FACTORS INFLUENCING ICT INTEGRATION IN QUALITY SERVICE DELIVERY AMONG GOVERNMENT MINISTRIES IN KENYA

A CASE OF THE MINISTRY OF PUBLIC WORKS

BY

KIHIU SIMON NDUNG'U

A RESEARCH PROJECT REPORT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF ARTS IN PROJECT PLANNING AND MANAGEMENT OF THE UNIVERSITY OF NAIROBI

2012

DECLARATION

This research project report is my original work and has not been presented for academic purposes in any other university.

Sign.....Date.....19/11/2012.....

Kihiu Simon Ndung'u

L50/61461/2011

This research project report has been submitted with my approval as university supervisor.

Sign.....Date.....19/11/2012.....

Dr. Harriet Kidombo

Senior Lecturer, Department of Educational Studies,

University of Nairobi

DEDICATION

I dedicate this project to my family, my wife Alice for the moral support and her unending endurance of my absence during my study period despite our young marriage, to my parents for laying down the foundation of success and being a source of inspiration, to my brothers and sisters for your prayers and support and to my friends who stood by me and encouraged me during my study period at the University of Nairobi. I also dedicate this project to my colleagues at the Ministry of Public Works for the logistical support and encouragement. May the Lord bless you all.

ACKNOWLEDGEMENT

This study was conducted with the direct and indirect contributions from various individuals. In a special way I would like to acknowledge the support of my supervisor Dr. Harriet Kidombo for her valuable and timely advice and support throughout the period of writing this research project. I would not have come this far were it not for her help and guidance.

Special thanks to all the staff of Extra Mural Department and School of Continuing and Distance Education for giving me the opportunity to pursue the Masters program. I cannot forget to thank my colleagues who also played a critical role in peer reviewing of my work. Joseph Kotoine, thank you so much. I also deeply appreciate my other colleagues and group members at the university; Catherine, Richard Gichohi, Elizabeth, Patience, Susan, Pauline Mwaura, Richard Mwiti and Pauline Mumbi for their support and cooperation throughout the course. Thank you so much.

Last but not least I acknowledge all those who committed their time and effort in order to provide me with support, word of encouragement, advice and guidance during the study period. You will remain an integral part of this research. Thank you so much and may God bless you abundantly.

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ABBREVIATIONS AND ACRONYMS

AGIMO	- Australian Government Information Management Office
AISI	- African Information Society Initiative
CCK	- Communication Commission of Kenya
CCTV	- Closed Circuit Television
CDMA	- Code Division Multiple Access
COMESA	- Common Market for Eastern and Southern Africa
EAC	- East African Community
EASSY	- East African Submarine System
FIP	- Freedom of Information Policy
G2B	- Government to Business
G2C	- Government to Citizens
G2G	- Government to Government
GDP	- Gross Domestic Product
GOK	- Government of Kenya
ICT	- Information Communication Technology
IT	- Information Technology
IFMIS	- Integrated Financial Management Information System
IPPD	- Integrated Personal and Pensions Database
IST	- Institute of Science and Technology
ITU	- International Telecommunication Union
KBRC	- Kenya Building Research Centre
KictAnet	- Kenya ICT Action Network
KICTB	- Kenya ICT Board
KNBS	- Kenya National Bureau of Statistics
MAMPU	- Malaysian Administrative Modernization and Management Planning Unit
MDGs	- Millennium Development Goals
MPLS	- Multiprotocol Label Switching
NCLR	- National Council for Law Reporting
NESC	- National Economic and Social Council
NICT	- National ICT Policy
NPM	- New Public Management
PPP	- Public-Private Partnerships
SADC	- Southern African Development Community
SEACOM	- Southeast Asia Commonwealth
TEAMS	- The East African Marine Systems
UCISA	- Universities and Colleges Information Systems Association
UNDP	- United Nations Development Programme
WB	- World Bank
2G	- Second-generation wireless telephone technology
3G	- Third-generation wireless telephone technology

ABSTRACT

This research was undertaken to investigate and analyze the factors that influence the integration of Information Communications Technology (ICT) in government offices. The descriptive survey research design was employed and data was collected by means of questionnaires administered to 207 employees of Ministry of Public Works, which was the case of study. Observation and focused group discussion were also used. The objectives of the study were; to assess the status of ICT infrastructure at the Ministry of Public Works and their influence on the quality of service delivery, to assess the level of knowledge of ICT among the government officials for quality service delivery, to determine the influence of level of ICT access, usage and expertise on quality of service delivery, to explore the impact of risks and security issues associated with ICT adoption on the quality of service delivery, to evaluate the influence of management support in ICT integration on quality of service delivery. The findings indicated that there are sufficient ICT facilities but still there are facilities that are shared amongst the employees. Sharing leads to time wastage and compromises on service delivery. The available ICT facilities are relevant to the job description of the majority of the employees (94.7%). Also the personnel have relevant basic skills (96%) in ICT and 80.2% always use the ICT facilities in their daily operations with 96.6% being comfortable using the facilities with the skills they possess. There is good internet connection (96.6%) with 39.15% of the employees always using the internet for job related tasks. Written memo communication takes 92.2% while emails take only 15% of the official communication despite having working internet connections. 67.6% of the staffs are not comfortable with this form of communication. The security access measures are low and therefore cases of unauthorized access to premises and workstations are high (63.8%). 20.8% have lost an ICT facility. 90.8% have had cases of computer viruses and 88.4% use anti-viruses in their computers. 77.8% use passwords in their computers but 71.4% have disclosed their passwords to other people. 79.7% of the personnel agrees that the management encourages the use of ICT, however, 58.9% are not satisfied with management response to ICT related queries. Another 61.8% are not satisfied with the ICT maintenance measures. 93.7% are in agreement that ICT adoption has improved on the quality service delivery. The study recommends that the ministries should invest more in ICT facilities to avoid sharing, continuously train the personnel on specialized skills to be at par with the dynamic technology, scheduled maintenance of the ICT facilities, tighten the access security measures and encourage the use of passwords. The management should embrace technology in all areas and especially in communication by encouraging the use of the faster and efficient emails mode of communication. Lastly the government should ensure that the 2006 ICT policy is implemented so as to have a successful and sustainable ICT integration in government offices.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

ICT refers to technologies and tools that people use to create, share, gather, store and manage information and to communicate with one another, one on one, or in groups, through the use of computers and interconnected computers networks. They are mediums that utilize both telecommunication and computer technologies to transmit information. ICTs are not single technologies but combinations of hardware, software, media and delivery systems. Hand held devices like mobile phones are also part of ICT (Kandiri, 2006). ICTs encompass a range of rapidly evolving technologies and they include telecommunication technologies (telephony, cable, satellite, TV and radio, computer-mediated conferencing, video conferencing) as well as digital technologies (computers, information networks (internet, World Wide Web, intranets and extranets)) and software applications (Chisenga, 2006; Hanna, 2003).

Information and Communication Technology (ICT) plays a major role in all aspects of national life; in politics, in economic life, as well as in social and cultural development. ICT is rapidly transforming people's lives, the way we do business, access information and services, the way we communicate with each other and entertain ourselves. It fuels the global economy. It also relates to human rights, helping, at best, to support freedom of expression and right to information according to Article 19 of the Universal Declaration of Human Rights (UN) and Article 35 of the Constitution of Kenya (GOK-NCLR, 2010). The increasing use of Information and Communications Technologies (ICTs) by governments has primarily been spurred by a trend where many governments have been reforming their public sector in order to meet the aspirations of their citizens (Calista and Melitski, 2007). Public sector reform is considered core to the potential for sustained economic development.

A government is a huge and complex organisation whose operations and strategic focus could be greatly enhanced by the well focused application of Information and Communication Technologies (ICTs) to support improvements in productivity, management effectiveness and ultimately the quality of services offered to citizens (Gichoya, 2005). Since the mid 1980s, ICT has been characterized as an invaluable platform for economic growth attracting increasing attention from different governments around the world mainly from developing

nations. ICT has revolutionized the global economy with changes in different economic activities (Kamel, Rateb, and El-Tawil, 2009; UNDP, 2005). Experience has proved that given the proper infrastructure, ICT can be an enabler for socio-economic development. Examples from the developed world where significant ICT investments had major impacts include increasing the United States gross domestic product (GDP) by 7.8%, 8.0% in the UK, 8.3% in Singapore and 8.4% in Australia; all such developments were linked with improved productivity, competitiveness and citizen engagement (Kamel et al., 2009).

The Kenyan government's recognition of the strategic role played by ICTs in the economy and overall development is an important aspect of the implementation of Vision 2030, the country's development blueprint and the Millennium Development Goals (MDGs). Vision 2030's key goal is that Kenya will be one of the top three investment destinations in Africa by 2030. This will be achieved by addressing three pillars; Economic, Social and Political. ICT is explicitly dealt with under the Economic Pillar, which is geared at attaining prosperity for all Kenyans through an economic development programme aimed at achieving an average GDP growth rate of 10% per annum (GOK-NESC, 2007).

With the emergence of Information and Communication Technologies (ICTs) and e-government, it is possible to improve efficiency and effectiveness of internal administration within government and to re-locate government services from government offices to locations closer to the citizens (Gichoya, 2005). With appropriate use of ICTs, information can be gathered accurately and timely, analyzed and disseminated quickly. It also helps in transforming paper-based services to electronic forms which can be accessed easily and conveniently.

E-government is generally regarded as a way of providing government services electronically, usually by relying on the internet infrastructure to reduce the physical character of customer transactions (Calista and Melitski, 2007). It is the provision of government services using Information and Communication Technologies (ICTs) in order to improve effectiveness, efficiency and service delivery. It was introduced in African countries under the banner of New Public Management (NPM) and is envisaged to fundamentally aid in improving governance in developing countries (Muganda and Belle, 2009; Ochara, 2008). New Public Management (NPM) denotes broadly the government policies that are aimed at modernizing the public sector and making it more effective. Generally, it is used to describe a management culture that emphasizes the centrality of the citizen or customer, as well as

accountability for results. It also suggests structural or organizational choices that promote decentralized control through a wide variety of alternative service delivery mechanisms. It began in the late 1970s and early 1980s. Its first practitioners emerged in the United Kingdom under Prime Minister Margaret Thatcher and in the municipal governments in the U.S (Manning, 2001; Gruening, 2001). The imported model of e-government is therefore transferred to African countries as a panacea to bad governance by carriers such as international donor agencies, consultants, information technology vendors and western-trained civil servants. Improved governance is expected to impact on the socio-economic development of these countries implementing e-government, as an NPM instrument (Ochara, 2008).

The primary vision of e-government is to transform a government's value to its citizens, by digitizing government operations so that they are accessible and interactive, thus translating into service delivery in minutes or hours as opposed to weeks and months. Ideally, services that are traditionally delivered by physically going to government offices are automated and made available online so that citizens and businesses that wish to interact with the government can do so from the comfort of their homes, offices or cyber cafés (Basu, 2004). Time has come for the citizens to get out of the line and get online. E-government is the tool that will make this possible. ICT-enabled public service delivery, if implemented effectively, can improve access to public services, increase efficiency, transparency and accountability of government and political processes and empower citizens by enabling them to participate in the decision-making processes of governments (Deloitte, 2012).

There are benefits that come as a result of ICTs adoption and use in the governments. There is cost reduction, quality and timely service delivery, increased capacity of the government, improved decision making, transparency in government's operations, reduced corruption, improved efficiency and also improved access to information. It also has the ability to bring citizens much closer to the government (Ndou, 2004; Gichoya, 2005). E-government services in which the entire transaction can be completed online are revolutionizing the relationship between government and citizens. This in turn offers the potential to reshape the public sector and remake the relationship between citizens and their government (Ndou, 2004). It is clear therefore that e-governance requires strong commitments from political leaders, the private sector and civil society to carry out the necessary transformations.

Information and Communication Technologies (ICTs) hold great potential to transform citizen participation and service delivery tracking and influence government decision-making and execution. Platforms like government's websites and blogs can positively impact citizen-government engagement and be used as a tool to amplify citizens' voices. The cornerstone of good governance involves high quality service delivery, quick and efficient response mechanisms, easy access to necessary resources and high civic engagement. The government therefore should have a holistic approach in ICT development.

While the benefits of ICT in governments cannot be disputed, there are several concerns about its success as well as the strategies to be adopted in implementation of ICT systems (Gichoya, 2005). Technology is double-edged sword and almost always brings some challenges with it. Most of the challenges do not involve the technology itself, but its alignment with existing processes and the organisation's/department's strategic goals. The value of ICT lies in its ability to assist the government in finding solutions to its problems. ICT expenditure can only be justified if there are benefits accruing to it and not adopting it for its own sake. An ICT implementation that creates information haves and have-nots, either on the basis of access or computer-literacy will eventually fail to achieve whatever goals of governance it was meant to achieve. An ICT project implementation can only be perceived to have succeeded if the perceived benefits are realized (Lal, 1999).

Africa has been hard hit with poverty and disease and this has had an immense effect on the quality of social, cultural and political lives of the people. This has made development to move at a very slow pace in the last decades. But the presence of Information and Communication Technologies (ICTs) has somewhat carved out an alternative path to development. Not withstanding the urgency and enthusiasm with using this new medium for social and economic change, the internet has brought about negative as well as positive contributions to development in Africa (Langmia, 2005; Nirmala, Karthikeya, Appalabatla, and Patharaj, 2012). The internet has become an invaluable bridge for Africans to regroup and discuss social, political, cultural, and economic issues facing them at home and abroad. In this day and age, the role of technology in improving the lives of the people cannot be underestimated. Most people, including minorities, more than ever before are now buying goods and services online, sending emails to donor agencies for support and receiving instant replies. The issue of network technology has been one of the fundamental problems affecting development in Africa (Langmia, 2005).

The advent of the information age and its acceleration effect on globalization are leading the world to a new economic order driven by information and knowledge based economies. In an increasingly globalized world, where information technology has become one of the key determinants of growth, many African countries are facing new challenges as a result of the emerging information age (Kitaw, 2006). The enabling role that ICTs can play in facilitating and accelerating socio-economic development is now being recognized by most African governments. Ogunsola (2005) adds that a growing number of national and local governments are setting up national ICT policies, putting critical information online, automating administrative processes and interacting with their citizens through online services, yet the great opportunities offered by these new technologies remains largely unexploited.

Kenya has made remarkable progress putting in place an ICT policy framework and implementation strategy, complete with measurable outcomes and time frames. The 2006 ICT Policy of Kenya is based on the Economic Recovery Strategy for Wealth and Employment Creation and the following four guiding principles; infrastructure development, human resources development, stakeholder participation and appropriate policy and regulatory framework (GOK-NICT, 2006). When fully implemented, it will significantly impact on the socio-economic development of the country. There is a clear commitment to strategic engagement and cooperation with all key stakeholders and the principle of Public-Private Partnerships (PPPs) to implement necessary infrastructure (IST-Africa Consortium, 2012). The process has had the benefit of sound advice from officials and stakeholders. The policy document has detailed a number of initiatives aimed at improving communication within government agencies (G2G), between government and business (G2B), and between government and citizens (G2C). The National ICT policy suggests that the focus should be on redefining the relationship between government and citizens with the objective of empowering them through increased and better access to government services. This will have the effect of making the government more result oriented, efficient and citizen centered (GOK-NICT, 2006; IST-Africa Consortium, 2012).

The 2007 Draft Freedom of Information Policy is another policy document whose explicit vision is to make Kenya a knowledge-based society. This is to be partly achieved by ensuring maximum access by all Kenyans to information held by public authorities to enable the country to transition to a knowledge-based society (GOK-FIP, 2007). The achievement of an

information-based society is one of the main priorities of the government of Kenya as it works towards reaching its national development goals and objectives for wealth and employment creation for all citizens. Harnessing the benefits of ICTs will therefore help the government realize a number of its key public policy objectives (GOK-NICT, 2006).

1.1.1. Status of ICT growth in Kenya

Kenyans have full embraced the Information and Communication Technologies. This is evidenced by the latest released (second quarter of 2011/12) statistics by the Communication Commission of Kenya (CCK). In an overview, the telecommunication sector remains on a growth trajectory particularly the mobile sector that has witnessed positive growth over the years. By the end of the second quarter of 2011/12 i.e. the period from 1st October to 31st December 2011, there were a total of 28.08 million mobile subscriptions in the country up from 26.49 million subscriptions recorded during the previous quarter. This represents an increase of 6.00 per cent during the period.

The summary of mobile subscriptions is as shown in Table 1.1.

Table 1.1: Mobile subscriptions

Subscription type	Dec-11	Sep-11	Quarterly Variation (%)	Dec-10	Annual % Change (12 Months)
Prepaid Subscriptions	27,844,335	26,260,564	6.03	24,756,190	12.47
Post-Paid subscriptions	236,436	233,376	1.31	212,701	11.16
Total Mobile subscriptions	28,080,771	26,493,940	6.00	24,968,891	12.46

Source: CCK, Operators' Returns

Internet has become an important tool of accessing information and communicating. Internet services continued to rise steadily during the quarter to stand at 6,152,687 internet subscriptions from 5,435,008 during the previous period, representing a 13.20 per cent increase and 86.62 per cent increase compared to the same period of the previous year. The estimated number of internet users rose by 21.55 per cent from 14.30 million users in the previous period to 17.38 million during the period under review. Compared to the same period of the previous year, an increase of 95.63 per cent was realized. This translates to

44.12 per cent of the population that have access to the internet with majority accessing the service through their mobile phones.

The summary of internet subscriptions is as shown in Table 1.2.

Table 1.2: Internet subscriptions

Subscription by type	Dec 11	Sep 11	Quarterly Variation (%)	Dec 10	Annual Variation (%)
Total internet subscriptions	6,152,687	5,435,008	13.20	3,296,975	86.62
Mobile data/internet subscriptions	6,076,444	5,376,050	13.02	3,257,100	86.56
Terrestrial wireless data/internet subscriptions	26,615	13,059	103.81	17,965	48.15
Satellite data/internet subscriptions	669	774	-13.57	921	-27.36
Fixed DSL data/internet subscriptions	11,422	11,016	3.69	12,413	-7.98
Fixed fiber optic data/internet subscriptions	37,514	22,467	66.97	8,576	337.43
Fixed cable modem subscriptions	25	25	0.00	25	0.00
Total Internet users	**17,382,034**	**14,300,679**	**21.55**	**8,884,850**	**95.63**

Source: CCK, Operators' Returns

In the postal and courier sector, the number of letters sent continued to record a downward trend with 4.75 per cent reduction recorded during the period. Similarly international incoming and outgoing letters experienced a decline of 20.06 per cent and 17.96 per cent respectively during the period. The stiff competition the sector faces from the telecommunication players has had a negative impact on the growth of this sector. For instance the growth in internet usage volume during the period could be one of the indications that some of the postal traffic is being consumed by the telecommunication sector. Compared to the same period of the previous year a decline of 33.51 per cent in postal traffic is recorded.

