurisdiction in which that election occurs. Any jurisdiction can have different requirements guarding a voting machine depending on various factors such as whether the jurisdiction is rural or urban and the number of registered voters.

It has been noted that an independent body responsible for the certification of the technology and to determine as to whether or not the machine has met the standards required for voting or e-voting technologies should be considered. In the United States for example, independent testing authorities do perform this function. These laboratories are private companies that have been accredited by the U.S. Election Assistance Commission. However, the level U.S extent of a testing authority's actual independence is quite dependent largely on the electoral body and the voting machine vendor. In the United States, for example, the authority is often paid to test the equipment and software by the voting machine vendor, potentially compromising the legitimacy of the certification process which poses a challenge to the credibility. It is

a technical challenge more so on the certification process determined by the existing certification standards for a particular jurisdiction as well as satisfying the standards for public information. It is difficult to certify the machines before the decision to deploy the technology can be made. This calls for effective training at the point of election officials and poll workers to allow for effective operation and use of the machines. Once the decision to deploy the technology is made too late, the amount of time available to test the machines and to properly train poll workers and election officials on their use and also to familiarize the electorate with the technology may be condensed to the detriment of the electoral process.

2.5.4 Technical Expertise

The adoption and subsequent embracement of the new technology in elections management has had its own challenges regarding its applicability. There is well known challenge and general shortage of people both in the developing and developed countries that have the technical expertise not only to the observation but also to all aspects of the electronic voting process and to work with electoral commissions to adequately administer electronic elections. There is a wide gap between the knowledge of the technicians that have had an opportunity to run the election and that of the electorate that could become so wide as to make the processes of the larger electronic voting completely opaque to observation. In such circumstances, the ability of the general public to lodge complaints or legal challenges would be severely eroded. Similarly, the political parties also suffer from a lack of technical capacity to observe electronic voting and thus become an obstacle to the outcomes based on their naivety. It has been noted that political parties should be trained to observe electronic voting and therefore it should be accepted and thus the creation of training programs

for political party agents and other key stakeholders on voting technology should be emphasised.

The construction of electronic ballots is generally based on the creation of complex databases. The nature of this process introduces a high possibility of human error. Clear policies and procedures regarding the creation of electronic ballots that include institutional roles and responsibilities are considered helpful. The Ballots need to be therefore consistent in layout and design with any paper ballots that may be used.

2.5.5 Challenges of the Election Day Procedures

With the new technological advancements in elections, there is need to make a clear outline on the appropriateness of the voting procedures. The election observers should also be acquainted with a comprehensive understanding of procedures for elections in which electronic voting technologies are used that can include voting processes. Electronic voting technologies should therefore offer voters the same options as manual voting, including, but not limited to, casting blank ballots and cancelling their votes. If a voter verified paper trail (VVPT) is used the voter should be able to cancel his or her vote should the paper receipt not reflect the ballot cast on the machine. The necessary steps should be taken by the electoral management body to ensure that the secrecy of the vote is protected, that a vote cannot be traced back to a specific voter, and that voters are not able to remove evidence of how they voted from the polling place.

Moreover, the election management bodies in any country that embraces technological voting should have clear and consistent rules in place in case of machine failure that may result from power outages or other issues. These rules should therefore be clearly communicated to all poll workers and technicians as well

as observers and party agents. The lack of prior planning may lead to disputed results or lack of accountability. The poll workers should receive training on what to do in such instances. Machine failures should be clearly documented to avoid disputes that may be borne. Documented chain-of-custody procedures should be in place to ensure that machines are secure from tampering once removed from the polling station either at the end of polling or in case of machine failure. Any replacement equipment therefore should be subject to the same testing and certification processes as equipment initially installed in the polling place. International observers should do an assessment of the degree to which election management bodies have taken steps to ensure that contingency plans and procedures are clear to election officials and are implemented throughout the electoral process in relation to the plans and procedures.

2.6 Conceptual Framework

The conceptual framework links the research objectives to the actual research. It is guided by independent variable being role of technology and independent variable being the Management of Elections. Role of technology in elections management is influenced by certain factors like skills, policies and administrative directions while management of election is guided by determinants brought about by independent variables. However, there are intervening variables guiding that if taken care for may yield positive outcome such as computer hardware and software, time of usage and the larger usage.

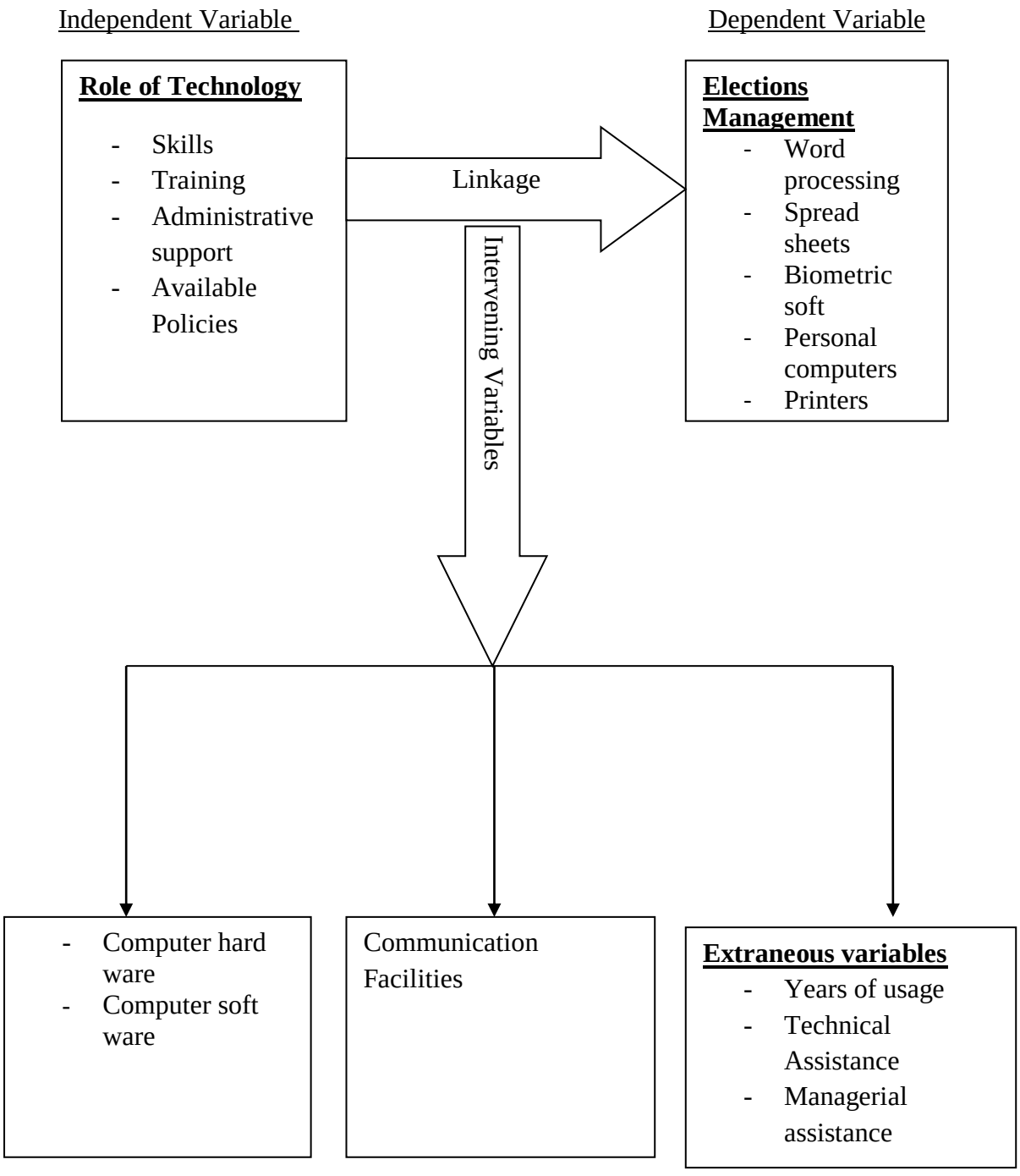

Figure 2.1: Conceptual Framework Model

Source: Researcher, 2016

2.7 Theoretical Framework

The study adopted a theoretical framework informed by the Adaptive Structuration Theory (AST) and Innovation Diffusion Theory (IDT). This theory was deemed relevant in this study due to its applicability in the information systems discipline.

2.7.1 Adaptive Structuration Theory

The theory that guides this study is Adaptive Structuration Theory (AST) propounded by DeSanctis and Poole, (1994). The theory is founded on Anthony Giddens' (1984) structuration theory. Adaptive Structuration Theory (AST) has continued to be used for a number of years in the information systems discipline to study the use of new technologies in organizations (West and Turner 2000). Its proponents contend that developers and users of the technology systems hold high hopes for their potential to change organizations for the better. However, actual changes do not occur often, or occur inconsistently. Adaptive Structuration Theory examines the change process from two points of view based on the types of structures (Hardware and Software) mainly provided by technologies and the structures that actually emerge in human action like the technological policies as people interact with these technologies.

Organizations, governments and other bodies have come up with policies that provide the information to users of the organisation's technological resources to the staff, trainees and management. Organisations or governments therefore need to inform its workers about the type of behaviour it expects of those using technology and about the consequences for abusing technology privileges. Moreover, policies exist for the protection and guidance of the organisation and individuals as they give users ground rules for acceptable use of the technology that facilities and enhances communication equipment. Once technology has become central to the operations, the organisation

puts in place policies to ensure that it is managed properly, that staff get adequate training, as well and workable procedures for dealing with breakdowns of key equipment. If well utilised therefore, elections can be well managed through the acquired technologies fostered by the learned skills.

