VCTORS INFLUENCING THE ADOPTION OF INFORMATION AND COMMUNICATION TECHNOLOGY IN PUBLIC SERVICE DELIVERY IN AKURU DISTRICT, KENYA

BY

KIPROTICH KETER TIONY

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

2012

DECLARATION

This research project is my original work and has not been presented to anybody. No part of this research should be reproduced without my reference.

Signature ..... **Date** ...^llb^T.

KIPROTICH KETER TIONY

REG NO. L50/65993/2010

This research project report has been submitted with my approval as the University supervisor

Signature .....

Dr. Harriet Kidombo, PhD

Senior Lecturer,

School of Continuing and Distance Education

University of Nairobi

DEDICATION

1 would like to dedicate this work to my beloved family and friends who supported me to make this research project a success.

ACKNOWLEDGEMENT

I do express my sincere gratitude to all the parties that made completion of this research project a success. Special thanks go to my supervisor Dr. Harriet Kidombo Senior Lecturer School of Continuing and Distance Learning Education, University of Nairobi, who has been very supportive by offering invaluable advice, technical support and encouragement in writing this document. I also extend my acknowledgements to the devoted lecturers at the UoN Nakuru Town Campus for their insightful courses that in various ways contributed to the production of this document. Especially Dr. Raphael Nyonje who taught me research methods and Dr.Stephen Lokitero for the complementing statistics -I now understand significance and correlation thank you.

Special thanks go to Mr.Joseph Mungai, Resident Lecturer and Program Coordinator Nakuru Town campus together with his dedicated staff Mr.Mumo Mweke, Ms Maureen Ndungu,Ms Leah Mwanzi and Mr.Edward Otieno each for the roles they played during my short student life at the Nakuru Extra-Mural center.

The following people were also very instrumental in the course of this research; the Regional Commissioner Mr. A.N. Gathecha; K.D.Abdulahi, District Officer Nakuru; Mr B. Mwangi , Kenya National Bureau of Statistics Nakuru,; Lucy Kimemia Provincial Human Resource Officer Rift Valley; and Lydia Gathoni of Provincial Headquarters Nakuru.

Finally to Susan Karanja for typing and preparing the first draft proposal. To the rest whose names have not been mentioned here due to space I appreciate your support. Thank you all

1 will be forever indebted to the University for giving me the opportunity to further my studies and grow professionally. I therefore acknowledge every responsibility, knowledge and skills used in production of this document as my original work and commit its communication to entire University of Nairobi fraternity, all scholars, government and private sectors and support in implementation of research process.

TABLE OF CONTENTS **Page**

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS AND ACRONYMS

ERS	-	Economic Recovery Strategies
ESP	-	Economic Stimulus Program
FO		Fiber Optics
G2B	-	Electronic Interaction between Government Agencies and Private Businesses
G2C	-	The Relationship between Government and Citizens
G2E	-	Relationship between Government and its Employees
G2G	-	Relationship between Governmental Organizations
GCS	-	government communication system
GITS	-	Government Information Technology Services
GOK	-	Government of Kenya
ICT	-	Information Communication Technology
ID		Identity Card
ISP	-	Internet Service Provider
IT		Information Technology
MISD	-	Micro Computer Information System
OP		Office of the President
UON	-	University of Nairobi
OECD	-	Organization of Economic Cooperation and Development Countries Worldwide.
GDP	-	Gross Domestic Product
R&D	-	Research and Development
NEPAD	-	New Partnership for African Development
AU	-	African Union
SMES	-	Small and Micro Enterprises

ABSTRACT

ICT adoption in both the public service delivery and the private sector is critical to global competitiveness in both the labor markets and the service industry today. Public participation as one of the pillars of adoption has suffered neglect in the various processes necessary for successful adoption of ICT as studies done so far in this area reveal. The present study sought to investigate this and the state of ICT readiness and other factors influencing the adoption of ICT in the public service delivery in Nakuru district, Kenya in depth. The research design was descriptive survey and used questionnaires as its instruments. The research site was Nakuru town in Nakuru District which hosts a sizeable number of government departments, 44 in total. A randomly selected sample size of 196 civil servants was drawn from the 44 departments with a staff population of 668 located at the Rift valley Provincial headquarters. The unit of analysis consisted of the management and staff at various levels in these departments. The findings were analyzed qualitatively and quantitatively and tabulated. 153 (78%) of the target sample respondents participated. The Adoption and Diffusion of technology theory of Rogers (1962) guided the study.

According to the findings there was near gender parity in the work placements in the Provincial headquarters where the study was conducted. Most of the respondents were middle aged (39%) and had post high school education extending to graduate levels. They also had over 11 years work experience in the civil service in various stations around the country, hence, could give a more valid account of the change of service delivery in the public service since the promulgation of the Public Service Reform Program of 2003 and the subsequent launch of the E-govemment initiative in 2004. ICT readiness was observed in most departments in terms of trained personnel, however, there was still a big investment gap in terms of equipment and infrastructure and maintenance personnel needed to make the e-govemment initiative a complete success as intended. Service delivery had reportedly improved in many departments and the digitalization of government was still rated by most respondents as effective in combating corruption despite the high levels of anxiety posted over the vulnerability of the networks to fraudsters and, hence, the need to improve on the integrity of information management in the networks. Digital divide remained an unresolved issue with most respondents arguing that the government was not within its rights to go online without first ensuring the ubiquity of ICT in most parts of the country. Finally there is need to invest significant proportion of the budget for research and development of ICT in the country in order to engender innovative ICT products that meets the technological needs of the country across all social strata and terrain and ensure product neutrality. These imply that digital government was both a necessity and,thus, needed constant monitoring to make it run objectively as envisioned at the beginning otherwise the implementation may unnecessarily suffer gross inefficiency that would encourage the mushrooming of old corruption networks.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

We can define Information Communications Technology or ICT as we know it today as the acquisition, processing, storage and dissemination of vocal, pictorial, textual and numerical information by a microelectronic based combination of computing and telecommunications technology- with cellular telephony included (Kandiri 2007). This by extension also incorporates other associated technology like software and network infrastructure consisting of wireless, fiber optics and the Ethernet technologies with their enormous data processing and storage capabilities that facilitate accelerated dissemination of information across the world today.

Globally, the rapid development of ICT over the last 150 years has totally eclipsed all other endeavors by man in computing and communications technology that can be traced back to the abacus of 3000 B.C.(Schwartz 2005). Today's world is dominated by numerous forms of information processing and communications devices that pervade all strata of the society. This has made ICT to become one of the most prolific global technological enterprises in human history.

The U.S. was inarguably the first country in the world to incorporate ICT into its mainstream affairs which include government, military and business. This could largely be the consequence of most of the technology finding its origins there (Barnes 2006). Other global powers would soon follow in step and adopt the ICT technologies into their systems not withstanding the Cold War political culture that affected the diffusion of technology across different regions in the world (Duque 2006). The Internet which came to be at the closing days of the war as the result of private enterprise and government cooperation (Collins 2007) radically altered the access to information and the structure of communications (Kandiri 2007). However, this development attracted to it a host of challenges that limited the diffusion of technology transfer and the subsequent adoption in different regions and different sectors within these regions (Duque 2006).

Countries like Brazil continue to enjoy accelerated integration of the Information Society (Candido 2006) which includes online revenue collection while in some African countries today e.g. Nigeria, Ivory Coast. Rwanda and Uganda as in many other developing countries the ICT initiative is being taken very seriously and more so in the public service delivery. Rwanda for instance has made remarkable strides in the incorporation of ICT in the public sector.

ICT development in the private sector in Kenya can be rated as quite impressive if the economic gains like job creation, money transfer businesses, and other technology assisted businesses are anything to go by. The public is yet to fully benefit from the mainstream incorporation of ICT.

The Public Sector Reform Program was initiated in 2003 to create an efficient government capable of providing timely services demanded by the public, eliminate bottlenecks and increase the levels of accountability of public servants and by extension government. This led to the adoption of the e-Government Strategy of 2004 which has been structured to meet the primary service delivery requirements of the various sectors namely: relationship between government and its citizens (G2C); government agencies and private business (G2B); relationships between government departments (G2G); and relationship between government and its employees (G2E).

However, the adoption of ICT and hence e-Government in the public sector as in business (Barnes 2005) has been fraught with many challenges despite the obvious benefits of the system. These range from investments, technology adaptation, to culture (Abbate 2006), and mutual public cooperation.

This study was governed by the Adoption/Diffusion of Innovations Theory Rogers (1962) that sought to explain how, why, and at what rate new ideas and technology spread through different cultures. The determination of the influence of this theory on the uptake of technological innovations among other issues critical to the adoption of ICT in the Public Service Delivery Program forms the thrust of this study which was carried out in Nakuru town which is the fourth largest town in the republic and is well represented in terms of government departments.

1.2 Statement of the Problem

For more than three decades now, governments all over the world have been progressively adopting Information and Communications Technology into their core functions in a bid to create more efficient governments. ICT has over time been identified and has indeed proven to be a viable solution in addressing service delivery through information processing, storage and dissemination across wide areas with diverse populations and unique sets of challenges found in each of the various regions (Duque 2005).

In Kenya, the quest to have efficient government has been with us since independence in 1963. Various policy papers and reports have successively emphasized this point over the years. The manual system of information handling in the public service domain has in the past been deplored for its gross inefficiency, inconsistencies and vulnerability to corruption schemes, facts that made it increasingly unreliable in terms of service delivery and discouraged public participation in government affairs. It was also considerably expensive as compared to the electronic system both to the government in terms of the wage bill, materials etc. and also to the public in terms of travel, time etc. These led to the need to digitize government services in order to improve information service access by the public, government bodies, the private sector and the international community and led to the adoption of ICT policy by the Kenya government as contained in e-Govemment Strategic Plan 2004 (Republic of Kenya ,2004).

However after eight years, that is, at the present date of this study, public participation in compliance to the e-Government Strategy is still very much wanting as evidenced by unnecessary queues in government departments for services already being offered in the government websites online. Proportionally low investments in ICT infrastructure and connectivity (Kamar, 2006), and other supporting infrastructure like electricity connections especially in the rural and marginal areas tend to contribute to the dismal public participation in the process. These tell-tale signs are some of which are particularly noticeable in Nakuru District and are as a result of a combination of various underlying factors which this study now sought to investigate in detail. Most research works done in this area of study concentrate on the adoption of ICT as a public service delivery tool on the national level. This study therefore sought to

investigate the factors influencing the adoption of ICT in public service delivery in Nakuru district, Kenya which is at a devolved level of government.

1.3 Purpose of the Study

This research aimed at establishing the factors influencing the adoption of ICT in the public service delivery in Nakuru District..

1.4 Research Objectives

1. To establish how demand for timely services influences adoption of ICT in public service delivery.
2. To examine how advances in ICT influence adoption of ICT in public service delivery.
3. To investigate how the need for security of information influences adoption of ICT in public service delivery.
4. To determine how the need for integrity influences the adoption of ICT in public service delivery.
5. To verify how public sector reform programs influence the adoption of ICT in public service delivery.

1.5 Research Questions

The following questions were designed in accordance to the purpose of the research.

1. How does the demand for timely service delivery influence the adoption of ICT in public service delivery?
2. How do the advances being made in ICT influence the adoption of ICT in public service delivery?
3. How does the need for security of information influence the adoption of ICT in public service delivery?
4. How does the need for integrity influence the adoption of ICT in public service delivery?
5. How do the reforms outlined in Public Sector Reform Program of Kenya influence the adoption of ICT in public service delivery?

1.6 Research Hypothesis

The following are the research hypotheses the study tested.

- Increased demand for timely service delivery does not have a significant relationship with the adoption of ICT in public service delivery.
- Advances in ICT do not have significant relationships with the adoption of ICT in public service delivery.
- The need for information security does not have a significant relationship with the adoption of ICT in public service delivery.
- The need for integrity does have a significant relationship with the adoption of ICT in public service delivery.
- Public sector reform programs were not significant to the adoption of ICT in public service delivery.

1.7 Significance of the Study

It is hoped that Information gathered from this study was to give an overall picture of the factors influencing the adoption of ICT in the public service delivery. The findings of the study are meant to be of great help to different sectors of the population. First, the information technology sector could utilize the findings as a research focused on the adoption of ICT at a much lower but equally important level like the district level as in this case Nakuru district would pave way for many similar studies leading to better adoption strategies and, hence, accelerated adoption of ICT in the public service delivery in Kenya and in turn deliver on key economic fronts like job creation, increased revenue base (Andersen & Coffey 2011), public savings, cost savings on material and the wage bill and engendering of more leaner and efficient governments.

Secondly, to the academician and also other stakeholders the study would serve as a scholarly reference material for future studies and research work in decentralized programs as well as other development programs. The government could gain by identifying and addressing the issues behind the implementation of the policy and finally, the public who is the object of these reforms will ultimately be the greatest beneficiary when service delivery is improved. It is therefore

hoped that these contributions were used by the stakeholders accordingly in their respective disciplines.

1.8 Basic Assumptions

The assumptions of the study were that all the government offices/ institutions in Nakuru town have one or more information technology related installation in place and that it is being used to serve the public. It is also assumed that the respondents are fairly conversant with the issues at hand and will fully cooperate with the study and will answer all the questions correctly and truthfully, and also that the sample taken was representative of the entire population of government departments in Nakuru district. In addition the objectives stated were met, and the research instruments met the validity and measurement for the desired construct.

Another assumption was that other factors like industrial actions was not to interfere with the research and that there was enough time to conduct the research; this was mediated by the delimitation of the research to a manageable area.

Finally it is assumed that the research was successful financial constraints notwithstanding.

1.9 Limitations of the Study

The projects targeted government officers as they went about their daily activities and this enhanced collection of relevant data for the study. However, it was anticipated that the study was to encounter challenges as some respondents might be of low literacy levels and of little or no formal training in ICT could cause some respondent effect i.e. the respondents could lie or unknowingly give misleading information. I overcame this by structuring the questionnaire in the preferred language and explaining the purpose of the study, and also administering them at appropriate time at the convenience of the respondents e.g. drop and pick questionnaires to gain their confidence. I used secondary data to measure the output in terms of quality and volume. The population sampling was done to ensure high levels of confidence and some respondents were not very cooperative but I talked to them with a lot of respect to enlist their cooperation based on some ground rules I laid out to them.

I

1.10 Delimitation of the Study

The study focused on government departments in Nakuru town. The town, which was established by the British during the colonial era, is Kenya's 4th largest town. It has since grown into a cosmopolitan town whose township status was awarded in 1904 and became a Municipality in 1952. It has witnessed tremendous growth over the years as a result of being a transit town, a tourist destination and has favorable climatic conditions. Nakuru is a fastest growing town in east and central Africa. It is the administrative headquarters of Rift Valley province and administration hub for Nakuru County and also serves in the same capacity for the district. Most government ministries are well represented here. The Information technology industry in the town is also thriving; however, the study delimited itself to a sample of 196 respondents which included 1 top manager and 2 mid-level managers and 2 staff from each ministry or government department. Availability of information was made easier due to the presence of experienced civil servants on the issue of IT in government offices.

1.11 Definition of Significant Terms used in the Study

Computerization -is the use of computers to assist humans in carrying out specific tasks.

ICT- is the general term used in relation to Information and communications technology

Data Base-A database is a collection of records or data that is stored in a computer system. It could be hierarchical or horizontal as in a network.

Service delivery- refers to the mode of exchange of information items and other services between the public and the government departments.

Mbps- refers to the computer download speed in megabits per second

1.12 Organization of the Study

This study consists of five chapters. Chapter one comprises: the background of the study; statement of the problem; study objectives, questions and hypothesis; purpose of the study all which are intended to provide a clear sense of objectivity in the study. Chapter two contains the literature review which deals with the scope and challenges of the research problem as encountered in previous studies leading to the assumptions of this study. It also looks at the

theoretical framework and consequently the conceptual framework that underpins the study. In the third chapter, the study methodology used in conducting the study is discussed; comprising the design, site, study population, sample size, sampling methods and procedures, and the research instruments. It also contains the operational definition of variables. Chapter four discusses the findings as obtained and presented from the data analyzed. The last chapter gives the summary of findings, conclusions and recommendations.

CHAPTER TWO: LITERATURE REVIEW

This chapter presents a review of studies done on the factors influencing the adoption of ICT in the provision of services in the public sector by various governments. The review material is sourced from various print and electronic publications which include books, journals, and government documents, academic papers presented at various forums and also contained in various websites. We look briefly into the historical developments of ICT and its global uptake. We then discuss the concept of e-government and the ICT adoption related issues which include the challenges it faces across many regions and particularly in Kenya. This is followed by a Theoretical framework that will guide the study and a Conceptual framework is then constructed where variables are operationalized to help in designing the method of investigation.

2.1 Historical Development of Information and Communications Technology

This section retraces the origins of Information and Communications Technology down the ages to about the year 3000 B.C. It then briefly discusses the significant developments made in advancing ICT over the succeeding centuries and then finally brings us up to date with the state of the current technologies. It will first discuss the development of ICT technologies from scientific history namely the origins of the computer which is the cornerstone of ICT and the subsequent development of the telephone. Then it discusses the integration of these technologies through the development of other assisting technologies such as satellites, fiber optics, wireless communications and the internet which appeared in the 21^{sl} century and revolutionalized ICT towards the end of the century.