The summary of the postal and courier traffic is as shown in Table 1.3.

Table 1.3: Postal and courier traffic

Postal and Courier Traffic International leased bandwidth	Oct-Dec 11	Jul-Sep 11	Quarterly Variation (%)	Oct-Dec 10	Quarterly Variation (%)
Number of letters posted locally	19,595,146	20,571,629	-4.75	29,536,992	-33.66
Total courier items sent locally	385,914	392,566	-1.69	316,310	22.00
International incoming letters	80,217	100,348	-20.06	130,044	-38.32
International outgoing letters	2,244,615	2,736,154	-17.96	1,777,095	26.31

Source: CCK, Operators' Returns

Also the current national census identified that 3.6 per cent of households in Kenya own at least one computer and 63.2 per cent of households own at least a mobile phone (GOK-KNBS, 2010 – Table III (Appendix)). This shows that Kenyans have fully embraced technological innovations and an upward positive growth is expected. Computers and some mobile phones can be used to access internet, which can be a source of key information and services.

1.2 Statement of the Problem

Traditionally the Kenyan government services have been known to be poor, slow and inefficient. There is a lot of paper work which make simple but essential services to take a very long time. Protocol and bureaucracy is the order of the day making it very hard for citizens to enjoy timely services at government offices. When seeking services from government offices, one is never sure when he/she will get the intended service. A lot of useful time is wasted as one waits in the long queues. Most of the times the government officials are judged wrongly for they are seen idling around and as if not willing to serve the people. But maybe they don't have the capacity and powers to make decisions. Those with power and the ones who are meant to make important decision, at times are not in the offices. There has always been a big contrast between the private sector and public sector in terms of service delivery.

Citizens demand that services are provided quickly and efficiently and they are not interested in the processes involved or where or by whom the service is delivered. Workflow earlier adopted as a starting point for organization of public service delivery, is no longer considered efficient from a citizen's perspective. Citizens have in the past been confronted with complex organizations, comprising different departments and different civil servants in order to access single service, often with slow and compartmentalized service delivery.

With the adoption of ICT, there is a bit of improvement. E-government for example, has made it possible and easier for citizens to have quick access to government services. The services that were traditionally delivered by physically going into government offices are automated and made available online so that citizens and businesses that wish to interact with the government can do so at the comfort of their homes, offices or cyber cafes (Gichoya, 2005; Ndou, 2004).

Currently almost all government ministries have websites. Websites provide largely static information on thematic functions of government and some also provide downloadable forms. Examples of the active and running online services available in websites and that allow citizen interactions are; applying for public service jobs (http://www.psckjobs.go.ke), submitting tax returns forms (https://mapato1.kra.go.ke/), custom services (https://forodha.kra.go.ke), business licensing e-Registry (http://www.businesslicense.go.ke), P3 forms, wanted criminals, missing persons etc at the Kenya Police Website (http://www.kenyapolice.go.ke), passport application and tracking status (http://www.immigration.go.ke/), exam results and candidates selection (http://elimu.education.go.ke) and (http://examscouncil.or.ke), Higher Education Loans Board (http://www.helb.co.ke), the judiciary of Kenya (http://www.judiciary.go.ke), among others.

Other ongoing e-government projects include: Government shared services; Government Data Centre; Community Learning Information Centres; County connectivity project; Interactive Voice Response System; Government unified messaging system and Capacity building (IST-Africa Consortium, 2012). The government is also connecting the ministries to run integrated information systems for example the Integrated Financial Management Information System (IFMIS) and the Integrated Personal and Pensions Database (IPPD) (Magutu and Lelei, 2010; Gichoya, 2005).

However, it appears that ICT adoption has not reached its full utilization. The transition is visible but it is very slow (Magutu and Lelei, 2010). Of interest to note is the quality of the ICT facilities in the government offices, level of ICT knowledge and skills among the government officials, access and usage of the facilities, management support, risks and security issues associated with ICT adoption among others (Gichoya, 2005; Okiy, 2005; Haliso, 2011, Ogunsola, Akindojutim, and Omike, 2011, Al-Rashidi, 2011; Magutu and Lelei, 2010). Magutu and Lelei (2010) specifically studied Information Systems Implementation in State Corporations with a bias on State Parastatals. There was a need for a study that would investigate the issues raised by literature and explore the practical experience in government offices in Kenya. This study therefore sought to establish the extent to which ICT adoption has been successful and the reasons hindering it's fully utilization in the quality service delivery in the government offices. The selected factors were investigated and analysed. The Ministry of Public Works in particular was the case of study.

1.3 Purpose of the Study

This study sought to establish the extent to which ICT adoption has been successful and the factors that impede its full utilization at the Ministry of Public Works. The factors identified were ICT infrastructure, ICT skills and capacity, level of ICT usage, risks and security issues associated with ICT adoption and management support in ICT integration.

1.4 Research Objectives

This study was guided by the following objectives,

1. To assess the status of ICT infrastructure at the Ministry of Public Works and their influence on the quality of service delivery.
2. To assess the level of knowledge of ICT among the government officials for quality service delivery.
3. To determine the influence of level of ICT access, usage and expertise on quality of service delivery.
4. To explore the impact of risks and security issues associated with ICT adoption on the quality of service delivery.
5. To evaluate the influence of management support in ICT integration on quality of service delivery.

1.5 Research Questions

The study was guided by the following questions,

1. What is the status of ICT infrastructure at the Ministry of Public Works and how does it influence on service delivery?
2. How well equipped are the government officials with the relevant knowledge and skills in ICT to offer quality services?
3. To what extent does the level of ICT access, usage and expertise among the government officials influence on quality service delivery?
4. How do security issues and risks associated with ICT adoption influence service delivery.
5. Does management support in ICT integration have any significant influence on quality of service delivery?

1.6 Significance of the Study

The study was able to bring out the main areas of concern in the ICT adoption at the Ministry of Public Works. These included the ICT facilities and their qualities, the skills and capacity of the government officials, the level of access and usage of the available facilities, security and risks associated with adoption of ICT and management support in ICT integration. It also bought out main challenges and gave suggestions on how ICT integration can be fully utilized to enable the Ministry of Public Works achieve its goals and objective.

The ministry should invest in quality ICT facilities and also train its personnel in ICT skills. Proper and scheduled maintenance should also be carried out to the ICT facilities to avoid damages which may prompt purchase of new equipment. The administration should also encourage the use technology in areas like communication.

1.7 Delimitation of the Study

The study was carried out in the Ministry of Public Works headquarters in Nairobi County. The study location was convenient to the researcher in terms of accessibility.

1.8 Limitations of the Study

The research instrument gave data varying data depending on the individual or the department where it was used. The shortcoming was addressed by applying both quantitative to qualitative approaches to research.

Due to technological dynamism, administrative and personnel changes within government offices, approaches to ICT integration use can change within a short time, rendering the research findings obsolete. Also, the study of Nairobi where electricity and ICT accessibility is high means that the results may not be generalized to rural areas where ICT infrastructure is inadequate.

1.9 Assumptions of the Study

It was assumed that the staffs at the Ministry of Public Works who were the respondents would be available for the research and that they possessed relevant knowledge that would help the researcher to make accurate conclusion. This was actually confirmed following the high rate of return and the information they provided was adequate and it enable the researcher to make accurate, valid and reliable conclusions.

1.10 Definitions of Significant Terms

Infrastructure – physical computing components and facilities which include computer hardwares and softwares, media and delivery systems, printers, fax, networking components, telephones, mobile phones etc. It is defined in terms of availability, reliability, flexibility, cost and compatibility with the existing systems

Skills and Capacity – this is the relevant knowledge in ICT components and applications which is defined in terms of knowledge level, level if training, duration of experience and relevancy of the skills to job description.

Usage – this is application of ICT facilities for in operations for service delivery. It is influenced by attitude, culture, age, gender, skills, resistance to change, interest and motivation.

Security and risk – this is the illegal access to electronic information. It also includes theft of ICT facilities, malicious damage of electronic information, illegal access to buildings and ICT facilities, viruses, worms, trojans, internet hacking and cyber crime.

1.11 Organization of the Study

The study encompasses five chapters. Chapter one looks at the background information to the study, the statement of the problem, the research objectives and questions, purpose and significance of the study, assumptions, limitations and delimitations of the study and definition of significant terms. Chapter two is a review of literature on ICT integration and service delivery. The global, regional and local ICT integration literature is reviewed. Literature on the identified factors is also sampled in this chapter. Chapter three focuses on the methods of carrying out the research study. It covers the research design, target population, sample and sampling techniques, methods of data collection, research instruments, validity and reliability of the instruments, operational definition of variables, methods of data analysis and the ethical considerations of the research. Chapter four covers data presentation, analysis and interpretation. Chapter five focuses on the summary of findings, discussion of the findings, recommendation and lastly suggestions for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section examines the works done by other researchers and scholars on ICT integration in public sector for quality service delivery. It begins by looking at an overview of ICT integration in the public sector. ICT integration and e-government globally, in the African context and Kenyan context is then discussed in the sections that follow. The proceeding and final section is a detailed investigation and analysis of the main factors identified as the ones that affect ICT integration and which are in line with the findings of other scholars. These factors include ICT infrastructure, ICT skills and capacity, level of ICT usage, risks and security issues associated with ICT integration and management support. These factors are the main areas of interest and form the subject of this study.

2.2 An Overview of ICT Integration in the Public Sector for Service Delivery

Information and Communication Technology (ICT) are modern tools and equipments that are used for the processing, storing, disseminating and utilization of information. According to Ogbomo, Obuh and Ibolo (2012), ICT is concerned with the technology used in handling, acquiring, processing, storing and disseminating information. ICT covers any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form, for example personal computers, scanner, printers, digital television, email and robots It is also concerned with the way these different uses can work with each other.

Public sector organizations the world over are under pressure to deliver quality public services that are responsive to peoples' needs, choice and access. This has called for adoption of modern technologies to re-engineer work processes and improve on communication channels (Siambi, 2008). In this regard therefore, ICT is increasing becoming an important resource with the potential to transform the way people live, transact business and interact as individuals and with organizations.

Within the past dozen or so years, governments across the globe and at all levels have adopted electronic government (e-government) as a means of delivering of governmental information and services 24 hours per day, seven days per week. Nearly all national

governments, most sub-national or state governments and large numbers of local governments have established web sites through which they provide e-government (Norris and Llyod, 2006). The provision of services electronically by the government (e-government) calls for an appropriate use of ICT for advancing the goals of the public sector and creation of an enabling environment for social and economic growth (Georgescu and Georgescu, 2008). The ultimate goal of e-governance is to support the reform process, including being part of civil service reforms, and ICTs should not be a mere add-on but an integral part of the reform process (Deloitte, 2012). ICT promotes good governance, and at the same time benefits. However, Sellami and Jmaiel (2007) notes that, ICT cannot miraculously turn bad governance into good, although they can be used as tools under the right conditions and circumstances to effectively reach out to communities as part of the reform process. Political will for reform is a prerequisite for effective e-governance.

At the heart of transforming public services is the need to engage more effectively with citizens and to ensure that they have both choice and voice. ICT can provide useful tools to improve public services and enable better user engagement (UNDP and Panos, 2011). There is a broad recognition that government information belongs to the people and technology is enabling a new wave of sharing this information (Schaefer, 2012). According to Batista (2003), the society today is demanding more transparency on the part of governments, more decentralization and more independence to express demands, desires, prerogatives and priorities. Citizens demand that services are provided quickly and efficiently and they are not interested in the processes involved or where or by whom the service is delivered. Workflow earlier adopted as a starting point for the organization of public service delivery, is no longer considered efficient from a citizen's perspective. The complex organization, compartmentalized service delivery and bureaucratic structures are now being replaced by a more flexible consumer-oriented organization that require citizens only to know the service they are seeking and not the processes they must follow. Hence one-stop shops are being created and organizational boundaries are being blurred. This means that public service systems need to be integrated, sharing data and authority so that, ideally, just one person can help the citizen (Deloitte, 2012).

As societies become more democratic and awareness levels among citizens increase, public service delivery agencies now place an unpresented emphasis on citizen-centric agencies delivery. E-government is one of the strategies that are being used to achieve these goals

(Deloitte, 2012; AGIMO, 2011). E-government focuses on the adoption of ICTs to deliver government services through the internet and other emerging digital technologies. E-government projects are initiated as a key factor in the national strategies to enhance the efficiency and effectiveness of the government operations and improve the relationships between citizens and the state (Ndou, 2004; Al-adawi, Yousafzai, and Pallister, 2005). As it can be observed from the United Nations 2012 survey, e-government has strongly shifted expectations of what governments can and should do, using modern information and communication technologies, to strengthen public service and advance equitable, people-centred development. However, Al-adawi et al. (2005) notes that e-government is far from reaching its maximum potential and until the gap between what is offered and what is used is bridged governments can not justify large investments in e-government and will not get all of the value possible out of these investments. Therefore it is important to understand the factors that might influence citizens' intentions to engage in government services provided over the internet.

ICT integration generates a democratization factor., The outcome of any e-government initiative should lead to a process of transformation, which increases the effectiveness, efficiency and transparency of government and administration (AISI, 2002). Batista (2003) adds that ICT themselves should be a means for creating mechanisms and policies conducive to learning, a new technology facilitating the sharing of solutions among different levels of government and population. There is a growing recognition that e-governance can support development by improving inter-organizational linkages and consolidation of government systems (UN, 2012). E-government has an important role to play, now and in the future. According to Sharma (2012), conditions for good governance have improved with ICT use in the last few years.

The challenges brought about by ICT integration revolve on the question of how to allow the advancement of different segments of society toward innovation and the adaptation of new technologies in order to improve government processes and to reduce economic and social disparities (Batista, 2003). Key challenges in harnessing ICT for economic growth and poverty reduction include lack of a comprehensive policy and regulatory framework, inadequate infrastructure and insufficient skilled human resources. A comprehensive policy, legal and regulatory framework is required to support ICT development, investment and application, promote social inclusion and expansion of human freedom, promote competition,

ensure affordability and national access, address privacy, e-security, ICT legislation, cyber crimes, ethical and moral conduct, copyright, IPR and piracy and support ICT research and development and develop an institutional framework for policy development and review (IST-Africa, 2012).

The overall conclusion that emerges from the United Nations 2012 survey in today's recessionary world climate is that while it is important to continue with service delivery, governments must increasingly begin to rethink in terms of e-government and e-governance, placing greater emphasis on institutional linkages between and among the tiered government structures in a bid to create synergy for inclusive sustainable development. An important aspect of this approach is to widen the scope of e-government for a transformative role of the government towards cohesive, coordinated, and integrated processes and institutions through which such sustainable development takes place (UN, 2012).

2.3 Global ICT Integration

According to Ndou (2004) and Sharma (2012), governments around the world have embraced ICTs and the internet in particular, as a means of mainstreaming public policy decisions, practices and processes, while providing citizens with greater and easier access to government services. Increased information flows between the public and private sector and citizens have improved transparency and accountability and established an environment of trust and reliability between citizens and elected officials in many parts of the world (UN, 2007). Moreover, many ministries responsible for ICTs and modernization initiatives have realized the importance of a clear national strategy for becoming a part of the global information society and narrowing the gap between "haves" and "have-nots" (Sokari-Whyte, 2010).

Broadband access and usage, supported by strong national backbones, are increasingly considered as essential services that need to be universally available to all citizens in order to develop networked economies and information societies. As telecommunication/ICT networks are deployed, governments are better able to provide e-government services to their citizens, which improve transparency, accountability, utilization of resources and access to governmental services, including health and education (Sharma, 2012). Telecommunications and ICT play a vital role as catalysts for sustainable economic development and growth. A World Bank study has shown that every 10% increase in broadband penetration boosts Gross

Domestic Product (GDP) by average of 1.3% and every 10% increase in mobile teledensity results in a 0.7% increase in the GDP of a nation (Deloitte, 2012).

According to Hanna (2003), the ongoing ICT revolution, combined with the forces of globalization, has provoked the hopes and fears of countries at all levels of development, to leapfrog to the new economy, or be left out of the loop. A growing number of developing countries have been inspired by the success stories of fast growing exports of ICT services from a diverse group of countries (UN, 2012). As a result, the response of many governments is to formulate national ICT policies and strategies, where ICT is treated mainly as a sector or industry. Donors and aid agencies responded by piloting a variety of ICT applications for specific sectors or target groups, by including ICT components in development projects, by dealing with telecommunications infrastructure as a free-standing sector, and most recently, by carrying out assessments of e-readiness (Hanna, 2003).

2.3.1 Global e-government

Nearly all countries across the globe, from the poorest countries to the most advanced ones, have some sort of internet presence, or so-called e-government (Davidrajuh, 2004; Al-adawi et al., 2005). The fast development of the Information and Communication Technology (ICT) derived the rapid growth in the number of government websites as well as the variety of services offered (Lee, Rao, and Braynov, 2003). Governments worldwide continue to develop more sophisticated ways to provide the public with online service channels that have evolved from the early days of simple web pages to the recent widespread emergence of online transaction services and integrated service delivery systems (Sharma, 2012).

Progress in online service delivery continues in most countries around the world. Among the e-government leaders, innovative technology solutions have gained special recognition as the means to revitalize lagging economic and social sectors (Sharma, 2012). The increasing role of e-government in promoting inclusive and participatory development has gone hand-in-hand with the growing demands for transparency and accountability in all regions of the world. The United Nations, e-government survey of 2012, with a focus on governance solutions that enhance service delivery and streamline public sector efficiency, found that many governments have put in place e-government initiatives and information and communication technologies applications for the people to further enhance public sector

efficiencies and streamline governance systems to support sustainable development (UN, 2012).

The United Nations e-government rankings in 2012 reflect an assessment of which countries are undertaking their e-government development with a view to integrated, user-centric public service delivery. The assessment focused on the concept of integrated services that exploit inter-linkages among different public services on a functionally and/or thematically similar one-stop-shop portal, thereby improving and facilitating citizen experience, allowing for back office integration across governmental departments and strengthening institutional arrangements (Sharma, 2012; UN, 2012).