2.7.2 Diffusion of Innovation Theory

This study was also guided by the diffusion of innovation theory, otherwise known as the Innovation Diffusion Theory (IDT). The theory was first postulated by Everett Rogers in his book Diffusion of Innovations, first published in 1962 and now in its fifth edition. Since then, innovation diffusion research has been widely applied in fields such as education, sociology, communication, agriculture, marketing and information technology, etc (Rogers, 1995; Karahanna, *et al.*, 1999; Agarwal, Sambamurthy, & Stair, 2000). Innovation is an idea, practice or object that is perceived as new by an individual or another unit of adoption (Rogers, 1995). Diffusion is the process by which innovation is communicated over time between the members of the social system through certain channels (Rogers, 1995). Accordingly, the IDT theory argues that potential users make decisions to adopt or reject innovation based on the belief that they form about innovation (Agarwal, 2000). The IDT includes five significant innovation characteristics: relative advantage, compatibility, complexity, and testability and observability. Relative advantage is the degree to which innovation is considered to be better than the idea that it replaced. This construction has been identified as one of the best predictors of the adoption of innovation. Compatibility is the degree to which innovation is considered to be consistent with existing values, prior experience and needs of potential end-users. Complexity is the perceived level of difficulty of end-users in understanding innovations and their ease of use. Testability is the degree to which innovations can

be tested on a limited basis. Observability is the degree to which other people can see the results of innovations. These characteristics are used to explain the adoption of innovations by end-users and the decision-making process. (Rogers, 1962).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter outlines all the methodologies which were applied in this study. This includes the appropriate research design and the target population. The chapter also highlights the sample size as well as the data collection instruments which were used. In line with the instruments were the data collection techniques considered suitable to the study and the data analysis procedures which gave room for testing reliability and validity. Ethical considerations were involved as they had a role in actual preparation of the data collection.

3.2 Research Design

Research design is a comprehensive plan for data collection in any research. It is a "blueprint" for empirical research aimed at answering specific research questions or testing specific hypotheses and it informed the sampling process which was used in this research.

This research utilized descriptive survey research design. This is because descriptive studies are concerned with specific predictions with narration of facts and characteristics of individuals, groups and situations. The method also exposes the relationship between dependent and independent variables associated with the problem. The design was applicable for the study because it allows the researcher to study phenomena that do not allow the manipulation of variables. According to Kothari (2004) descriptive research studies are designed to obtain pertinent and precise information concerning the status of phenomena and whenever possible to

draw valid general conclusions from the facts discovered. According to Robson (2002) descriptive design is used on preliminary and exploratory studies to allow the researcher to gather the information, summarize, present and interpret data.

3.3 Location of the Study

The research study area was Bungoma County within the Republic of Kenya. According to Bungoma County Integrated Development Plan (2013-2017), Bungoma County is home to an estimated 1.7 million people and sits on an area of 2,069 km². Bungoma is the 3rd populous County after Nairobi and Kakamega. It borders three Counties: Kakamega on the South, Trans Nzoia on the North and Busia on the West. It also enjoys a vast shared international border with Uganda. Bungoma County has 9 constituencies and 45 County Assembly wards. The 9 constituencies, which also serve as Sub-Counties, include Kanduyi, Bumula, Webuye East, Webuye West, Kabuchai, Sirisia, Tongaren, Kimilili and Mt. Elgon (Bungoma County Integrated Development Plan, 2013-2017).

This research aimed at assessing the perception of the constituents of Bungoma County on the use of technology in the election management in Kenya.

3.4 Target Population

The target population is a group which a researcher would like the results of the study to be generalized or inferred to (Gay, 2003). A population consisted of all the subjects who were to be studied in the research. The population under this study was grouped into three categories of respondents that is, politicians, IEBC officials at County level and NGOs. The identification of these groups was influenced by their roles in society and how they influence political processes in the country.

Politicians included Members of the County Assembly (MCAs), area MPs, and other contenders of Bungoma County. They consisted those who were elected by the electorates and those who lost in the elections. IEBC Officials included the County IEBC officials who represented the national IEBC office and were responsible for implementation of National IEBC policies at County levels. NGOs included Non-governmental Organizations consisting of social welfares like Community Based Organizations (CBOs), faith-based organizations among many others. They are mandated by their objectives to provide humanitarian assistance to the affected and infected citizens during political instability alongside other social and economic aids to less fortunate members in the society.

Sampling is the process of selecting a group of subjects for a study in such a way that the individuals represent the larger group from which they were selected. This research used Purposive sampling technique which is anon probability sampling method involving selecting certain units or cases ‘‘based on a specific purpose rather than random selections (Tashakkori & Teddlie, 2003a, p. 713, Kuzel, 1992; LeCompte & Preissle, 1993; Miles & Huberman, 1994; Patton, 2002).

Sample size depends on what the researcher wants to know, the purpose of the inquiry, what’s at stake, what will be useful, what will have credibility, and what can be done with available time and resources (Patton, 1990).

In order to understand the problem of small samples in qualitative inquiry, it's necessary to place these small samples in the context of probability sampling. A qualitative inquiry sample only seems small in comparison with the sample size needed for representativeness when the purpose is generalizing from a sample to the population of which it is a part. In a case where there are 100 subjects in a program to

be evaluated. It would be necessary to randomly sample 80 of those subjects (80%) to make a generalization at the 95% confidence level and if there are 5,000 subjects in the population of interest, 357 must be sampled (7%) to achieve a 95% confidence level in the generalization of findings (Fitzgibbon and Morris, 1987: 163).

Table 3. 1: ***The target population***

TARGET GROUP	TARGET POPULATION
IEBC OFFICIALS	38
NGO OFFICIALS	13
POLITICIANS	189
TOTAL	**240**

3.5 Sample frame and Sampling

According to Mugenda and Mugenda (2003) a representative sample of 10-30% for a descriptive research design is recommended. A representative sample of 150 persons which accounted for 62.5% of the total target population was used in this study. The respondents were selected from three target groups within Bungoma County. To obtain the participants from the population, the names of the possible participants among politicians were numbered. Thereafter, the researcher selected the participants through simple random techniques. The process involved writing the numbers in small pieces of paper after which they were folded and put in a container. The researcher then handpicked the papers and those whose names coincided with the numbers picked were included in the study. IEBC officials and NGO officials were purposively sampled. The use of the sample is appropriate when saving on cost and time (Kothari, 2013).

The sample size for this study was obtained using Slovin's formula (2004) as follows;

$$n = \frac{N}{\left(1 + Ne^2\right)}$$

Where;

n = the sample size

N = the size of population

e= the error of 5 percentage points

Using 95% confidence level and an error limit of 5% the sample for the study is therefore;

$$n = \frac{240}{1 + 240 \times 0.05^2} = 150\ respondents$$

This sample is considered appropriate since it is more than 10% of the entire population and hence significant for the current study. The relevant sample for the study is 10% and above (Wire, 2015).

The study adopted a stratified sampling in which all samples in the same strata were classified in the same category.

The researcher is satisfied with this view and as such applied this technique in the research study.

Table 3. 2: ***Sample Size***

TARGET GROUP	TARGET POPULATION	SAMPLE SIZE
IEBC OFFICIALS	38	24
NGO OFFICIALS	13	8
POLITICIANS	189	118
TOTAL	**240**	**150**

3.6 Sampling Strategy

Purposive sampling technique was used by the researcher in this research study. The researcher chose the technique with explicit attributes in mind and the intent of providing in-depth analysis of those attributes and how they relate to the selected study population and the study subject.

3.7 Data Collection Techniques

The research utilized mixed method technique of data collection.

3.7.1 Data Collection Instruments

Qualitative technique was used guided by interview schedule and the questionnaires which the researcher formulated to ensure maximum reliability and minimization of biasness. Structured and semi-structured questionnaires were used. The research relied on both primary and secondary data. The primary data is the data that is raw and which the researcher first handily collects in the field for the first time through questionnaires and interviews. Secondary data is the already collected and available data and which have passed through statistical process. The researcher chose this method of data collection because the study aimed at getting primary views of the selected respondents and as well the views of other researchers which were in the secondary data.

The questionnaires were personally administered to the respondents by the researcher. The researcher personally collected all completed questionnaires from the respondents at the point where the questionnaires were administered to them.

3.8 Data Collection

The research used questionnaires, interviews and interview schedule as the instruments of data collection.

3.8.1 Questionnaire

The research used questionnaires as one of the tools of data collection in the study. Structured and semi-structured questionnaires were administered to the respondents to ensure that the objectivity of the study was attained. By using structured and semi-structured questionnaires the researcher was able to control objectivity of the research and promote relevancy of the data collected in reference to the study.

3.8.2 Interview Schedule

The research used interview schedules to collect data from key informants to the study. The study used in-depth interview. In-depth interview method was chosen because of its face-to-face interaction with respondents that mostly enables them to provide rich-information which can assist to attain the objectivity of the study.

3.9 Data Analysis

The data analysis consisted of examining the surveys for correctness and completeness, coding and keying data into a database in Statistical Package for Social Sciences (SPSS), and performing an analysis of descriptive responses. All incomplete responses were discarded from the analysis. Frequency tables and descriptive

statistics were constructed to display results with respect to each of the research questions.

3.10 Validity and Reliability

Reliability and validity ensure accuracy in data collection and is aimed at obtaining measurability in research. According to Kothari (2004), validity refers to the degree to which results are obtained from analysis of the data to represent the study subject. Reliability aimed at ensuring the data process collection was consistent. In this study the reliability was determined by the data collections which the researcher chose to use in data collection.

3.11 Ethical Considerations

According to Sekran (2003), ethical issues should be addressed while collecting data. This may include the purpose of the research, confidentiality of data obtained, respect of the participant in all aspects, and not forcing the participants in case he/she takes time to respond. During the study, strict compliance was ensured with regard to the guidelines by Homan, (1991) for the need to explain the purpose of study and the benefits expected from respondents, the rights of respondents and how these would be protected and kept confidential and obtaining the informed consent of respondents during the process of interviews. In this study, therefore, it was ensured that the fundamental aspects of ethical consideration were complied with. Participants were assured of full confidentiality of their identity (personal) and the information provided.

CHAPTER FOUR

THE TYPES OF TECHNOLOGY USED IN ELECTIONS MANAGEMENT IN BUNGOMA COUNTY

4.1 Introduction

The first analysis begins with the presentation and analysis of data about the background information regarding the respondents' gender, age categorized based on range, level of education, employment status and level of experience. This was seen as a necessary basis for understanding the respondents as it also showcases their ability to understand the issues raised by the researcher. This is followed by data presentation, analysis and discussion of findings on the first specific objective of the study. The first specific objective of the study which is to analyse the types of technology used in elections management in Bungoma County.