2.1.1 The Development of the Computer, Telephone and Satellites

ICT as we know it today is defined as the acquisition, processing , storage and dissemination of vocal, pictorial, textual and numerical information by a microelectronic based combination of computing and telecommunications technology(Kandiri 2007). The term can be expanded to include other assisting technologies e.g. satellites, fiber optics, wireless communications, Ethernet etc. many of which appeared in the last quarter of the 21st century and greatly improved ICT in the globe. The term is of fairly recent origin given man's age old endeavors to improve on

I

his information processing and communications technology due to territorial imperative (Wong 2000). Chronicling the history and development of the computer Schwartz (2005) retraces the science of computing as far back as 3000 B.C to the primitive abacus which was essentially a toy that could also be used for numerical purposes.

However, in the succeeding millennia there was no major development until the 17lh century A.D. when spurred by the need to enhance computation for the burgeoning scientific work of the day, scientists among them Wilhem Schikard and Leibnitz who was also the co-inventor of calculus developed the first four function calculator clock and the first differential machine respectively (Barnes, 2006) and (Wong, 2000). The discovery of electricity through experimentation at the turn of the eighteenth century by Benjamin Franklin was an important watershed in the history of science and was instrumental to the development of the computer (Schwartz, 2006). In 1833 Charles Babbage gave us the first general purpose computer. Professor Babbage is the preeminent father of the computer being credited with the pioneering of computer architecture an identity retained in all computers to date. He was assisted greatly by a protege named Ada Lovelace who incidentally became the world's first computer programmer.

The development of the Complex Number Calculator during World War II by the Bell Labs marked the initial transition from analogue to digital computers (Barnes 2006). This was an improvement from the first Electronic Calculator named Z1 of 1931 built by Konrad Zuse. Both of these devices operated on vacuum tubes as the transistor which is a product of semiconductor technology had not yet been discovered (Milman, 1973). This discovery of semiconductors with their immense current amplification properties paved the way for the modern digital computer as we know it and a host of other devices using semiconductor technology like watches, digital equipment, office and pocket calculators etc. Since then scientific discoveries together with innovative engineering has occasioned the exponential growth of ICT across all sectors of the society especially as witnessed in the last quarter of the 20lh century.

These included the introduction of the Graphical User Interface (GUI) features in computers by Apple (Barnes 2005) in the early 1980's which was a radical departure from the text-based system popular with scientists (Collins 2006).This was an another important watershed in ICT. It

enhanced man-machine interaction (Collinson 2003) and furthermore it served as a viable platform on which advanced software development was possible along with other computing activities which include learning, presentations etc.

Almost concurrent with these events was the development of the telephone in the later half of the 19th century by Alexander Bell followed later by the Trans-Atlantic cable linking America and Europe. This was again followed in step by Samuel Morse who taught us message coding and decoding enabling information to be transmitted by wire over long distances without suffering any distortion of its contents.

The cabling system associated with telephones had its many weaknesses for instance communication could be intercepted, the lines disrupted by vandals or natural forces and from the economical perspective, telephone lines were expensive to install, were susceptible to failure and had terrain limitations. Furthermore, these factors or their elements made the system unsuitable for military applications although science with its culture of openness was not affected (Abbate 2006). This and the desire to conquer and exploit space led to the launching and placing in orbit of the first man made satellite Sputnik 1 in October 1957 by the Russians triggering a subsequent launch and successful placement in orbit of the American satellite Transit 1 in 1958 (Collinson 1996) and (Anderson 1984). These were used to test the viability of radio transmission over wide terrain across the globe, a task in which they proved quite capable of. Subsequent developments and the need to meet the increasing demand for reliable global communications which included telephone, radio and television, led to the launch of the first commercial satellite Telstar (Anderson 1984).

2.1.2 Integration of Computers and Telephony

It was now possible to integrate telephone operations with those of computers of which the introduction of digital computers and their increasing processing capabilities had made communications across numerous telephone networks possible in real time. This was to be enhanced by the geosynchronous satellites (Nolan 1993) which flying in low orbit (Collins 2006) and with their terrain defying triangular communication systems that led to the introduction of wireless communications.

I

2.1.3 Use of Fiber Optics and the Ethernet for ICT Integration

Wireless communications facilitated by the satellites though highly successful was like any other technology beset by its own unique set of challenges among them the high altitude ionospheric effect that interfered with radio communications to and from the satellite, the narrow bandwidths limiting radio frequencies to operate at only fixed ranges and also the prohibitive costs necessitated the exploration of other terrestrial alternatives.

Fiber optics have presented a viable solution for ICT Integration due to their energy efficiency particularly at higher frequencies as opposed to metallic telephone wires that allows them to have increased data carrying capacity (Wilson and Buffa 2000) and also their high flexibility (Collinson 1996) and (Nolan 1993). They also enhance data integrity during transmission and are not affected by electromagnetic disturbances. This makes them especially suitable for digital data transmission. They also eliminate need for modems (Wilson and Buffa 2000) and can be used for coding and decoding information. Countries all over the world are currently installing the FO cables into their ICT systems. Kenya has successfully completed the installation of its own fiber optic cable system through the Submarine Cable project in partnership with several countries and with the cable linking them.

The Ethernet is a family of computer networking technologies for local area networks (LAN) commercially introduced in the 1980s. Developed by Robert Metcalfe (Net events tv, 2006) as part of his PHD dissertation, the Ethernet has gradually replaced the LANs due to its capability and has resulted in reputable commercial success. This network enhancing technology can be useful to government and businesses in improving access to their services.

Modern trends in micro-processors and semiconductors brought about by the convergence of microelectronics, computing (hardware and software) and telecommunications, has enabled the processing and storage of enormous amount of data while integration of fibre optics and fast Ethernet technology in networks has facilitated rapid distribution of information through communication networks (Kandiri 2007).

2.2 Global adoption of ICT

In this section we look into the adoption of ICT in the United States public sector and the factors influencing this, and also the gains made so far economically and in other areas. We also look at the concurrent progress in the adoption of ICT in other countries considered as major world powers whose role in the development of ICT systems play a very important in the diffusion of the technologies. Finally, we discuss the role of the political culture of the Cold War which significantly shaped the development and subsequent direction of information and communications technologies globally including the development of the Internet.

2.2.1 The United States

The US government was the first to entrench ICT into its core functions giving it a global competitive edge in its military, public service and business. Over the last several decades, the development of the ICT industry has made a positive impact on nearly every facet of the U.S. economy. Advances in telecommunications dramatically transform the way in which people live, work, learn, communicate and conduct business. Spanning every industry sector, ICT has a far-reaching multiplier effect throughout many specific industry sectors such as electric utilities, transportation, agriculture, health, financial services, machine building, distribution and retail to name a few. Numerous examples and studies demonstrate and document the degree to which the multiplier effect of ICT directly benefits other industries and the U.S. economy as a whole. But despite its longstanding primacy in ICT, the US is lagging behind other countries in the adoption of ICT in the public sector service delivery (Andersen and Coffey, 2011).

In 2009, the ICT industry contributed $1 trillion to U.S. GDP, or 7.1% of GDP, including $600 billion from the sector itself and $400 billion in benefits to other sectors that rely on ICT. The ICT sector's direct contributions to GDP have increased 25% since the 1990's, growing from 3.4 percent in 1991-1993 to 4.2 percent in 2005-2009, the highest gains of any industry sector. The National Research Council found that the ICT industry accounted for 25 percent of U.S. economic growth from 1995 to 2007 measured as real change in GDP. Over the last two decades, the development and use of ICT has accounted for as high as 60% of annual U.S. labor productivity gains. From 1995 to 2005, use of ICT technologies were largely responsible for

t

productivity in the U.S. growing by more than 3 percent per year (essentially twice the rate of the preceding 20 years), persisting through the recession of the early 2000's when "productivity grew at the impressive—and counterintuitive—rate of 4.8 percent." The ICT industry is also an important source of high-paying jobs. In 2009, ICT firms accounted for 3,535,000 jobs with full-time employment compensation averaging $107,229, 80.6% higher than the national average.

On job creation, a mere 1% increase in broadband deployment has the potential to directly lead to the creation of as many as 300,000 new jobs, not including the jobs that would inevitably result from new access to broadband and the benefits it brings to all types of business. The development and deployment of a public safety broadband network, specifically would lead to the creation of 100,000 new jobs and produce indirect benefits of up to $8 billion per year. The (J.S. economy benefits tremendously from the ICT industry, and there is significant potential for ICT to be a key economic driver to exit the current recession and pave an innovation leadership position for the U.S. The magnitude of the positive impact of ICT on the broader U.S. economy as well as the amplitude of the ICT industry's multiplier effect moving forward were determined significantly by the federal government taking the necessary steps to buttress a historically unmatched, but now eroding U.S. ICT research ecosystem (Clarke 2011).

The health of the ICT sector in the U.S., along with the other industry sectors that it benefits, depends on a healthy ICT research ecosystem. A primary reason for U.S. primacy in ICT innovation has been a strong, unparalleled research ecosystem consisting of robust university and industrial research institutions, emerging start-ups, mature technology companies, private financing, federal funding and a pool of talented researchers. Research is a key factor in enhancing innovative performance and productivity, as well as long-term economic growth. All sectors depend on and derive benefits from ICT research, which is precisely why the federal government should be alarmed by the poor state of federal funding for ICT research and demonstrate greater support for the sector.

I

While the U.S. still boasts the strongest research ecosystem in the world, we are beginning to see signs of erosion as competing nations take strong steps to attract investment in ICT research and development to build innovation-based economies.

2.2.2 Russia and the Far East

Russia and other countries in the Far East and Western Europe and Scandinavia have been long regarded as world powers due to their influence in shaping global developmental agenda across all spheres e.g. technology, military, politics, education etc. The adoption of ICT in these countries were the focus of this section which also sought to highlight the uniqueness of the adoption factors in the various countries (Duque 2006).

ICT development meant for the public domain in Russia and the other former COMECON or Warsaw Pact countries has not been as illustrious as that of the United States and other Western countries (Gus, 1996).This has largely been due to the COCOM embargo that made it impossible to import computers and other associated technologies from the capitalist countries especially at the height of the cold war due to their perceived political differences. As a result, the Russian version of computers had significant design disparities with those of the west with their hardware configurations noticeably different from those produced outside the communist block. Langa (1991) observes that the hardware configurations could led to incompatibility problems with other computers outside the COMECON countries because they were mostly unauthorized copies reproduced after being sourced from covert intelligence operations and facitly studied.
These structural disparities rendered soviet made Chips unsalable outside the COMECON countries as Langa says.

However, the computer revolution in Russia can be attributed to the leadership Sergei Alekseyevich Lebedev of a team of scientists in the former Soviet Union State of Ukraine.
They built Russia's first Marge electronically computing machine' MESM in the period 1948 - 1951. The machine became operational in 1951 and had about 6000 vacuum tubes consuming 25K.W of power and could perform approximately 3,000 operations per minute (Crome, Goodman and Seymour, 1994). Since then there has been a production of over 15,000 mainframe

computers which were clones of IBM mainframes and released in the COMECON countries under the initiative of the former Soviet Union. Later, a series of personal computers were produced the state owned companies like ES EVM. However, Russia is yet to feature prominently in the world ICT adoption rankings despite its perceived global muscle, scientifically, militarily and in several other aspects.

Japan has long been identified with global ICT leadership both in terms of hardware and software. Ranked at number 3 globally in terms of the adoption of ICT, Japan was recently displaced by China as both the world's second largest economy and R & D spender in ICT develoment (Anderson and Coffey, 2011). The Japanese ICT industry has been steady due to its political and economic alignment to the West. Currently, Japan has the highest broadband penetration in the world with download speeds of 64 Mbps (TIA, 2011) and also network access due to its ambitious ICT ubiquity efforts (Japan Ministry of Internal Affairs and Communications, 2010).

South Korea has been ranked number 5 overall in the world in R&D investments and also has made it to the world's top 10 in the adoption of ICT (Clarke, 2011). It currently invests 3.37% of its GDP to ICT research and development which makes it among the OECD countries making significant investments over 3% of their GDP to ICT R & D (Andersen and Coffey, 2011). It currently enjoys one the most advanced broadband infrastructures with an average download speed of 40 mbps.

2.2.3 Scandinavia and Continental Europe

Sweden has been ranked as the first country in the world in the adoption of ICT (Clarke, 2011) and also as the most ICT ready country according to the Worlds Economic Forum Global Information Technology Report (2010-2011). Sweden has a very high ICT R & D intensity similar to that of Finland. It has an average of 85% broadband penetration in both residential and business settings (European Commission, 2010). It commits 3.74% of its GDP to ICT R & D as of now.

I

Finland has been extremely successful in developing their ICT sector according to Andersen and Coffey. 2011. Their intensity in ICT R & D is one of the highest in the world paralleled by Sweden and other Scandinavian countries. It commits 3.9% of its GDP to the Research and Development of ICT.

These traditional Western Block countries have lagged behind comparatively in the ICT adoption rankings and also in terms of R & D. Germany leads the three with 2.5% ICT R & D to GDP ratio which is slightly above the 2.2% OECD average. Failing to make it to the top ten, the UK a traditional ally of the US has set a target to increase its current R & D in ICT spending from 1.9% of its GDP to 2.5% by 2014. France, has an ambitious goal to rise from its current 2.02% ICT R & D spending to 3% in the near future and further, it plans to increase its broadband penetration to 70% by 2012 (OECD, 2011).

ICT in Europe has been identified as one important economic building block that can visibly lead the continent out of the economic down turn according to the European Commission Information Society. It hopes to lead the way into the 'future internet' and replace the current web and fixed and mobile networks and service infrastructures. This along with initiating new ICT paradigms will see it claim the future leadership of ICT. In its current plans it intends to permeate many sectors of society from medicine to internal security using ICT, according to the commission of the European communities (2009).

However, this can only be possible if development and investments in the US and China are not taken into account.

2.2.4 Emerging Global Economies

For the last two decades, Brazil and China have both made significant strides in economic development to have a major impact on the global economy today. This could be attributed to among other factors, the increasing adoption of ICT in the two countries and particularly in the public service delivery as discussed below.

2.2.4.1 China

The World's Economic Forum's Global Information Technology Report (2011) puts ranks China at position 36 globally in ICT adoption. The road to ICT adoption in China has not been easy due to the political and investment climate coupled by the demographics and raging disparities in the economy and infrastructure internally leading to a wide digital divide (Dong Fu, 2000). Since the year 2000, China has witnessed a dramatic upturn in its Internet subscription which grew from 30 percentage points over ten years from 1.7 in the year 2000 to 31.6 in 2010 (China, 2010). The country has recognized ICT as a primary driver their economic strategy (Andersen and Coffey, 2011). As a result it has earmarked a significant portion of its annual expenditure to the research and development of ICT to be in tandem with its other development agenda. This has enabled it to leapfrog its neighbor Japan and become the second highest global investor in R & D (OECD, 2006).

Its 10^{th} five year plan 2001 - 2005 coupled with the substantial investments in ICT and strong commitment to R & D ultimately poise China to become a global leader in the ICT industry. However, this alone does not necessarily qualify it to claim the top spots in adoption ranking when other factors come into play like the regulations and usage of ICT (Clarke, 2011). The latter is compounded by the wide gap in the digital divide. But there are conflicting reports about the exact nature of China's digital divide with some saying it is widening while others in some cases produce evidence to suggest it is narrowing (Dong Fu, 2000). However, this depends on the studies' approach to the matter, as in terms of per capita GDP, the former conclusion would suffice, while other measurements might give the latter impression. China also enjoys the presence of an expanding labor pool of low cost engineers which potentially makes it an attractive destination for ICT developments by multinationals (NRC, 2009).

Finally, with the expanding ICT industry, and China being ranked the world's second largest telecommunications market after the United States, and with the possibility of overtaking it if all its potential is exploited (Andersen and Coffey, 2011), China is fast becoming an ICT market that no multinational or country can afford to ignore. We also note that China plans to expand its Internet infrastructure to reach 45% of the population by 2015 (TIA, 2011).

I

2.2.4.2 Brazil

Brazil can be described as a very beautiful, wealthy and promising country, in spite of its dramatic socio-economic contradictions (Candido, 2006). It derives its wealth on its great human resource potential which supplies it with intellectual, artistic and physical creativity necessary to drive its economy and make it a paradise of sorts. It is also the leader of one of the most important regions of the world - South America. Apart from its human capital, it also bases its economy on the power of its industry and agriculture and on its accelerated integration in the information society among other aspects (Candido, 2011).

Since the late 80's, Brazil has made remarkable in roads also sustained developments into the information society, and has initiated the free and massive production and commercialization of computers and eventually the access of the world wide web in 1995 (Candido, 2006). This has made it possible for government to collect revenue via the Internet and as well as conduct plebiscites and general elections on electronic ballot boxes making the voting process totally computerized. However, it still has a low ICT R & D budget committing only about 1% GDP as of 2005. Its broad band penetration is still low and has speeds ranging from 4mbps to 622 mbps. The biggest problem facing ICT adoption in Brazil is the digital divide which still remains inordinately high. This, it is observed (Candido, 2006) could be narrowed by the institution of public and private policy of high investment in R & D and also education. There must also be political will to make digital inclusion a reality.