2.3.2 Key findings from the 2012 United Nations survey

The 2012 survey found that many member states are moving from a decentralized single-purpose organization model, to an integrated unified whole of-government model, contributing to efficiency and effectiveness. The model aims at centralizing the entry point of service delivery to a single portal where citizens can access all government-supplied services, regardless of which government authority provides that service. In some countries, the whole of-government approach helps build a transparent government system with interconnected departments and divisions.

The 2012 survey also indicates that global infrastructure access has improved, with the global average ICT index value reflecting an increase in mobile penetration. The global average number of mobile subscriptions per 100 inhabitants is now 88.5. Broadband penetration, however, remains very low, with a global average of only 8.7 fixed broadband connections per 100 inhabitants. Mobile based technologies have become the most rapidly adapted technologies to provide e-services, playing a pivotal role, especially in developing countries. Rural areas with very little access to telephony can now benefit from mobile and broadband services to access services. The survey identified that, 25 countries have developed separate m-government websites, and 24 countries provide the option of making payments via mobile phones. 78 countries have provided for citizen participation via facebook and twitter (Table IV (Appendix))

The e-government survey rankings shows that the Republic of Korea is the world leader (0.9283) followed by the Netherlands (0.9125), the United Kingdom (0.8960) and Denmark

(0.8889), with the United States, Canada, France, Norway, Singapore and Sweden close behind (Table V (Appendix)). The steady improvement in all the indicators of the e-government development index has led to a world average of 0.4877 as compared to 0.4406 in 2010. This reflects that countries in general have improved their online service delivery to cater to citizens' needs. On a regional level, Europe leads with an average of 0.7188 while Africa comes last with an average of 0.2780 (Figure 3 (Appendix)).

Despite progress, there remains an imbalance in the digital divide between developed and the developing countries, especially in Africa. The latter region had a mean e-government development index of about 30 per cent of Northern America and about half of the world average. The digital divide is rooted in the lack of e-infrastructure, which has hindered information-use and knowledge-creation. The tremendous difference of broadband width and subscriptions between the developing and the developed world proves that there are yet many milestones to be reached in order to close the gap of the digital divide. Low-income countries, in particular, continue to contend with traditional barriers to ICT investment such as lack of technical skills, high costs of technology and ineffective government regulation.

2.4 ICT in African Context

Information and Communication Technologies (ICTs) have been a remarkable success in Africa. Africa's communications infrastructure has grown as the sector has expanded. This growth has been accompanied by high levels of investment in network infrastructure and a steady geographical expansion of networks to cover more and more of the continent's population, but, although telecommunications infrastructure has improved in all countries in Africa, some have moved much faster than others (Williams, Mayer, and Minges, 2011; UN, 2012). This ongoing growth and transformation of Africa's communications infrastructure is driving change in the retail market, as operators are able to provide new services and lower prices. Internet usage in Sub-Saharan Africa has been slow to take off and lags far behind the rest of the world (Internet World Stats, Figure 4 (Appendix)), but this is starting to change with the emergence of global standards for wireless broadband networks, increases in international bandwidth available to Africa, and reductions in the price of network equipment and end-user devices. By the beginning of 2010, broadband internet was available in most countries in Sub-Saharan Africa, and the total number of subscribers rose from 0 to more than 19 million between 2000 and the beginning of 2010 (Williams et al., 2011).

Prices for ICT services in Sub-Saharan Africa are generally high relative to other regions, but, in most countries, they have been falling as markets have reformed and competition has developed. Some prices have fallen faster than others. The average price of an international call from Sub-Saharan Africa to the United States, for example, fell by 57 percent between 2000 and 2008. Internet access, however, remains prohibitively expensive in most countries. Prices in Sub-Saharan Africa are much higher than in high-income countries in other regions of the world or even the middle-income countries of North Africa. Not only are internet prices very high, but quality is generally very poor (Williams et al., 2011).

Widespread regulatory reform has been a major factor in the success of the ICT sector in Africa. The gradual shift from a politically driven decision-making process to a more rules-based, technocratic one has improved investor confidence and allowed competition to develop. Independent regulatory authorities were relatively unknown in Africa before the establishment of telecommunications regulators (Minges, Briceño-Garmendia, Williams, Ampah, Camos, and Shkaratan, 2008). Although it has taken time for these institutions to become effective, their technical capacity and experience in carrying out their mandate has improved, and the quality of regulation has increased (Williams et al., 2011).

A caution from Ngwenyama, Andoh-Baidoo, Bollou and Morawecynski (2006) is that in Africa, three quarters of the population is illiterate and live in the rural areas that lack basic facilities such as electricity and to expect effective utilization of communication technologies like the internet in all areas, by all people, would be unreasonable. This is one of the main reasons why Africa is lagging behind in terms of ICT integration which is evidenced from the United Nation 2012 survey (UN, 2012).

The Eastern African countries are unique in that they are the only ones in the world that have not yet been connected to the global undersea optical fiber network. The East African Business Leaders created the East African Submarine System (EASSY) consortium in the year 2003 as a vehicle to finance the construction of the undersea optical fibber cable on the East African coast. Unfortunately, progress on the project has been very slow because of divergent objectives among countries in the consortium and complexity of financing models. For example, the East African region is not homogenous and has unresolved ICT policy and regulatory issues, different ICT market structures and multiple regional economic zones (EAC, COMESA and SADC). Kenya has been getting impatient because some of the other

partner countries do not see the urgency of an undersea optical fiber and the associated loss of opportunities from the delay (Ndemo, 2007).

2.4.1 ICT in e-government in Africa

Almost all African countries have now developed government web sites. However, these generally lack coherence and vision. Most of the sites are not updated regularly. The sites do not encourage interaction and dialogue between government and citizens. Besides government web sites there are other forums and web sites that contribute to e-governance in Africa. These are established by the civil society and those living abroad. These forums are not only aimed at discussing governance issues alone but also bringing issues that affect day-to-day welfare of citizens (AISI, 2002).

Africa has seen improvement in e-government with countries in the region looking to increase their online presence through developing websites for government ministries and agencies as shown by the United Nation 2012 survey. Seychelles (0.5192) climbed several points to number one in the region in 2012 followed by Mauritius (0.5066) and South Africa (0.4869). It is notable that all of the African leaders increased their e-government development index value in 2012 but lost in comparative performance around the world, except for Kenya and Morocco, which gained in the world rankings from 124 to 119 and from 126 to 120 respectively. Tunisia (0.4833) and Egypt (0.4611) declined in rank substantially as did Cape Verde (0.4297) because their improvements did not keep pace with those of other countries around the world (Table VIII and Table IX (Appendix)).

The key challenge for the e-government development of Africa remains the widespread lack of infrastructure and functional literacy. Despite recent expansion in mobile telephony, most countries in Africa remain at the tail end of the digital divide. These challenges have translated into a lower than world average e-government development for all sub-regions (UN, 2012). Warschauer (2004) also adds that despite there being massive amounts of digital content on the internet, the creation does not meet the needs of certain communities around the world. This has been attributed partly due the geographical imbalance of the sources of this digital content as well as the predominant language used in these websites.

2.5 ICT Integration in Kenya

Over the years, ICT has remained Kenya's top development agenda as evident in the country's national plans and other government initiatives such as the e-government strategy (2004-2009) which provide a road map on ICT implementation (Siambi, 2008). In terms of adoption of ICT, Kenya has come along way from the era of using mainframe computers to the modern world of wireless and mobile technology. Kenya has made remarkable progress putting in place an ICT policy framework and implementation strategy, complete with measurable outcomes and time frames. The process has had the benefit of sound advice from officials and stakeholders. However, universal implementation is challenging given the lack of resources, national ICT infrastructure and even electrical supply particularly in the rural areas (Farrell, Isaacs, and Trucano, 2007; GOK-NICT, 2006).

Kenya ICT Board was founded as a State Corporation in 2007 with the aim of coordinating and promoting the ICT industry in Kenya. The board also seeks to promote ICT investments both locally and abroad. The mission of the board is to rapidly and innovatively transform Kenya through promotion of ICT for socioeconomic enrichment of our society. The board's strategic objectives are to develop and position Kenya as the preferred ICT destination in Africa, to develop and promote competitive ICT industries in Kenya, to develop world class ICT institutions, to increase ICT access, utilization for all Kenyans and to ensure customer satisfaction (GOK-KICTB, 2007).

Kenyan's Vision 2030 identifies ICT as one of the core drivers of Kenya's growth and development strategy to becoming a middle income country by the year 2030. Vision 2030 stresses access to ICTs based on its potential to increase productivity and raise the competitiveness of local businesses in a knowledge-based economy (GOK-NESC, 2007). To realize this, the government is investing heavily in ensuring that the entire country has access to internet services at an affordable cost. Government has invested in fibre optic cables at least to every provincial headquarters and has an ambitious plan to have all urban centres connected to the World Wide Web (World Vision, 2011). However, despite these efforts, access to internet or to computers amongst the rural population, is still limited (Tilvawala, Myers, and Andrade, 2009). Some of the district headquarters have no basic internet infrastructure hampering effective and timely communication and learning (World Vision, 2011).

Compared to other peer countries in Africa, Kenya is one of the leading countries on ICT services but still can improve on mobile, internet and broadband services (Figure 5 (Appendix)). Table 2.1 is a summary of ICT access and penetration in selected African countries.

Table 2.1: ICT access and penetration for selected African countries 2010

ICT	Ghana	Kenya	Nigeria	South Africa	Tanzania	Uganda
GDP per capita, PPP (current international $)	1,552	1,573	2,203	10,278	1,362	1,217
Mobile cellular subscriptions per 100 inhabitants	71.49	61.63	55.10	100.48	46.80	38.38
Internet users per 100 inhabitants	8.55	20.98	28.43	12.30	11.00	12.50
Fixed broadband subscriptions per 100 inhabitants	0.21	0.01	0.06	1.48	0.01	0.06

Source: ITU and WB
Prepared by: APOYO Consultoria (Apoyo, 2011)

According to Gichoya (2005), the characteristics that define Kenyan ICT environment includes unstable ICT resources, inadequate (but rising) budgets for ICT, most ICT projects are initially donor funded where some donations are made without prior consultation or carrying out a needs analysis by the recipient organization and lack of ICT policies and master plans to guide investment to the extent that, with a number donors funding ICT, there have been multiple investments for the same product due to lack of coordination.

According to Kenya Data Networks, Kenya is making positive strides in enhancing countrywide internet connectivity. Major steps include connectivity to submarine cables i.e. TEAMS, SEACOM etc, connectivity to the digital villages, innovative money transfer technologies, increased wireless coverage countrywide; 2G/3G, CDMA, WiFi and Wimax, MPLS-enabled networks and nationwide fiber. The current network coverage is 115 towns in the country which is about 70% of the population (www.kdn.co.ke).

The government is committed to universal service availability nationwide. Policy objectives include ensuring all citizens have access to ICT services, basic ICT services are made available at an affordable price, promoting availability of widespread access to internet

services, and ensure relevant education and training programmes maximize opportunities afforded by ICT to improve the quality of their lives and to enhance their work prospects (IST-Africa Consortium 2012). Given that the e-government strategy envisages provision of services through websites, the small number of fixed-line connections severely limits the reach of these services given the reliance of e-government on the internet infrastructure. In addition and according to Kenya Data Network, a majority of these connections are only in the major urban centers of Nairobi, Mombasa, Nakuru and Kisumu. It is expected that greater access to ICTs will contribute to economic growth by reducing transaction costs and increasing businesses efficiency, especially in the case of small service firms in rural areas. In addition, ICTs should contribute to improve educational standards and access to information as well as accountability on the part of government officials (Apoyo, 2011).

2.5.1 E-government in Kenya

The Government of Kenya established the e-government programme in June 2004. It has since then committed itself towards achieving an effective and operational e-government to facilitate better and efficient delivery of information and services to the citizens, promote productivity among public servants, encourage participation of citizens in government and empower all Kenyans (Directorate of e-government Kenya- http://www.e-government.go.ke/; Choi, Kaushal, and Nio, 2011). The e-government strategy outlines the objectives and process for the modernization of government that encompass the entire spectrum of government operations, impacting citizen-government, business-government and government-government as a means towards enhancement of transparency, accountability and good governance, hence making government more efficient, result oriented and citizen focused (Siambi, 2008).

The Kenya e-government service charter mission is to provide quality information and services to and enable online interactions with the public, businesses and other government units in a convenient and secure manner through the innovative use of ICTs. The e-government strategy is designed to achieve pre-determined set of goals and objectives, which are; better and efficient delivery of government information and services to the citizens, promote productivity among public servants, encourage participation of citizens in government and empower all Kenyans in line with development priorities outlined in the Economic Recovery Strategy for Wealth and Employment Creation (Directorate of e-government Kenya- http://www.e-government.go.ke/).

The achievement of e-government in Kenya has been one of the main priorities of the government of Kenya towards the realization of national development goals and objectives for wealth and employment creation, as stipulated in the Kenya Vision 2030. Effective and operational e-government will facilitate better and efficient delivery of information and services to the citizens, promote productivity among public servants, encourage participation of citizens in government and empower all Kenyans (IST-Africa Consortium, 2012).

Currently almost all government ministries have websites. Websites provide largely static information on thematic functions of government and some also provide downloadable forms. However, an analysis of all government websites in Kenya showed that the official language of the website is English, despite the fact that a majority of the rural populace communicate either in local ethnic languages or in Swahili. Warschauer (2004) comments that physical access means little without sufficient digital content that is relevant to people and in the language of their communities. In the Kenyan case, this is evidently a concern given that 35 of government ministry websites are all in English. The argument is that this excludes a big segment of the population. This segment (80 percent in the rural areas) and the urban poor need to be reached by localizing content as well as using a language they can understand (Ochara, 2008).

2.5.2 ICT Policy

After several years of effort (Mwololo, 2005), Kenya promulgated a National ICT Policy in January 2006 that aims to improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services. The ICT policy framework and implementation strategy is complete with measurable outcomes and time frames. The process has had the benefit of sound advice from officials and stakeholders. The national policy has several sections, including information technology, broadcasting, telecommunications, and postal services. However, it is the section on information technology that sets out the objectives and strategies pertaining to ICT (GOK-NICT, 2006).

The policy provides a vision for creating an e-enabled and knowledge-based society by using ICTs to improve the livelihoods of Kenyans and to optimize its contribution to the development of the economy through the availability of efficient, reliable and affordable info-communication services throughout the country. The policy spells out the priority goals and objectives that will harness the potential of the ICTs to achieve the MDGs and Vision

2030. It recognizes that young people are the future workforce and leading creators and earliest adopters of ICTs. It aims to empower them as learners, developers, contributors and future entrepreneurs/decision-makers. It recognizes the enormous opportunities that ICTs can provide for women, who should be an integral part of and key actors in the new information society. It also recognizes the plight of the bulk of the population who reside in the rural areas and seeks to ensure that they have an opportunity to participate in the evolving information society (GOK-NICT, 2006).

2.6 Factors Affecting ICT Integration in Service Delivery

ICT integration has not reached its full potential and utilization. This has been brought about by a number of factors. Okiy (2005) points out poor and inadequate ICT facilities, poor levels of computer literacy and ICT skills, poor level of awareness of internet facilities among policy makers, government officials and the ruling class in general and minimum involvement of academic institutions in network building as challenges mitigating against the use of ICTs. Haliso (2011) adds that lack of functional ICT policy, economic barriers, ICT infrastructure, resistance to change, low capacity of communication facility and lack of policy for manpower development are also common barriers undermining the use of ICTs. According to Al-Rashidi (2009), resisting change from within the organizations, technical barriers and lack of ICT training for employees are among the factors that can lead to failures of e-government projects.

Ogunsola et al., (2011) add that human resources, culture, funding, education and training as also key factors that impede ICT use and integration in developing countries. According to them, unskilled and untrained human resources lead to the employment of expatriates and African governments cannot pay or sustain expatriates. Without adequate training, organizations may not be able to effectively use ICTs. Gichoya (2005) adds that infrastructure, finance, poor data systems and lack of compatibility, skilled personnel, leadership styles, culture and bureaucracy and altitude as barriers that hinder ICT implementation and also adds user needs, technology, coordination, ICT policy, transfers of ICT idolizer and donor push as the inhibitors that prevent successful implementation and sustainability. Magutu and Lelei (2010) identified process and structure, procurement and communication, information system design, people management, corruption and technical and system tuning as the challenges in information system implementation.

2.7 ICT Infrastructure and Service Delivery

An ICT infrastructure is the physical hardware used to interconnect computers and users. Infrastructure include the transmission media, including telephone lines, cable television lines and satellites and antennas, and also the routers, aggregators, repeaters and other devices that control transmission paths. They also include the software used to send, receive and manage the signals that are transmitted. ICT infrastructure is everything that supports the flow and processing of information (Wikipedia). ICTs do not exist in a vacuum. Computers, radios, software and other ICT tools rely on a range of supporting infrastructure. ICT infrastructure is an essential foundation for the information society.

ICT infrastructure constitutes a significant barrier to implementation of e-governance projects in Africa (UN, 2012). If the goal is to improve interaction between public services and its stakeholders, all stakeholders including average citizens should be able to have access. Yet ICT infrastructure in government institutions is technically inferior to those in private sectors and NGOs. The general public has limited access to basic tools such as radios and telephones. The cost involved in rolling out high bandwidth infrastructure as well as meeting universal access needs for the majority is very high (Sarker, Zakir, and Rahman, 2006).

Most developing countries are characterized by limited computer application in the public sector, inadequate infrastructure and shortage of skilled manpower (Gichoya, 2005). Kenya is not an exception. With limited access to electricity and phone lines, few people in Kenya have a computer at home. Radio and television access is much better (GOK-KNBS, 2010). On the other hand, mobile phones are commonplace and the number of internet users is increasing rapidly due to the number of internet cafés, shops and access centres that are available, particularly in urban areas (CCK, 2012).

For quality service delivery the ICT facilities should be readily available. Kenya lacks adequate connectivity and network infrastructure. There are a number of challenges concerning access to and use of ICT in Kenya, including high levels of poverty, limited rural electrification and frequent power disruptions (Osodo, Indoshi, and Ongati, 2010; Kipsoi, Chang'ach, and Sang, 2012). According to Farrell et al, (2007), there is limited penetration of the national physical telecommunication infrastructure into rural and low-income areas. Consequently, there is limited access to dedicated phone lines and high-speed connectivity

for e-mail and the internet. Even where access to high-speed connectivity is possible, high costs remain a barrier to access.