4.2 Gender of the Respondents

The researcher sought to find out the gender of the respondents and the findings were as shown below;

Table 4. 1: ***Gender of the Respondents***

Gender of the Respondents	Frequency	Percentage %
Male	99	66
Female	51	34
Total	**150**	**100**

Source: Field data, 2016

Gender is important in any society today. The Constitution of Kenya for instance provides that there should be at least a third of the opposite gender in any

organization. It was necessary to get the gender status of the responds in order to avoid being biased through getting single sided information. The findings indicate that majority of the respondents were male while the female respondents were a few.

4.2 Age of the Respondents

The researcher assessed the age of the respondents in order to ascertain their level of understanding in regard to the elections in Kenya.

The findings were as shown in the table below;

Table 4. 2: Age of Respondents

Age Range	Number	Percentage %
18 – 28	30	20
29 – 39	37	25
40 – 50	52	35
51 – 61	16	11
62 – 72	13	8
73 and above	2	1
Total	**150**	**100**

Source: Field data, 2016

In order to understand the kind of respondents providing information, the researcher asked for the ages of the respondents. However, the years were to be provided in age range so as to observe the privacy of the respondent. The data collected was viewed as representative because the respondents as per the age range show that it was from the recently registered voter of 18 years to the probable oldest being 73 years and above.

The findings indicate that majority of the respondents were in the age range 40-50 years. The findings further indicate that among the respondents few people were old with a representation of 1% from the findings. It can therefore be deduced that majority of the people in Bungoma County and more so the voters are the youth as

indicated from the findings that can be grouped as from the age 18-39 years hence from the sample totaling 67 and a percentage of 45%.

The age range of 62 years and above totaled 15 respondents. This is 9% of the total sample. It implies that there were at least well experienced personnel when it comes to the number of years that they have witnessed or participated in elections. It can therefore ne pointed out the respondents were citizens who cut across the entire quadrangle as far as elections participation is concerned.

4.3 Level of Education

This research is concerned with the new technology used in elections and it would be wrong to develop assumptions that all the citizens have an understanding. This explains why the researcher decided to find out the educational level of the respondents.

The findings were as indicated in **Table 4. 3**

Table 4. 4: ***Level of Education of the Respondents***

Level of Education	Number of Respondents	Percentage %
Graduate	96	64
Diploma	27	18
Certificate	25	17
CPE	2	1
KCPE	0	0
None	0	0
Total	**150**	**100**

Source: Field data, 2016

The determination of the level of education of the respondents was important and Paramount as it would enable the researcher estimate the level of their understanding on the topical issue. From the findings it was noted that 96 of the sampled population were graduates. This is a total of 64% which implies that majority of the respondents had good understanding on the technological use in elections.

The technological use in elections is new to the Kenyan system of conducting elections but not new globally. The respondents who had diploma were 27 which is a total of 18%. The figure is similar to those who have certificate as their highest level of education. This means that they at least have an understanding on the technological use to manage elections.

The research findings also indicate that minority 1% with a total of 2 respondents have Certificate of Primary Education as their highest level of education. It therefore implies that they underwent schooling long time before the introduction of Kenya Certificate of Primary Education. The sample represents the elderly people. It means that they are a representation of people that have participated in numerous elections and have an insight of the multiple election processes. From the findings, it can also

be noted none of the respondents had attained KCPE as the highest level of education and that there was no respondents who had neither of the educational qualifications. The reflection of the minority group characterized by the 1% representation further shows a reflection of the elderly people tallying with the age group of 73 years and above.

4.4 Employment Status

It was necessary to ask the respondents questions regarding their employment in order to ascertain their status. Their responses were as outlined in the table below;

Table 4. 5: ***Employment Status***

Employment Status	Number of Respondents	Percentage %
YES	109	72
NO	41	28
Total	**150**	**100**

Source: Field data, 2016

The findings indicate that majority of the respondents were employed. This means that they have had experience on the usage of technology at one point in time while on duty. The 41 respondents who are unemployed which totals 28% is a representation of the unemployed citizens and their views regarding technological use are valid.

4.5 Level of Experience in Service

In order to conform to the question of employment, the researcher had to ask the views of the respondents who agreed to being employed as to how long they have been in service.

The results were as in the table below;

Table 4. 6: ***Level of Experience in Service***

Level of Experience	Number of Respondents	Percentage %
Below 1 year	10	9
1 – 5	31	28
6 – 10	21	19
11 – 15	16	15
15 – 20	8	8
21 and above	23	21
Total	**109**	**100**

Source: Field data, 2016

The findings indicated that 109 of the 150 respondents are people who are employed. It means majority are employed and have a better understanding of technological use. Those who have been employed and have an experienced ranging between 1-5 years are the majority with them totaling 31 which is 28%. It was also found out that the most experienced personnel were present among the respondents being the second most in number of 23 out of the total 109. This is estimated at 21%.

It can be deduced from the collected data that majority of the respondents have an understanding of the concept hand since they have an experience of more than one year. This applies to all the respondents except the 10 respondents estimated at 9% who had experience of less than one year.

The findings also indicate that majority of the respondents fall in the age range 40-50 years which can be categorized as the experienced personnel in service provision and therefore widely involved in technological use. It is worth noting however that all the respondents were eligible voters and have therefore participated in one way or another in electioneering process.

From the findings it was also established that majority of the respondents have attained at least a degree level of education with majority 64% being graduates. Those

who have not attained degree level have at least attained diploma or certificate level as indicated by the 17% each. The remaining 1% of the respondents had CPE as highest level of education. This was important to the research as they are the people who have participated or witnessed most elections.

Getting to know the employment status of the respondents was important as it also contributes to the understanding of technological use based gained experience. The research findings indicated that majority 109 of the 150 respondents are employed and the remaining 41 respondents who are unemployed are representation of the unemployed persons in society.

The level of experience of the respondents shows the probable ability of their understanding of the research area. With majority of the respondents as indicated by the analyzed data having experience of 1-5 years, it implies that they have an understanding of the changing technological how. The findings also indicate that 21% of the respondents had the highest level of experience being 21 years and above. It means that they have experience in relation to the use of technology and that they have participated or witnessed many elections.

4.6 Data presentation, analysis and discussions on the types of Technology used in Elections Management in Kenya

The researcher wanted to find out whether the citizens of the Republic of Kenya have an understanding on the types of technology used in managing elections. It was clear that majority of the Kenyan citizens are aware of the technological machine used in managing elections. All the participants agreed that they knew of the technology used as all the 150 participants making it 100% were in agreement on the basis of asking as none disagreed.

4.6.1 Types of Technology

It was therefore important to ask the participants to state any technological machine that they know since they all agreed to have knowledge on it. On the basis of their responses, the results were as presented in the following pie chart;

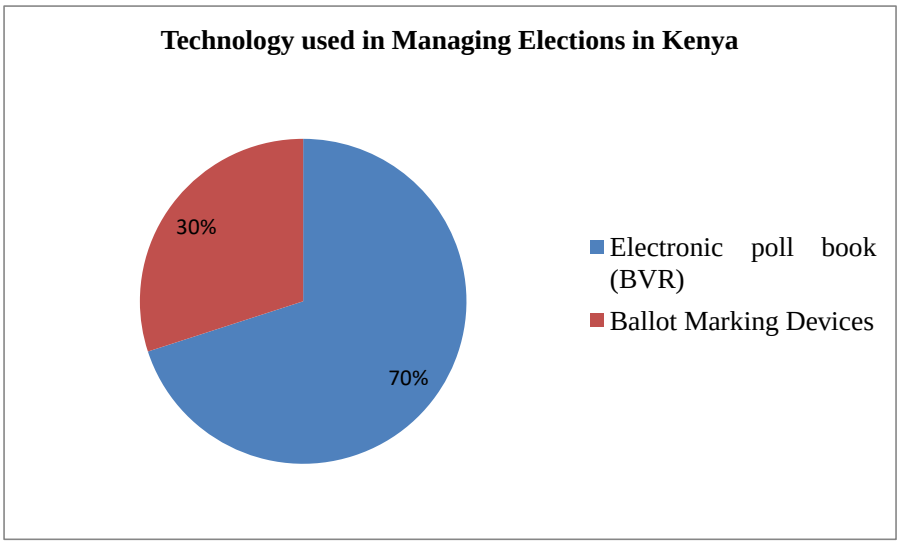

Figure 4. 1: Technology used for managing Elections in Kenya

Source: Field data, 2016

There are two most known types of technology that are used in management of elections in Kenya. There are many other types of technologies used to manage elections but from the findings it is clear that 105 of the 150 respondents that is a reflection of 70% knew BVR as the technology mostly used. Ballot marking devices is also a well-known technological device with 45 of the respondents which equates to 30% stating it. The findings therefore show that majority of Kenyans are aware of the two technological devices.

4.7 Types of Voting System Technology in Kenya

The research sought to find out the types of voting system in Kenya through highlighting some of the well-known systems worldwide. The finding was necessary because it would add value to the technology systems.

The results were as indicated in table 4.6;

Table 4. 7: Types of Voting System Technology in Kenya

Types Voting System Technology in Kenya	Number of Respondents	Percentage %
Direct Recording Equipment	0	0
Precinct Count Optical Scan Equipment	0	0
Central Count Optical Scan Equipment	0	0
Lever Machines	0	0
Electronic Poll Book	96	64
Ballot Marking Devices	37	25
Not aware	17	11
Total	**150**	**100**

Source: Field data, 2016

It was clear from the findings that the most known voting systems were marked by the BVR tool kit. The move to indicate BVR by 64% (96) of the 150 respondents who participated could have been escalated by the 2013 general elections. However, ballot marking devices were also indicated as one of the voting systems in Kenya. The results showed that the respondents knew about the Ballot marking devices though very few individuals were aware of it. This is shown by the findings that had a total of 37 (25%) participants being in agreement that they were aware of Ballot Marking Devices. It was clear from the findings of the collected data regarding voting system that 17(11%) respondents of the total 150 participants failed to indicate any type of

voting system. This meant that they did not know of any type of voting technology used in Kenya.