2.2.5 Africa

Many African governments both national and local are now beginning to recognize the enabling role of ICT facilitating and accelerating socio economic developments by improving access to basic information over a wide area. Kitaw (2007) remarks that in spite of the improvement in terms of legislature and investments in ICT by these governments; the uptake of opportunities offered by ICT is still dismal as it remains largely unexploited.

Africa has been characteristically notorious with low investment in infrastructure. Poor infrastructure coupled with armed perennial or sustained armed conflict, corruption and other factors have penalized Africa in terms of unimpressive economic returns. However, with the changing socio-economic matrix brought about by privatization of national resources, the emergence of the free market economies, the SME's which are gradually gaining recognition and momentum, and the opening up of democratic space which sought to level the playing field in the public domain.

In some African countries e.g. Nigeria, Ivory Coast, Rwanda and Uganda as in many other developing countries the ICT initiative is being taken very seriously and more so in the public serv ice delivery. Rwanda for instance has made remarkable strides in the incorporation of ICT in the public sector.

However, all this is set to change if the development pacts by several countries in Africa and other global partners seeking to change the face of ICT are followed up and implemented. These pacts include that of the G8 Kananaskis Summit in Canada, 2002 dubbed the Africa plan of action and that was also followed a few weeks later by the NEPAD program (Okpaku, 2002) at the AU Summit in 'Durban, South Africa in July, 2002'. This paved way for other conferences and summits aimed at accelerating ICT development in Africa.

This included obtaining commitment to budgetary allocations from member states to develop ICT in their own countries, to attract support and investments from development partners, multinationals and their citizens in the Diaspora, to create digital factories and also create enabling legal frameworks.

However, many countries in Africa including Kenya are yet to fully commit their budgets to ICT development. ICT development in the private sector in Kenya can be rated quite impressive if the economic gains like job creation, money transfer businesses, and other technology assisted businesses are anything to go by. The public is yet to fully benefit from the incorporation of ICT in running government through the Public Sector Reform Program.

2.2.6 The Cold War

The US government was the first to entrench ICT into its core functions giving it a global competitive edge in its military, public service and business. Seeing these advantages, other global powers soon joined the fray. However as Duque and Candido (2006) opine, this soon encountered protocol challenges making it hard to transfer technology across many nations due to cultural dynamics in unique regions like the incompatibility of technology across adversary states. This led to the introduction of the Internet through the joint venture of private enterprise- namely the Iridium start-up-and various governments all over the world to make it possible to share ICT resources across many states, departments, agencies, organizations and the business community hence greatly reducing costs(Duque 2006). This was a major game-changer in ICT that would soon revolutionize the global politics, markets, ideologies and military interests.

2.3 The Concept of E-Government

E-government can be defined as the use of ICT as a tool to achieve better in government service delivery (Lau, 2003). The need to promote efficiency in the delivery of services in the public sector has led to many governments worldwide opting to adopt ICT into their core government functions. In this section, we discuss the concepts and merits of e-Government and the challenges it faces in adoption especially in Kenya.

The imperative to specially package ICT to serve as a tool for government has been informed by the emergence of the Internet and the development in processing power and data storage capacity of computers over the last three decades that has significantly altered the environment for ICT use across society and government. Quite inevitably governments were obliged to improve performance in order to keep pace with these developments. Fortunately ICT gives them the tools to do so (Lau, 2007).

But as Lau (2003) and others concur e-govemment and information access challenges are not primarily technical. They are managerial and necessarily functions of the administrations cultures and capabilities. Hence, ICT should be viewed as a tool in aid of the transformation of the structures, operations and very importantly, the culture of the government.

In context, e-government is not a single acting agent. It must necessarily work in an environment in which it interacts with various factors that influence its direction. In other words, the environments exert pressures internally and externally. In this sense it can be seen that the environment in which it is embedded is actually governed by the larger information society, hence, it is only an element within the society itself. This society in general plays the roles determining the availability of technological tools, levels of access to the citizenry and enterprises, confidence in electronic channels and systems, and their expectations or service delivery. All these working in concert will ultimately shape and influence the enterprises and citizens uptake of electronic services. Failure in these can be a major draw back to the success of the E-government.

Some of the key challenges of the realization of a full e-government are mirrored in many countries across the globe, although as Dugue (2006) puts it there were unique sets of challenges depending on the local cultural dynamics of the different regions. Hence, in general the challenges include; rapid technological evolution, the digital divide, privacy and security concerns, and the public expectation and seamless services.

Other imposed challenges include barriers in the form of legislative and regulatory, budgetary, common technical frameworks and infrastructure, and other internal barriers like; ensuring a common vision, providing leadership at many levels, strengthening co-ordination, improving collaboration, clarifying public-private partnerships, meeting rapidly changing skill needs and monitoring and evaluation.

These can be categorized into three units; e-government in context; the external barriers, and the internal barriers. We now look into how these factors play out in the light of ICT adoption requirements in Kenya.

2.4 ICT adoption in the public service sector in Kenya

For e-government to function effectively, it must be understood or taken in the context of the larger information society, which will, technically speaking determine the efficacy of the

I

initiative in delivering services in the public domain (Lau, 2003). Further, it must be emphasized that the modern day government has no alternatives to adopting ICT but only in the best ways to implement ICT if it has to keep up with the pressure. In this way it can be seen that the government's uptake of ICT leaves it with very little or no choice at all in the face of growing demands for public sector reforms (PSRI CB, 2003). This is bound to be a delicate balancing act when the pace of reform is taken into account especially considering the privatization of public enterprises which in effort allows the private sector to assume the responsibilities previously undertaken by the public sector.

The argument is, if privatization is rapidly accelerated without institutional capacity in the private sector, the risk of market failure and social distraction becomes imminent. On the other hand when the privatization is too slow, one runs the risk of declining investor confidence and economic stagnation. This makes it equally essential to find a middle ground in which the factors come into play and make the e-government a viable enterprise. The success of the initiative will of course lead to timely service delivery as demanded by the clients, increases collaboration and monitoring of government agencies, better economic returns, job creation, sustainable industry and reduction of the wage bill. The last item is being fuelled by the imperative to scale down government expenditure especially by the use ICT. While on this we note that the government downsized the civil service from 272,000 personnel in 1991 to 193,000 in 2002.

2.5 Challenges of adopting ICT in the Public Service Sector in Kenya

Before we can attempt to analyze the challenges of ICT adoption in Kenya, it's important to subscribe to a known standard like the Network Readiness Index of the World Economic Forum which examines the levels of preparedness of countries in the use of ICT. This examines in three dimensions: the general business, regulatory and infrastructure environment for ICT; the readiness of three key societal actors- individuals, businesses and governments- readiness to use and benefit from ICT and actual usage of available ICT (Clarke 2011)

I

2.5.1 Demand for timely services.

A 2003 economic recovery strategy for wealth and employment creation (ERSWEC 2003) paper noted that the public sector was both large and inefficient. This led the government to form a program aimed at implementing the ERSWEC report with an investment program financing framework that sought to increase the funding for the program by; Increasing donor resources, reducing the wage bill and privatization.

The government of Kenya seemed to have quite succeeded in the last item above by articulation of a bold vision aimed at increasing public-private partnership with the intended result of government becoming more leaner, more efficient provider of policy framework and services that will facilitate the private sector as an engine for growth.

This moves paves way for the improvement of ICT networks and opens the door for more investment, but is silent about the public participation in the whole process i.e. the intended beneficiary is not involved in the policy making. As such as much as the move intends to narrow the digital divide in the provision of public services through the involvement of private sector, the input of the public were vital to the success of the program as: at first they may see the move as unnecessarily elaborate and would, as in the case of Finland in 1999, see no obligation to use the e-govemment ICT tools as they are not required by law to poses digital signatures(Lau 2003);second their participation in the regulatory framework is important and seems to challenge the former position in the light of article 27 of the Kenya constitution 2011 where freedom to information obligates the government to avail information to all citizens indiscriminately. In this some citizens may raise the question of their ICT preparedness i.e. Are they computer literate and also do they have access to a computer network for transactions in the public domain. Pertinent to this are also the issues of disabilities where some form of impairment would lock out those who cannot use ICT. The other legal challenge would come from the position of the digital divide. If government intends to fully incorporate ICT in its core functions there should be a policy that would tame economic marginalization by prescribing a minimum income. A good case in point is the acquisition of second hand ICT equipment. A good computer in Kenya today will retail for US $600 including accessories and network connection. 60% of the population earns less than a dollar per day. Thus it would take nearly three years work and savings to acquire a computer and that is not taking into account, the intermittent nature of the jobs,

provision of electricity, inflation, family obligations and the cost of training. An approach like that of India in which they developed the Simputer in a partnership involving the Indian Institute of Technology and the private sector would suffice (Duque 2006). This device is a low-cost, low energy internet device that does not require literacy and can be easily shared by an entire village. This, of course, will demand that the government commits itself to research and development as in other countries mentioned formerly in an effort to make ICT ubiquitous in the country. To sum it up, citizens want to get value in this system.

2.5.2 **Technological advancement**

We now look at the actual usage of available ICT. In this we must be aware that ICT is a rapidly evolving technology both in hardware and software. OECD E-government project recommends that procurement should stipulate that performance has precedence over technology (Lau 2003). Many vendors would promote their technologies as best suited for the clients systems and needs when in reality they are not hence leading to failure. The project recommends that all the technologies intended to be used in the E-govemments should be performance tested first.

In addition there should be technological neutrality in legislation, co-operation with international partners and involvement of all stakeholders in the regulatory process.

The third is essential to the public to ensure they sufficiently trained and have access to the technologies. In addition the public should have assurance that the system be a one stop shop i.e. the government agencies are all working in collaboration to ensure seamless delivery of services.

Technological advances will of necessity increase cost of training, increase working hours-which is not desirable, create redundancies of old systems leading to e-waste, increase stress levels for the employees.

They could also be advantageous in reducing carbon emission by reducing the rate of motorized travel to access services, create or preserve carbon sinks by reducing amount of paper required for work hence saving forests, create more office space with the attendant cleaner, working environment and in the long run reduce the wage bill which could be redirected to Research and Development of ICT in the country. Finally we stand to reap enormously like our international counterparts in terms of economic growth, job creation and increased revenue (Andersen and Coffey 2011)

2.5.3 Need for information security

This touches on the second and third indices of the Networked Readiness Index. As noted above in the preceding section, network security and safety of their information in the network is of supreme importance. The failure by the network service providers to guarantee institutional capacity to monitor their network and forestall or curtail breaches security would cause market failure and social distraction (P.S.R.I.C.B 2003). That is to say it will affect their willingness and readiness to use ICT to procure services in the public domain. Hence, in legislation of ICT the citizenry must be involved in order to help navigate the legal challenges presented by this issue that is they need to be in a position to determine the course of action to be taken against the culprits. In the same vein, we note that viruses and malware are spread across the internet and could have devastating effects on the performance of the system and reduce confidence in it.

2.5.4 Need for integrity

Integrity here falls under the Network Review Index's item two which gauges the readiness of the key societal actors to use ICT (Clarke 2011). It can be two pronged: first addressing the *status quo ante* where malfeasance severely compromised the state of service delivery in state departments. The second which is more pertinent to ICT adoption today is the commitment of the government and service providers to guarantee the information privacy and that sharing it seamlessly across the network will not amount to any breach of confidence (Lau 2003). This is a legitimate concern for once information is in the network, it is in the public domain and other people or agencies or countries should not be in a position to access this information without due consent or Authority. A typical case recently reported in the media, pitted a social network against the public where the net work had illegally accessed private information of members of another network. There might even be more cases of some government department's websites being hacked like that of the Kenya police.

Another concern is failure. In this case failure in the network at some point due to irregularities of power or other inherent weaknesses could virtually stop traffic and paralyze operations until the problem is addressed. Hence, a multiplexed system would give the necessary confidence to the public that they can switch operations to a standby channel which has equal capacity as the

former. Case of Kenya ports authority "simba" system break down caused delay in cargo clearance at Mombasa Port.

2.5.5 Public Sector Reforms Program

A policy can be defined as a guiding principle designed to influence decisions, actions, etc. (Kandiri 2007). Typically, a policy designates a required process or procedure within an organization. Thus stated, a policy can be very instrumental in influencing technology adoption as in this case ICT in the public service delivery. This is consistent with the adoption and diffusion of technology theory of Rogers (1962) where he identifies influencers as crucial to the adoption process. However, policy formulation and adoption for the public is rigorous and costly and, hence, must be driven by a compelling need or set of needs crucial to the welfare of the general public such as public service transformation which is the subject of this study.

Public service transformation is one of the key priorities of the Government as it forges towards the realization of Vision 2030, the country's development blueprint for the period 2008-2030. The aim of the vision is to transform Kenya into a newly industrializing, middle-income country, providing a high quality of life to all citizens by 2030. Achievement of this very noble goal demands, foremost, a high performing public service that delivers in a timely, efficient and effective manner. The Government, cognizant and in acknowledgment of the role and contribution of e-Govemment in facilitating better delivery of information and service to the citizens, promoting productivity among public servants and increasing citizen participation and empowerment, has placed technology as an innovation in its service delivery, it has embraced Information communication technology through e - Government initiative, at the forefront of its development agenda (Republic of Kenya 2004).

The Public Sector Reform Program was initiated in 2003 to create an efficient government capable of providing timely services demanded by the public, eliminate bottlenecks and increase the levels of accountability of public servants and by extension government. This led to the adoption of the e-Government Strategy of 2004 which has been structured to meet the primary service delivery requirements of the various sectors namely: relationship between government

and its citizens (G2C); government agencies and private business (G2B); relationships between government departments (G2G); and relationship between government and its employees (G2E). The public service has made tremendous strides in deployment of e-government since the formulation of the e-Govemment Strategy 2004. During the intervening period a number of key milestones have been achieved laying the requisite firm foundation for the future development of e-Government and its continued contribution towards transforming the Public Sector. The benefits of this legal framework have far reaChing effects if all the actors involved collaborate. It is the identification of the e-govemment and ICT as a tool for its facilitation that shows the level of commitment of the government in the efficient delivery of services to the public.

However, the adoption of ICT and hence e-Government in the public sector as in business (Barnes 2005) has been fraught with many challenges despite the obvious benefits of the system. These range from investments, technology adaptation, to culture (Abbate, 2006) to mutual public cooperation. In addition, Kandiri (2007) notes that ICT policies may either encourage or discourage the application of ICT technologies in various sectors of the system. If ICTs are to be part of a sustainable activity there will need to be a suitable policy environment. It is also observed that the consequences of poor implementation of ICT policy would see Africans become relegated to consumer status of technology instead of innovators and producers, and poor ICT policy will also make Africa loose advantage of its diverse cultural heritage that should form technological development.

Having taken note of the institutional weaknesses, the program will if properly implemented radically alter the culture of government as noted by Lau (2003) and Duque (2006). There is also need to Support ICT innovation in Kenya by providing incentives for locally produced software and hardware, provide quality ICT infrastructure and a political will fostering a workable implementation plan. We might agree with Candido (2006) that the political will plays an important role in the mobilization of support, and policy formation, adoption and implementation.

Public sector reforms in Kenya involved the following; Financial management reforms that saw the introduction of Financial information systems at the treasury, the reforms on records management whereby e-records were introduced, there were reforms in procurement where e-procurement was introduced and the introduction of anti-corruption initiatives in the public sector and more emphasis were put on Result based management than in the process management.

2.6 **Information Communication Technology in the Public Service Sector in Nakuru**

The vision of the Information Communication Technology sector is to ensure that Kenya is at the forefront in Africa in the case of Information and Communication Technology (ICT) to improve the quality of life and competencies. Its mission is to promote and enable the society by developing a National Information Infrastructure (Nil) and skills for all Kenyans regardless of geographical or socio-economic status.

In the medium term, Nakuru District Information and Documentation Centre (DIDC) was to install a computer with internet and E-mail facilities which was to be accessed by other departmental heads in the district while dissemination of the 1999 Population and Housing Census Results for Nakuru were done at the district level through computerization at the District Statistics office.

The District Development Committee is encouraging civil servants in the district to undertake computer training locally. Egerton University has established town campus in Nakuru town offering computer packages / maintenance. The Kenya National Library Services (KNLS) - Nakuru branch has a good stock of ICT journals, which can be accessed by members of the public.

ICT has enhanced communication in this district through communication efficiency by provision of ATM facility in most banks, trading through Email, E-commerce with over 21 Cyber Cafes in Nakuru providing services, employment and income to the people of this district. Introduction of cell phones has assisted in the decongestion of landlines and made communication easy along the

covered areas. This is one sector, which does not require construction of new buildings but only use of technology in the existing buildings.

In Nakuru District, Information Communication and Technology has got several key players. Although this is new industry, we should not forget that it has been in existence for several decades. Some of the key players are;- Ministry of Information, the electronic media as T.V. and radio. Ministry of Information has been the pioneer until recently when other players joined the market. There are libraries in Government Institutions and Non-governmental institutions; there are also the printed media, providing newspapers such as the Daily Nation newspapers, Standard newspapers, Kenya Times and other local publications.

The mobile telephones, computers, fax machines, E-mail, Internet have assisted in reduction of communication cost. Telecommunication such as Post and Telecommunication have assisted a great deal in development. With improved Information and Technology, there were less need to spend a lot of money and time in travelling.