The government is already collaborating with University of Nairobi, Jomo Kenyatta University of Agriculture and Technology and Strathmore University, as well as the private ICT industry to develop and assemble cheap personal computers (Ngambi, 2006; Ndemo, 2007). The government is also in discussions with leading software vendors such as Microsoft about software license costs. It is also exploring the use of open source software in educational and government institutions. The focus of the government, however, has been in the capital-intensive communications infrastructure that will provide the necessary affordable connectivity for businesses and other organizations in Kenya (Ndemo, 2007).

The ICT facilities should be reliable. Over the last five years, the Kenyan government has initiated some capital investment towards set up and installation of reliable ICT infrastructure. Funding for these investments is achieved through partnerships between the government and development partners (Ndemo, 2007). The foreign funding component constitutes the largest percentage of this investment in terms of technology. The government contribution is usually in the form of technical and support staff and facilities including buildings. So far, the Government Information Technology Investment and Management Framework is connecting all ministries to the internet under the Executive Network. The government is also connecting the ministries to run integrated information systems for example the Integrated Financial Management Information System (IFMIS) and the Integrated Personnel and Pensions Database (IPPD) (Gichoya, 2005; Magutu and Lelei, 2010). The ICT facilities should therefore be reliable meaning that they should give the expected results in the required quality and within the required timeframe. These ICT facilities should also be flexible so that they can be easily integrated in the system for user satisfaction.

An ICT infrastructure should be able to meet the user's expectations and deliver the expected results. Integration of ICT facilities means that each facility should be flexible and be compatible with existing systems for quality service delivery. A facility should also be cost effective in that it should be able to deliver services at lower cost as compared to service delivery without use of ICT facilities. Its cost, the cost of installation and maintenance and the cost of running should also be reasonable and within reach of the organizations (Ndou, 2004; Gichoya, 2005).

2.8 ICT Skills and Capacity and Quality Service Delivery.

Computer literacy is defined as the knowledge and ability to use computers and related technology efficiently, with a range of skills covering levels from elementary use to programming and advanced problem solving. It also refers to the comfort level someone has with using computer programs and other applications that are associated with computers (Wikipedia). Anunobi (2004) described computer literacy as having a basic understanding of what computer is and how it can be used as a resource. To Ikolo and Okiy (2012), computer technology literacy deals with an understanding of an infrastructure that underpins much of today's life, it also means knowing some basic things about ICT, for example, how to save and open a file, or how to use a word processor.

The Ministry of Education introduced the National ICT Strategy for Education and Training in June 2006. The aim is to integrate ICT in education, harness emerging technologies and ensure access to ICT skills and training (GOK-MOE, 2006). This is all in a bid to ensure that as citizens leave the learning institutions they have the required skills to use ICT facilities both as employees (both in public and private sector) and as citizens. However, according to Ayere, Odera and Agak (2010), less than ten percent of secondary schools in Kenya offer computer studies as a subject in the curriculum despite its perceived role in the nation's socio-economic development. The few schools that have an ICT programme limit the number of candidates who take up the subject, considering it a speciality despite its being an essential subject as other compulsory subjects like mathematics and languages. The ideal situation, according to the scholars, would be to have ICT mainstreamed in all school subjects such that it would be integrated in geography, history, commerce, physics, etc.

Mastering the use of ICT has become a core competency for competition and sustained development. It is also likely to become a core competency in delivering public services, education and training, and even micro credit and poverty reduction programs. To realize this potential, as Hanna (2003) notes, the current focus on investment in physical infrastructure and hardware, and on isolated experimentation and piecemeal implementation must be broadened and scaled-up to address the enabling policies, institutions, infrastructures, and skills, and to devise national strategies that are capable of agile adaptation and participatory social learning.

It is now widely recognized that the technological revolution associated with ICTs is skill-intensive, not just because of the skill requirements associated with ICT adoption but also due to the lengthy periods of experimentation and learning that many firms need to go through in order to make effective use of ICTs (UNDP and Panos, 2011). Indeed, the process of investing in assets which are complementary to ICTs (such as software, business reorganization and new product development) may contribute more to raising the relative demand for skilled labour than the diffusion of ICTs themselves. Organizations with relatively high (or low) proportions of skilled workers can be expected to have a comparative advantage (or disadvantage) in minimizing the costs both of ICT adoption and of learning how to make best use of ICTs (Forth and Mason, 2004).

The availability of literate, efficient and dependable workforce is critical for the success of e-governance. However, those civil servants who will benefit from and promote e-governance are not yet ready. There is lack of adequate skills and adequate experience in ICT usage. The duration of experience is also limited. There is also a brain drain in the public sector, limiting the human resource base in the public sector (Sarker et al., 2006). Basic ICT skills are important but not adequate for quality service delivery. Right technical skills that match with the job description are important to develop and use e-projects. Public officials should be trained and retrained in application of new technologies for improved governance. To sustain this, there is a need for rethinking education as a whole to produce the future e-governance implementers, even though human resource development is a costly business (AISI, 2002).

According to Ochara, (2008), the e-government programs are being implemented in an environment in which there is no comprehensive public access to ICT education to enhance their preparedness for utilizing governance resources. Kenya is faced with two divides, the international digital divide as well as the local divide between the rural and the urban areas. Where the urban areas have access to some form of ICT education in the form of various programs offered by commercial colleges and NGOs whereas, there is little or no access to ICT education in the rural areas (Hallberg, Kulecho, Kulecho, and Loreen, 2011; Ochora, 2008). Ochora (2008) further adds that this divide is exacerbated by the fact that in most rural areas, there is no electricity or telecommunications. Further, attempts by the government to introduce computer education in schools targets those schools that already have electricity, which would further enhance the divide between those who have the ability to access and those who do not.

2.9 Level of ICT Usage and Quality of Service Delivery

A relationship exists between use of ICT and job enhancement. Use of ICT provides significant benefits in work measurement, cost reduction, productivity improvement and better services to customers and clients. Actually it is availability which makes use possible and it is use that makes performance attainable. So the combined access and use of ICTs can enhance the job performance (Rosenberg, 2005). There is need for all developed and developing nations of the world to take ICTs as tools that aid the enhancement of job performance (Haliso, 2011).

Davis, Bagozzi and Warshaw (1989) developed a theory of 'action relating to reasons' (Technology acceptance model) based on the work of Fishbein and Ajzen (in Davis et al., 1989) to investigate the reasons why some people use computers and their attitudes towards them. Their model, shown in Figure 1, links the perceived usefulness and ease of use with attitude towards using ICT and actual use (system use). They tested this model with 107 adult users, who had been using a managerial system for 14 weeks. They found that people's computer use was predicted by their intentions to use it and that perceived usefulness was also strongly linked to these intentions.

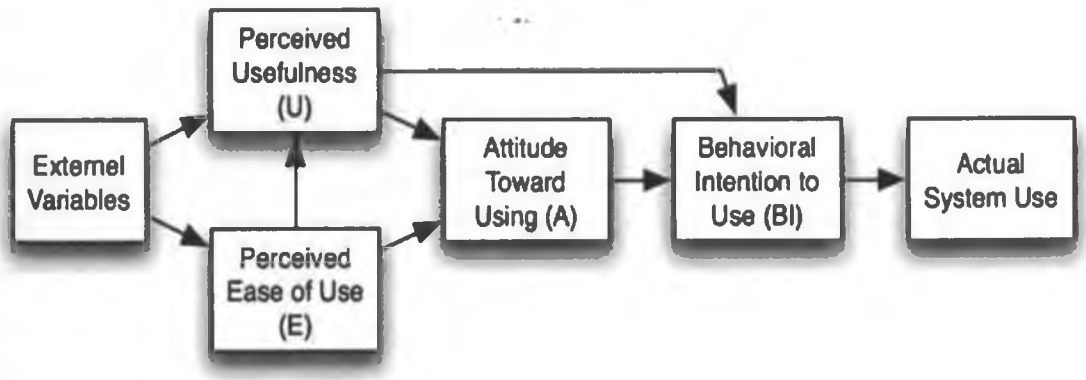


Figure 1: Technology acceptance mode

Source: Davis, Bagozzi and Warshaw 1989, p. 985.

Other factor that contributes to the under-use of ICTs is culture. System designers need to understand or undertake a systematic study of the organization and country within which the system will be used (implemented). Supporting this Odedra (1992) (in Haliso, 2011) opines that culture is a strong factor that dictates if technology will be accepted or not accepted. The

challenge goes to system planners and programme writers to consider the local way of thinking, cultural setting, level of education and awareness. Culture may have different levels of analysis. It can be analysed as functional, professional, organizational, industrial, regional and national (Haliso, 2011). To this study however, professional and national cultures appear to be more suitable.

Professional culture has cultural peculiarities, the way they (people) take training, supervision and socialization. National culture is about where someone is born, undergoes training etc. Tully (2003 as cited in Haliso, 2011) states that the environment where one grows up can determine his or her ability to fully use modern technologies. Those introduced to technology at early age tend to be more comfortable using any technology without any hindrances thus a positive influence towards their level of performance. However, the same cannot be said when it comes to the older generation who schooled and obtained their academic qualifications without sighting a computer. Some of these do occupy key positions in administration and find it very difficult to even think of an innovative way of doing things (Haliso, 2011). Others feel that the introduction of computers in the systems will threaten their positions and source of livelihood as a result.

It has been observed that there is a gender gap in the use of ICTs. Essentially, gender refers to sets of relationships attributes, roles, beliefs and attitudes that define what being a man or a woman is within the society. It is a socially ascribed attribute as opposed to sex which is a biological attribute (Oghiagbephan and Asamaigo, 2010). As a result of gender roles assigned by different cultures many women have been brought up to see technology and its use as reserved for the male gender. According to Munusamy and Ismail (2009), women look at computers and see more than machines, thus considering computers as masculine and complicated to use. Asuquo and Onasanya (2006) observe that, many factors in and outside the classroom result in girls being turned away from computer technology. These factors include the media depicting men as experts in technology, societal expectations of different goals for boys and girls, the structure of learning tasks, the nature of feedback in performance situations and the organization of classroom seating. Because these factors are often subtle, they go unnoticed. It is little wonder why girls are not interested in computer technology. This situation has led to what scholars have termed the gender digital divide (Ikolo and Okiy, 2012).

Explaining this, Ikolo (2010) stated that the gender digital divide is manifested in the low number of female users if ICTs compared to men. According to Tella and Mutula (2008), the issue of gender equity as far as access to and use of ICTs is concerned continues to be a topical subject not only in developing countries but the world over. However, available indices have began to suggest that, although there is a gender gap in all countries, with the significant growth in access to and increased educational opportunities for more women, the relative difference between men and women is diminishing (Sorenson, 2002; Munusamy and Ismail, 2009).

There is a need for breaking the ICT phobia through incentives, awareness and training. Employee resisting change can lead to e-project failure. Demonstrating the role of ICTs for development in general and for governance in particular could reduce resistance (AISI, 2002). Training will boost self confidence and self esteem which as a result will increase the motivation and interest in ICT and technology in general. This will break the fear and improve performance towards quality service delivery.

2.10 ICT Security and Risks and Quality Service Delivery

A central challenge of one-stop government is how the new technology can be used not only to increase efficiency for public administration, but also to strengthen confidence in privacy measures by creating mutual transparency between public administration and citizens (UN, 2012). UNDP and Panos (2011) and UCISA (2005) further add that while secure systems are needed to impede unauthorized access to data, such personal data must be made accessible to a citizen who wishes to verify the use, authenticity and accuracy of his or her own personal data. There must also be a strong emphasis on a legal framework that embodies elements of trustworthiness, traceability, security and privacy of citizens' data (UN, 2012).

According to Runeckles and Maison (2009), protection of personal data calls for a number of organizational and technical measures to prevent unauthorized access and processing, for example by protecting premises, equipment and systems software, including input-output units, protecting software applications used to process personal data, preventing unauthorized access to personal data during transmission thereof, including transmission via telecommunication means and networks, ensuring effective methods of blocking, destruction, erasure, or anonymization of personal data, enabling subsequent determination of when individual personal data were entered into a filing system, used or otherwise processed, and

the person responsible, for the period covered by statutory protection of the rights of an individual with regard to unauthorized supply or processing of personal data (UN, 2012; Runeckles and Maison 2009; UCISA, 2005).

Runeckles and Maison (2009) noted that people can be the biggest threat to the security of ICT systems whether inadvertently or deliberately. No matter how technically secure the ICT systems are, people can often be the weakest link. It is important that staffs are educated about the potential risks and how to avoid them. For example, the organization may carefully enforce secure and regular password changes to access the network itself. They have also noted that physical security of ICT systems is something that can easily be overlooked with often disastrous, expensive, and embarrassing consequences. Even if you have insurance you will recover the cost of buying a new server or a computer but the data and configurations in the stolen kit are more valuable than the replacement cost. It is therefore a good practice to always keep inventory of equipment in your organization and also control access to the facilities. Only the authorized people should be allowed to use the facilities.

Building access as a security issue is particularly important where your building or office is readily accessible to the public, or where open windows are accessible from the street. This is according to a security guide by Lasa (UK) (Runeckles and Maison, 2009). According to the guide it is required that you know who has access to your building or office(s) and take appropriate measures. For example you can lock valuable items such as laptops, data projectors etc. Away, store keys securely and make sure only authorised people have access to them. Also as a security measure, escort and supervise all visitors and if necessary have them sign in / out, change any door codes regularly, use a security alarm and make sure it is set overnight or during other long periods when the office will be unattended and most importantly ensure office keys are handed back when staff leave the organisation.

UCISA (2005) observes that a big risk with highly portable (and desirable) devices is loss and theft. On top of taking precautions to avoid these mishaps, it's worth preparing for the event that the worst should occur. Public areas are notorious for the ease in which equipment can 'go missing'. In addition to having up-to-date inventories, adequate insurance and indelible security marking, PCs and monitors should be secured either to the desk on which they sit or an adjacent wall using an appropriate device which doesn't damage the casing such as a cable lock.

Computer viruses are a universal problem. The problem of viruses is exacerbated by individuals who sneak in discs from cyber cafes and a lack of expertise to clean the computers. The cost of anti-virus software contributes to the problem. This disrupts computer operations as the computers shut down frequently (Nizegorodcew, 2007). Internet security is also a big concern. Some sites on the internet may lead one to executable materials that may end up damaging your computer and servers. Given the complexities, implementation of trusted security and privacy measures constitutes a major challenge to one-stop-shops, which many governments have yet to tackle. Only about one fifth of national portals clearly indicate the presence of security features with significant regional variation (UN, 2012).

Cyber crime is another security concern that has been on the rise recently. It can broadly be defined as any activity on the internet and ICTs generally that offends human sensibilities (KictAnet, 2010). Ngundi (2010) adds that it is the crime committed using a computer system and/or the internet. He also adds that cybersecurity is the branch of security dealing with digital technology and/or information communication technology. Cybercrime can be categorize in three ways; against government (e.g. cyber warfare), against property (e.g. ICT based systems, denial of service) and against the person (e.g. child pornography, harassment and cyber stalking) (KictAnet, 2010). ICT and internet has lead to the proliferation of communities of interest with global membership thus presenting convenient channels through which cyber criminals can reach unsuspecting users (Ngundi, 2010). While the cyberspace have provided secure tools and spaces where people can enjoy their freedom of expression, information and privacy of communication, the same benefits of anonymity and privacy also extend to those who employ ICTs for criminal activities and use the internet to commit violence against other people (KictAnet, 2010).

The lack of specific cybercrime/cyber security legislation makes it even more difficult to punish those who use ICTs tools to conduct violence against women. While, the review of the Kenya Communications Amendment Act, enacted in January 2009, begins to deal with the problem, it does not explicitly deal with all cyber crime and cyber security issues on the person. With increased access to broadband, which will translate to increase in use of ICTs and the internet in particular, it is has become very urgent to ensure that policy and regulation is developed to address issues of cyber violence (KictAnet, 2010).

A comprehensive approach is required in planning, developing, operating and maintaining the government's ICT security processes. The ICT security measures need to be incorporated

early, in the requirement specification and design of the ICT system, before the implementation stage to ensure a cost-effective and comprehensive system (MAMPU, 2002). The ICT security process must cover all aspects of operation, including mechanisms used by hardware and software systems, networks, databases and other related systems and facilities. The goal is to achieve a secure working environment for employees and other persons working at or visiting the government's facilities as well as to help establish processes to ensure the protection of information (GOK-NICT, 2006). According to the UN 2012 survey, almost half of the countries in Europe display secure links on their national websites, while only one in Africa appears to do so, underscoring the continuing difficulty that African governments face in moving to the transactional and connected stages of e-government development (UN, 2012).

2.11 Management Support and Quality of Service Delivery

Top management support in ICT, as defined by Chatterjee et al., (2002, as cited in Pudjianto and Hangjung, 2010), is a term of managerial beliefs and support in initiatives and participation in adoption and diffusion of IT innovation in large systems within the organization. Top management support and commitment has often been considered to play a crucial role in any initiation and adoption process. It has great power to influence other members' behaviour within the organizations. Through long term strategic vision, top management can encourage the entire organization to learn and participate in e-government assimilation. In addition, by strong support from top management the necessary resources can be allocated to e-government program appropriately in high priority (Pudjianto and Hangjung, 2010).

If effective one-stop government is to materialize in any shape or form, public officials must have a long-term coherent vision that identifies, articulates and advocates the benefits of a one-stop government programme. They must also be aware of potential resistance to change, which is always inherent in projects like one-stop government. Since tradition is deeply rooted in public administration, leaders must address and explain what the one-stop government portal is, inviting the opinion of personnel in the process and emphasizing the importance of continuous communication while developing and implementing the project. Leaders must also provide all necessary resources to personnel to carry out their work effectively, while training them in an adequate and continuous way during the whole process (UN, 2012).

Schedler and Schmidt (2004) shows that the management of an administrative unit has a relevant influence on the development of e-government in that it becomes active in three different fields of intervention: strategy, in the sense of setting objectives and the course of the project; the establishment of structures, such as the organization of structures and processes, but also rules and incentives; and capacity building in the sense of extending the organisation's potential possibilities of action. Schedler and Proeller (2007) add that these activities are not conducted in isolation from each other but should be adapted to each other as finely as possible. It must be the goal of management to act in all these areas in as integral and consistent manner as possible.