4.8 Usage of Any Technological Machine

In order to understand the technological types used in Kenya, the researcher asked the participants whether they had used any technological machines.

The responses were as indicated in table 4.7;

Table 4. 8: ***Have you used any technological machines*****?**

Variables	Frequency	Percentage %
Yes	110	73
No	40	27
Total	**150**	**100**

Source: Field data, 2016

It was appropriate to find out the participation of the respondents in the usage of technology as it would be a reflection of the societal system. From the findings, it was clear that majority of the participants have used at least a technological device as 110 (73%) of the participants agreed to have used technology. It was also clear that some of the participants had never used technological device or that they had no clear understanding of the concept of technology. From the results, 40 respondents which is a total of 27% noted to have not used any technological device.

4.8.1 Specific Technology used

In order to get specific results on the kind of technology that the participants have used, the researcher had to ask them on the specific technology that they have used which was specific to those who agreed to have used them.

The results were as shown in the pie chart below;

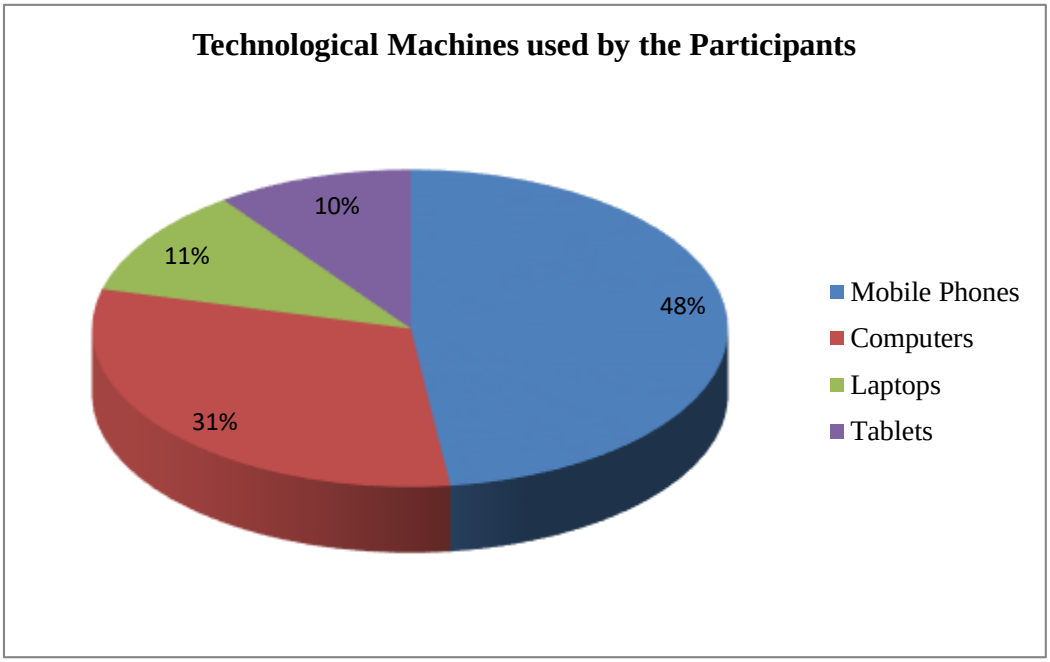

Figure 4. 2: Technological machines that have been used by the participants

Source: Field data, 2016

Apart from the BVR machine the other technological machines that were known and even used as shown by the findings of the results included mobile phones, computers, laptops and tablets. The results indicate that majority of the respondents representing 48% (72 out of 150 respondents) categorized mobile phones as a technological device that they have used. The findings also indicate the computers as the technological machine that the respondents had used was the second highest noted device with a total of 47 out of 150 respondents which was a reflection of 31%. There were 16 out of 150 respondents (11%) who mentioned laptops as the technology that they had used, while the remaining 15 respondents (10%) had used tablets.

It can therefore be noted from the findings that the participant were well aware of the fact that there are technology being used in election management in the country, and that they are most known voting system technology being the Electronic poll book (BVR).

It is clear from the results that the respondents knew about the Ballot marking devices though few individuals were aware of it. The findings also show that in as much as the participants knew about technology that was being used in election management in the country, they had indeed used some of the technological machines with the BVR being the most one they were most familiar with. Apart from the BVR machine the other technological machines that were well known and even used as shown by the findings of the results included computers, laptops, tablets and mobile phones.

CHAPTER FIVE

THE BENEFITS OF USING INFORMATION COMMUNICATION TECHNOLOGY IN ELECTIONS MANAGEMENT

5.1 Introduction

This chapter presents data analysis and presentation regarding the second objective which is to establish the benefits of using information communication technology in elections management in Bungoma County. It gives the analysis and its presentation on the research questions derived from the objective on the basis of the participants' views.

5.2 Technological Equipment usage in Elections Management in Kenya

The research sought to get responses from the participants especially in regard to usage of the technological equipment to manage elections. The first response from the participants was on closed ended question which needed a YES or NO response.

The results were as in the below pie chart;

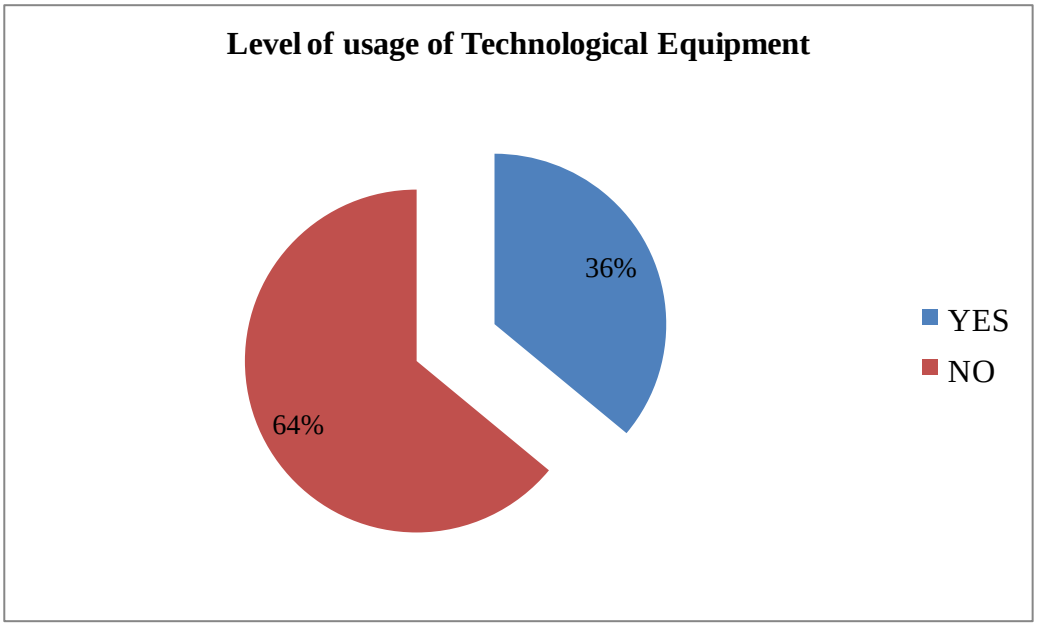

Figure 5. 1: Responses on successful usage of technological equipment to manage elections

Source: Field data, 2016

The findings showed that the technological equipment have not been successfully used in election management in Kenya. The collected data indicated that majority of the respondents which is 96 out of the 150 respondents equivalent to 64% were of the opinion that the technological equipment had not been successfully used to manage elections in Kenya. Those who felt that the technological equipment had been successfully used to manage elections were 54 respondents which represented 36% which is fairly high.

5.2.1 Extent to which Technology use is successful

In order to get more information in relation to the benefits and the successful use of technology to manage elections, the researcher sought to know the extent to which the respondents felt it was successful.

The results were as shown in table 5.1;

Table 5. 1: Extent to which Technology use is successful in Elections Management

Variables	Number	Percentage %
Very High	0	0
High	27	18
Medium	84	56
Low	27	18
Very Low	12	8
Total	**150**	**100**

Source: Field data, 2016

This part of response from participants had a lot of mixed reactions. The researcher sought to know the extent to which technological equipment had been used successfully to manage elections. Majority of the respondents stated that these technological machines had been used successfully but the extent was medium. This group of respondents totalled 84 being the highest percentage 56%. There are also those who thought that the level of success from the technological use of equipment was high marked by 27 respondents which was an estimated 18%. The figures were however similar to those who agreed that there was success in the use of the technology but that the level was low. Those who thought that the level of success from the use of the technological equipment was very low were 12 participants

marking the lowest percentage being 8%. It therefore implies that there was at least some success that would have been brought about by the use of technological equipment. However, it is notable that in as much as some of the respondents pointed out that there was success; the few who said that these machines had been used successfully were not satisfied with the application of technology in elections managements.

5.3 Enhancement of Technological Machines

The researcher sought to find out whether there was need to enhance the technological machines in order to realize a wide application of technology and the benefits thereof.

The responses were as indicated in the below table;

Table 5. 2: Do you think the use of technological machine need to be enhanced?

Variables	Number	Percentage %
YES	141	94
NO	9	6
Total	**150**	**100**

Source: Field data, 2016

The results show that it was almost unanimously agreed that the use of technological machines need to be enhanced for them to be successful in management of elections in Kenya and therefore realize its benefits. From the findings, majority 141 of the 150 participants which is 94% felt that there is need to enhance the technological machines. Few participants however felt that there is no need to enhance the technological machines. Those who were of the idea that it should not be enhanced were 9 in number which represents 6%.

5.3.1 Reasons for Enhancing Technological Machines

The researcher sought to find out the reasons for the need to enhance the technological machines in elections management from the respondents who were of the idea of enhancement.