There are several key stakeholders in Information and Technology in the district. These include the government, private sector, individuals, parastatals, organizations and non-governmental organizations. The government covers the electronic media very well through collection and dissemination of information covering the entire district, the private sector on the side of printed media, telecommunication through private sector and parastatals while training on the same is being undertaken by private individual and parastatals. There are several commercial computer-training institutions in the urban areas, whereas Egerton University, Rift Valley Institute of Science and Technology, Kenya Industrial Training Institute (KITI) do offer courses related to Information and Technology. For efficiency of running banking and financial institutions ICT is a must, while Local Authorities will need to improve on ICT too (Ministiy of Planning Nakuru DDP 2002-2008)

2.7 **Theoretical Framework**

A theoretical framework is a set of interrelated ideas based on theories and, propositions about concepts and their relationships (Mugenda and Mugenda, 2003). They are a set of assumptions about the nature of phenomena. A theoretical framework is a collection of interrelated concepts 'like a theory but not necessarily so worked-out. It guides a research through determining things a researcher will measure and what statistical relationship a researcher will look for. It is a set of terms and relationships within which a research problem is formulated and solved. This research is guided by the Adoption / Diffusion theory of Rogers (1962).

2.7.1 **Adoption/Diffusion Theories in ICT adoption**

Adoption can be termed as the first or minimal level of behavioral utilization while diffusion in essence, is the process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers 2003). The Adoption/Diffusion theories are of relatively recent origin. First enunciated by Everett Rogers (1960), considered by many the "guru" of adoption/diffusion research since publishing his groundbreaking Diffusion of Innovations in 1960 and which is currently in its fourth edition. In his most recent theory which is a revision of the earlier works, Rogers (1995) argues that potential adopters of a technology progress over time through five stages in the diffusion process. First, they must learn about the innovation (knowledge); second, they must be persuaded of the value of the innovation (persuasion); they then must decide to adopt it (decision); the innovation must then be implemented (implementation); and finally, the decision must be reaffirmed or rejected (confirmation). The focus is on the user or adopter who is critical to the whole process.

The "top-down" and "bottom-up" models of adoption/diffusion provide a directional perspective to the process. Another theory dichotomy relates to the scale of innovation efforts by distinguishing between macro-level theories and micro-level theories. Macro-level theories focus on the institution and systemic change initiatives. In his latest works he reveals three important ways in which the adoption of interactive communications differs from that of previous innovations. 1) A critical mass of adopters is needed to convince the "mainstream" teachers of the technology's efficacy. 2) Regular and frequent use is necessary to ensure success of the

diffusion effort. 3) Internet technology is a tool that can be applied in different ways and for different purposes and is part of a dynamic process that may involve change, modification and reinvention by individual adopters.

Unlike most preceding technologies which were thrust upon the user communities (Carr 1997), ICT technology is individually available to diverse users who can use their own systems to serve their own purposes. The impetus for the innovation frequently grows from individual users of the technology, and as their communication and influence moves laterally through their contacts, a body of support can grow and exert "pressure" on the institutional administration to commit to adoption of the technology. There is, therefore, a high potential for a "bottom-up" or "grass roots" adoption process to succeed. Hence, we can now see the importance of public participation in the adoption of ICT in the public service whose characteristics are essentially different from other technologies in that it allows the users to build their own applications to suit their demands without necessarily affecting the system.

2.8 **Conceptual Framework**

A conceptual framework is a hypothesized model identifying the concepts under study and their relationship (Mugenda & Mugenda, 2003). Below is a conceptual framework developed for the current study

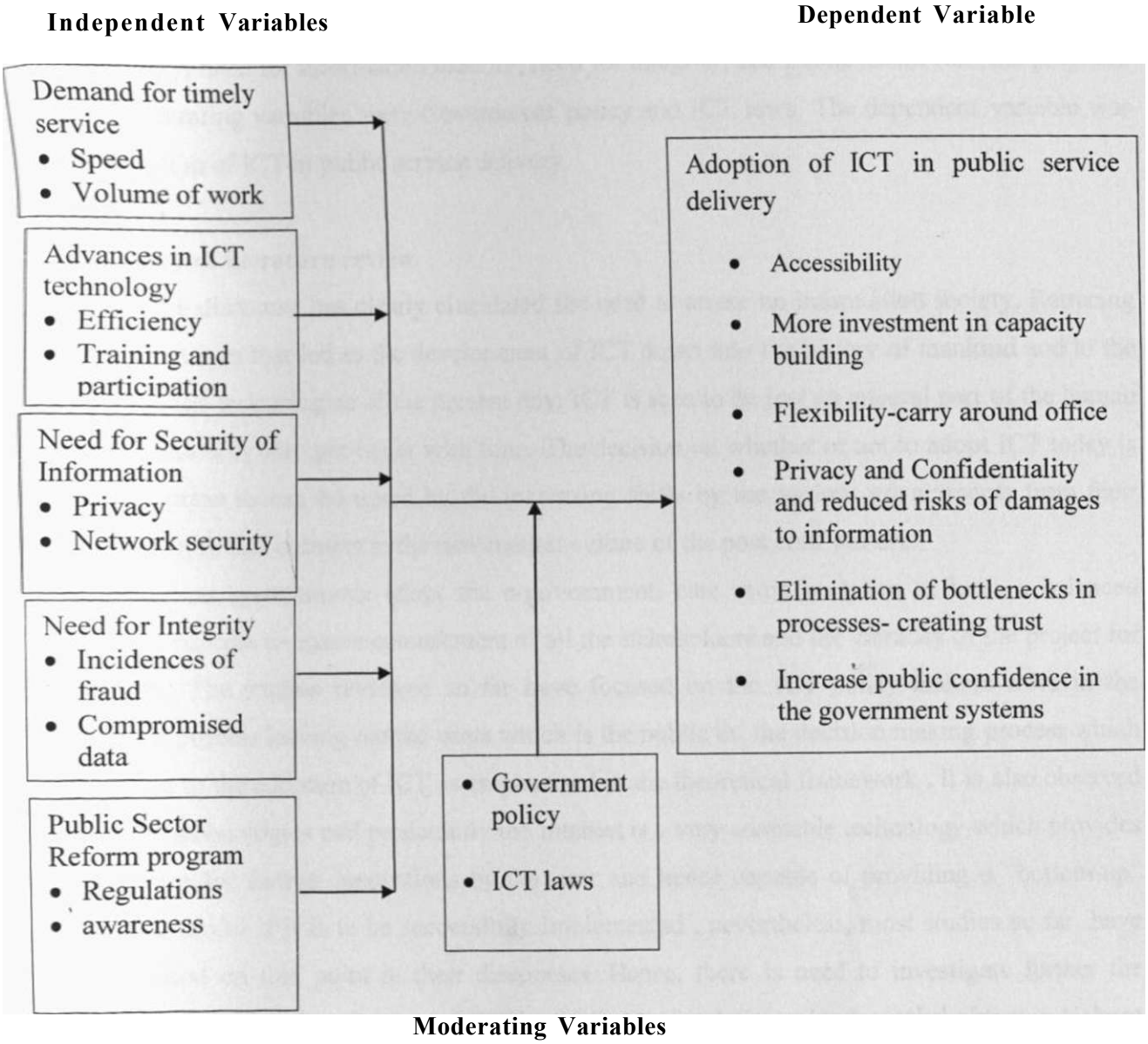


Figure 2.8.1. Conceptual Framework

This conceptual framework was developed by me to present more explanatory graphical relationships between the variables, that is, independent, moderating and dependent variables.

These variables constituted the factors influencing the adoption of ICT in the public service delivery in Kenya. The independent variables were: demand for timely service; advances in technology; need for information security; need for integrity; and public sector reforms program. The moderating variables were Government policy and ICT laws. The dependent variable was the adoption of ICT in public service delivery.

Summary of literature review

The above discourse has clearly elucidated the need to create an information society. Retracing the imperatives that led to the development of ICT down into the history of mankind and to the cutting-edge technologies of the present day, ICT is seen to be just an integral part of the human society and will only get better with time. The decision on whether or not to adopt ICT today is hot an option as can be noted by the increasing shifts by the various governments from their erstwhile political cultures to the new market culture of the post cold war era.

However, as governments adopt the e-government, care must be taken to have a balanced adoption process to ensure commitment of all the stakeholders and the vibrancy of the project for posterity. The studies reviewed so far have focused on the ICT policy makers roles in the adoption process leaving out the users which is the public in the decision making process which is critical to the adoption of ICT as emphasized in the theoretical framework . It is also observed that ICT technologies and particularly the internet is a very adaptable technology which provides a platform for further innovations by the user and hence capable of providing a "bottom-up" adoption model if it is to be successfully implemented , nevertheless, most studies so far have not focused on this point in their discourses. Hence, there is need to investigate further the factors influencing the adoption of ICT in public service delivery by the stakeholders in Nakuru district, Kenya given that observation shows that part of the stakeholders in this case the public have not been involved in the decision making process leading to their dismal participation in the process and, hence, unequal access to information due to socio-economic, regional and geographical disparities. This can be legally challenging for the government which is seen to marginalize areas with poor ICT infrastructure and low income and also people with low or no ICT literacy by stipulating the use of ICT in accessing its services contrary to the current constitution.

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

Methods were used to carry out the research project which comprise of the research design, research site, population, sampling techniques, data collection methods and procedures, research instruments, and data analysis.

3.1 Research Design

This study employed a descriptive survey research design in order to capture the state of affairs as it currently exists in the service delivery in the public sector (Kombo and Tromp, 2006). This was used to establish the populations' current disposition to the variables of the research (Mugenda and Mugenda 2003). This survey design also has the added advantage of being able to explain and explore the status of two or more variables, and with respect to each other, at a given point in time.

3.2 Research Site

Research was done in Nakuru town which serves as the administrative headquarters of both Rift Valley province and Nakuru district and most of the key government departments which were to be surveyed in the study are located in the town. Its population has grown exponentially from of 38,181 in 1962 to 674,229 in 2009. The population growth has been influenced by the birth rates, rural-urban migration and boundary extensions. The town is located 160 km North West of the capital Nairobi and is the fourth largest urban centre in Kenya after Nairobi, Mombasa and Kisumu. It is situated at an altitude of 1859m above the sea level and it is within the region of the Great Rift Valley whose formation gave rise to a unique natural structure. It is sandwiched between Lake Nakuru National Park to the south and the Menengai crater and its associated volcanic landscapes. The major economic sectors of the Nakuru urban economy are: commerce, industry, tourism, agriculture and tertiary services. The commercial sector in Nakuru contributes about 19% of the economy of the town. Within the Central Business District (CBD), retail activity occupies 26%; wholesale has 10%, the informal sector enterprises 18% of all the commercial activity space. The most dominant forms of business in the Nakuru economy include: retail in hardware, general wholesale, outlets for agro-industrial machinery, motor

vehicle trade, spare parts and servicing the agro-chemical retail and wholesale outlets. There is a significant network of financial institutions providing banking, insurance and credit services to the business community.

3.3 **Target Population**

Kombo and Tromp (2006) define the population as a group of individuals, objects or items from which samples are taken for measurement, and also that they must at least have one thing in common which is of interest to the researcher (Kombo andTromp 2006) and (Best and Kahn 1998). Best and Kahn further state that the target population is a small portion of the population with characteristics which are representative of the whole (Kombo and Tromp 2006) and is selected for observation and analysis. Nakuru town is home to 44 government departments majority of which are located in the central business district at the Rift Valley Provincial headquarters. The departments offer various kinds of services ranging from security to agriculture and having a total work force of 668 personnel stationed at the former provincial headquarters and over ten thousand in the entire District/ county. These have various modes of interfacing with the public and also have different organizational structures. 196 respondents were selected from the entire population using random sampling for the purposes of the study and the unit of analysis comprised of the management and subordinate members of staff.

3.4 **Sampling Procedure and Sample Size**

Patton (1990) describes sampling as act, process, or technique of selecting a suitable sample, representative part of the population for the purposes of determining parameters or characteristics of the whole population. It can also be defined as a finite part of a statistical population whose properties are studied in order to gain information about the whole (Webster 1985). Mugenda and Mugenda (2003) add that the population should have relevant characteristics and be obtained from the accessible population.

For this research design, that is, descriptive survey, Frankel and Wallen (2000) recommend that a minimum of 100 respondents should be used if proportional sampling is to be employed in

selecting respondents. This research employed probability sampling which practically gives every member an equal chance of being included in the study (Kombo and Tromp 2006).

To determine the sample size for the target population, the study adopted a formula proposed by Mugenda and Mugenda (2003)

$$n = \frac{z^2 p q}{d^2} \quad \text{(i)}$$

n is the sample size (if the target population is greater than 10,000)

z is the standard normal deviate at the required confidence level

p is the proportion or percentage of the target population estimated to have the characteristics being measured..,

q is equal to 1 - p

d is the level of statistical significance set.

Setting p at 15% i.e. 0.15, and the confidence level at 95% where the z-statistic equals 1.96, and the desired level of statistical significance set at 0.05, then the sample size is

$$n = \frac{(1.96)^2 (.15)(.85)}{.05^2} \quad \text{(ii)}$$

= <u>195.9216 or 196</u>

After obtaining a sample size of 196, the sample population was divided by forty four departments to yield approximately 5 members per department including the management.

Bias and sampling error (Kombo and Tromp 2006) were addressed using a larger sample population for instance 196 is also approximately 30% of 668 and will permit better statistical analysis correspondence and discrepancies. Careful respondent selection was carried out to

enlist only willing participants to avoid cheating, copying, hostility and partial co-operation. Early preparations will also ensure that time is well managed to obtain optimal results and also to enable the researcher measure all the variables simultaneously and heterogeneously.

%

3.5 Methods of Data collection

To collect primary data, the study mainly utilized quantitative and qualitative methods of data collection to give adequate insights into the topic. Primary data is important as it involves creating "new" data (Kombo and Tromp 2006) and these were collected from existing sources. Data to be collected were based on the perceptions and attitude of the group members towards the subject of the items in the questionnaires. The questionnaires were self administered.

Secondary data was also collected to supplement the primary data. This was not collected directly by me, but obtained from the diverse store of information or electronically stored information.

3.6 Research Instruments

The preferred research instrument for this study that assisted in collecting primary data is the questionnaire. This research instrument was pilot tested for validity and the elimination of bias before being deployed in the field to collect data at the District Treasury office in Nakuru district headquarters which was not to participate in the actual study.

3.6.1 Questionnaire

This is a research instrument that gathers data over a large sample (Kombo and Tromp 2006). It has quite a number of advantages which include: confidentiality; time saving; and reduced interviewer bias. However, it requires careful preparation as it could easily confuse the respondents, or discourage them, or simply fail to capture important information needed in the study (Mugenda and Mugenda 2003). The questionnaires used in this study contained both structured and unstructured questions. They were administered by me and my research assistants. They had the advantages of being of low cost, easy access, physical touch to widely dispersed samples (Fowler 1993) and also the fact that the results are quantifiable.

3.7Validity and Reliability

In research no two interviewers are alike and the same person (respondent) may provide different answers to different interviewers (Kombo and Tromp 2006). The manner in which a question is formulated can also result in inaccurate responses since individuals tend to furnish the interviewers with false answers to particular questions. This necessitates the need for reliable instruments to enable the researcher to extract accurate information from the respondent (Mugenda and Mugenda 2003) in order to maximize the reliability and validity of the data collected.

3.7.1 Reliability

Reliability is the measure of the consistency of the results from the tests. It is a measure of the degree to which a research instrument yields consistent results or data after repeated trials. Reliability is the accuracy and precision of a measurement procedure in terms of economy, convenience and interpretability. It is influenced by random error.

Pre-test of the instruments were conducted to ascertain their internal reliability and hence minimize instrument and researcher's error. This enabled restructuring of some items in the questionnaires. After pre-test, reliability of the instruments was estimated using Cronbach's Co-efficient Alpha (K-R) 20 formula.

The Cronbach Alpha reliability test was performed on the questions in the instruments using a reliability co-efficient of 0.7 and above. Kathuri and Pals (1993) state that the Cronbach Alpha appropriateness was because of its ability to handle multiple responses of the items. The findings for the Cronbach reliability Alpha test for the study are as shown in Table 3.1.

Table 3.1 Reliability Statistics

Cronbach's Alpha	N of Items
0.801	76

The term N of items in table 3.1 refers to the number of questions picked by the computer for reliability tests using SPSS.

The reliability coefficient (Alpha) achieved for questions selected in all sections of the questionnaires on aggregate was 0.801. Basing on Kathuri and Pals (1993) recommendations the questionnaires were adopted since their reliability co-efficient was above the recommended 0.7 mark. The quality of the questionnaires was also assessed with the input from experts.

3.7.2 Validity

Validity is the accuracy and meaningfulness of inferences, which are based on the results. It is a measure of how well a test measures what it is supposed to measure. Validity refers to the extent to which a test measures what a research wish to measure.

It is concerned with the accurate representation of the variables under study. It is influenced by systematic error in data. This was addressed in the present study by proper instrument design to reflect the research objectives and pre-testing the instruments.