Paul, Opal, Vanesa and Karlene (2008) posited that while management characteristics are perceived as a large part in the decision-making processes towards ICT adoption, it is the characteristics of managerial practices that bear a direct relationship to the adoption-diffusion process. Another managerial attribute affecting adoption is age. Older managers are more likely to be uncomfortable with taking rapid steps towards ICT adoption, while younger individuals may be more likely to embrace ICT. It was found that managers with the most positive attitude towards ICT adoption were those who interpreted IT as an effective tool in transforming business operations. Administrative culture also has an effect on the development of e-government. This, however, can only be established by management to a certain extent (Schedler and Schmidt, 2004).

Despite widespread support for whole-of government, there remain major problems in overcoming departmental silos, reducing fragmentation and enhancing coordination (UN, 2012). E-government barriers are both technical and non technical. According to Al-Rashidi (2009), successful e-government is at most 20% technology and at least 80% about people, processes and organizations. Leaders' management skills are important to have a successful e-project. Top leadership should therefore adhere to the principles of management through planning and regulations of operations, decision making and control over actions of human being and coordination of resources through the processes of planning, organizing, directing and controlling in order to give stated objectives.

2.12 Conceptual Framework

The study looks at the factors that affect ICT integration on quality service delivery in government offices in Kenya. It looks at the factors that can influence the impact that ICT may have on service delivery. These include ICT infrastructures, ICT skills and capacity, level if ICT usage, ICT security and risks and management support.

Quality ICT infrastructures are essential for service delivery. With the relevant skills accompanied by high levels of ICT usage, quality service delivery is inevitable. Security in ICT is crucial so as avoid unauthorized access to information and malicious damage to ICT infrastructure and electronic information. Management support is needed for successful implementation of e-projects through facilitation and motivation. These have been summarized in conceptual framework as shown in Figure 2.

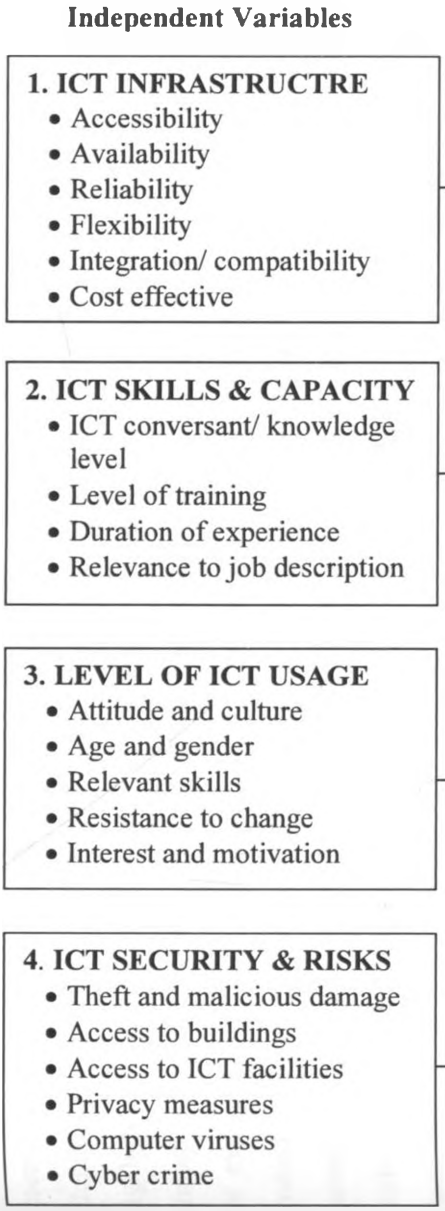
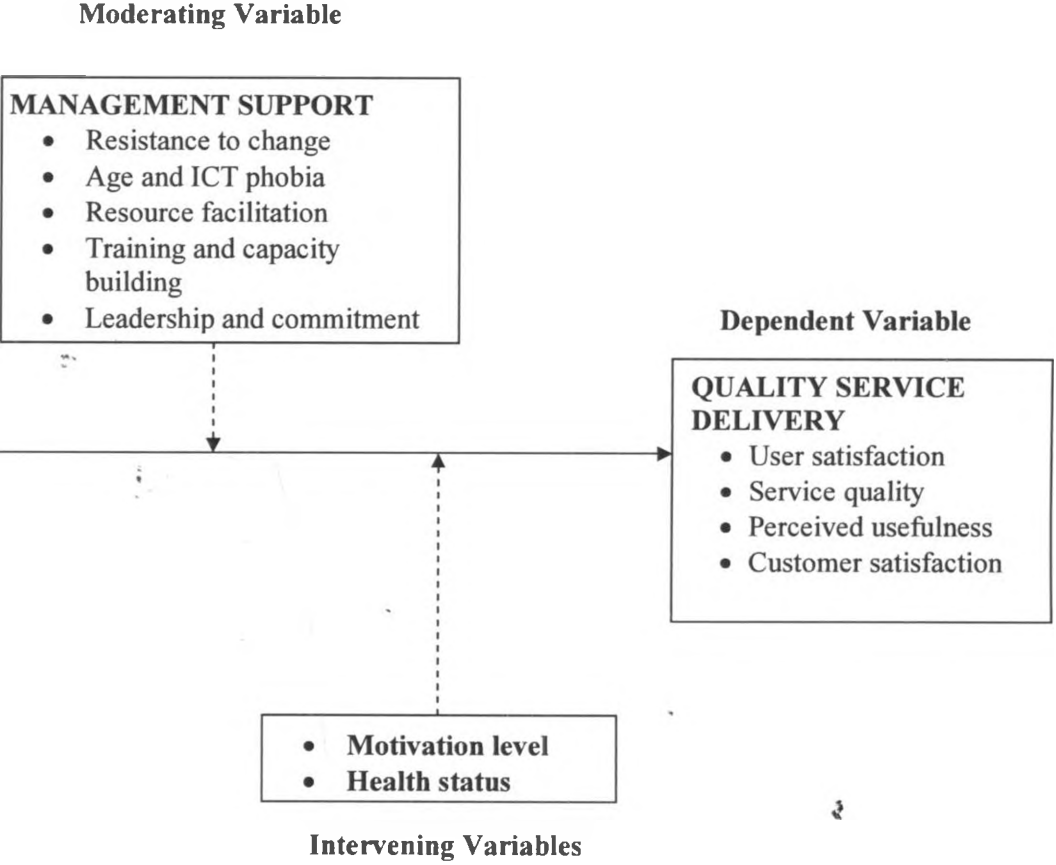


Figure 2: Conceptual Framework


Moderating Variable
MANAGEMENT SUPPORT
Resistance to change
Age and ICT phobia
Resource facilitation
Training and capacity building
Leadership and commitment
Dependent Variable
QUALITY SERVICE DELIVERY
User satisfaction
Service quality
Perceived usefulness
Customer satisfaction
Motivation level
Health status
Intervening Variables

2.13 Knowledge Gap

The number of previous studies in this area indicates that it is an area worthy of doing research. ICT integration has and continues to be a challenge in many organizations. Its adoption is yet to reach its full potential and its utilization is limited. The literature review highlighted several factors that affect ICT integration for service delivery. However, there is limited information on ICT integration in government ministries. Magutu and Lelei (2010) for example are among the scholars who have contributed in this area. They specifically studied Information Systems Implementation in State Corporations but with a bias on State Parastatals. There is a need for a study that will investigate the issues raised by literature and explore the practical experience in government offices. There has been no study or assessment of the ICT integration in the Ministry of Public Works. This is the information that this study will seek to add to the ICT integration area of knowledge.

2.14 Summary of Chapter Two

This chapter has looked at other scholarly and literature works from different renowned and distinguished scholars and authors on ICT integration for service delivery. The initial sections highlighted ICT and e-government in global, regional and local perspectives followed by a detailed discussion of the identified factors that affect ICT integration in service delivery. These factors are in agreement with the observations of many scholars and authors as already highlighted. The conceptual framework which is a diagrammatic representation of all the identified variables (factors affecting ICT integration) and how the interact and link with each other is also given. The final section of this chapter highlights the knowledge gaps that have been identified and what the study will be aiming to fill. This is the limited information on ICT integration specifically in government offices.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology that was used in the study. It is discussed under the following sub-topics; research design, target population, sampling procedure, data collection methods and procedures, instrumentation, reliability and validity of data collection instruments, operational definition of variables, methods of data analysis and ethical considerations.

3.2 Research Design

This study used the descriptive survey design. A descriptive survey describes the state of affairs of an occurrence as it exists. A survey is an attempt to collect data from members of a population in order to determine the current status of that population with respect to one or more variables (Mugenda and Mugenda, 1999). It involves systematic and comprehensive study of a particular community, group or organization with a view of analyzing a social problem and presentation of recommendations for its solution (Ahuja, 2001).

The study analyzed the factors influencing integration of ICT in government ministries and quality service delivery. The factors that were investigated included the quality, availability and interconnectivity of ICT infrastructure, skills and capacity in ICT among the government officials, level of usage of ICT facilities and attitudes towards ICT use, ICT risks and security and management support in ICT integration for quality service delivery.

The cross-sectional research design was employed by obtaining a representative random sample of males and females staffs of all cadres in all the departments of the Ministry of Public Works. The research was done in the natural setting and therefore permitted the researcher to employ random probability samples. The design enabled the researcher to make statistical inferences to other government ministries and permitted him to generalize the findings to real-life situations, thereby increasing the external validity of the study.

3.3 Target Population

Target population refers to the entire group of individuals or objects to which a researcher is interested in generalizing the conclusions (Best and Kahn, 1989). A population can be defined as an entire set of relevant units of analysis or data. It can be referred to as the aggregate of all the cases that conform to some designated set of specifications. Borg and Gall (1989) argues that the target population are all the members of a real or hypothetical set of population, events or objective to which a researcher wishes to generalize the results of the study. Target population is considered as the population to which a researcher wants to generalize the results of the study. In this study, the target population was drawn from the government officials (employees) in the Ministry of Public Works. There are **574** employees in the ministry who formed the target population.

3.4 Sample Size and Sampling Procedure

A sample is a finite part of a statistical population whose properties are studied to gain information about the whole (Webster, 1985). It is a group in a research on which information is obtained. When dealing with people, it can be defined as a set of respondents (people) selected from a larger population for the purpose of a survey. Sampling is the process of selecting the sample of individuals who will participate as part of the study.

Krejcie and Morgan (1970) developed a table (Table X (Appendix)) that guides the sample selection process in research. This research adopted the model suggested by the two researchers. From this model, a sample size of 225 is adequate for a target population of 574. The researcher used the total number of employees as the population (N) and then used the model developed by the two researchers to get the sample size (S). The researcher then got the ratios of the employees in each department, in comparison to the total employees of the ministry so as to get the number of employees in each department who would participate in the research. The sample size in this study was **228**. The sampling units were obtained through simple random sampling technique where each sample unit had an equal chance of being selected.

3.5 Methods of Data Collection

This study utilized the questionnaires, as the main data collection method. Naremo (2002) argues that the questionnaires condenses all the authentic data against the question in it and is free from distortion at the time of analysis. The sentiments by Naremo (2002) are supported by Mugenda and Mugenda (1999) who emphasizes on the use of questionnaires for survey designs.

The researcher visited all the departments of the Ministry of Public Works and collected quantitative and qualitative data from the employees using questionnaires and observations. The questionnaires used had both closed and open ended questions focusing on the five objectives under study. The researcher also undertook a focused group discussions to deepen understanding and to add human dimension to impersonal data.

3.6 Instrumentation

The research instruments used were questionnaires, focused group discussions and observations. The questionnaires contained both closed and open ended questions. In open-ended questions the respondents were given room to explain their answers in detail. Closed-ended questions were refined using Arbitrary and Likert scales or made a choice of "Yes" or "No" answers. Observation method was also used where the researcher visited various departments in the Ministry of Public Works to check the availability of computers and other ICT facilities that facilities the day to day operations within the ministry in service delivery. Observation was important as a guide to both quantitative and qualitative research. Focused group discussions were carried out with selected government officials. Information obtained from observations and focused discussions were used to strengthen the responses obtained from the questionnaires.

3.7 Reliability of Data Collection Instruments

Reliability is the consistency of your measurement, or the degree to which an instrument measures the same way each time it is used under the same condition with the same subjects. In short, it is the repeatability of your measurement. A measure is considered reliable if a person's score on the same test given twice is similar. It is important to remember that reliability is not measured; it is estimated (Mustonen and Vehkalahti, 1997).

The split-half technique, according to Babbie (2010), was used to test the reliability of the instrument. Responses were divided using odd numbers for one set and even numbers for the other set. The reliability coefficient was then calculated using the Spearman-Brown prophecy formula as indicated here below:

$$Reliability\ of\ the\ overall\ test = \frac{2 \times reliability\ for\ \frac{1}{2}\ tests}{1 + reliability\ for\ \frac{1}{2}\ tests}$$

3.8 Validity of Data Collection Instruments

Validity refers to the appropriateness, meaningfulness and usefulness of the inferences a researcher makes. It is the strength of our conclusions, inferences or propositions. More formally, Cook and Campbell (1979) define it as the "best available approximation to the truth or falsity of a given inference, proposition or conclusion. According to Mugenda and Mugenda (1999), validity is the degree to which a test measures what it purports to measure. It enables the researcher to remove irrelevant, biased and ambiguous questions hence promoting validity.

Validity of instruments refers to the accuracy, clarity, soundness, suitability, meaningfulness or technical soundness of the research instrument. Validity was achieved through pilot study where the irrelevant items were removed. Secondly, the instrument was given to a peer for review and comments and lastly the supervisor for further review and technical input.

3.9 Operational Definition of Variables

A variable is an empirical property that can take two or more values. It is any property that can change, either in quantity or quality.

A dependent variable is a variable whose outcome depends on the manipulation of the independent variables. In this study the dependent variable was quality service delivery. Independent variable on the other hand is a variable that is manipulated to cause changes in the dependent variable. In this study the independent variables were ICT infrastructures, ICT skills and capacity, level of ICT usage and ICT security and risks. Moderating variables behaves like the independent variable in that it has a significant contributory or contingent

effect on the relationship between the dependent and the independent variable. In this study the moderating variable was management support. Intervening variable is a variable that might affect the relationship of the dependent and independent variables but it is difficult to measure or to see the nature of their influence. In this study the intervening variables were motivation level and health status.

An operational definition describes how the variables are measured and defined within the study. It is a description of a variable, term or object in terms of the specific process or set of validation tests used to determine its presence and quantity. It is generally designed to model a conceptual definition. Table 3.1 is a summary of the operational definition of variables in the study showing the indicators, measure of indicators, measurement scale, tools and type of analysis. Nominal scales were used to investigate the various variables in the study.

Table 3.1: Operational definition of variables

RESEARCH OBJECTIVES	VARIABLE	TYPE OF VARIABLE	INDICATORS	MEASURES OF INDICATORS	DATA COLLECTION METHOD	MEASUREMENT SCALE	TYPE OF ANALYSIS	LEVEL OF ANALYSIS
To assess the status of ICT infrastructure at the Ministry of Public Works and their influence on the quality of service delivery.	ICT infrastructure	Independent variable	• Presence of relevant ICT infrastructure • Condition of ICT infrastructure • Relevance to job description • Complexity of ICT infrastructure	• Number of relevant ICT facilities • Number of working ICT facilities • Frequency of use of the facility in daily operations • Ease of use of ICT infrastructure	• Questionnaire • Observation	Nominal	Descriptive statistics	Proportions
To assess the level of knowledge of ICT among the government officials for quality service delivery.	ICT skills and capacity	Independent variable	• Level of training • Relevance to job description • Duration of experience • On-job training	• Acceptable ICT qualifications • Application of the skills in daily operations • Number of years of experiences • On-job training	• Questionnaire • Records	Nominal	Descriptive statistics	Proportions
To determine the influence of level of ICT access, usage and expertise on quality of service delivery.	Level of ICT usage	Independent variable	• Possession of relevant ICT skills • Attitude towards ICT • Presence of working internet connections • Link with other departments	• Ease of use of ICT infrastructure • Frequency of ICT usage • Frequency of internet use for job related tasks • Official means of communication	• Questionnaire • Observation	Nominal	Descriptive statistics	Proportions

To explore the impact of risks and security issues associated with ICT adoption on the quality of service delivery.	ICT security and risks	Independent variable	• Access security measures • Unauthorized access to workstations. • Theft of facilities • Malicious damage of information • Computer viruses • Use of passwords	• Access security rating • Number of unauthorized access cases • Number of theft cases • Number of cases of malicious damage of information • Number of cases of viruses infection • Number of password use cases	• Questionnaire • Observation	Nominal	Descriptive statistics	Proportions
To evaluate the influence of management support on quality of service delivery.	Management support	Moderating variable	• Resource facilitation • Training and capacity building • Motivation and encouragement • Response to queries • Maintenance of ICT facilities	• Number of ICT facilities • Frequency of ICT trainings • Frequency of ICT usage • Number of queries responded to promptly • Frequency of maintenance of ICT facilities	• Questionnaire • Observation	Nominal	Descriptive statistics	Proportions

3.10 Methods of Data Analysis

This study generated both quantitative and qualitative data. The completed questionnaires were edited to ensure that they are complete and thorough. The qualitative data from open ended questions were coded to enable quantitative analysis. The coded data and the quantitative data were analyzed using descriptive statistics. Statistical Package for Social Sciences was used to analyze data in order to establish relationship between the variables. Writing was done using Microsoft word and findings presented in tables.

3.11 Ethical Considerations

Prior to embarking on the study, the researcher sought written permission from the concerned authorities. The questionnaire was approved by the supervisor before being used in the research. The participants were informed of the purpose of study and assured of confidentiality. No names were required on the questionnaire and participation was voluntary.

3.12 Summary of Chapter Three

The chapter dealt with the research methodology which outlined how the research was done. It detailed the research design, the population which was involved in the study and also the methods of data collection and data analysis. The determination and the results of validity and reliability of the study and the research instruments were also explained. The research variables in the study were also identified and ways of measuring then has been elaborated. Finally the ethical considerations in the study were specified.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents the research findings obtained from the participants from the Ministry of Public Works – headquarters, Nairobi, where the study was conducted. The findings of this study generated enough information which effectively answered the research questions. The survey focused on assessing the status and the influence of ICT infrastructure, ICT skills and capacity, level of ICT usage, risk and security issues associated with ICT adoption and management support in ICT integration and how they influence on service delivery.