The findings were as indicated in the pie chart below;

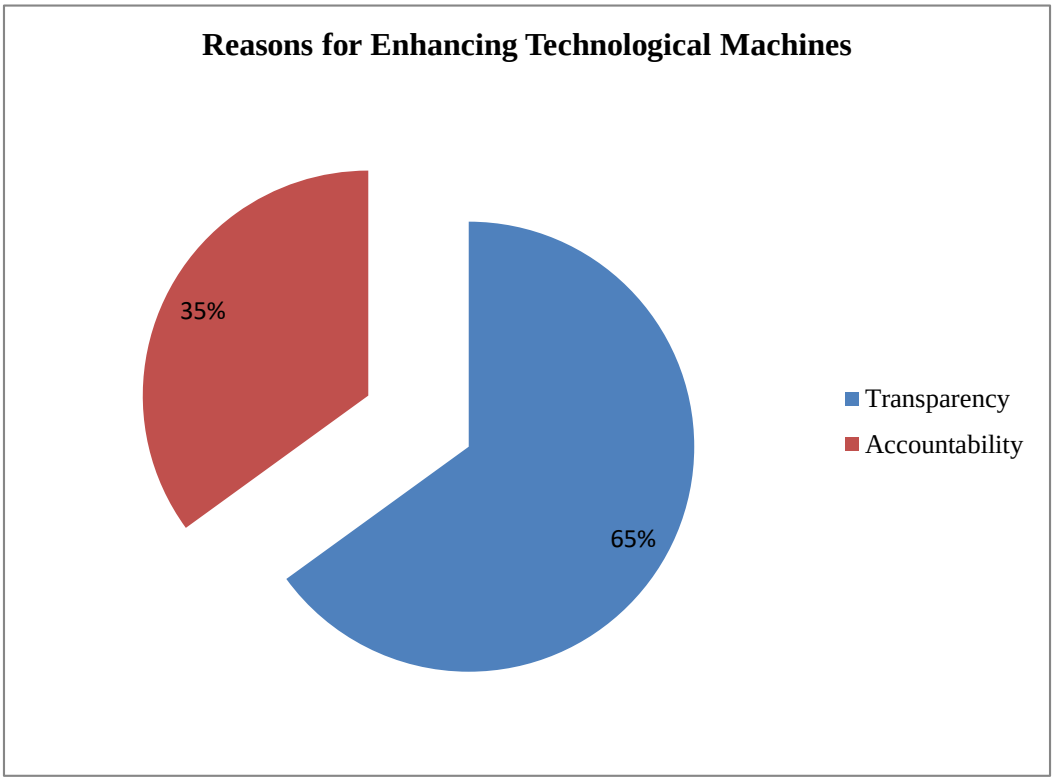

Figure 5. 2: Reasons for Enhancing Technological Machines

Source: Field data, 2016

The study found out that the proper use of technological machines should be enhanced mostly for purposes of transparency and accountability in the election in Kenya. The results indicate that majority 97 out of 150 respondents, (65%) noted that enhancement of the technology would allow for transparency in elections. The remaining 53 respondents (35%) argued that accountability would be attained once the technology is enhanced.

5.4 Probable Outcomes when Technological Machines are used in Elections Management

The researcher sought to find out on the probable outcomes upon the use of technological machines in managing elections.

The findings were as indicated in the pie chart below;

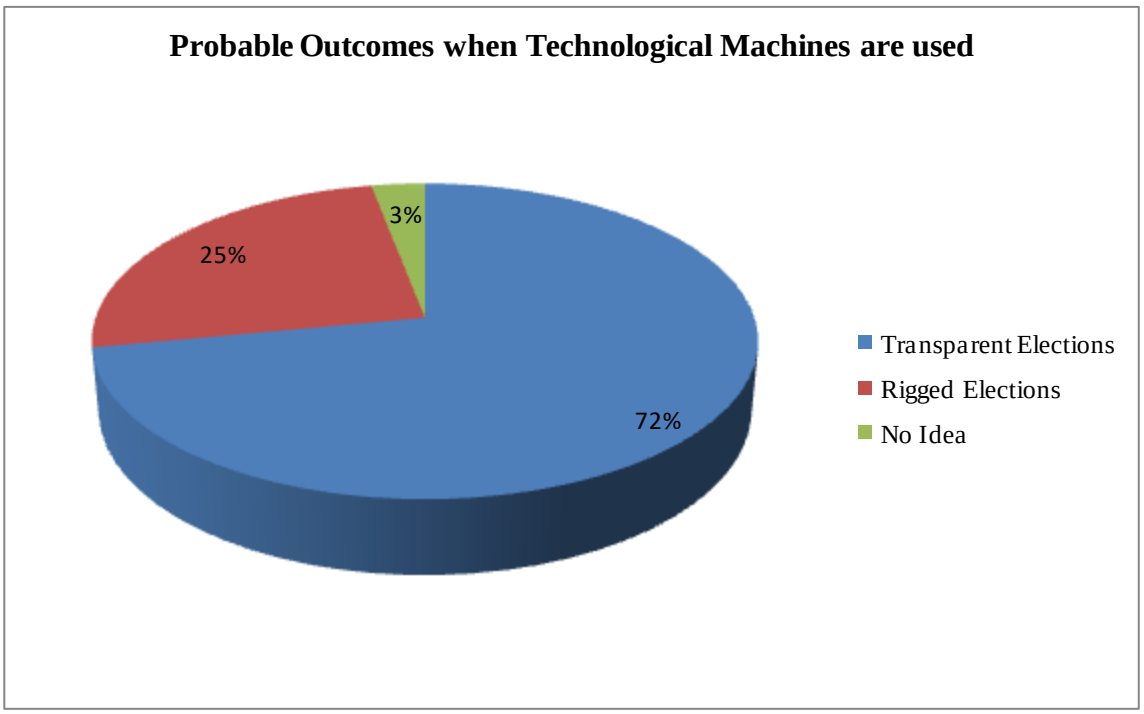

Figure 5. 3: Probable Benefits when Technological Machines are used

Source: Field data, 2016

The findings also indicated that the most probable outcome of using technological machines in Kenyan election would be transparent election. This was reflected by majority 108 of the respondents which is 72% being in agreement. The results also indicated that 37 respondents representing 25% pointed out to rigged elections by use of the same technological devices being the outcome. In as much as majority pointed

to transparency as the likely outcome from the use of technology to manage the elections, the findings show that 5 respondents had no idea on the probable outcome. This is the least group as it constituted 3%.

5.5 Rating the Impact of Technological Machine Kits as Voting Equipment in Kenya

The researcher sought to find out the participants' ratings on the impact of the technological machine kits as the voting equipment in Kenya.

The findings were as shown in the table below;

Table 5. 3: Rating the Impact of Technological Machine Kits as Voting Equipment in Kenya

Variables	Number	Percentage %
Very Good	0	0
Good	27	18
Average	86	57
Bad	27	18
Very Bad	10	7
Total	**150**	**100**

Source: Field Work, 2016

The findings show that majority of the research respondents rated the impact of the technology at an average level. This is supported by the findings being 86 respondents depicting 57%. Those who rated the effectiveness of the voting kits as being either good or bad were equal in number with both having 27 (18%) respondents. The findings further show that 10 respondents do not feel that the technological machine kits are effective. This is 7% of all the participants. None of the participants however would rate the effectiveness at very good level.

5.6 The Benefits of Technology in Elections Management in Bungoma County, Kenya

In order to get more information concerning the benefits of technology in managing elections, the researcher asked the participants on the impact of these technologies to elections management.

It was however found out that majority of the respondents considered the use of technology in election management a failure.

This majority represented 72 of the respondents who gave their comments saw it as a failure compared to the 38 of those who considered it a success.

5.6.1 Technological Machine used by IEBC and Manual Voting Process by former ECK

The study sought to find out the opinion of the respondents in relation to the IEBC technological machine and the manual voting process used by the former ECK before the promulgation of the new constitution. The study further sought their opinions as to why they would consider the IEBC technological machine as more preferred.

The findings were as shown in the table below;

Table 5. 4: Benefits for IEBC Technological Machine being Preferable

Variables	Number	Percentage
Faster Process	108	72
Minimizes Repeated Voting	23	15
Does not need many clerical Officers	19	13
Total	**150**	**100**

Source: Field Work, 2016

Given that all the respondents were in agreement that the IEBC technological machines were better in the 2013 than the ECK manual voting process in the previous elections, the researcher found out more of the reasons for the IEBC technological preference. The findings showed that majority 108 out of 150 respondents representing 72% saw it fit due to its fast process. Another reason which was its ability to minimize repeated voting from some voters. Those of the opinion constituted 23 out of 150 respondents representing 15%. The last reason was that it would reduce the number of clerks required for the process. This argument was supported by 19 respondents representing 13% which was the least provided reason.

It can therefore be noted from the findings that the technological equipment have not been successfully used in election management in Kenya.

CHAPTER SIX

CHALLENGES IN THE USE OF TECHNOLOGY IN ELECTIONS MANAGEMENT IN BUNGOMA COUNTY

6.1 Introduction

This chapter provides the research findings on the third research objective which was to investigate the challenges faced in technological use in elections management in Bungoma County.

6.2 Shortcomings Brought about by Technological Machines in Elections Management in Bungoma County, Kenya

The study sought to find out the possible shortcomings that arise from the use of technological machines in the effort to manage elections in Bungoma County, Kenya.

The findings were as shown in the table below;

Table 6. 1: Shortcomings Brought about by Technological Machines in Elections Management in Bungoma County, Kenya

Shortcomings	Number	Percentage %
Incompetent personnel	22	15
Defective machines (BVR kits)	20	13
Lack of proper awareness of voter registration in Kenya	30	20
Lack of awareness and familiarity to the use of technology in election management	31	21
Poor infrastructure and facilities e.g. electricity, network,	27	18
Manipulation of the systems used in the technology.	20	13
Total	**150**	**100**

Source: Field data, 2016

The findings have indicated that there are lots of shortcomings that result from the use of technology to manage elections. From the findings, 30 and 31 out of 150 respondents respectively (20% and 21% respectively) noted that lack of proper awareness of voter registration in Kenya and also lack of awareness and familiarity to the use of technology in election management were the immediate problems that emanated from the desire to use technology in managing elections in Kenya. The findings further indicated that 27 out of 150 respondents (18%) pointed to poor infrastructure and facilities such as the electricity and network problems as having arose from the introduction of technological mechanisms. The least group of 20 out of 150 respondents (13%) indicated that manipulation of the systems used in the technology and use of defective machines (BVR kits) was the cause of shortcomings brought about by use of technology to manage elections.