For the instruments to provide consistent results that contribute to validity and Reliability, questionnaires were well structured to improve clarity. Trained and motivated persons were to conduct the research and sample size items were broadened enough, simple language with clear instructions illustrated with examples were used in my instruments and that detailed instructions for administering the test, scoring keys , evidence about reliability and guides for using the test and for interpreting the results were put in place.

3.8 Data collection

Care was taken to ensure that the data was scored correctly, and systematic observations made. Primary data were collected mainly utilizing quantitative and qualitative methods to obtain in depth information of the study variables. Respondents were approached through the management separately and questionnaires self administered. The use of closed and open ended questions in the questionnaire was instrumental in generating both quantitative and qualitative data. This improved the quality of responses to be contained in the questionnaire. The questionnaires were

pilot tested at the District Treasury department in Nakuru district headquarters; however, these did not participate in the actual survey. This was done to identify weaknesses, ambiguities and omissions in the questionnaire so as to improve its quality.

3.9 Ethical Considerations

For both legal and ethical considerations permits to carry out the study were obtained from the relevant authorities like the University of Nairobi, National Research Council and the Rift Valley Provincial Commissioner's office, the Nakuru District Commissioner's Office and the Nakuru District Education Office. Polite language was used and respondents were accorded due respect in the process of data collection.

3.10 Data Analysis Techniques

Qualitative data was generated from open ended responses. This was an on -going process which went hand in hand with the data collection. The information was then transcribed and coded based on established themes, sub-themes and patterns. That is thematic analysis were used since it is best suited for this study as it classifies major issues or topics covered and makes it possible to develop a coding system based on the samples of data collected (Kombo and Tromp, 2006). In addition it was easier to develop a summary report identifying major themes and the associations between them. Various successive steps and activities were followed in the analysis including writing field notes, writing session summaries, coding and interpretation of findings. Codes from transcripts, session summaries and field notes were available for report writing. Coding was used to distinguish data collected from different sources.

Since this study sought to assess the influence of the independent variables on the dependent variables, and also be able to do this quantitatively, chi-square was used for analysis based on the ordinal and nominal scale data that was collected. Data was further described using descriptive and inferential statistical methods presented on tables.

The data was analyzed using SPSS, which has an inbuilt analysis tool pack that enabled me to carry out the process efficiently.

l able 3.2 Operational definition of variables

Objectives	Variables I	Indicators	Measurement Scales
	Dependent Adoption of ICT in public service delivery	• Accessibility • More investment in capacity building • Flexibility-carry around office • Privacy and Confidentiality and reduced risks of damaged • Elimination of bottlenecks in processes- creating trust • Increase public confidence in the government systems	Ordinal Nominal
[1] To establish how demand for timely services influences adoption of ICT in public service delivery.	**Independent** Demand for timely service	• Speed • Volume of work .	Ordinal
To examine how advances in ICT influence adoption of ICT in public serv ice delivery.	**Independent** Advances in ICT technology	• Efficiency • Training and Participation	Ordinal Nominal
To investigate how the need for security of information influences adoption of ICT in public serv ice delivery.	**Independent** Need for Security of Information	• Privacy • Network security	Ordinal Nominal

To determine how the \ need for integrity influences the adoption of ICT in public service delivery.	**Independent** Need for Integrity	• Fraud • Compromised data	Ordinal
To verify how public sector reform program influence the adoption of ICT in public service delivery.	**Independent** Public Sector Reform program	• regulations • Public awareness	Nominal Ordinal

CHAPTER FOUR:
DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter presents results arising from the analysis of data collected using questionnaires. The findings are presented in tabular summaries, and their implication interpreted. The study sought to determine the Factors influencing the adoption of information and communication technology (ICT) in public service delivery in Nakuru district, Kenya. It also sought to assess the level of ICT readiness of the public offices in the area which is critical to the adoption of ICT for government functions. Data collection instruments were developed and distributed targeting 44 government departments with a combined staff population of 668. A sample of 196 respondents was drawn from the staff and the departmental heads and distributed accordingly in every department in order to participate in the survey. The data collected was analyzed using descriptive and inferential statistical methods for each variable and the results are presented in tables and discussed in the sections below.

4.2 Response rate of the Research Instruments

Table 4. 1: Response rate of the Research Instruments

No. of questionnaires returned	*Target No. of questionnaires*	*Response rate Percentage*
153	196	78

The study was able to get a response from 153 respondents out of the 196 questionnaires distributed the staff at the Rift Valley provincial headquarters as shown in Table 4.1; this represents a response n of 78% which was quite good for the study analysis. The rest of the respondents did not return t questionnaires citing reasons such as forgetfulness, misplacement, lack of time or being out on offic duty.

4.3 Respondents Demographies

The study sought to find out background characteristics of the respondents relevant to the study including gender, age, highest level of education, work experience in terms of years and the previous duty stations in order to present a wider view of the research problem.

4.3.1 Gender of the respondents

The gender of the respondents is given in Table 4.2

Table 4. 2: Distribution of the respondents according to gender

Gender	*Frequency*	*Percentage*
Male	**85**	**56**
Female	**68**	**44**
Total	**153**	**100**

The study used a sample size made up of 44 % female respondents and 56 % male respondents as shown in the figure above. This implied that there was near gender parity in the workforce. This represented a gender balance that could offer a neutral, that is, unbiased approach during service delivery. Therefore gender was not significant to the findings.

4.3.2: **Age of the Respondents.**

The age of the respondents is as given in Table 4.3 below.

Table 4. 3: **Distribution of the Respondents according to age.**

Age of the Respondents (Years)	*Frequency*	*Percentage*
19-29	26	\T~
20 - 30	49	32
41-51	60	39
52 and above	18	12
Total	153	100

The findings further reveal that for the employees in the 19- 29 yrs group the males were 30% compared to the females at 70%. This represented 9% and 26% for both genders in their individual categories respectively. In the 30 - 40 yrs group the reverse was observed with males at 70 % and females at 30%. In their categories, this translated to 40 % and 22% respectively. This was the highest score for the males in their category. The succeeding group of 41 - 51 yrs had a 50-50 gender representation. Incidentally this was the highest score for the females in their category at 44%. The modal group of the respondents was 41-51 years and was 39% of the respondents. This indicates that most of the civil servants were still in their prime age and were also career people who had a better view of the effect of the adoption of ICT in the public service hence their accounts could improve the validity of the study and by extension the future of ICT adoption in the public service delivery.

4.3.3 Level of education and work experience

Table 4.4 below shows the highest level of formal education achieved by the respondents. The data is based on self declaration.

Table 4. 4 Highest-level of Education of the Respondents

Highest-level of Education	*Frequency*	*Percentage*
O-levels	17	11
Certificate (Tertiary)	46	30
Diploma	37	24
Degree (Bachelor's)	33	22
Masters	18	12
Others	2	1
·	153	100

The table 4.4 shows that one third of the respondent i.e. members of staff at the Provincial Headquarters were in possession of tertiary level certificates. Only 11% had no tertiary level

education but only O - levels. The rest, that is, 89% had post high school training and qualification up to the graduate and PhD levels. This shows that the public service has enormous potential capacity to deliver on the service delivery based on the capability of its employees in terms of academics.

Work experience was sought to give a clearer picture of the level of education and this was given in terms of years. This is as presented in table 4.4 below..

Table 4. 5 Work Experience of the Respondents

Work Experience (years)	Frequency	Percentage
0 — 5 years	43	28
6 - 1 0 years	26	17
11 >years	84	55
Total	153	100

In terms of work experience, 55% of the respondents had equal to or more than 11 years experience in the public service and they constituted the majority who had served in various stations in the country. This was important to the study as the respondents work experience spans the time preceding the adoption of ICT in public service since its formal inception in 2003.

Approximately three out of ten members of staff working in the Provincial headquarters had less than five years working experience in the public service. Only 17% of the employees seem to have been recruited at the outset of the Reform Program launch and just after the launch. This information was cross-tabulated with the highest level of education and is presented in Table 4.5

Table 4.6 Work and Highest Level of Education of the Respondents

Work Experience (Yrs)	*O-levels*	*Cert.*	*Diploma*	*Degree*	*Masters*	*Others*
0-5	3	16	13	9	2	0
6-10	2	2	6	12	4	0
11>	12	28	18	12	12	2
	17	46	37	33	18	2

The tables 4.6 shows that majority of the respondents with less than 5 years i.e. 37% of the staff in the provincial headquarters had tertiary level certificates and this was followed by Diploma level education at 30% while one out of five was in possession of a university degree. Since this group i.e. 0 - 5 yrs level of work experience falls at the entry level of formal employment and coming after the promulgation of the public sector reform program of 2003 and the subsequent launch of the E-Government initiative, it shows that the government is committed to the public sector reform program by recruiting more qualified personnel to carry out its ambitious plan.

At the higher levels of work experience, such as those with over eleven years, the higher levels of education by the seemingly career civil servants suggests that both the employer and the staff have taken the onus to build capacity among the serving employees to enhance their skills in public service delivery in compliance with the Reform Program.

4.4 Relationship between the Study Variables and ICT Adoption

This section introduces findings on the research variable and the tests for hypotheses to determine the significance of relationship between the variables using the Chi-square method which is among several methods used for testing the significance of relationships. It was suitable for this study due to the non-parametric nature of the data being analyzed, that is, the data was mostly nominal and ordinal. The research variables were Demand for timely service, Advances

in ICT technology, Need for Security of Information, Need for Integrity and the Public Sector Reform program of 2003. These are presented as listed above in the following subsections.

4.4.1 Demand for Timely Services and ICT Adoption

The demand for timely services has been a recurrent theme in public service delivery due to the anticipated increased levels of transactions between the government and the public brought about by the reform programs. This study aimed at establishing how this factor as stated contributes to the adoption of ICT in public service delivery. This was achieved by information extracted from questions stemming from this factor namely; levels of computer literacy, respondents' view of the performance of ICT in their departments, the sharing of information across the local networks and the cost benefit analysis. The findings are given in the following sections.

Computer literacy

The study sought to establish the level of computer literacy among the staff at the Provincial Headquarters as it is deemed an integral component to the running of the E-government initiative and also crucial to the adoption of ICT in the public service delivery. The findings are as presented in the table below.

Table 4. 7 State of Computer Literacy

State of Computer Literacy	*Frequency*	*Percentage*
Yes	146	95
No	7	5
Total	153	100

Table 4.7 shows that the level of computer literacy was extremely high in the Provincial Headquarters at 95% while illiteracy stood at only 5%. However, this per se would not confirm the level of readiness to deliver timely services to the public as ICT technology is dependent on among other things the level of training specifically in ICT which include the use and maintenance of computer hardware and software and the application packages proficiency. The

table below gives a breakdown of ICT skill level among the staff at the Provincial Headquarters, Nakuru.

Table 4. 8 Level of Computer Literacy

Level of Computer Literacy	*Frequency*	*Percentage*
Basic (introduction)	66	45
Word processing	38	26
Spread sheet	34	24
Software Technician	6	4
Hardware Technician	2	1
	146	100

Table 4.8, shows that 45% of the respondents who were computer literate had only learned computing up to the introductory levels. ***26%*** of the total had acquired word processing skills and only 24% could use the spreadsheet packages. There were only six software technicians serving the 44 departments and only 2 hardware maintenance personnel. This says that the user knowledge in ICT in the public service was limited to only application software hence they cannot improve on the system itself.

This latter part means that machine breakdowns would necessarily take longer to trouble shoot and fix incase of malfunctions. There is evident need to recruit or train more software and hardware support staff to ensure smooth and reliable ICT infrastructure within the Provincial Headquarters especially as the departments become increasingly linked on a single network.

Actual service delivery within the departments

It was important to gauge the change actual service delivery at the departmental level since the introduction of ICT in the various departments. It was assumed here that ICT as a tool for enhanced service delivery was introduced after the promulgation of the public sector reform

program. The indicators of timely services were: faster services, volume of work done per day, employee performance reduction workload, and collaboration with other different departments. This is as summarized in the table below.

Table 4. 9 Respondents agreement with service delivery within the departments

State of Agreement with Indicators	*Frequency*	*Percentage*
Yes	609	80
•No	17	2
Not sure	139	18
Total	765	100

Table4.9 show that majority of the respondents, that is, 80% thought that there was an improvement in service delivery at their departments since the introduction of ICT. However, only 29% were satisfied with the ability of ICT to deliver promptly services in the respective departments to the public. 17 (2%) still thought that ICT in their departments has yet to make any impact with only less than 0.4% rating ICT in their departments as very poor. These were the dissatisfied lot. Additionally, 18% of the civil servants were not so sure of the impact ICT was making in their departments. However, this is only an appreciation of ICT as found in the various departments, the exact capability and readiness would need a much more physical count which would not be possible under the current circumstances.

These indicators were also ranked in order of performance appreciation by the staff as follows;

Table 4.10 Indicators of Timely Services

Indicators of Timely Services	*Frequency*	*Percentage*
Volume of work done	129	21.3
Faster services	127	20.8
Reduction of workload	125	20.5
Employee performance	120	19.7
Collaboration with other departments	108	17.7
	609	100

The indicators have a mean score of 121.8 which is approximately 80% of the total responses per item, hence, supporting the earlier position that about four out of five respondents were in agreement that ICT had an impact on the public service delivery in their departments. The high scoring of the indicator denoting volume of work done agrees with the fact that ICT increases capacity to work while the comparatively low scoring of collaboration, the two having a range of up to 21 points indicating that many of the respondents were not satisfied with the level of networking within their departments and the others. This underpins the need to improve the networking of the departments in order to facilitate seamless services to the public. This also led to the need to assess the knowledge of computer networks as given in the following section.

Familiarity with the Network Server

A total of 125 (82%) of the respondents knew something or were familiar with the network server while 28 (18%) admittedly didn't know what it was. For those who knew, the level of their appreciation of the network server is as summarized in the table below.

Table 4.11 Level of Appreciation Of The Netw ork Serv er

Level of Importance	*Frequency*	*Percentage*
Very important	70	56
Important	48	39
Neutral	5	4
Less important		<1
Not important		<1

Table 4.11 indicates that the vast majority i.e. 95% of the respondents agree that the network server is a very important information sharing resource and hence it should be availed at their departments. A survey of the availability of the server revealed the presence of only six servers for the entire 44 departments. This translated to a mere 14% internal network access. Hence, there is need to improve departmental connectivity using the servers in order to enhance service deliver}', but this obviously comes at a cost of which the succeeding section now explores.

Cost Benefit Analysis

98 (64%) of the respondents readily agreed that the incorporation of ICT in their departments was costly while 36%, that is, 55 respondents didn't think so. The study, therefore, sought to get an in depth view of this aspect and the findings are presented in the table below for those who said that the implementation of ICT was costly.

Table 4.12 Perception of Cost Benefit Analysis

Cost Rating	*Frequency*	*Percentage*
Very high	46	47
High	37	38
Average	11	11
Low	1	1
Very low	3	3
. Total	98	100

Table 4.12 show the cost rating, less than half of them were convinced that the cost of ICT implementation in their departments was very high. A further evaluation of this revealed that about 31 out of the 153 i.e. 20% highly justified the benefits while 62% thought that the costs justified the benefits. This suggests that ICT investment in the public service delivery would yield better returns as anticipated. Hence, it is only a matter of implementation.

Test **of Hypothesis 1:**

For objective 1 the following hypothesis was formulated and tested to establish the relationship between the Demand for Timely Services and the Adoption of ICT in Public Service Delivery.

Ho : There was no Significant Relationship Between the Demand for Timely Services and the Adoption of ICT in Public Service Delivery

The indicators of the demand for timely services were the need for information sharing and cost of ICT implementation were tested for significance of relationship with the dependent variable which is the adoption of ICT in the public service delivery. These were tested at a 1% significance level and 1 degree of freedom i.e. Chi-Jt_a^2 = 6.635.

In terms of sharing information across departments the critical Chi- x_c^2 value was 0.12 which was much lower than the table Chi- x_a^2 value of 6.635 from the tables, thus confirming that information sharing across the public service departments was critical to the adoption of ICT.

When testing the cost implication against ICT adoption, the Chi- x_c^2 value was 9.3 which was way above the Chi- x_a^2 value of 6.635, thus the null hypothesis was rejected indicating that cost was not a factor in the adoption of ICT in the public service. This could be informed by the belief that government was duty bound to avail ICT resources within its departments, hence, cost was not a factor.

Table 4.13 Test of Hypothesis 1

Predictors	X^2	d.f
Information sharing across departments	0.12	1
Cost implication	9.3	1
Total	9.42	2

Significance level ***a* = 0.05 = 5%; 2 d.f; *y2*** = 5.991

Table 4.13 show that the Chi-square result is far above the critical value and hence significant. This leads to the rejection of the hypothesis. Thus both tests imply that there was a strong significant relationship between the demand for timely services and the adoption of ICT in public service delivery. In conclusion, this variable shows that the public service state of readiness is good in terms of human capital but is still wanting in terms of equipment. Therefore, there is needed to make significant investments in ICT equipment.

4.4.2 **Advances in ICT Technology and ICT Adoption**

In this variable, the study sought to assess how advances in ICT technology influenced its adoption in the public service delivery and was guided by parameters such as efficacy, training costs, legal requirements and friendliness of the technology. The efficacy and training were as presented in the table below.