4.2 Response Rate

This study was conducted in all the nine departments of the Ministry of Public Works. A total of 228 questionnaires were administered to randomly selected members of staff from each department. Out of these, 207 were successfully collected indicating a **90.8%** response rate. The response per department was as shown in Table 4.1:

Table 4.1: Survey Return Rate

S/No.	Department	Number of Questionnaires issued	Return rate	Percentage (%)
1	Accounts	12	11	91.7
2	Administration	36	32	88.9
3	Architectural	48	44	91.7
4	Electrical and Mechanical Engineering	44	40	90.9
5	KBRC	8	8	100
6	Quantities and Contracts	24	22	91.7
7	Structural and Civil Engineering	32	29	90.6
8	Supplies Branch	16	14	87.5
9	Supply Chain Management	8	7	87.5
	Total	**228**	**207**	**90.8**

4.3 Descriptive Characteristics of the Respondents

The male population was higher among the respondent accounting for 64.7% in comparison to 35.3% of the female colleagues. 63.8% of the respondents had worked in the ministry for between one and five years while only 3.4% had worked for over 31 years in the ministry. Table 4.2 is a summary of the general characteristics of the respondents.

Table 4.2: Characteristics of the respondents

Variable		Frequency	Percentage (%)
Gender of respondent	Male	134	64.7
	Female	73	35.3
	Total	207	100
Years of working in the Ministry of Public Works	0 – 5	132	63.8
	6 – 10	32	15.5
	11 – 20	24	11.6
	21 – 30	12	5.8
	31 and above	7	3.4

4.4 Factors that Influence ICT Integration for Quality Service Delivery.

The questions used in the survey, the focused group discussion and observations were aimed at addressing the factors that influence ICT integration for service delivery. The results were organized in the following sub-sections; ICT infrastructure, ICT skills and capacity, level of ICT usage, ICT risks and security and management support in ICT integration.

4.5 ICT Infrastructure and Service Delivery

The status and the influence of ICT infrastructure was measured using both closed and open ended questions and also observation. In open-ended questions the respondents were given room to explain their answers in detail. 94.7% of the respondent agreed that there are ICT facilities which are relevant for their job description within their reach and 96.6% were comfortable using them with their level of ICT skills. 80.2% agreed that the facilities were in a satisfactory condition while 10.6% believed they were excellent. Only 9.2% said that the facilities were in poor condition. However, 86.5% shared facilities and out of these 71.5%

admitted that the sharing had an effect in the service delivery. The shared facilities included computers, printer, plotters and telephone. 61.8% felt that there was missing facilities most which are the shared facilities. Table 4.3 summarizes the status of ICT infrastructure in the Ministry of Public Works.

Table 4.3: Status of ICT infrastructure

Variable		Frequency	Percentage
Relevance of equipment to job description	YES	196	94.7
	NO	11	5.3
Condition of the ICT facility	Excellent	22	10.6
	Satisfactory	166	80.2
	Poor	19	9.2
	No facility	0	0
Sharing of facilities	YES	179	86.5
	NO	28	13.5
There is effect of sharing	YES	128	71.5
	NO	51	28.5
Missing facility	YES	128	61.8
	NO	79	38.2
Easy to use the facility with skills possessed	YES	200	96.6
	NO	7	3.4

Observation method found that there was a common machine room in the technical departments (Architectural, Electrical and Mechanical, KBRC and Structural and Civil departments). In the machine room is where the plotters, printers, large scale photocopiers and few computers were located. This is where the bulk printing and production of large drawings was done. The small printers were also available for those who could not access them from their workstations or offices. In some open office set-ups, the computers were networked to a printer such that one could print from his/her workstation. Most computers observed were the desktop computers but there were few laptops especially for those in management positions or closed office set-up.

4.6 ICT Skills and Capacity and Quality Service Delivery

It was observed that 4.3% of the employees did not have any training at all while 86% had basic training in ICT. 9.7% had advanced training. Those with advanced training were noted to be from the ICT section of the ministry. 83.1% had over two years of experience in ICT and 96% agreed that the skills they have were relevant for their job description. However, only 22.7% have had some form of ICT training while working at the ministry. The courses were noted to have been between three and six months. Table 4.4 summarizes the ICT skills and capacity.

Table 4.4: ICT skills and capacity

Variable		Frequency	Percentage
Level of ICT training	No training	9	4.3
	Basic	178	86
	Advanced	20	9.7
On job training	YES	47	22.7
	NO	160	77.3
Years of experience in ICT	0 - 0.25	9	4.3
	0.25 - 0.5	4	1.9
	0.5 - 1	1	0.5
	1 - 2	21	10.1
	2+	172	83.1
Relevance of skills to job description	YES	190	96
	NO	8	4

4.7 Level of ICT Usage and Quality of Service Delivery

Under the level of usage of ICT for service delivery, 78.7% were rated as average users of ICT and only 5.8% were rated as below average users. Those with no training and therefore had no skills remained at 4.3% as in the previous subsection. The level of usage of ICT was high among the staffs of the ministry with 80.2% using ICT always in their operations and only 4.8% rarely using ICT and 3.4% do not use ICT at all. Internet connection is adequate with 96.6% of the skilled users having working internet connections. However, it was observed that the internet was not sufficiently used for job related tasks. Only 39.1% always used the internet for official tasks while 34.8% frequently used the internet for job related

tasks. 14.5% occasionally used the internet, 6.8% rarely used it and 4.8% did not use internet at all for official tasks. In communication, ICT is not well used in the ministry. Written memos accounted for 92.2% of the official communication while telephone takes 84.1%. Emails take only 15% of the communication despite having working internet connection. Only 30.9% had work-related email address. About satisfaction with the means of communication, 67.6% said they were not satisfied with the current official communication with only 32.4% feeling satisfied with the means of communication. The respondents suggested the use of technology i.e. use of emails, intranet and teleconferencing as ways of improving communication within the ministry. Table 4.5 summarizes the ICT usage in the ministry.

Table 4.5: ICT usage for service delivery

Variable		Frequency	Percentage
User rating	Excellent	23	11.1
	Average	163	78.7
	Below average	12	5.8
	No skills	9	4.3
Frequency of use of available ICT facilities	Always	166	80.2
	Occasionally	24	11.6
	Rarely	10	4.8
	Never	7	3.4
	No facility	0	0
Internet connection	YES	200	96.6
	NO	7	3.4
Internet use for official tasks	Always	81	39.1
	Frequently	72	34.8
	Occasionally	30	14.5
	Rarely	14	6.8
	Never	10	4.8
Work related email address	YES	66	30.9
	NO	141	69.1
Official means of communication	Email	31	15
	Memo	191	92.2
	Oral	26	12.6
	Telephone	174	84.1
	SMS	7	3.4

Satisfied with means of communication	YES	67	32.4
	NO	140	67.6

4.8 ICT Risks and Security and Quality Service Delivery

Among those who participated in the study, 49.3% felt that the access security measures in their departments were medium and 36.7% felt it is low. 5.8% were categorical that they were no measures and only 8.2% seemed satisfied with the security measures that were employed in the various departments. 36.2% admitted that there was unauthorized access to workstations and 20.8% have lost an ICT facility. Higher cases of unauthorized access to workstations were reported in open offices set-up where majority shared facilities. 90.8% reported to have had cases of computer viruses and 88.4% used anti-viruses programs in their computers to protect their data. According to this study, 77.8% used passwords in their computers to limit access but 71.4% of those who used passwords admitted to have disclosed the password to other people. Again this was in areas where they shared facilities. Table 4.6 shows in summary how the participants responded to the ICT and security issues associated with ICT adoption.

Table 4.6: ICT risks and security

Variable		Frequency	Percentage
Access security measures ratings	High	17	8.2
	Medium	102	49.3
	Low	76	36.7
	No measures	12	5.8
Cases of unauthorized access to workstations	YES	75	36.2
	NO	132	63.8
Loss of ICT facility	YES	43	20.8
	NO	164	79.2
Malicious damage of e-information	YES	56	27.1
	NO	151	72.9
Cases of computer viruses	YES	188	90.8
	NO	19	9.2
Use of anti-viruses	YES	183	88.4
	NO	24	11.6
Use of passwords	YES	161	77.8
	NO	46	22.2

Disclosing passwords	YES	115	71.4
	NO	46	28.6

4.9 Management Support in ICT Integration

Management support is crucial for quality service delivery. According to this study, 79.7% of the staff agreed that the management encouraged the use of ICT. Management is also responsible for provision of facilities. As was highlighted earlier, 94.7% admitted to having a relevant ICT facility within their reach. This shows that there is support and encouragement by the management. However, 52.1% of those who have had ICT queries with the management felt that the response was poor and only 36.8% felt that the response was satisfactory. Still 6.8% said that there was no response at all. Again 59.4% said that the maintenance of the ICT facilities was poor and only 36.7% were satisfied with the maintenance of the ICT facilities in their departments as summarized in Table 4.7

Table 4.7: Management support in ICT integration

Variable		Frequency	Percentage
Management encouragement	YES	165	79.7
	NO	42	20.3
Queries to management	YES	117	56.5
	NO	90	43.5
Management response rating	High	5	4.3
	Satisfactory	43	36.8
	Poor	61	52.1
	No response	8	6.8
Maintenance of ICT facilities rating	High	3	1.4
	Satisfactory	76	36.7
	Poor	123	59.4
	No maintenance	5	2.4

4.10 ICT Integration and Quality Service Delivery

According to this study, 73.4% were satisfied with the quality of service delivery in the Ministry of Public Works while 26.6% felt otherwise. On whether ICT integration enhances quality service delivery, the participants were provided with a five-point Likert scale (i.e. Strongly Agree, Agree, No Opinion, Disagree and Strongly Disagree) to indicate their degree of agreement. 55.1% strongly agreed that ICT enhances quality of service delivery with 41.5% agreeing with the same. 2.4% did not have an opinion while 0.5% strongly disagreed. To emphasize that, 93.7% agreed that ICT adoption in the Ministry of Public works had improved on the quality of service delivery.

Table 4.8: ICT integration and quality service delivery

Variable		Frequency	Percentage
Satisfied with quality of service delivery	YES	152	73.4
	NO	55	26.6
Degree of agreement	Strongly agree	114	55.1
	Agree	86	41.5
	No opinion	5	2.4
	Disagree	1	0.5
	Strongly disagree	1	0.5
Opinion on ICT improving service delivery	YES	194	93.7
	NO	13	6.3

4.11 Correlation of Variables

Correlation describes the degree of relationship between two variables. Spearman's rank correlation is used to determine the strength of association between variables of interest. 1-tail test tests the possibility of a relationship in one direction. This is what has been used in this study. Correlation of the variables was generated from SPSS analysis and is as shown in the following tables.

Table 4.9: Correlation between ICT infrastructure and quality service delivery

		Satisfied with quality of service delivery
Relevance to job description	Correlation Coefficient	-.045
	Sig. (1-tailed)	.260
Ease of use of the available facility	Correlation Coefficient	.069
	Sig. (1-tailed)	.162
Condition of the facility	Correlation Coefficient	.020
	Sig. (1-tailed)	.389
Sharing of facility	Correlation Coefficient	-.046
	Sig. (1-tailed)	.255
Effect of sharing	Correlation Coefficient	.027
	Sig. (1-tailed)	.362
Missing Facility	Correlation Coefficient	.045
	Sig. (1-tailed)	.259

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

*. Correlation is significant at the 0.05 level (1-tailed)

From Table 4.9 it is clear that there is a positive correlation between condition of ICT facilities and ease of use of the facility and user satisfaction for quality service delivery. There also a negative correlation between sharing of ICT facilities and user satisfaction for quality service delivery. This shows that adequate facilities that are in good working condition and which the user is comfortable using will lead to quality service delivery.

Table 4.10: Correlation between ICT skills and capacity and quality service delivery

		Opinion on ICT improving service delivery
Training in ICT	Correlation Coefficient	-.091
	Sig. (1-tailed)	.096
On job training	Correlation Coefficient	-.097
	Sig. (1-tailed)	.081
Years of experience in ICT	Correlation Coefficient	.018
	Sig. (1-tailed)	.400
Relevance of skills to job description	Correlation Coefficient	.055
	Sig. (1-tailed)	.219

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

*. Correlation is significant at the 0.05 level (1-tailed)

The relevance of skills in ICT and years of experience in ICT has a positive correlation as can be seen from Table 4.10. Training has a negative correlation showing that the current training level of the personnel is not sufficiently enough to offer quality services.

Table 4.11: Correlation between ICT usage and quality service delivery

		Opinion on ICT improving service delivery
How users rate themselves as ICT users	Correlation Coefficient	.049
	Sig. (1-tailed)	.241
Frequency of use of the ICT facility	Correlation Coefficient	.024
	Sig. (1-tailed)	.363
Internet use for official tasks	Correlation Coefficient	-.065
	Sig. (1-tailed)	.175

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

The user ratings and frequency of use of ICT facilities has a positive correlation with quality service delivery. But internet use for official tasks has a negative correlation with user satisfaction of service delivery. This means that efforts to boost the user confidence and internet application for official tasks need to be employed. These include training and refresher courses as well as encouraging the use of internet.

Table 4.12: Correlation between ICT risks and security and quality service delivery

		Opinion on ICT improving service delivery
Access security measures ratings	Correlation Coefficient	-.021
	Sig. (1-tailed)	.383
Cases of unauthorized access to workstations	Correlation Coefficient	-.012
	Sig. (1-tailed)	.432
Loss of ICT facility	Correlation Coefficient	-.083
	Sig. (1-tailed)	.116
Cases of computer viruses	Correlation Coefficient	.194**
	Sig. (1-tailed)	.003

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

*. Correlation is significant at the 0.05 level (1-tailed)

The access security measures and unauthorized access to workstations have a negative correlation showing that the majority are not satisfied with the access measures in place.

Table 4.13: Correlation between management support and quality service delivery

		Opinion on ICT improving service delivery
Management encouragement	Correlation Coefficient	.365**
	Sig. (1-tailed)	.000
Queries to management	Correlation Coefficient	.054
	Sig. (1-tailed)	.219
Response rating	Correlation Coefficient	-.020
	Sig. (1-tailed)	.414
Maintenance rating	Correlation Coefficient	-.006
	Sig. (1-tailed)	.464

From Table 4.13, there is a positive correlation between the management encouragement and staff opinion on ICT improving service delivery but a negative correlation between response rating from the management and maintenance of ICT facilities and quality service delivery. This shows that the management need to be more supportive both morally and the facilitation of maintenance services for quality service delivery

4.12 Summary of Chapter Four

The chapter explored an overall 90.8% survey return rate, summary of respondents' gender, years of service and factors that influence the integration of ICT in quality service delivery at the Ministry of Public Works. The factors are; ICT infrastructure, ICT skills and capacity, level of usage, ICT skills and capacity and management support in ICT adoption.

Information on the factors was collected using questionnaires, focused group discussions and observations. The questionnaires used contained both closed and open ended questions. In

open-ended questions the respondents provided qualitative data. Closed-ended questions were refined using Arbitrary scale and Likert scale or made a choice of "Yes" or "No" answers.

Descriptive statistics such as frequencies and percentages were used in data analysis. The analyzed data was presented in tables. Data from discussions and observation were used to reinforce those obtained by questionnaires.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction.

This chapter consists of summary of the research findings, a discussion of the findings and then the recommendations based on the research findings. This research was guided by five objectives and five research questions. The descriptive survey research method was used and questionnaires, focused group discussions and observation methods were used as the data collection methods. The summary of the findings is as shown in Table 5.1.

Table 5.1: Summary of findings

RESEARCH OBJECTIVE	RESEARCH FINDINGS
To assess the status of ICT infrastructure at the Ministry of Public Works and their influence on the quality of service delivery.	- 94.7% of the employees had relevant ICT facility within their reach. - 80.2% respondents said that the facilities were in good and satisfactory working condition. 10.6% believed that the facilities were excellent with only 9.2% saying that the facilities were in a poor condition. - 80.2% of the employees said that they always used the available ICT facilities in their daily official tasks with only 4.8% saying the rarely used the facilities. - 96.6% of the respondents said that they were comfortable using the ICT facilities with the ICT skills they possessed. - 86.5% admitted that there is a facility that they shared with 71.5% of those saying that the sharing affected their service delivery. Most of the shared facilities were in common machine rooms.
To assess the level of knowledge of ICT among the government officials for quality service delivery.	- 86% of the respondents said they had basic training in ICT. 9.7% believed their training in ICT was at an advanced level and only 4.3% said they had no training in ICT. - 77.3% of the employees had never had any form of training or refresher courses while working at the ministry while only 22.7% admitted to have had some form of training. - 83.1% said they had over two years of experience in ICT while only 4.3% had less than four months of experience in ICT.

	- 96% of the employees said that the skills they possessed were relevant to their job description and were comfortable using the available ICT facilities.
To determine the influence of level of ICT access, usage and expertise on quality of service delivery.	- 94.7% of the employees had relevant ICT facility within their reach. - 96% of the employees said that the skills they possessed were relevant to their job description and were comfortable using the available ICT facilities. - 78.7% of the employees rated themselves as average users of ICT and 11.1% said they were excellent in the use of ICT. Only 5.8% rated themselves below average and 4.3% said they had no skills. Those who had never had any training are the same ones who said they had no skills. - 80.2% of the employees said that they always used the available ICT facilities in their daily official tasks with only 4.8% saying the rarely used the facilities. - 96.6% had working internet connection and 34.8% frequently used the internet for official tasks. Only 6.8% rarely used internet for official tasks. - All the respondents said that they required link with other departments and sections within the department. 92.2% used written memos as the official means of communication while email took only 15% despite having a working internet connection. - 67.6 % admitted that they were not satisfied with the means of communication employed by the ministry.
To explore the impact of risks and security issues associated with ICT adoption on the quality of service delivery.	- 49.3% of the employees rated the access security measures taken in their departments as medium while 36.7% rated the measures as low. 5.8% said there were no security measures at all. - 36.2% admitted to have had unauthorized access to their workstations. - 20.8% said that they had lost an ICT facility at one point while 27.1% said they have had malicious damage of their electronic data. This was either data being deleted by other people or computers crashing due to viruses. 86.5% said that they shared a facility. - 90.8% admitted to have had cases of computer viruses and 88.4% said they used anti-viruses in their computers. - 77.8% said that they used passwords in their computers but out of those 71.4% admitted to have disclosed the password to another person.
To evaluate the	- 94.7% of the employees had relevant ICT facility within their reach. - 77.3% of the employees had never had any form of training or

influence of management support in ICT integration on quality of service delivery.	refresher courses while working at the ministry while only 22.7% admitted to have had some form of training. - 79.7% admitted that the management encourages the use of ICT. - 56.5% said that they have had ICT related queries with the management. However, 52.1% rated the response as poor while 6.8% said there was no response at all. Only 36.8% were satisfied with the response. - 59.4% rated the ICT maintenance as poor and 2.4% said there was no maintenance at all. Only 36.7% found the ICT maintenance to be satisfactory.
Quality of Service Delivery at the Ministry of Public Works	- 73.4% of the employees were satisfied with the quality of service delivery at the Ministry of Public Works. 26.6% were not satisfied. - 55.1% strongly agreed that ICT integration enhances quality service delivery while 41.5% agreed with the statement. Only 0.5% disagreed with the statement. - 93.7% of the employees agreed that the adoption of ICT in the ministry had improved on the quality of service delivery.