It is clear from the findings that there are several challenges that are thought to have resulted from the use of technology to manage elections. The comparison between the benefits and the challenges was a bit high which means that there are many problems that resulted from the introduction of technological devices and were well known by the participants in the research.

6.3 Level of Success of the Technological Machine in 2013 General Elections

The researcher sought opinions of the respondents as to whether the use of technological machines in the 2013 general election was successful. The results were based on respondents' agreement or disagreement with whether the technological machines succeeded in managing the 2013 General Elections.

The responses were as shown in the pie chart below;

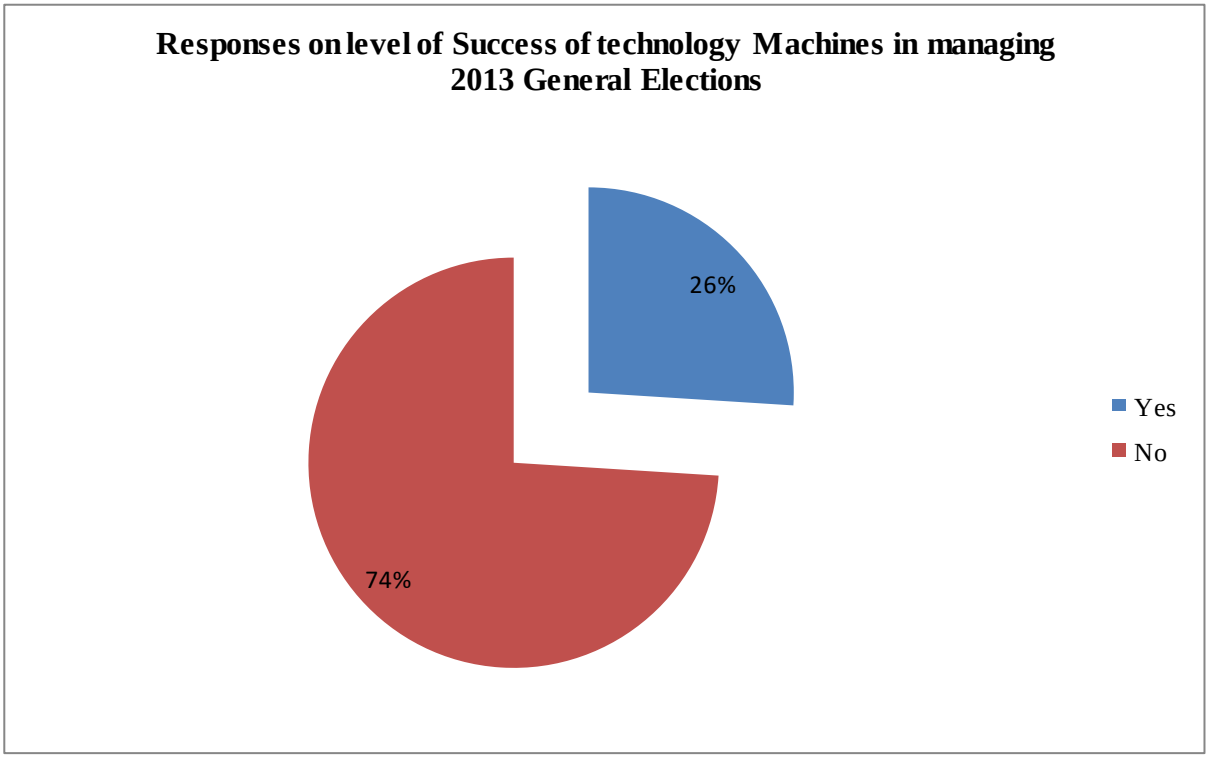

Figure 6. 1: Level of Success of technology machines in managing 2013 General Elections

Source: Field data, 2016

The majority of respondents, 111 out of 150 respondents (74%), disagreed with the assertion that the use of technology to manage the 2013 general elections was successful. The findings also showed that in as much as majority did not agree that the election technology machines succeeded in managing 2013 General Elections, there were 39 out of the 150 respondents representing 26% who agreed that the use of technology machines in managing 2013 General Elections was successful.

In order to get an insight on the same concept of success, the researcher sought for more explanations on the stand from the respondents which were as follows;

6.3.1 Reasons why use of technology was not successful

The researcher wanted to find out why majority 111 (74%) of the respondents were of the opinion that use of technology in 2013 general elections was not successful.

The results were as shown in the table below;

Table 6. 2: Reasons for the argument that Technology was not successful

Variables	Number	Percentage %
Court cases	38	25
Lack of awareness	33	22
Incompetent personnel	33	22
Manipulation of systems	24	16
Poor infrastructure	22	15
Total	**150**	**100**

Source: Field data, 2016

The findings show that the majority of the respondents who were of the opinion that the use of technology was not successful in managing the 2013 general elections pointed to the many court cases regarding the presidential and gubernatorial and parliamentary petitions. This was supported by 38 out of the 150 respondents representing 25%. It also emerged that the unsuccessful process could have been due to incompetent personnel. This was supported by 33 out of 150 respondents (22%); the same number of respondents argued that lack of awareness from the electoral body was the reason for the argument that technology was not successful. There were 24 out of 150 respondents (16%) who noted that technology was used to manipulate the electoral results. Poor infrastructure was also was cited as another factor that led to the failure in the technological mechanism; 22 respondents who represented 15% were of this opinion.

6.3.2 Reasons why Technology was Successful

The researcher sought to find out the underlying reasons from the respondents who were of the opinion that the technology use to manage the 2013 general elections was successful.

The findings were as shown in the table below;

Table 6. 3: ***Reasons for agreement that the Technology used was Successful***

Variables	Number	Percentage %
Speedy sending of results	68	45
Competent persons	45	30
Peaceful Elections	37	25
Total	**150**	**100**

Source: Field data, 2016

From the findings it is clear that majority of the participants, 68 of the 150 respondents representing 45% argued that the success of the technology would be seen from the speedy transmission of results that were instant. Another reason for the success according to 45 out of 150 respondents (30%) was the competency of persons manning the elections. There were 37 respondents who attributed the success of technology to peaceful election process.

6.4 IEBC Efforts in Promoting Voter Registration Awareness

The researcher sought to find out the thinking of the participants as to whether they thought the IEBC had done enough in promoting voter registration awareness in Kenya.

The findings from interviews showed that many people felt that IEBC as the electoral body which was mandated to promote voter registration awareness did little in this mandate. The analysed data showed that majority of the participants totalling 117 of the 150 participants rated the electoral body's efforts as low which translated into a challenge in determining the success in the management of elections.

The findings also showed that few participants thought that the IEBC has done fairly in promoting voter registration awareness. The data collected from interviews and analysed showed that 33 participants being 22% noted that the awareness has been done through the media.

6.5 The Need to Improve Technological Performance

It was important finding out the opinions of the respondents on why they think the technology should be improved. This was as a way of finding the probable results after solving the challenges.

The results were as indicated in the table below;

Table 6. 4: ***The Need to Improve Technological Performance***

Variables	Number	Percentage %
Transparency and accountability	47	31
Minimize system manipulation/Rigging	76	51
Instant transmission	27	18
Total	**150**	**100**

Source: Field data, 2016

The findings showed that majority of the participants thought that improving the technology would lead to positive outcome that could in turn reduce chances of

manipulating the system. There were 76 out of 150 respondents (51%) who were of the idea that effective technology would reduce votes rigging. It is also true from the findings that improving the technology would assure transparency and accountability which was identified as a challenge in elections management. This idea was supported by 47 (31%) of the respondents. It was also noted by 27 (18%) respondents that technological improvement would enable instant or speedy transmission of results.

6.6 Challenges facing use of Technology in Elections Management

The research sought to find out the challenges facing the use of technology in elections management.

The findings were as shown in the pie chart below;

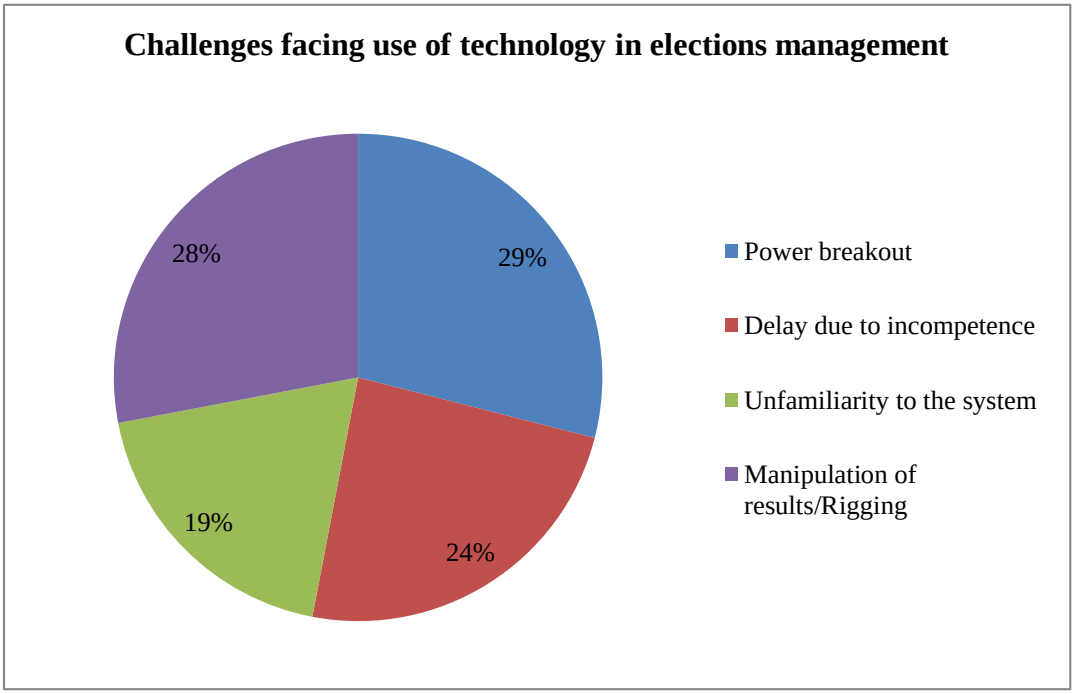

Figure 6. 2: Challenges facing use of technology in elections management

Source: Field data, 2016

The findings showed that there were indeed challenges that faced the use of technology in elections management. The results show that unreliable power supply was common and therefore delayed the process. The participants who thought of this being a challenge were 44 (29%). Another notable challenge from the findings was the delayed process due to incompetence from the personnel. The challenge was mentioned by 36 respondents (24%). Since the use of technology is new in Kenya, unfamiliarity with the system was pointed out by 29 respondents (19%) as the resultant challenge. The findings further showed that 42 respondents (28%) argued that rigging of votes or manipulation of the system would be the consequent challenge.