Efficacy and training costs

Table 4.14 Efficacy and Training Costs Rating

Efficacy and Training Costs Rating	*Frequency*	*Percentage*
Very high	242	26
High	432	47
Average	209	23
Low	34	4
Very low	1	0
Total	918	100

Table 4.14 shows that the respondents thought that ICT was highly reliable and efficient. While most respondents agreed that the ICT was a highly efficient technology with its rating at 47%. This was not so for reliability which scored 22% but was rated high at 56%. Capacity was rated at 80% which was good and which shows that majority of the respondents had confidence in the technology's capability. However, 25% of the respondents were undecided about the flexibility of the technology. Two thirds of the respondents i.e. 62% were of the opinion that advances in technology increased the costs of training, and this was significant in the attempt to narrow the digital divide. Only 10% of the respondents said that the maintenance requirements were low, thus, corroborating the fact that technology was actually advancing.

Legal requirements and access to ICT

The table below shows the rating of insufficient access to ICT as a limiting factor in the adoption of ICT in public service delivery.

'Table 4.15 Rating of insufficient access to ICT

Rating of insufficient access to ICT	*Frequency*	*Percentage*
Very much	73	48
Much	41	27
Somehow	28	18
Not so much	5	3
Not at all	6	4
Total	153	100

Table 4.15 shows that about 3 out of 4 respondents thought that insufficient access to ICT was slowing down the adoption process, hence, necessitating more investments in ICT infrastructure. This led to the need to investigate the aspect of legality in a bid to see whether the authorities should be compelled to provide better access to ICT to the public.

The ratings are as presented in the table below.

Table 4.16 Rating of Constitutional Right to access ICT

Rating of Constitutional Rig/it to access ICT	*Frequency*	*Percentage*
Strongly Agree	46	30
Agree	62	41
Neutral	22	14
Disagree	13	8
Strongly disagree	10	7
Total	153	100

From table 4.16 it is evident that the majority i.e. 71% thought the government was duty bound to provide access to ICT to its citizens if the E-government initiative was to be successful. However, 10 (7%) of the respondents felt that this was unnecessary as it was incumbent on the public to take initiative and invest on ICT as it was becoming increasingly important. Pertinent to this was the need to have more friendly ICT technologies which is the subject of the next sub-section.

Technological neutrality

51% of the respondents said that adjusting to new technology was relatively easy while only one third of the respondents felt it was quite hard. This informed the need to obtain an in-depth look at how they felt about the friendliness of the ICT technology with increasing technological advancement in their departments. This is as summarized in the table below.

Table 4. 17 Need for Technological Neutrality

Need for Technological Neutrality	*Frequency*	*Percentage*
Strongly Agree	69	45
Agree	63	41
Neutral	10	7
Disagree	10	7
Strongly disagree	1	0
Total	153	100

Table 4.17 findings indicate that an overwhelming majority 86% were of the opinion that advancing ICT technology needed to be friendlier if it was to achieve high adoption rates. This is underpinned by the adoption of technology theory (Rogers, 1962) which emphasized knowledge as a critical element in the adoption of technology. Hence, there was need to stipulate that ICT vendors intending to supply their products to the public service should comply with this requirement.

Test **of Hypothesis 2:**

For objective 2 the following hypothesis was formulated and tested to establish the relationship between the Advances in ICT Technology and the Adoption of ICT in Public Service Delivery

Ho: **There was no Significant Relationship between the Advances in ICT Technology and the** Adoption **of ICT in Public Service Delivery**

The Advances in ICT Technology where the efficiency, access to ICT, the legal aspects and the challenge of adapting to new technology were tested against the dependent variable which is the adoption of ICT in the public service delivery. These were tested at a 1% significance level and 1 degree of freedom i.e. Chi-x_a^2 = 6.635. In terms of efficiency brought about by ICT in service delivery across departments the critical Chi- jt_c^2 value was 3.41 which was much lower than the Chi- Xa value of 6.635 from the tables, thus confirming that efficiency in service delivery across the departments was significant to the adoption of ICT in public service delivery.

In testing the access to ICT against ICT adoption, the Chi- jc_t^2 value was 9.3 which was way above the Chi- Jt_a^2 value of 6.635, thus the null hypothesis was rejected indicating that access to ICT was not a factor in the adoption of ICT in the public service. The above two results are presented in tabular form below:

Table **4.18 Test of Hypothesis 2**

Predictors	**X^2**	**d.f**
Efficiency	3.41	**1**
Access	9.3	**1**
Total	**12.719**	**2**

Table 4.18 gives a computed Chi-value of 12.719 that is above the critical Chi-value of 9.210 which is significant but could not be given by chance. As such the hypothesis that no significant relationship exists between the Advances in ICT Technology and the adoption of ICT in public service delivery is rejected. Thus both tests imply that there was a strong significant relationship between the Advances in ICT Technology and the adoption of ICT in public service delivery.

Need **for Information Security and ICT Adoption**

The literature review identified the need for information security as very important for the adoption of ICT in the public service delivery. This was analyzed in terms of, privacy concerns and departmental capability to mitigate these concerns; and also in terms of Network Security i.e. the networks to malwares and viruses propagated via the internet. The following subsections discuss these issues.

Privacy concerns

The table below gives the ratings of the privacy concerns as expressed by the respondents.

Table 4. 19 **Privacy concerns**

Privacy concerns	*Frequency*	*Percentage*
Strongly Agree	170	22
Agree	331	43
Neutral	207	27
Disagree	45	6
Strongly disagree	12	2
Total	765	100

Table 4.19 is an aggregate of the privacy concerns as cross tabulated against the departmental capability. 65% of the respondents expressed the need for privacy in the network, that is, information should only be shared with due authorization. This was critical to the adoption process as the public needed more reassurance of the safety of their personal information when on - line. 78% of those surveyed were of the opinion that information security needed to be enhanced while 71% of expressed serious concerns over the privacy of information while on the network. At the same time 82% thought their departments ICT were not capable of offering security of the information stored on the networks.

One in ten respondents thought that the networks were capable of guaranteeing protection from unauthorized access to personal information on the networks, while 14% supported this view that there was enough network security for public information.

Internet Security

The table below shows how the respondents reacted to the network security threats posed by the internet.

Table 4. 20 Internet Security Threat Ratings

Internet Security Threat Ratings	*Frequency*	*Percentage*
Strongly Agree	44	29
Agree	75	49
Neutral	19	13
Disagree	14	9
Strongly disagree	1	0
Total	153	100

Table 4.20 shows that 78% of the respondents thought that there was need for internet security due to the possibility of increased vulnerability of the local networks on the internet. This in the earlier findings that indicated buttresses many respondents were apprehensive about the public information being accessible on the internet, that is, it was possible for personal information to be accessed without authority when online by hackers.

In relation to this, the study sought to gauge the fears expressed by the respondents asking about the possibility of the entire information system collapsing due to the malwares. This is as given in the table below.

'Vhreats posed by Malwares on the Internet

Table 4.21 Ratings of Mahvare (viruses) Threat

Malware (viruses) Threat Ratings	*Frequency*	*Percentage*
Strongly Agree	46	30
Agree	73	48
Neutral	17	11
Disagree	14	9
Strongly disagree	3	2
Total	153	100

The findings as presented on the table 4.21 closely agree with the earlier findings which clearly show that there was need to improve on network security to gain more public confidence and hence participation on the system.

Test of Hypothesis 3:

For objective 3 the following hypothesis was formulated and tested to establish the relationship between the Need for Information Security and the Adoption of ICT in Public Service Delivery

Ho: There was no Significant Relationship between the Need for Information Security and the **Adoption of ICT in Public Service Delivery**

The Need for Information Security where the risk of personal information being on the public domain without adequate security, internet security and the presence of malwares in the networks were tested against the dependent variable which is the adoption of ICT in the public service delivery. These were tested each at a 1% significance level and 1 degree of freedom i.e. Chi- x_a^2 = 6.635. In terms of the risk of personal information being on the public domain without adequate security, the critical Chi- x_c^2 value was 2.163 which was much lower than the Chi- x_a^2 value of 6.635 from the tables, thus confirming that the risk of personal information being on the

public domain without adequate security, was critical to the adoption of ICT in public service delivery.

When internet security and the presence of malwares in the networks were tested against ICT adoption, the Chi- Jt_c^2 value was 1.037 which was still lower than the Chi- x_a^2 value of 6.635, thus the null hypothesis that said internet security was a factor in the adoption of ICT in the public service was accepted. The table below shows both results.

Table 4.22 Test of Hypothesis 3

Predictors	**X^2**	**d.f**
Adequate network security	2.163	**1**
Presence of malwares in the networks	1.037	**1**
Total	**3.2**	**2**

Significance level a = **0.05 = 5%; 2 d.f; y2** = 5.991

The Chi-value obtained Table 4.22 results is much lower than the tabulated value and could not be as a result of chance and, hence, significant. Both results on the above tests imply that there was a strong significant relationship between the Need for Information Security and the adoption of ICT in public service delivery.

4.4.4 Need for Integrity and ICT Adoption

The need for integrity was identified as a key element in the adoption of ICT in the public service delivery. It is two pronged; first it is intended to address the integrity problems experienced in the previous manual regime while at the same time not being itself culpable to cyber crime, that is, fraudsters operating online.

This was analyzed using a survey of the performance of ICT in the department(s) since its introduction and the influence it has had. The findings were as presented in the subsequent sub-sections.

'"Cable 4. 23 Performance of ICT in the department since introduction

Performance of ICT in ilie department since introduction	*Frequency*	*Ratings*
Efficient records management	128	84
Information Integrity	112	73
Incidences of Corruption	65	42
Transparency and Accountability	99	65
Effectiveness in combating corruption	77	50
Vulnerability to power and system failures	56	37
	537	

Performance of ICT in the Departments

Table 4.23 show that Most of the respondents surveyed i.e. 84% agreed that ICT had made their work easier by enabling efficient records management. 73% were of the opinion that there was information integrity, however, it must be pointed out that the departments are not fully networked, hence, there was only minimal information sharing across the departments via networks. Only 4 out of 10 respondents thought that ICT has reduced incidences of corruption in their departments, while 65% thought ICT had encouraged transparency and accountability in their departments. 50% of the staff members believed that the technology was effective in combating corruption in their departments. 63 percent or two thirds of those surveyed were not sure whether their departments' systems were reliable when it came to power blackouts and system failures. These calls for improved power back ups like stand by generators and increase level of redundancy of ICT components. In terms of years of experience the opinions on the above was expressed as follows:

For those who had less than 5 years work experience, only 56% mere of the opinion that ICT had improved the service delivery in the public domain; 61% of the respondents who had between 6 and 10 years work experience said that ICT had improved service delivery while 57% of those who had more than eleven years work experience agreed with the fact that ICT has improved

service delivery in the public domain. In general, 58% of those surveyed agreed that ICT had enhanced their service capability. This is in agreement with the earlier findingsA

Influence of ICT in Anti-corruption Initiatives

In terms of anti-corruption initiatives, the findings are as presented in the table below in terms of the respondents work experience for comparison.

Table 4. 24 Work Experience compared with perception of anti-corruption initiatives

0-5 yrs

Work Experience	*Frequency*	*Percentage*
High	113	57
Neutral	50	25
Low	35	18
Total	198	100

Table 4.24 findings are in close agreement with the previous one on the rating of ICT performance where 57% of the respondents in this category agreed with the influential role of ICT in service delivery and subsequently the fight against corruption.

Table 4. 25 **Work Experience compared with perception of anti-corruption initiatives**

6 - 10 years

Work Experience	*Frequency*	*Percentage*
High	126	60
Neutral	67	32
Low	17	8
Total	210	100

"ITable 4.25 indicate that In the category, 60% were convinced that ICT was influential in combating corruption while only 8% thought it could not. Hence, the expectation of ICT is high.

Table 4.26 **Work Experience compared with perception of anti-corruption initiatives**

llyrs and Above *Work Experience*	*Frequency*	*Percentage*
High	303	59
Neutral	153	30
Low	54	11
Total	510	100

Table 4.26 again show that 59% of the respondents in this category agreed with the influence of ICT in anti-corruption initiatives while 30% were not sure. 11% disagreed with the role of ICT in combating corruption.

Test of Hypothesis 4:

For objective 4 the following hypothesis was formulated and tested to establish the relationship between the Need for Integrity and the Adoption of ICT in Public Service Delivery

Ho: There was no Significant Relationship between the Need for Integrity and the Adoption **of ICT in Public Service Delivery**

The Need for Integrity where the need for efficient records management, corruption and vulnerability to system and power failures were tested against the dependent variable which is the adoption of ICT in the public service delivery.

-Vable 4.27 Test of Hypothesis 4

Predictors	X^2	d.f
Efficient records management	8.12	**1**
Corruption and vulnerability to system and power failures	4.213	1
Total	**12.333**	**2**

Significance level **a = 0.05 = 5%; 2 d.f;** *yl* = 5.991

Table 4.27 shows the test of Hypothesis four. These were tested at a 1% significance level and 1 degree of freedom i.e. Chi- x_a^2 = 6.635. In terms of efficient records management across departments, the critical Chi- x^2 value was 8.12 which were higher than the Chi- x_a^2 value of 6.635 from the tables, thus confirming that efficient records management was not critical to the adoption of ICT in the public service delivery.

Corruption and vulnerability to system and power failures were tested against ICT adoption, the Chi- x^2 value was 4.213 which were lower than the Chi- x_a^2 value of 6.635, and thus the null hypothesis was accepted indicating that corruption and vulnerability to system and power failures were tested were strong factors in the adoption of ICT in the public service. Thus both tests imply that there was a strong significant relationship between the Need for Integrity and the adoption of ICT in public service delivery due to the values of Chi-

The Chi-value obtained Table 4.27 results is much higher than the tabulated value and could not be as a result of chance and, hence, significant. Both results on the above tests imply that there was a strong significant relationship between the Need for Information Security and the adoption of ICT in public service delivery.

_V.4.5 **Public Sector Service Reforms and** ICT **Adoption**

The study sought to find the role of the promulgation of the public sector reforms of 2003 on the adoption of ICT in the public service. In this the level of acquaintance with the policy among the civil servants (respondents) was sought. The knowledge of E-govemment initiative which is a key element of the reforms package was also assessed. The findings are discussed below.

Level of acquaintance with public sector reforms

Table 4.28 summarizes the findings.

Table 4. 28 **Conversance w ith the Reforms Program**

Conversant with the Reforms Program	*Frequency*	*Percentage*
Yes	118	77
No	35	23
Total	153	100

Table 4.28 indicates that 77% of the respondents said they were conversant with the reforms programs while 23% said they were not aware of such reforms. Of those who were conversant with the reforms, 72% said they were highly conversant while 31 (26%) said they had only average acquaintance with the program. This shows that a lot of effort has been expended in inculcating the reform agenda among public servants to increase their levels of readiness to deliver better services to the public.

^•.-Government Initiative

\n terms of this initiative, the findings were as presented in the table below.

Table **4.29 Conversance with E-government Initiative**

Conversant with E-government Initiative	*Frequency*	*Percentage*
Yes	143	93
No	10	7
Total	153	100

Table 4.29 findings showed that a very high percentage of the public servants knew about on-line government. The 93% showing supersedes the 77% demonstrated by the knowledge of the reforms initiative. This shows that the knowledge of E-govemment does not itself depend on the knowledge of the reforms program.

Test **of Hypothesis 5:**

For objective 5 the following hypothesis was formulated and tested to establish the relationship between the Public Service Sector Reforms program and the Adoption of ICT in Public Service Delivery

Ho: There was no Significant Relationship between the Public Service Sector Reforms program and the Adoption of ICT in Public Serv ice Delivery

The Public Service Sector Reforms program where the level of conversance with the reform initiative and its impact and also the familiarity with the e-govemment initiative were tested against the dependent variable which is the adoption of ICT in the public service delivery. The table below shows the results of the CHI-square test done on this.

"Table 4.30 Test of Hypothesis 5

Predictors	X^2	**d.f**
Level of conversance with the reform initiative	2.578	1
Familiarity with the e-government initiative	1.126	1
Total	3.704	**2**

Significance level **a = 0.05 = 5%; 2 d.f; = 5.991**

Table 4.30 result shows that the computed Chi - value is much less than the tabulated value at 2 degrees of freedom which is significant and not resulting from chance. Hence, it leads to rejection of the null hypothesis.

The individual predictors were each tested at a 1% significance level and 1 degree of freedom i.e. Chi- x_a = 6.635. In terms of the level of conversance with the reform initiative and its impact the critical Chi- x_c value obtained was 2.578 which was much lower than the Chi- x_a value of 6.635 from the tables, thus indicating that the level of conversance with the reform initiative and its impact was critical to the adoption of ICT in public service delivery.

Familiarity with the e-govemment initiative were also tested against ICT adoption, the Chi- $\mathbf{jc}_c^2$ value was 1.126 which was below the Chi- x_a^2 value of 6.635, thus the null hypothesis was accepted indicating that familiarity with the e-government initiative were factors in the adoption of ICT in the public service. Both of these tests imply that there was a significant relationship between the Public Service Sector Reforms program and the adoption of ICT in public service delivery due to the extreme values of Chi- $\mathbf{jc}_c^2$.

CHAPTER FIVE:

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes, discusses, concludes and makes recommendations on the research findings as carried out in the actual study. It is devoted to the summary of the findings, conclusions and recommendations emanating from the study. The implications are discussed and suggestions made on areas of further study.