5.2 Discussion of Findings

The researcher successfully investigated and analyzed the factors; ICT infrastructure, ICT skills and capacity, level of ICT usage, ICT risks and security and management support in ICT integration in the Ministry of Public Works.

5.2.1 ICT infrastructure and service delivery

ICT infrastructure constitutes a significant barrier to implementation of e-governance projects in Africa; yet ICT infrastructure in government institutions is technically inferior to those in private sectors and NGOs (UN, 2012). According to Gichoya (2005) most developing countries, Kenya being one of them, are characterized by limited computer application in the public sector, inadequate infrastructure and shortage of skilled manpower. But Ndemo (2007) emphasizes that over the last five years, the Kenyan government has initiated some capital investment towards set up and installation of reliable ICT infrastructure.

This study revealed that the Ministry of Public Works has done well as far is ICT infrastructure is concerned. 94.7% admitted to have a relevant ICT facility within their reach

and 96.6% had working internet connection available to them. 80.2% agreed that the facilities were in satisfactory working condition with 10.6% finding them excellent. However 86.5% of the staff shares some facilities with 71.5% of those admitting that the sharing had an effect in their service delivery. The most shared facilities include printers, plotters and photocopiers with few cases of computer sharing. Observation revealed that these shared facilities were in a common machine room meaning that those who wanted to use them had to go to those rooms. There were also other cases of a single printer in an open office set-up where the printer was connected to only one computer. This means that the user where the printer is connected would always have interruptions from the colleagues who wanted to use the printer. Also data is carried via portable storage devises like flash disks which are prone to viruses and Trojans. 90.8% of the respondents admitted to have had cases of computer viruses. In addition, users of shared facilities have to share passwords with their colleagues which further expose them to security threats. 71.4% admitted to have shared passwords with their colleagues.

Sharing of facilities was found to have major effects in productivity and services delivery. A lot of productive time is wasted during the movement from one location to another. This significantly slows down service delivery and limits continuous workflow and timely delivery of services. There is procrastination of tasks especially if a facility is located in office where one does not have access to delaying timely service delivery and also affecting other related services. On the other hand and from a positive perspective, sharing enables workers to work together in a peaceful co-existence and also there is good utilization of available limited space.

To counter the effects of sharing, the respondents suggested the networking of computers and printers and also provision of computers to every staff. 61.8% of the participants believed that there is a facility that is missing.

5.2.2 ICT skills and capacity and quality service delivery

Organizations with relatively high (or low) proportions of skilled workers can be expected to have a comparative advantage (or disadvantage) in minimizing the costs both of ICT adoption and of learning how to make best use of ICTs (Forth and Mason, 2004). The availability of literate, efficient and dependable workforce is critical for the success of e-governance and successful adoption and integration of ICT.

This study revealed that 86% the staff have basic ICT training and 9.7% have advance training in ICT. It was however noted that only 22.7% have had some training in ICT while working at the ministry. The training programs took less than six months meaning that the majority of the staffs must have had ICT training prior to employment in the ministry. The Ministry of Education introduced the National ICT Strategy for Education and Training in June 2006, with the aim of integrating ICT in education, harnessing emerging technologies and ensuring access to ICT skills and training (GOK-MOE, 2006). This is all in a bid to ensure that as citizens leave the learning institutions they have the required skills to use ICT facilities both as employees (both in public and private sector) and as citizens. The majority of the staff at the Ministry of Public Works therefore could have acquired their ICT skills from the learning institutions.

Basic ICT skills are important but not adequate for quality service delivery. Right technical skills that match with the job description are important to develop and use e-projects. This is according to the African Information Society Initiative (AISI, 2002). This study revealed that 96% of the staffs have the basic skills which are relevant to their job description and therefore quality service delivery is guaranteed.

Sarker et al., (2006) fears are that the civil servants who will benefit from and promote e-governance are not yet ready. They also cited lack of adequate skills and adequate experience in ICT usage as what may impede the implementation of e-government programmes and ICT adoption. However, this study revealed that 96% have relevant skills and 83.1% have over two years of working experience in ICT. This shows that the Ministry of Public Works is ready and able to implement ICT related programmes with the skills possessed by the personnel.

5.2.3 Level of ICT usage and quality of service delivery

Rosenberg (2005) observed that relationship exists between use of ICT and job enhancement. Use of ICT provides significant benefits in work measurement, cost reduction, productivity improvement and better services to customers and clients. The combined access and use of ICTs can enhance the job performance.

This study revealed that 78.7% of the staff rated themselves as average users of ICT and 11.1% felt they were excellent users. Only 5.8% felt they were below average while 4.3%

said they do not have ICT skills. 80.2% said that they always used the available ICT facilities with only 4.8% rarely using the facilities. With 94.7% in agreement that they had access to a working ICT facility, then job enhancement and performance is almost guaranteed at the Ministry of Public Works.

96.6% of the respondent had working internet connections. However, it is not fully used for official tasks. Only 39.1% of the employees always used the internet used for official tasks. 14.5% said they occasionally used internet for job related tasks while 6.8% rarely used the internet. Worse still 4.8% never used the internet at all for job related tasks. 69.1% said they do not have a work related email address and only 15% used emails as the official means of communication.

All the respondents said that they required link with other departments or sections within their department. Written memos were reported be the official means of communication by 92.2% of the respondent. 84.1% cited the analogue landline telephones as the official means of communication. Despite the 96.6% working internet connection, email communication was reported to be in use by only 15%. This clearly shows that ICT has not been fully embraced as a means of communication. As a result, 67.6% of the staffs were not satisfied by the official means of communication.

Use of email as a faster mode of communication compared to the 'traditional' memo signed by the head of departments, networking department and the introduction of intranet were given as suggestions on how to improve communication within the ministry. The ministry is rich in ICT skills and so the adoption of ICT in official communication would be very easy and readily acceptable.

5.2.4 ICT security and risks and quality service delivery

Building access as a security issue is particularly important where your building or office is readily accessible to the public, or where open windows are accessible from the street. This is according to a security guide by Lasa (UK) (Runeckles and Maison, 2009). According to the guide it is required that you know who has access to your building or office(s) and take appropriate measures. This study revealed that 49.3% believed that the access security measures are medium. But 36.7% believed that the measures are low and 5.8% declared that there are no access security measures. This is a big risk which can have profound

consequence. The access security measures must be improved for successful implementation and integration of ICT at the Ministry of Public Works.

According to Runeckles and Maison (2009), protection of personal data calls for a number of organizational and technical measures to prevent unauthorized access and processing, for example by protecting premises and preventing unauthorized access to personal data either stored or during transmission. UCISA (2005) and UNDP and Panos (2011) further add that secure systems are needed to impede unauthorized access to data. From this study, 63.8% admitted that unauthorized people do have access to their workstations. Moreover, 20.8% reported to have lost an ICT facility. Most of the lost items are the portable ones like laptops, flash disks, cameras and mobile phones but still there were cases of loss of computer monitors and CPU. Unauthorized access exposes the staffs to security risks like theft of properties.

Runeckles and Maison (2009) noted that people can be the biggest threat to the security of ICT systems whether inadvertently or deliberately. No matter how technically secure the ICT systems are, people can often be the weakest link. It is important that staffs are educated about the potential risks and how to avoid them. For example, the organization may carefully enforce secure and regular password changes to access the network itself. This study revealed that 77.8% of the staff used passwords in their facilities and worse still 71.4% of them have disclosed the passwords to other people. This definitely exposes them to malicious damage of information and their personal data and compromises their privacy.

Nizegorodcew (2007) observed that computer viruses are a universal problem. The problem of viruses is exacerbated by individuals who sneak in discs from cyber cafes and a lack of expertise to clean the computers. The cost of anti-virus software contributes to the problem. This study revealed that 90.8% have had cases of computer viruses. 88.4% admitted to using anti-viruses in their computers. Sharing of facilities was attributed be a major cause of computer viruses. 11.6% of those who do not use anti-viruses said that an anti-virus program had not been installed by the ICT personnel and that the anti-viruses programs are very expensive. As a curative measure, the ministry was urged to invest in genuine anti-virus programs.

Some of the suggestions as measures that would manage ICT risks and security include use of access control systems, installation of CCTV, having dedicated and vigilant security

guards, having lockable cabinets, ensuring all doors have working locks, having a central back-up system, emphasis on use of passwords, use of genuine anti-viruses and ensuring every staff has a computer to avoid sharing.

5.2.5 Management support and quality of service delivery

Top management support and commitment has often been considered to play a crucial role in any initiation and adoption process of ICT related programmes. It has great power to influence other members' behaviour within the organizations. Through long term strategic vision, top management can encourage the entire organization to learn and participate in e-government assimilation. In addition, by strong support from top management the necessary resources can be allocated to e-government program appropriately in high priority (Pudjianto and Hangjung, 2010).

This study revealed that management has supported ICT adoption to some extent. 79.7% of the staffs agreed that the management encouraged the use of ICT facilities. 94.7% admitted to having a working and relevant ICT facility within their reach. The level of usage of the facilities was high with 80.2% saying that they used the ICT facilities always in their job performances. 96.6% had working internet connection.

However, there are other areas where the management is obligated to play a key role and it has not as revealed by this study. One of such areas is training. 77.3% of the staff said that they had never had any training in ICT while working with the ministry. Another area is general and moral support. 56.6% admitted to have had some ICT related queries with the management and only 36.8% felt that the response was satisfactory. 52.1% rated the responses as poor with 6.8% saying there was no response at all. Management need to be in the lead in ICT integration by quickly and thoroughly handling ICT issues that are brought to their attention.

Communication is another area where management has a lot of influence. The study revealed that electronic based form of communication is not emphasized, despite having working internet connections. The traditional written memo is widely used taking 92.2% while emails take only 15% of the communications. 67.6% of the staffs are not satisfied with the official means of communication.

Maintenance of the ICT facilities is another responsibility of the management team. Another poor performance of the management was exposed with 59.4% of the respondents rating the maintenance as poor. Only 36.7% were satisfied with the maintenance measures while 2.4% said according to them there is no ICT maintenance at their departments.

It was noted that, those in management were older and had worked for more years. According to Paul, Opal, Vanesa and Karlene (2008) older managers are more likely to be uncomfortable with taking rapid steps towards ICT adoption, while younger individuals may be more likely to embrace ICT. Those in management and influential positions should be at the fore front leading the integration of ICT in organizations for quality service delivery.

5.3 Conclusion

The researcher considered factors and issues which relate to ICT adoption and integration in the Ministry of Public Works. Given the fast developing ICT, it is expected that ICT will bring changes in the way organizations are run and governed. It is thus important for the policy makers, government ministries administrators and management to understand the factors affecting ICT integration and the strategies that can be appropriately explored to make such changes viable to all.

ICT infrastructure is an essential foundation for the information society. Being everything that supports the flow and processing of information, ICT infrastructure constitutes a significant enhancer (or barrier) to implementation of e-governance and ICT integration projects. For quality service delivery the ICT facilities should be readily available. They should give the expected results in the required quality and within the required timeframe. The infrastructure should be flexible so that they can be easily integrated in the systems for user satisfaction. They should also be cost effective in that they should be able to deliver services at lower cost as compared to service delivery without use of ICT facilities. An infrastructure cost, the cost of installation and maintenance and the cost of running should also be reasonable and within reach of the organizations.

Mastering the use of ICT has become a core competency for competition and sustained development. It is also likely to become a core competency in delivering public services, education and training. The availability of literate, efficient and dependable workforce is critical for the success of ICT integration programmes. Organizations with relatively high (or

low) proportions of skilled workers can be expected to have a comparative advantage (or disadvantage) in minimizing the costs both of ICT adoption and of learning how to make best use of ICTs. Basic ICT skills are important but not adequate for quality service delivery. Right technical skills that match with the job description are important to develop and use. Public officials should be trained and retrained in application of new technologies for improved governance and quality service delivery. To sustain this, there is a need for rethinking education as a whole to produce the future ICT integration implementers.

A relationship exists between use of ICT and job enhancement. Use of ICT provides significant benefits in work measurement, cost reduction, productivity improvement and better services to customers and clients. Actually it is availability which makes use possible and it is use that makes performance attainable. So the combined access and use of ICTs can enhance the job performance. Organization culture should accommodate and encourage the ICT applications in its operations. Fears the adoption of ICT in the systems will threaten individuals' positions and source of livelihood should be eliminated. The gender gap should be minimized by encouraging both sexes to adopt ICT through measures like equal facilitation and access to ICT facilities, training and motivation. There is a need for breaking the ICT phobia through incentives, awareness and training. Training will boost self confidence and self esteem which as a result will increase the motivation and interest in ICT and technology in general. This will break the fear and improve performance towards quality service delivery.

A comprehensive approach is required in planning, developing, operating and maintaining the government's ICT security processes. The ICT security measures need to be incorporated early, in the requirement specification and design of the ICT system, before the implementation stage to ensure a cost-effective and comprehensive system. The ICT security process must cover all aspects of operation, including mechanisms used by hardware and software systems, networks, databases and other related systems and facilities. The goal is to achieve a secure working environment for employees and other persons working at or visiting the government's facilities as well as to help establish processes to ensure the protection of information. There should be restricted access to buildings and workstations, use of passwords, computer anti-viruses and anti-hacking mechanisms.

The managerial beliefs and support in initiatives and participation in adoption and diffusion of IT innovation in organizations play a key role in its success. Top management support and

commitment has often been considered to play a crucial role in any initiation and adoption process. It has great power to influence other members' behaviour within the organizations. Through long term strategic vision, top management can encourage the entire organization to learn and participate in ICT integration. In addition, by strong support from top management through resource allocation, facilities provision, training, moral support, motivation and encouragement can lead to the successful implementation of ICT adoption in government offices.

5.4 Recommendations

The research findings and interpretation reveal that measures need to be taken to ensure that the ICT integration in government offices reaches its full utilization and achieves its maximum potential. What have been done are the initial stages in ICT adoption but more effort need to be taken to ensure the sustainability of the implementation. The following recommendations are put forward for consideration.

1. The management should provide enough quality ICT facilities for every staff. Enough facilities combined with the relevant skills will translate to timely delivery of services. Sharing of facilities results to time wastage and delays in service delivery. Also the sharing trends may result in loss of facilities, malicious damage of electronic data and compromises the privacy of the users. For quality and timely service delivery, there should be enough facilities for everybody.
2. New technologies are fast emerging and for ICT integration in any organization to remain relevant, the personnel must be trained continuously so as to be at par with the new trends. Government ministries should ensure that they train their personnel in ICT so as to enable them deliver quality services that meets the standards of the current times. It is also very important to train people in the areas of their specialization, not just the basic general skills. They should be provided with the relevant software and training on how to use them. For example the technical people need to learn the technical related ICT skills like CAD designs, accounts personnel require ACCT skills and Quantities and Contracts department personnel will require Orion skills for their daily operations.
3. The management should encourage and support the use of ICT in all areas in the ministry. There should be emphasis on email as the official means of communication

in the place of the traditional written memos. Emails are faster, easier and cost effective means of communication. All the departments should be interlinked via the Local Area Network (LAN) and intranet should be introduced where personnel can access information at the click of the button. It is also important to motivate the staff otherwise the same staff will use ICT to frustrate and delay delivery of service. The management should also empower the ICT section through increased resource allocation, both human resource and funding.

4. The ICT department is very crucial in the implementation of ICT integration projects. The management should therefore be ready and willing to invest in the ICT department. It need to be allocated enough resources both human resource and funding. With enough resources the ICT department will be in a position to put all the required ICT facilities, genuine softwares and the necessary connections to enable a smooth running ICT integration project. ICT personnel should also be deployed to every department. This will enable faster resolution to ICT related queries ensuring uninterrupted service delivery.

5. ICT infrastructure are normally very delicate and prone to damages if not well handled or maintained. Maintenance of the ICT facilities should be done regularly to detect, repair or replace worn out parts and defects. Failure to maintain regularly may lead to complete damage of components prompting the purchase of new equipment. This should be avoided since the cost implications are high.

6. Access security measures should also be employed and adhered to strictly. Most of the losses of ICT facilities occur due to the unauthorized access to buildings and workstations. Use of access control systems and surveillance cameras need therefore to be installed for a secure working condition. The security guards need also to be more vigilant and ensure that only the staffs and those with genuine, legal and acceptable intentions are allowed to access the premises. This will prevent unauthorized access to premises and workstations and also the loss of ICT facilities. Also personnel need to be trained on the need to use passwords and the dangers of sharing passwords. Ministries should also invest in genuine anti-viruses softwares and the staff need to be encouraged to use the anti-viruses at all times and especially when accessing the internet. This will minimize malicious damage of e-information.

7. Finally the government should make sure that the ICT policy is well known to all the employees and that policy guidelines are followed to ensure a smooth and successful implementation of ICT integration projects in government offices. ICT integration has a great potential of enhancing service delivery. All the stakeholders should play their parts to ensure the success of ICT integration in the government offices. Everybody should be made to understand that ICT is a tool that is used to solve human issues. It normally makes human activities easier but can never and will never replace human beings. There should be no fear in adopting ICT. At this point in time everybody should be ready, eager and willing to adapt to the changing times.

5.5 Suggestions for Further Studies

The study suggests further research to be done on the altitude toward ICT use by senior staff and the senior management. Most of the senior staff and those in senior management positions have used both systems of service delivery; the traditional manual systems and the modern technology based system of service delivery. A research need to be done to have their opinion on both systems.

Also a research can be done on the administrative culture and ICT integration in government offices. The government administration is characterized by protocol and bureaucracy. A research need to be done to identify the extent to which this bureaucratic culture influences in ICT integration.

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APPENDICIES

APPENDIX I

LETTER OF TRANSMITTAL

KIHIU SIMON NDUNG'U,
P.O BOX 41191-00100,
NAIROBI.