6.7 Advice given to IEBC on Handling Elections by use of Technology

As a way of getting people's opinions on what their advice would be to the electoral body that would improve the election processes, the researcher sought responses from the participants on their pieces of advice. The responses were as shown in the table below;

Table 6. 5: ***Advice given to IEBC on Handling Elections by use of Technology***

Variables	Number	Percentage %
Educate voters to create awareness	42	28
Train the IEBC personnel	37	25
Have strong power backups	35	23
Ensure there is transparency and accountability	36	24
Total	**150**	**100**

Source: Field data, 2016

The findings showed that 42 out of 150 respondents representing 28% of the participants felt that the electoral body should pay attention to educating the voter to

create awareness. It also showed that people would want the electoral body to train its personnel; this advice was according to 37 participants (25%). According to 35 respondents (23%), the IEBC should have strong power backups to avoid power interruptions that would delay the process. The findings also showed that 36 (24%) of the respondents' advice to the electoral body was that it should ensure there is transparency and accountability in elections management.

It is clear from the findings therefore that there are several challenges that are thought to have resulted from the use of technology to manage elections. This could be seen from the low range from one category of shortcomings to another and the many challenges indicated as from power breakups, incompetence leading to delays, unfamiliarity to the systems and manipulation of results.

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This chapter provides a summary of the research and its findings. It also provides the conclusion of the research and recommendations for further research.

7.2 Summary

This study sought to assess the role of information communication technology in managing the electoral process in Kenya with specific reference to Bungoma County. The research was guided by the following specific objectives: To identify and assess the types of technologies used in elections management in Bungoma County, Kenya, to establish the benefits of using technology in elections management in Bungoma County, Kenya and lastly to investigate the challenges faced in using technology in elections management in Bungoma County, Kenya. The research through its findings tried to answer the research questions.

The study aimed at finding out if the use of technology would influence elections and whether it can enhance transparency and accountability in elections which are presumed as democratic and that it represents the peoples will. The researcher had in mind the idea that the existence of a viable electoral system would be crucial in any country more so to the survival of its democracy. The desire to have democratic and credible elections in Kenyan has remained a problem. The Kenya's democratic experiments in history has demonstrated that elections and electoral politics have generated so much animosity to the extent of threatening its corporate existence as it

happened after the December 2007 presidential election. The successes exhibited by developed countries in elections management has informed the decisions of many states to incorporate the new technologies as a way of advancing on democratic moves although it is yet to be seen as successful in many African states.

The research consolidated various reviewed literature in line with the objectives through a proper statistical analysis. Conceptual framework was used to link the two variables in the research with 'role of technology' as independent variable while 'elections management' is the dependent variable. Adaptive structuration theory developed by Anthony Giddens' (1984) was used in the research.

The study utilized descriptive research design due to the nature of the research as it aimed at describing the characteristics of a particular group and individuals. The study targeted politicians, IEBC officials at County level and NGOs with a sample size of 150 respondents who were selected purposively.

Data was collected by use of questionnaires and interview schedules. The data was then analysed quantitatively and qualitatively. The findings were presented by use of tables, pie charts and through description. The bio data indicated that majority of the respondents were male 97(65%) as compared to female 53(35%). There was appropriate age variation of the participants starting from those getting to 18 years marking their first voting age to the elderly aged 73 years and above. It was also evident that most of the respondents were learned since 149 respondents (99%) had attained certificate level and above with 96 respondents (64%) being graduates. All respondents have relevant experience which means they have understanding and practical use of technology.

The findings show that the participants were well aware of the fact that there was technology being used in election management in the country; and that the most popularly known voting system technology was the Electronic Poll Book, the Biometric Voters Register (BVR). The results also showed that the respondents knew about the ballot marking devices although some individuals were not aware of it. The BVR was familiar to 105 out of 150 respondents (70%) while the ballot marking devices were familiar to 45 of the respondents (30%).

The findings also show that in as much as the participants knew about technology that was being used in election management in the country, they had indeed used some of the technological machines with the BVR being the most one they were most familiar with. Apart from the BVR machine the other technological machines that were little know and even used as shown by the findings of the results included computers, tablets, laptops and mobile phones.

The findings showed that the technological equipment have not been successfully used in election management in Kenya. It was found out that a majority of the respondents were of the opinion that the technological equipment have not been applied successfully. Regardless of this there were a few who thought otherwise and they stated that these machines had been used successfully but the extent was medium. Even the few who said that these machines had been used successfully were not satisfied with the application.

The most common challenges stated included: incompetent personnel and defective machines (BVR kits) according to 42 out of 150 respondents (28%); lack of proper awareness of voter registration in Kenya according to 30 respondents (20%); lack of awareness and familiarity to the use of technology in election management as pointed

out by 31 respondents (21%); poor infrastructure and facilities such as electricity and network which was mentioned by 27 respondents (18%), and; manipulation of the systems used in the technology according to 20 respondents (13%).

Further, analysis of the collected data revealed that most of the people of Bungoma County considered the use of technology in election management a failure. There was however preference of the system of technology due to its speedy process of transmitting results than the use of manual voting process as was used by ECK. This prompted the participants to point out on the areas that needed to be improved on by the IEBC in order to be efficient in handling election processes.

These areas include voter education to create awareness, proper training of the personnel, having strong power backups and emphasis on transparency and accountability to avoid manipulation of the system and subsequent interference with elections results.

7.3 Conclusion

The aim of this study was to provide a good understanding of the role of information communication technologies used in the management of electoral processes, starting with the registration, identification, counting of votes, transmission of results and, lastly, electronic voting, if any. The study further examined the challenges of using these technologies as well as the benefits of using these technologies in electoral processes in Kenya. It is very important from the study that countries try to ensure that their elections are marked by transparency and accountability in order to ensure that the transition to power is successful and that those who win are allowed to assume power and take responsibility. This can only be achieved through proper electoral systems. It is apparent from this study that although the use of integrated

technologies can assist in achieving efficiency, cost savings and enhance the integrity of the electoral processes, achieving these objectives in a sustainable manner is remains a challenge. A fair electoral process is one of the key factors that leads to an effective and functioning democracy, one in which the public has full confidence that the electoral process accurately represents the views of the people. In view of this, it is necessary that when considering technological solutions for electoral processes, Election Management Bodies would do better when they conduct adequate feasibility studies and proper strategic planning to ensure that they have adequate time for the introduction of new technologies. Kenya is one of countries especially in Africa that have had their share of the challenges in relation to democratic practices. Conducting credible elections has remained a problem. The use of technology in elections management is aimed at ensuring successful electoral processes. At the heart of the electoral crisis in Kenya is the lack of credibility for the official results of elections frequented by rejection of the results. New technological devices are thereby aimed at assuring that there is efficiency of elections in many countries. They are therefore to promote proper elections tasks through promoting successful voter registration and speedy-timely transmission of information. The use of biometric voter registration in Kenya was aimed at promoting transparency and accountability in elections although it also has its own challenges such as the incompetent personnel, lack of awareness on the part of the voters, delayed processes among others. The use of technology is very much encouraged only that states with Kenya being one of them should ensure there are proper voter education, adequate training of personnel and having effective machines with power backups especially in rural areas.

7.4 Recommendations

The research studied on the Role of information communication technology in Elections Management in Kenya. The focus has been on identifying the types of technology used in elections management, examining the impact of technology in elections management and assessing the challenges of using technology in elections management.

IEBC still needs to undergo continuous restructuring especially in areas such as staffing and staff development. IEBC should be capable of boasting of a workforce that is well qualified in ICT related training as well as efficient and sufficient enough.

The use of KIEMS kits in elections must be perfected to avoid technical hitches as experienced during the 2013 and 2017 general elections. Further, the government should provide sufficient financial support that will allow for smooth registration exercise for voters.

The IEBC officials should be given continuous training on new technological machines due to the changing nature as new technologies are beginning to displace the old methods of conducting elections. The voters should also be trained continuously.

7.4.1 Recommendations for further research

The study did not exhaust all the areas concerning information communication technology use in the management of elections which therefore prompted the researcher to highlight the following areas that needs further research:

A study should be conducted to determine the most appropriate technological devices and their suitable settings for relevance in applicability

Additionally, further research is necessary to understand technology adoption theories that will provide a better understanding of factors that may influence voters' acceptance of these technologies as well as issues likely to affect adoption and use of ICT in electoral processes ranging from planning, procurement, training and the physical attributes of polling places which are determinants of voter behavior.

Lastly the study recommends a study on how to improve effectiveness of technology to build on transparency and accountability.

The researcher therefore recommends that more research on the above-mentioned areas in order to add value and new knowledge around this area of study.

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APPENDICES

APPENDIX I: REQUEST LETTER

I am a Masters Student in the School of Arts and Social Sciences, Moi University doing a research on "*The Role of Technology in Elections Management: A case study of Bungoma County, Kenya".* My study covers the usage of information technology in elections management with reference to Kenyan General Elections held in 2013. The study seeks to find out the effectiveness and challenges of the use of technology in the management of election processes in Kenya while focussing on Bungoma County as a case study.