5.2 Summary of the Findings

The table below presents the summary of the findings in terms of the objectives the types of analysis and the major findings of the research.

Table 5.1 : Summary of the findings

Objectives	Hypotheses	Type of analysis	Major Findings of the Research
To establish how demand for timely services influences adoption of ICT in public service delivery.	Increased demand for timely service delivery has a significant relationship with the adoption of ICT in public service delivery.	•Frequencies • Percentages •Chi-square tests	• Computer literacy high at 95% but low technical support training. • There is need to improve collaboration between government agencies by minimizing duplication • Government needs to be more competitive in providing timely information and delivery of services. • Demand for timely services was significant factors in the adoption of ICT in public service deliveiy.
To examine how advances in ICT influence adoption of ICT in public service delivery.	Advances in ICT have a significant relationship with the adoption of ICT in public service delivery.	•Frequencies • Percentages •Chi-square tests	• Advancing technology increases the costs of training. • Technology neutrality was also emphasized in order to encourage use of ICT and narrow the digital divide. • Technology needed to be affordable to meet a wide range of needs.

			• Advances in ICT were significant factors in the adoption of ICT in public service delivery.
To investigate how the need for security of information influences adoption of ICT in public service delivery.	The need for information security has a significant relationship with the adoption of ICT in public service delivery.	• Frequencies • Percentages •Chi-square tests	• The level of information security in the networks needs to be upgraded to gain public confidence • There is need to provide public forums in ICT for citizens' participate in e-government activities. • Need for security of information was a significant factor in the adoption of ICT in public service delivery.
To determine how the need for integrity influences the adoption of ICT in public sen ice delivery.	The need for integrity has a significant relationship with the adoption of ICT in public service delivery.	•Frequencies •Percentages •Chi-square tests	• Inefficiencies and culpability to corruption networks the past could be addressed better by ICT. • The system should ensure more privacy of information. • The need for integrity was a significant factor in the adoption of ICT in public service delivery.
To verify how public sector reform programs influence the adoption of ICT in public service delivery. **1**	Public sector reform programs were significant to the adoption of ICT in public service delivery.	•Frequencies •Percentages •Chi-square tests	• Most public servants were conversant with the Public Sector Reforms Program and also with the E-government initiative. • The public service was ready to offer better services using ICT. • The levels of investment in ICT infrastructure needs to be increased to improve digital penetration in the country. • Public sector reform programs were significant factors in the adoption of ICT in public service delivery.

The first objective sought to determine how demand for timely services influences adoption of ICT in public service delivery. The hypothesis was tested to establish whether Increased demand for timely service delivery had a significant relationship with the adoption of ICT in public service delivery. Frequencies and Percentages were used to give a descriptive analysis while the Chi-square tests was used to determine the significance of the variable associated with this objective, that is, the demand for timely services and the adoption of ICT in public service delivery. The major findings of this research objective were; Computer literacy was high at 95% but low specialized technical support training; there is need to improve collaboration between government agencies by minimizing duplication; the government needs to be more competitive in providing timely information and delivery of services; and finally the Demand for timely services was a significant factor in the adoption of ICT in public service delivery.

The second objective sought to examine how advances in ICT influence adoption of ICT in public service delivery. The hypothesis was tested to establish whether Advances in ICT have a significant relationship with the adoption of ICT in public service delivery. Frequencies and Percentages were used to compare the attributes of the indicators of the variable associated with this objective at different levels. Chi-square tests showed that there was indeed a significant relationship between this variable and the adoption of ICT in public service delivery. Other major findings showed that; advancing technology increases the costs of training; technological neutrality needed to be emphasized in order to encourage use of ICT and narrow the digital divide; technology needed to be affordable to meet a wide range of needs; and Advances in ICT was a significant factor in the adoption of ICT in public service delivery.

The need to investigate how need for security of information influences adoption of ICT in public service delivery formed the third objective. The hypothesis to be tested for this objective was whether the need for information security had a significant relationship with the adoption of ICT in public service delivery. Frequencies and Percentages were used for descriptive analysis of the data. Chi-square tests were then used to test for the significance of the relationship between the variable associated with this objective and the adoption of ICT in public service delivery and this was determined as significant. The major findings of this objective were; the level of

information security in the networks needed to be upgraded to gain public confidence and that there is need to provide public forums in ICT for citizens' participate in e-govemment activities.

The fourth objective was concerned with the determination of how the need for integrity influences the adoption of ICT in public service delivery. The hypothesis tested here was whether the need for integrity had a significant relationship with the adoption of ICT in public service delivery. Descriptive analysis was used to compare the data and it employed the use of Frequencies and Percentages. Tests for significance were done using the Chi-square tests. The results showed that the need for integrity was indeed a significant factor in the adoption of ICT in public service delivery. Other major findings were that Inefficiencies and culpability to corruption networks of the past could be addressed better by ICT. The system should also ensure more privacy of information.

The last objective wanted to verify how public sector reform programs influence the adoption of ICT in public service delivery. The hypothesis to be tested was whether Public sector reform programs were significant to the adoption of ICT in public service delivery. Frequencies and Percentages were used to compare the data descriptively while the Chi-square test was used to test for the significance of relationship. The findings revealed that most public servants were conversant with the Public Sector Reforms Program and also with the E-government initiative and that the public service was ready to offer better services using ICT. The levels of investment in ICT infrastructure also needed to be increased to improve digital penetration in the country. Finally, it was established that Public sector reform programs were significant factors in the adoption of ICT in public service delivery.

5.3 Discussion of Findings

The study sought to establish how several factors influenced the adoption of ICT in the public service delivery in Nakuru District, Kenya. It was based on the assumptions that all the government offices/ institutions in Nakuru district had one or more types of Information and Communications Technology related installations in place and that it was being used to serve the public-this was verified by observation. It was also assumed that the respondents were fairly

conversant with the issues at hand and would fully cooperate with the study and were to answer all the questions correctly and truthfully, and also that the sample taken was representative of the entire population of government departments in Nakuru district, high technological awareness and computer literacy level was observed which made it possible to conduct the study more meaningfully. In addition the objectives stated were met, and the research instruments met the validity and reliability for the desired construct. There was also no undue interference by industrial action and financial challenges did not withstand the work

The findings reveal that there was gender parity in the public service and that majority of the officers were career people. It also shows that the new trend of recruitment encourages high level of education i.e. post-secondary school education. Majority of the employees were in the age 41 and above although the gender parity began falling rapidly near the end of the age bracket. Most of the employees 95% were computer literate which showed they were ready to take on the challenge of implementing ICT. Of these the majority had only training in basics and other application programs. However, a very small proportion could provide systems support due to their training. This means the government should hire or train more personnel to increase the level of compliance to ICT adoption requirements. There is also need to improve collaboration between government agencies by minimizing duplication of services and enhancing efficient and effective utilization of resources. It is also imperative to improve competitiveness by providing timely information and delivery of government services.

The findings on the Dependence of the Adoption of ICT in the Public Service Delivery on Demand for Timely Services in this study which are also statistically supported by the hypothesis tests for significance agree to a great extent with the 2003 economic recovery strategy for wealth and employment creation (ERSWEC 2003) report which noted that the public sector was largely inefficient in spite of the structural adjustments programs (SAPs) of the previous decade and, therefore, needed readjustment in terms of technology especially Information and Communications Technology in order to improve on its levels of service delivery output and, hence, reduce the costs of running government and encourage public participation. The interviews conducted also suggested that further investments needed to be more lateral, that is,

instead of investments in more computers and literacy training, more should be done to improve the ICT network infrastructure to increase information sharing and dissemination and hence reduce the digital divide.

Advances in technology was also a factor in the adoption of ICT with most respondents decrying the advancing technology as increasing the costs of training in order to keep pace.

The findings on the Dependence of the Adoption of ICT in the Public Service Delivery on Advances in ICT Technology are also statistically supported by the hypothesis tests for significance demonstrate that it is essential that the government ensures that the public have better access to ICT in terms of training, costs and reliable neutral technologies which in essence agrees with Lau (2003) who emphasizes among other things that ICT technology should be neutral to save on costs and increase the level of access across all social strata in order to encourage use of ICT and narrow the digital divide. This would reduce transaction costs for the government, citizens, and the private sector through the provision of products and services electronically at affordable rates and ensure that services are available to citizens over a wide range of access tools commonly used by citizens and businesses.

This view was also reinforced by the feeling that government had a constitutional obligation and was constitutional obligation duty bound to facilitate public information access and therefore in order to encourage compliance to the e-government strategy it should avail ICT resources to its citizens to empower them technologically access necessary information on this platform. Tests done for significance on the indicators of research objective imply that there was a strong significant relationship between it and the adoption of ICT in public service delivery.

In terms of security of information, the findings show that most respondents were uncertain with the level of information security afforded by the systems in place.

The study findings on the Dependence of the Adoption of ICT in the Public Service Delivery on Need for Information Security show that there ought to be enough guarantee of institutional capacity to monitor the networks of the ICT systems in order to forestall or curtail breaches of security of public information that would cause market failure and social distraction (P.S.R.I.C.B

2003) and gross ineffectiveness of e-government. Hence, there is need for more controls of ICT through legislation and regulations and the citizenry must be involved in order to help navigate the legal challenges that might be presented by this. This will lead to more public confidence in ICT adoption and provide a forum for citizens' participation in government activities. In the same vein, we note that viruses and malware are spread across the computer networks and could have devastating effects on the performance of the system and reduce confidence in it, therefore, calling for a form of cyber policing.

Findings on the Need for Integrity suggest that more should be done in form of investments and technology adaptation to influence organizational culture (Abbate, 2006) and thus encourage mutual cooperation with the public. Kandiri (2007) notes that ICT policies may either encourage or discourage the application of ICT technologies in various sectors of the system. If ICTs are to be part of a sustainable activity there will need to be a suitable policy environment that could change our actor position in ICT development from net consumers of technology to innovators and producer leading to better implementation of the e - government.

More institutional weaknesses like infrastructural management, procurement, finance, human resource, legal and records management are likely to be addressed when the program is being properly implemented and could gradually alter the culture of government as noted by Lau (2003) and Duque (2006). There is also need to Support ICT innovation in Kenya by providing incentives for locally produced software and hardware, provide quality ICT infrastructure and a political will fostering a workable implementation plan. This agrees with Candido (2006) that the political will needs to be sought for the mobilization of support, and policy formation, adoption and implementation. There is also need to improve on the integrity of the system in the public domain in order to address the inefficiencies and culpability to corruption networks in the past.

In terms of the Dependence of the Adoption of ICT in the Public Service Delivery on the Need for Integrity, the study findings that were also supported by tests on the hypothesis which show its significance to the process and say that more pertinent to ICT adoption today is the commitment of the government and ICT service providers to guarantee information privacy and

sharing it seamlessly across the network without any breach of confidence. This is a legitimate concern for once information is in the network, it is in the public domain and other people or agencies or countries should not be in a position to access this information without due consent or Authority. Levels of security within the system should be upgraded to ensure more privacy of information.

Another concern is failure. In this case failure in the network at some point due to irregularities of power or other inherent weaknesses could virtually stop information traffic and paralyze operations until the problem is addressed. Hence, a multiplexed system with enough technical support would provide the necessary safeguard and boost public confidence and therefore encourage more participation in the system.

Most of the public servants were conversant with the Public Sector Reforms program of 2003 and a significantly higher proportion with the E-government initiative. Public Service Sector Reforms in Kenya involves the following; Financial management reforms that saw the introduction of Financial information systems at the treasury, the reforms on records management whereby e-records were introduced, reforms in procurement where e-procurement was introduced and the introduction of anti-corruption initiatives in the public sector and more emphasis were put on Result based management than in the process management. Thus, it can be seen that ICT is gradually permeating every sector of government and gaining more acceptance by the day. This present study findings on the Dependence of the Adoption of ICT in the Public Service Delivery on Public Service Sector Reforms show that it is an influential factor in the Adoption of ICT and hence the policy implementation should be consistently pursued to ensure higher compliance both by the public servants and the general public. This will impact better on the management of public resources leading to less wastage, more efficacy in the handling of public information, improvement on the financial management and procurement, more result oriented public service that is client focused, progressive elimination of corruption in the public service, fast and reliable dissemination of information and service delivery and eventual gain of public confidence in the system. However, more emphasis should be put by the stakeholders in

increasing the levels in investment of ICT infrastructure to improve digital penetration in the country.

5.4 Conclusions

E-government is fundamental in providing developing countries with a common framework, goal and direction across public sectors. The use of ICT in the sector promotes greater accountability, increased efficiency and cost-effectiveness. In all the East African countries, e-government is taken seriously since it would be instrumental in poverty reduction. E-government will significantly contribute to the achievement of sustained economic growth and the attainment of the MDGs in these countries. The Fibre optic terrestrial and submarine programmes that are aimed at outsourcing giants in Africa in terms of skilled and well educated staff for cost effective and quality services implementation of e-govemment are currently underway in the country. The connection of countries through fibre optic cables to the global network for public interest is achievable through harmonization of information systems that provide e-services. Pro-poor e-governance provides opportunities for achieving the MDGs by enhancing local service delivery to the poor. Governments are strongly encouraged to implement e-governance for the poor as part of their national poverty reduction strategy and a way towards achieving the MDGs. Objectives of e-government in most cases are set to achieve efficiency in delivering government information and services to the citizens; to promote productivity among public servants; to encourage participation of citizens in government; and to empower citizens in line with development priorities.

This project report has assessed the impact e-government has on public service delivery. It would be simplistic to assume that the ICT alone will resolve inequities in social, political, economic and even scientific terms without the input of other key infrastuctural and legal sectors.

5.5 Recommendations

1. To the policy makers, Research and development of ICT should be entrenched in policy documents as in other countries cited in the study so as to ensure that funds are continually availed through annual budgetary allocations to improve ICT in the country

in terms of capacity of the populace to use ICT and also the availability of appropriate technology. There is also need to come up with adequate laws and regulations on ICT to monitor and control the use of ICT in the country and in the face of changing technology. This will produce more innovative products like those that encourage technological neutrality and combat cyber crimes and, hence, increase adoption. This can be more successful with the inclusion of the public as a major stakeholder in the policy making

2. To the practitioners, ICT is a very useful tool for service delivery in the public sector and there is need to craft more ICT investment solutions to enable more investments be made in terms of ICT infrastructure and capacity building by this sector by all relevant stakeholders including members of the international community and donor agencies to make government more accessible even in the remotest areas of the country. This will in turn save on the wage bill and other associated costs that can then be used to improve other public services

3. Theoretically adoption needs to be more encouraged at the local level, that is, "bottom up" as opposed to the "top-down" model since the adoption problems were more visible at the lower levels. More emphasis should be placed in learning ICT to increase the knowledge base and putting up supporting infrastructure like electricity and broadband access by the nascent county governments. This will be instrumental in providing last mile solutions to ICT in the country and make it truly ubiquitous ,thereby , progressively reducing the digital divide in the country in terms of socioeconomic and geographical disparities.

4. There is need for Partner/collaboration between government, investors and donors with local entrepreneurs. This is likely to engender innovations of ICT and associated infrastructure like energy efficient technologies such as solar, wind and geothermal energies in the country. It could subsequently reduce the cost of airtime and official travel by some percentage. This could also result in more job creation and increased revenue for the country. The government needs to support the idea of formulation of a regional

framework for e-government at local authority levels. Establishment of independent ministries/bodies to deal exclusively with **ICT** development and e-government projects as well as reform the legal system for effective control and regulation of e-government. Finally, there is needed to form working groups to establish and refine e-govemment structures and needs at national and local levels through monitoring and evaluation of the process.

5.6 Suggestions for further study

1. Future studies should be done to ascertain the state of the **ICT** facilities in the public service delivery in order to provide more data for monitoring and evaluation to determine the efficacy of the program implementation.

2. Research should be carried out to gauge the public involvement and participation in **ICT** adoption in the area and other similar areas, that is, regional governments to assess the level of their appreciation of **ICT** as a necessary innovation.

REFERENCES

Alare, A. (2007). *Kenya: State Drafts E-Commerce Bill.* In The East African Standard, 7th September 2007.

.Andersen J.C. and Coffey D (2011) *Telecommunications Industry Association.* Innovation White Paper: U.S. ICT Rand D Policy Report

Anderson J.D.Jr (1985) Introduction to Flight. Mc Graw-Hill, Library of Congress: New York

Barnes, P and Schwartz E.I (2006) Dawn of Digital Darwinism

Basant, R., Commander, S., Harrison, R,, and Menezes-Filho, N. (2006). ICT adoption and productivity in developing countries: New [a]rm level evidence from Brazil and India. *IZA Discussion Paper No2294,* Germany.

Bhatnagar, S. (2008). Colloquium on impact assessment of e-govemance projects: A benchmark for the future. *Vikalpa,* 55(4), 6993.

Bhatnagar, S. (2009). *Unlocking e-government potential: Concepts, cases and practical insights.* India: Sage Publications.

Bhatnagar, S.,and Chawla, R. (2007). Online delivery of land titles to rural farmers in Karnataka.

Bhatnagar, S., and Schware, R. (2000). *Information and communication technology for development:* Volume 6, Number 2, Summer 2010 125.