Dear respondent,

RE: RESEARCH DATA COLLECTION

I am your colleague at the Ministry of Public Works department of Electrical and Mechanical Engineering and also a Masters student at the University of Nairobi. I am carrying a research on **"Factors Influencing ICT Integration in Quality Service Delivery among Government Ministries in Kenya."** I am carrying out this research as a requirement for my study, as well as availing pertinent information for improving the integration of ICT in the Ministry of Public Works.

The questionnaire attached has been designed to gather information from respondents, which will be treated as confidential and no names will be mentioned in the research. The report will make recommendations for the improvement of ICT integration in order to improve the quality of service delivery in the ministry.

Your assistance in facilitating a successful study will be highly appreciated. A copy of research report, upon completion will be availed at your request.

Thanks in advance.

Yours faithfully,

.....

Kihiu Simon Ndung'u
Reg. No: L50/61461/2011

APPENDIX II

THE QUESTIONNAIRE

This questionnaire is aimed at collecting information on the factors that affect ICT integration in the Ministry of Public Works. The information that you will give will support the researcher in achieving his academic goals. The information will be treated with utmost confidentiality and will only be utilized for the purposes of this study. Your participation is highly appreciated.

(Please tick as appropriate)

PART 1: GENERAL INFORMATION

1. Department.....
2. Job description.....
3. Gender

   Male ☐ Female ☐

4. Number of years working in the Ministry

0-5	6-10	11-20	21-30	30 and above

PART 2: ICT INFRASTRUCTURE AND SERVICE DELIVERY

5. Tick to describe the ICT equipment at your workstation.

Computer	Printer	Telephone	Scanner	Photocopier	Plotter	Internet access	Other	None

Description (if other).....

Is the equipment relevant for your job description?

Yes ( ) No ( )

6. How would you rate the ICT equipment?

Excellent	Satisfactory	Poor	No facility

7. (a) Do you share any ICT facility with your colleagues?

Yes ( ) No ( )

(b) If yes which facility do you share and how crucial is the facility in your job performance?

Facility.....

Very Crucial	Not Crucial	An alternative	There are other options

(c) Does the sharing affect your service delivery?

Yes ( ) No ( )

If yes describe.....

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8. Are you comfortable using the ICT facility with your ICT skills?

Yes ( ) No ( )

9. Is there a facility you feel is relevant to your job description and has not been provided?

Yes ( ) No ( )

If yes describe.....

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PART 3: ICT SKILLS AND CAPACITY AND QUALITY SERVICE DELIVERY

10. What is you level of training in ICT?

No training	Basic	Advanced

11. Are your ICT skills relevant to your job description?

Yes ( ) No ( )

12. What is your duration of experience in ICT?

0 to 2 months	3 to 6 Months	6 to 12 months	1 to 2 years	Above 2 years	N/A

13. Have you ever had training in ICT use while working at the Ministry?

Yes ( ) No ( )

If yes what was the duration?

0 to 1 months	1 to3 Months	3 to 6 months	6 months to 1 year	Above 1 year	N/A

14. Please give suggestions on how you can improve your ICT skills.

.....

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.....

PART 4: LEVEL OF ICT USAGE AND QUALITY OF SERVICE DELIVERY

15. How do you rate yourself as an ICT user?

Excellent	Average	Below average	No skills

16. How often do you use the available ICT facilities in your job performance?

Always	Occasionally	Rarely	Never	No facilities

17. (a) Do you have internet connection at your work station?

Yes ( ) No ( )

(b) If yes, how often do you use the internet for job related tasks?

Always	Frequently	Occasionally	Rarely	Never

18. (a) Do you have official work-related email address?

Yes ( ) No ( )

(b) If yes, how many work-related (official) emails do you receive each day?

None	1-5	6-10	11-20	21-30	31 and above

19. (a) Do you require link with other departments or sections within your department?

Yes ( ) No ( )

(b) If yes, how is your official communication?

Email	Memo	Oral	Telephone	SMS

(c) Are you satisfied with the mode of communication?

Yes ( ) No ( )

20. Please give suggestions on how you can improve the communication within the ministry.

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PART 5: ICT RISKS AND SECURITY AND QUALITY SERVICE DELIVERY

21. How would you rate the access security measures taken in your department?

High	Medium	Low	No Measures

22. Do unauthorized people have access to your workstations?

Yes ( ) No ( )

23. Have you ever been a victim of a loss of ICT facility?

Yes ( ) No ( )

If yes describe.....

.....

.....

.....

24. Have you ever been a victim of malicious damage of work related electronic information?

Yes ( ) No ( )

If yes describe.....

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.....

.....

25. Have you ever been a victim of computer viruses?

Yes ( ) No ( )

26. Do you use anti-viruses in your computer?

Yes ( ) No ( )

Give reasons for your answer.....

.....

.....

.....

27. (a) Do you use passwords in your computer?

Yes ( ) No ( ) N/A ( )

(b) If yes, have you ever disclosed your password to a colleague or any other person?

Yes ( ) No ( )

28. What measures would you advocate for in order to curb loss of ICT facilities and malicious damage to electronic information?

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PART 6: MANAGEMENT SUPPORT AND QUALITY OF SERVICE DELIVERY

29. Does your management team encourage the use of ICT facilities?

Yes ( ) No ( )

30. (a) Have you ever had any ICT related query or request with your management?

Yes ( ) No ( )

(b) If yes how would you rate the level of response on your ICT queries by the management?

High	Satisfactory	Poor	No Response

31. How would you rate the maintenance of ICT facilities in your department?

High	Satisfactory	Poor	No Maintenance

PART 7: QUALITY SERVICE DELIVERY

32. Are you satisfied with the quality of service delivery in the Ministry of Public Works?

Yes ( ) No ( )

33. "ICT integration enhances quality service delivery". Please indicate your degree of agreement with the statement.

Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree

34. In your opinion has the adoption of ICT in the Ministry of Public Works improved on the quality of service delivery?

Yes ( ) No ( )

35. Please propose any strategy you feel will improve ICT integration and service delivery within the ministry.

.....

.....

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.....

.....

THE END

Thank you for spending your precious time on this important research. God bless you.

APPENDIX III

OWNERSHIP OF HOUSEHOLD ASSESTS

Table III: Number and % of households

	RADIO	%	TV	%	MOBILE PHONE	%	LANDLINE TELEPHONE	%	COMPUTER	%	OTHER	%
KENYA	6,489,453	74.0	2,456,594	28.0	5,538,689	63.2	105,367	1.2	311,543	3.6	3,528,84	32.2
NAIROBI	780,688	79.3	606,714	61.6	870,163	88.3	44,834	4.6	131,524	13.0	434,964	24.9
CENTRAL	1,042,279	85.1	495,395	40.4	918,440	75.0	11,011	0.9	45,400	3.7	520,324	33.9
COAST	455,555	62.3	194,196	26.6	476,347	65.1	11,235	1.5	27,978	3.8	308,395	31
EASTERN	959,056	74.6	265,876	20.7	758,368	59.0	7,320	0.6	19,950	1.6	575,475	37.3
N/EASTERN	175,277	56.1	10,925	3.5	90,091	28.8	1,251	0.4	1,936	0.6	49,249	2.7
NYANZA	890,689	75.0	221,636	18.7	686,075	57.7	7,512	0.6	21,671	1.8	466,203	34.5
RIFT VALLEY	1,506,917	70.5	494,209	23.1	1,255,706	58.8	17,890	0.8	51,363	2.4	719,553	28.7

Source: Kenya Population and Housing Census Report

APPENDIX IV

COUNTRIES WITH GOVERNMENT WEBSITES PROVIDING FOR CITIZEN PARTICIPATION

Table IV: List of countries with government websites providing a statement 'follow us on Facebook or Twitter'

AFRICA	AMERICA	ASIA	EUROPE	OCEANIA
Cote d'Ivoire	Antigua and Barbuda	Afghanistan	Andorra	Kiribati
Democratic Republic of Congo	Argentina	Azerbaijan	Austria	Vanuatu
Equatorial Guinea	Belize	Bahrain	Belgium	
Ethiopia	Brazil	Brunei Darussalam	Croatia	
Ghana	Canada	Georgia	Finland	
Guinea-Bissau	Chile	Iraq	France	
Morocco	Colombia	Israel	Germany	
Nigeria	Cuba	Japan	Greece	
Somalia	Dominican Republic	Malaysia	Hungary	
South Africa	Ecuador	Mongolia	Italy	
Sudan	El Salvador	Oman	Latvia	
Tunisia	Grenada	Pakistan	Liechtenstein	
	Guatemala	Philippines	Lithuania	
	Honduras	Qatar	Luxembourg	
	Mexico	Republic of Korea	Netherlands	
	Panama	Saudi Arabia	Norway	
	Paraguay	Singapore	Portugal	
	Peru	Thailand	Russian Federation	
	United States	United Arab Emirates	Spain	
	Uruguay	Uzbekistan	Sweden	
	Venezuela		Switzerland	
			Ukraine	
			United Kingdom	

Source: UN 2012 Survey

APPENDIX V

WORLD E-GOVERNMENT DEVELOPMENT LEADERS

Table V: World e-government leaders 2012

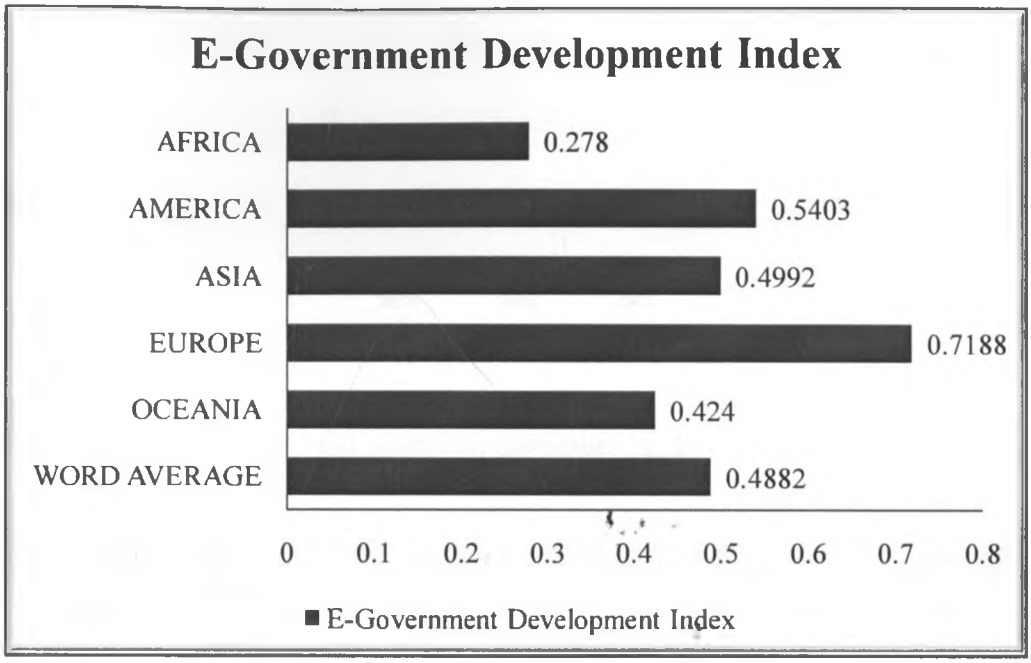
Rank	Country	E-government development index
1	Republic of Korea	0.9283
2	Netherlands	0.9125
3	United Kingdom	0.8960
4	Denmark	0.8889
5	United States	0.8687
6	France	0.8635
7	Sweden	0.8599
8	Norway	0.8593
9	Finland	0.8505
10	Singapore	0.8474
11	Canada	0.8430
12	Australia	0.8390
13	New Zealand	0.8381
14	Liechtenstein	0.8264
15	Switzerland	0.8134
16	Israel	0.8100
17	Germany	0.8079
18	Japan	0.8019
19	Luxembourg	0.8014
20	Estonia	0.7987

Source: UN 2012 Survey

APPENDIX VI

REGIONAL E-GOVERNMENT DEVELOPMENT

Figure 3: Regional e-government development index



Source: UN 2012 Survey

APPENDIX VII

INTERNET PENETRATION IN AFRICA

Figure 4: Internet penetration in Africa, December 31, 2011

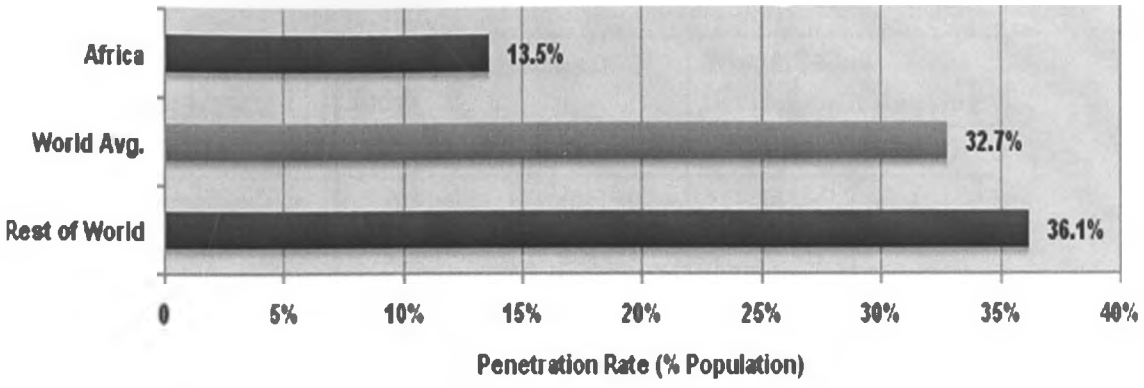
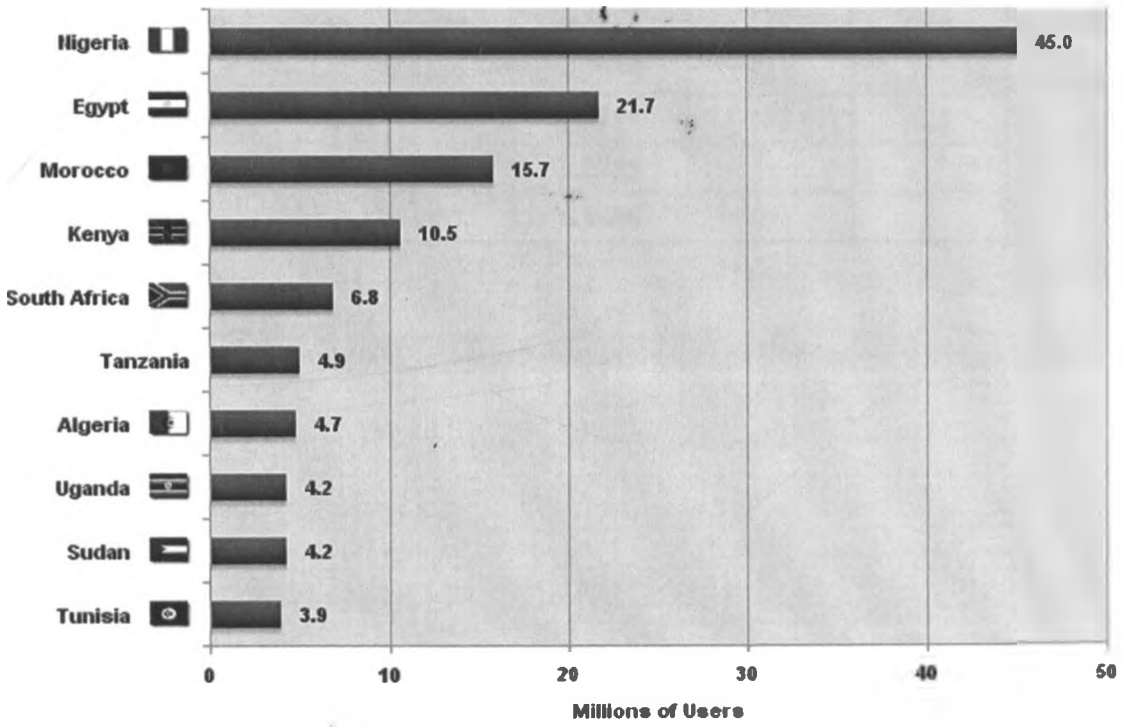


Figure 5: Africa top internet countries, December 31, 2011



Source: www.internetworldstats.com

APPENDIX VIII

TOP RANKED COUNTRIES IN AFRICA

Table VIII: Top ranked countries in Africa

RANK	COUNTRY	E-Gov. Development Index		World E-Gov. Development Ranking	
		2012	2010	2012	2010
1	Seychelles	0.5192	0.4179	84	104
2	Mauritius	0.5066	0.4645	93	77
3	South Africa	0.4869	0.4306	101	97
4	Tunisia	0.4833	0.4826	103	66
5	Egypt	0.4611	0.4518	107	86
6	Cape Verde	0.4297	0.4054	118	108
7	Kenya	0.4212	0.3338	119	124
8	Morocco	0.4209	0.3287	120	126
9	Botswana	0.4186	0.3637	121	117
10	Namibia	0.3937	0.3314	123	125
Regional Average		**0.2780**	**0.2733**		
World Average		**0.4882**	**0.4406**		

Source: UN 2012 Survey

APPENDIX IX

E-GOVERNMENT DEVELOPMENT IN EASTERN AFRICA

Table IX: E-government development in Eastern Africa

RANK	COUNTRY	E-Gov. Development Index		World E-Gov. Development Ranking	
		2012	2010	2012	2010
1	Seychelles	0.5192	0.4179	84	104
2	Mauritius	0.5066	0.4645	93	77
3	Kenya	0.4212	0.3338	119	124
4	Zimbabwe	0.3583	0.3230	133	129
5	United Rep. of Tanzania	0.3311	0.2926	139	137
6	Rwanda	0.3291	0.2749	140	148
7	Uganda	0.3185	0.2812	143	142
8	Madagascar	0.3054	0.2890	148	139
9	Zambia	0.2910	0.2810	154	143
10	Mozambique	0.2786	0.2288	158	161
11	Malawi	0.2740	0.2357	159	159
12	Comoros	0.2358	0.2327	171	160
13	Ethiopia	0.2306	0.2033	172	172
14	Burundi	0.2288	0.2014	173	174
15	Djibouti	0.2228	0.2059	176	170
16	Eritrea	0.2043	0.1859	180	175
17	Somalia	0.0640	0.0000	190	N/A
Sub Regional Average		**0.3011**	**0.2782**		
World Average		**0.4882**	**0.4406**		

Source: UN 2012 Survey

APPENDIX X

DETERMINING SAMPLE SIZE

Table X: Table for determining sample size from a given population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size
"S" is sample size.

Source: Krejcie and Morgan (1970)