The questionnaires and interview schedules herein are intended to collect reliable and valid information from respondents that will be used for academic research purpose only. Confidentiality of information collected from respondents is highly guaranteed.

Thank you in advance for your cooperation.

APPENDIX II: QUESTIONNAIRE

My name is Dominic Obunga. I am a student in Moi University pursuing Master of Arts Degree in Public Administration and Policy. Kindly answer the following questions:

KINDLY TICK WHERE APPROPRIATE (√)

Section A: Background Information

1. Age range 18-28 ( ), 29- 39 ( ) 40- 50 ( ), 51- 61 ( ), 62-72 ( ) 73 and above
2. What is your level of Education?
    a) Graduate [ ]
    b) Diploma [ ]
    c) Certificate [ ]
    d) KCSE [ ]
    e) KCPE [ ]
    f) None [ ]
3. What is your gender?
    Male [ ]
    Female [ ]
4. Are you employed?
    Male [ ]
    Female [ ]

    If YES, how long have you been in service in years?

    Below 1 year [ ], 1-5 [ ], 6-10 [ ], 11-15 [ ], 16-20 [ ], 21 and above [ ]

SECTION B: SPECIFIC INFORMATION

5. a) Do you know of any technology used in elections management?

YES [ ]

NO [ ]

b) If YES, state?

……

……

……

Which types of voting system technology are used?

a. Direct recording equipment (DRE) [ ]

b. Precinct count optical scan equipment [ ]

c. Central count optical scan equipment [ ]

d. Lever machines [ ]

e. Electronic poll book [ ]

f. Ballot marking devices [ ]

6. Have you ever used any technological machines?

YES [ ]

NO [ ]

If Yes, which one?

……

……

Have the technological equipment been successfully used in elections management in Kenya?

YES [ ]

NO [ ]

If YES, to what extent?

Very High ( ), High ( ), Medium ( ), Low ( ), Very Low ( )

7. Do you think the uses of technological machines need to be enhanced?

   YES [ ]

   NO [ ]

   If YES, kindly indicate why?

   ……
   ……
   ……

8. Which of the following do you think are the probable outcome when technological machines are used in managing Kenyan elections?

   a) Transparent elections [ ]

   b) Rigged elections [ ]

   c) No idea [ ]

9. How can you rate the effectiveness of technological machine kits as the voting equipment in Kenya?

   ……
   ……
   ……

   (a) Comparing the use of technological machine by IEBC and the manual voting process system used by the former ECK, which one in your opinion is preferable?

   ……
   ……
   ……

   (b) Why do you say so?

   ……
   ……
   ……
   ……

10. In your own opinion, what are the shortcomings brought about by the technological machines?

    ……
    ……
    ……

11. In your own opinion do you think with the use of technological machine in the 2013 general elections was successful? Explain in brief

    ……
    ……
    ……

12. Do you think the IEBC has done enough in promoting voter registration awareness in Kenya?

    ……
    ……
    ……

13. What do you think the IEBC should improve in technological awareness?

    ……
    ……
    ……

14. What do you think are the challenges facing the use of technology in elections management?

    ……
    ……
    ……

15. Basing on your own experience as a voter, what advice could you give IEBC on handling election process by use of technology?

    ……
    ……

THANK YOU

APPENDIX III: INTERVIEW SCHEDULE

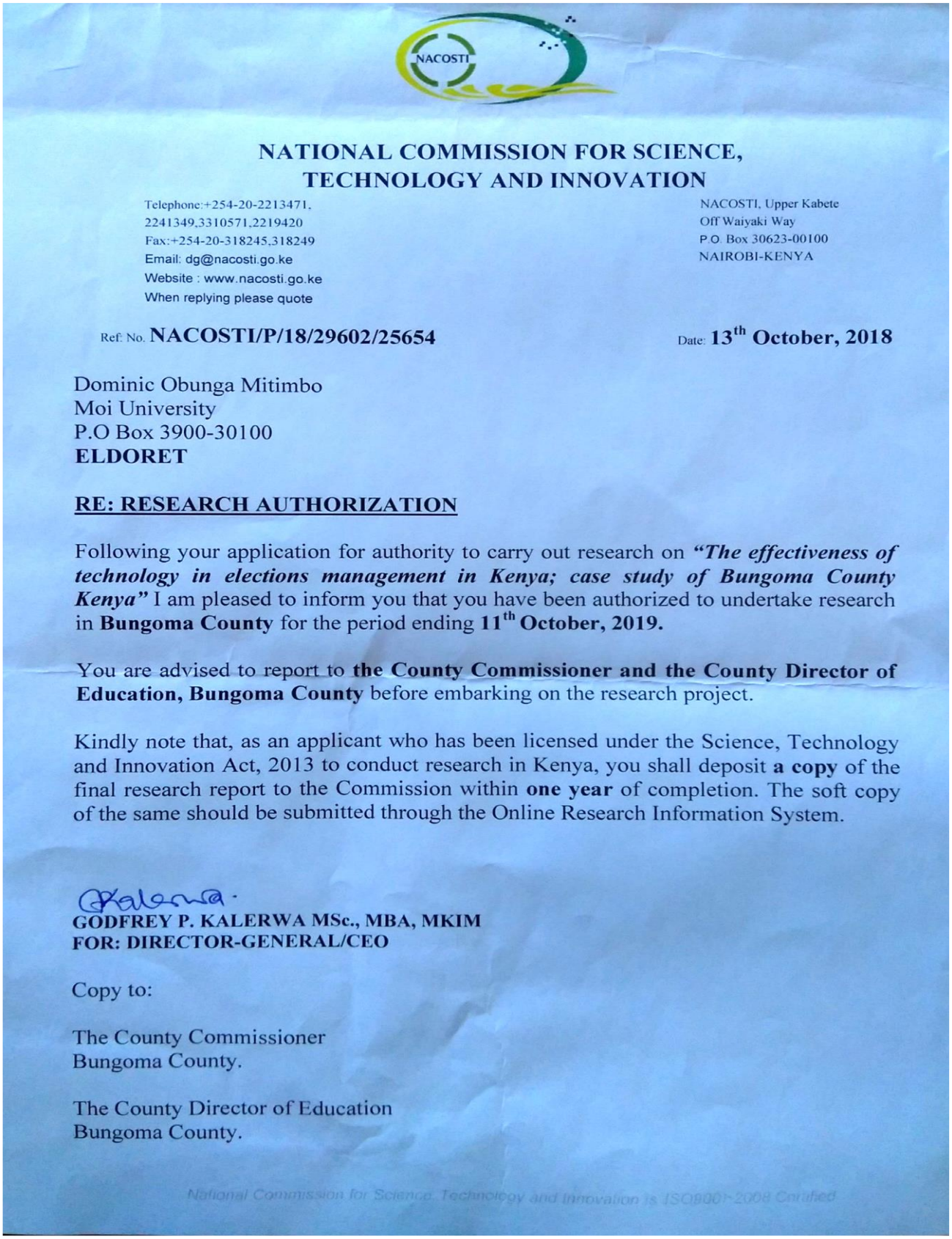
THE ROLE OF INFORMATION COMMUNICATION TECHNOLOGY IN ELECTIONS MANAGEMENT: A CASE STUDY OF BUNGOMA COUNTY, KENYA

ATTRIBUTE	INTERVIEW ITEMS
Types of technology used in elections management: • Knowledge of type of technology • Effectiveness of types of technology • Improvement of the types of technology	1. Which types of technology are used in elections management? 2. Which type of technology is effective in elections management? 3. What improvements would you suggest on the technology used in election management?
The role of technology in elections management: • Identifying the role of technology • Benefits of technology on elections management	1. What is the role of technology in elections management? 2. How has the use of technology impacted on elections management?
Challenges of using technology in elections management: • Identifying the challenges • Addressing the challenges	1. What are the challenges of using technology in elections management? 2. How would you address the challenges of using technology elections management?

APPENDIX IV: TIME SCHEDULE

TIME	ACTIVITIES			
	Jan 2015 – Aug 2015	**Oct 2015 – June 2016**	**July 2016 – Nov 2016**	**Dec 2017 – Mar 2019**
Proposal writing				
Proposal defence and Data collection				
Data Analysis/zero draft				
1st Draft				
2nd , 3rd , … final Draft and submission				

APPENDIX V: RESEARCH AUTHORIZATION



NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

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Website : www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/18/29602/25654**

Date: **13th October, 2018**

Dominic Obunga Mitimbo
Moi University
P.O Box 3900-30100
ELDORET

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"The effectiveness of technology in elections management in Kenya; case study of Bungoma County Kenya"*** I am pleased to inform you that you have been authorized to undertake research in **Bungoma County** for the period ending **11th October, 2019.**

You are advised to report to **the County Commissioner and the County Director of Education, Bungoma County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Bungoma County.

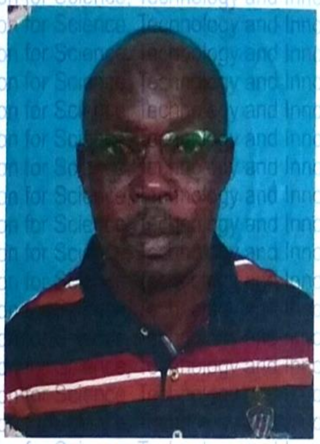
The County Director of Education
Bungoma County.

National Commission for Science, Technology and Innovation is ISO9001:2008 Certified

APPENDIX VI: RESEARCH PERMIT

THIS IS TO CERTIFY THAT:
MR. DOMINIC OBUNGA MITIMBO
of MOI UNIVERSITY, 30900-30100
ELDORET, has been permitted to conduct
research in *Bungoma County*

Permit No : NACOSTI/P/18/29602/25654
Date Of Issue : 13th October,2018
Fee Recieved :Ksh 1000



on the topic: *THE EFFECTIVENESS OF TECHNOLOGY IN ELECTIONS MANAGEMENT IN KENYA; CASE STUDY OF BUNGOMA COUNTY KENYA.*

for the period ending:
11th October,2019

....
Applicant's
Signature

....
Director General
National Commission for Science, Technology & Innovation