Candido C. and Duque, R (2005) One Look at the Making of the Global Age, "History and Technology 21: 301324

Collinson R.P.G (2003) Introduction to Avionics. Chapman and Hall. Great Britain

Department of Information Technology, Government of India. (2006). *Summary assessment reports of e-Government projects.* New Delhi: Government of India. Retrieved February 19, 2010, from http://www.mit.gov.in/default.aspx7id_570

D. Narayan & E. Glinskaya (Eds.), *Ending poverty in South Asia: Ideas that work,* pp. 219-243.Washington, DC: World Bank Publications.

Duque, Rick (2005) One Look at the Making of the Global Age, "History and Technology 21: 301324 *E-government.* [Online]. Available, www: http://go.worldbank.org/MlJHE0Z280 (Accessed 12th June 2009)

Electronic Administration Development Agency (ADAE) and Bearing Point. (2005). *MAREVA methodology guide: Analysis of the value of ADELE projects.* Paris: OECD. From http://www.oecd.org/dataoecd/45/27/38404004.ppt Retrieved February 19,2010,

Etta, F.E and Elder, L. (Ed.). (2005). *At the crossroads: ICT policy making in East Africa* [online]. Available at. http://www.idrc.ca/openebooks/219-8/ (Accessed 10,hJune 2009)

European Commission. (2006). *E-Government economics project (eGEP): Measurement framework final version.* Brussels: European Commission. Retrieved February 15, 2010, from http://www.epractice.eu/[a]les/media/media 1299.pdf

Federal Ministry' of the Interior, Germany. (2004). *WiBe 4.0: Recommendations on economic efficiency assessments in the German federal administration, in particular with regard to the use of information technology.* Berlin: Government of Germany. Retrieved February 19, 2010, from http://www.epractice.eu/[a]les/media/media 528.pdf

Gartner. (2002). *Is IT worth it? Presenting the public sector business case.* Stamford, CT:

Gartner. Retrieved March 19, 2010, from http://www3.gartner.eom/resources/l 04200/104275/ 104275.pdf

Grant. G. and Derek C. (2005). *Developing a generic framework for e-government.* In Journal of Global Information Management. [Online] Available http://www.accessmvlibrarv.com/coms2/summarv_0286-18298874_ITM http://www.idrc.ca/es/ev-50209-201-l-DQ_TOPIC.html (Accessed 26th May 2009)

Global Knowledge Sharing Program. (2002). *4 evaluations of 4 e-Government projects: Quantifying costs and benefits in e-government applications.* Washington, DC: World Bank. Retrieved February 19, 2010, from http://wwwl.worldbank.org/publicsector/bnpp/egovupdate.htm

Grimsley, M., and Meehan, A. (2007). E-government information systems: Evaluation-led design for public value and client trust. *European Journal of Information Systems, 16,* 134-148.

Gupta, M. P., and Jana, D. (2003). E-government evaluation: A framework and case study. *Government Information Quarterly, 20,* 365-387.

Heeks, R. (2002). E-Government in Africa: Promise and practice. *Information Polity,* 7(2, 3), 97-114.

Heeks, R. (2008, May 8). Success and failure in e-Government projects. *eGov4Dev.* Retrieved April 10, 2010, from http://www.egov4dev.org/success/index.shtml

Hewlett-Packard (HP). (2002). *Taking a leadership approach to E-government.* Retrieved March 19,2010, from http://h41131 .www4.hp.com/in/en/stories/taking-aleadership-approach-io-e-government.html

Hyden, G., Court, J., and Mease, K. (2004). *Making sense of governance: Empirical evidence from 16 developing countries.* London: Lynne Reinner Publishers.

Indian Institute of Management, Ahmadabad.(2008). *Impact assessment of e-governance projects.* New Delhi: Government of India. Retrieved November 23, 2009, from http://www.mit.gov.in/download/ImpactAssessmentReportDraft.pdf

International Institute of Information Technology, Bangalore. (2005). *Information and communications technologies for development: A comparative analysis of impacts and costs from India.* Bangalore, India: HIT. Retrieved February 19, 2010, from http://www.iiitb.ac.in/Facultv_micros/ Complete_report.pdf

Kaaya, J. (2002). *Implementing e-Government Services in East Africa: assessing status through content analysis of Government websites.*

Karaar, N. (2006). *Factors hindering effective management of Government* [Online] Available www.uneca.org/disd/events/2006/wsis-librarv/main.html - 240k (Accessed 20th May 2009)

Kamar, N and Ong'ondo, M. (2007). *Impact of e-government on management and use of government information in Kenya.* [Online].Available http://www.ifla.org.sg/IV/ifla73/papers/119-Kamar_Ongondo-en.pdf (Accessed 12th June 2009)

kandiri.John M (2007) *ICT Policy in Kenya and Ways of Improving the Existing ICT Policy.Presented To Management Science Students Association (Massa)* -University of Nairobi

Kane. S. (2005). In *About.com: Legal careers* [Online] Available http://legalcareers.about.eom/od/gIossary/g/E-Documents.htm (Accessed 12th May 2009)

Kiangi, G.E (2005). *Evaluating E-Business and E-Governance Projects.* Windhoek: University of Namibia Press.

Kirui, S. and Muhatia, G. (2006). *In Misura, G. e-Governance in Africa: from theory to action: a handbook on ICTs for Local Governance.* Pp. 11-26. [Online] Available http://www.idrc.ca/en/ev-1-201-1 -DO_TOPIC.html (Accessed 22nd May 2009)

Kitaw Yayehvirad (2006) E-Government in Africa: Prospects Challenges and practices.

Kombo, D.K and Tromp D.L.A (2006) Project and Thesis Writing: An Introduction. Pauline s Publications Africa

Kothari C.R. (2000) Research Methodology : Methods and Techniques. 2nd Revised Edition. New Age Publishers.

Kumar, R., and Best, M. L. (2006). Impact and sustainability of e-government services in developing countries: Lessons learnt from Tamil Nadu, India. *The Information Society, 22,* 1-12. 126 *Information Technologies & International Development*

Lau, E. (2005). *Electronic government and the drive for growth and equity.* Paris: OECD.

Lawson-Body, A., Keengwe, J., Mukankusi, L., Illia,A., and Miller, G. (2008). E-govemment service delivery performance: An adaptation of the balanced scorecard to the public sector. *Journal ofElectronic Commerce in Organizations,* ***6(2),*** 11-28.

Madon, S. (2009). *E-governance for development: A focus on rural India.* London: Palgrave Macmillan. Public Affairs Centre, Bangalore. (2002). *Report card on service of Bhoomi kiosks: An assessment of benefits by users of the computerized land records.*

Ministry of Information and Communication, Kenya (2006). *National Information Communications Technology (ICT) policy.* [Online] Available http://vyww.information.go.ke/docs/ICT%20Policv.pdf (Accessed 20th May 2009)

Mugenda and Mugenda (2003). Research Methods Quantitative and Qualitative Approaches. ACTS Press, Nairobi.

Nolan, Peter (1993) College Physics. Wm. C.Brown Communications.USA

Okuttah, M. (2007). *Kenya's ICT sector looking up despite archaic policies.* In The Daily Nation: Business Daily. Monday 24/12/2007. pp.12

Public Procurement Service, The Republic of Korea. (2009, August 14). *Annual report 2008.* Seoul: Government of Korea. Retrieved March 19,2010, from http://www.pps.go.kr/secureDN.tdf7seq ll&idx 2and board id PE 03 02&[a]d PE 03 02

Rama Rao, T. P., Venkata Rao, V., Bhatnagar, S. C., Satyanarayana, J. (2004). *E-governance assessment frameworks (EAF version 2.0).* New Delhi: Government of India. Retrieved February 19, 2010, from http://www.mapit.gov.in/NISG_EAF_18-05-04.pdf. Roche, C. (1999). *Impact assessment for development agencies: Learning to value change.* Oxford: Oxfam.

Republic of Kenya (2004): *E-Government strategy: the strategic framework, administrative structure, training requirements and. standardization framework.* [Online]Available http://www.panllOn.net/Presentations/ICT_Int_Std-2003.pdf(Accessed 10th June 2009) *SearchCIO-Midmarket.com.* [Online] Available http://searchcio-idmarket.techtarget.com/sDefinition/0..sid 183_gci928405.00.html (Accessed 9th June 2009)

Retrieved March 19, 2010, from http**://www**.transparency.org/content/download/2274/14262/ *system in Karnataka.* Washington, DC

Sato,Takayuki K. *Importance of ICT International Standards: SEISA AP/IT 2003*

Transparency International. (2005). *Annual report2004.* Berlin: Transparency International.

United Nations. (2003). *World public sector report2003: E-government at the crossroads.* New York: United Nations Publications.

Wikibooks. (2008). *ICT in Education/Definition of Terms.* [Online] Available http://en.wikibooks.org/wiki/ICT_in_Education/Definition_of_Terms (Accessed 13th June 2009)

Wilson J.D.and Buffa J.A. (2000) College Physics. PrenticeHall. New Jersey

Wong, C.W. (2000) Introduction to Mathematical Physics. Oxford University Press200 Madison Avenue ,New York

World Bank. (2002). *Information and communication technologies: A World Bank group strategy.* Washington, DC: World Bank Publications.

World Bank. (2007). Impact assessment study of E-govemment

APPENDICES

Appendix I: Questionnaires for ail Respondents

The aim of this study is to find out the factors influencing the adoption of Information and Communications Technology in the public service delivery in Nakuru, Kenya. Your opinions as captured in this questionnaire will form the basis of this study and were held in confidentiality. Therefore you are requested to fill this questionnaire in the most free and honest way possible. Please tick the appropriate answers in the boxes provided and also write down the appropriate answers in the spaces provided. Do not write your name on the questionnaire. Thank you in advance for your time and cooperation.

Respondent No

Department

Section A: **Background Information**

1. Gender: Male Q Female Q
2. Age :19-29 • 30-40 yrs • 41-51 yrs • 52 and above •
3. Highest level of education:

   O-levels • Certificate • Diploma • Degree • Masters •

   Other(specify)
4. Work experience;

   0-5 yrs • 6-10 yrs • 11 yrs and above •
5. Have you previously served in the civil service in different locations? If so please indicate the place and number of years served

Section B: Demand for timely services

1. a) Are you computer literate?

   Yes • No •

   b) If your answer in (a) above is yes, to what extent? (Tick the appropriate box below)

   Basic Q] word processing Q spreadsheet

   Software support technician Q hardware support technician

2. What is your rating of your department in the delivery of services since the introduction of the ICT in your department in terms of the following items?(tick as appropriate)

Items	Rating				
	Excellent	Good	Average	Poor	Very poor
Faster services					
Volume of work done per day .e.g. number of people served per day					
Employee performance					
Reduction of workload					
collaboration within your department and with other different departments					

3. a) Are you familiar with the term computer network server?

Yes • No •

b) If your answer in (a) above is Yes, is there any server in your department?

Yes • No •

c) How would you rate the sharing of information both internally and externally in your department using a server?

Very important • important • neutral • less important • Not important |

4. a) Do you think the incorporation of ICT in your department is costly?

Yes Q No •

b) If you answer in (a) above is yes, how would you rate the cost?

Very high • high • average • low • Very low •

5. Do the benefits justify the costs?

Strongly agree • agree • neutral • disagree • Strongly disagree Q

Section C: Advances in ICT technology

6. To what extent would you rate advances in ICT technology in the following terms terms? (tick as appropriate)

	Rating				
	Very high	High	Average	Low	Very low
Efficiency					
Reliability					
Capacity					
Flexibility					
Training costs					
Maintenance requirements					

1

7. Does insufficient access to ICT slow down the adoption process?

Very much • much Q somehow • not so much •

Not at all •

8. Do you think lack of access of ICT is in effect denying the public their constitutional rights?

Strongly agree • agree • neutral • disagree •

Strongly disagree^

Please explain

9. How easy do you find the challenge of adapting to new technology and computer application programs?

Very hard Q hard • fair • easy •

Very easy CH

10. Technology should be neutral, that is, one that can be learned and used easily by all. What is the extent of your agreement on this in relation to the information technogy in use in your department?

Strongly agree • a g r e e d n e u t r a l • disagree O
Strongly disagree

Section D: Need for Information Security

11. The public would not be comfortable with their information being in the public domain without adequate security and this is critical to the adoption of ICT. To what extend do you agree that the system in your department provides any guarantee on this?

Strongly agree • a g r e e d neutral • disagree •
Strongly disagrej^

12. Now that the internet is the preferred network channel for ICT, how much do you agree that this increases the risk of compromising information submitted online?

Strongly agree • agree • neutral • disagree •
Strongly disagree |

13. Mai wares such as viruses are propagated using the internet; do you agree that this can lead to the collapse of the entire information system in the public domain?

Strongly agree • [a]g[ree] O neutral • disagree •
Strongly disagree Q

14. Can you rate how **ICT** has influenced your department in the following terms? (tick as appropriate)

	Rating				
	excellent	Good	Average	Poor	Very poor
Security of information					
Confidentiality /privacy of information					
Storage of information on the network					
Unauthorized access to information					
Vulnerability to **ICT** component damage.					

Section E: Need for integrity

15. Rate the introduction of **ICT** in your department on the following? (tick as appropriate)

i	Rating				
	Excellent	Good	average	poor	Very poor
Efficient Records management					
Information integrity					
Incidences of					

Corruption					
Transparency and accountability					
Effectiveness in combating corruption					
Vulnerability to power and system failures					

16. How would you rate the influence of ICT on the following anticorruption initiatives implemented by the government on service delivery? (tick as appropriate)

[Influence of ICT on anticorruption initiatives on service delivery	Response				
	Very high	High	Medium	Low	Very low
Officers sensitization against corruption					
Elimination of brokers					
Corruption reporting mechanisms in place(boxes, email, telephone etc)					
Display of anti corruption messages					
Display of requirements and service charter					
Civil service code of conduct					

i

Section F: Public Sector Service Reforms

17. a) Are you conversant with the public sector reforms program of 2003?

Yes • No •

b) If your answer in (a) above is Yes, to what extent are you aware of public sector reforms program of 2003?

Very high • high • average • low • Very low •

c) How do you rate this public sector reform initiative?

Very important • important • neutral • less important • Not important |

18. a) Are you familiar with Government's e-government initiative?

Yes • No •

b) If your answer in (a) above is Yes, to what extent do you know it?

Very conversant • conversant • average • not very conversant • Not conversant •

19. Would you say there is sufficient communication on the above both to the public servants and the general public?

Strongly agree • agree • neutral • disagree • Strongly disagree £

20. Has the reform program influenced the adoption of ICT in your department in any way?

Very much • much • somehow • not so much • Not at all •

. The reform program was promulgated as a policy document partly to meet the objectives of **Vision 2030.** Can you rate the adoption of ICT in connection with the following government reform initiatives in line with this vision?

Reform objectives	Ratings			
	Very low	Low	High	Very high
Anti corruption strategies				
Records management				
Procurement processes				
Transparency				
Accountability				
Access to government				

Section G: Adoption of ICT in the public service delivery

22. In your own opinion how would you rate the adoption of ICT within your station in these terms? (tick as appropriately)

Computerization	Response				
	Very high	High	Medium	Low	Very low
Level of Computerization(number of computers)					
Level of computer usage among staff					
Level of networking within the department(intranet)					
Level of computer literacy among your staff					

23. Please rate the influence of the adoption of ICT on service delivery in your department on the following, (tick as appropriately)

	Very high	High	Medium	Low	Very low
Timely Service delivery					
Advancement of technology					
Need for integrity					
Need for information security					
Public service reform program					

APPENDIX II

QUESTIONNAIRES FOR DEPARTMENTAL HEADS

1. Do you know what ICT is?

2. What about E-government?

3. Has ICT policy been implemented in your department?

4. Is it of any value in your department in terms of your services?

5. How do you propose we address the digital divide that arises due to the adoption of ICT?

6. Do you think access to education will narrow the gap in the digital divide in the district?

7. Evidently there is a wide digital gap in Kenya. Would you say that education contributes to the use of ICT, that is, people with little formal education are less likely to use ICT as opposed to those with more advanced education?

8. What other factors do you think contribute to the digital divide in Kenya?

9. Do you think the introduction of ICT in your departments will eventually lead to the downsizing of the staff?
   Please explain your answer

10. Health experts are warning that increasing use ICT is leading to new kinds of work related stress and illnesses. Is your department already experiencing the effects of these health complications like ICT related sick-offs, members of staff having eye problems etc? Does this translate to additional medical costs to your department?

    Yes No
    Please explain your answer

11. a) How do you cope with system breakdowns and power failures?

b) For the ICT system and power infrastructure to be reliable, what measures do you recommend need to be taken to forestall such incidences in the future?

c) Do you think the costs of addressing (b) above will outstrip the benefits ICT brings to your department?

12. In your opinion, what do you think are the barriers to the adoption of ICT in the public service delivery in Nakuru district?

13. Do you think e-government will eventually succeed in the country?

Thank You

APPENDIX III

GOVERNMENT DEPARTMENTS IN THE PROVINCIAL HEADQUATERS NAKURU

SNO.	DEPARTMENT NAME	STAFF TOTAL	COMMENT
1	Assistant Labor Commissioner	12	
2	Prov. Director of Education	41	
3	Regional Local Govt. Officer	5	
4	AIDS Coordinator	7	
5	Betting Control And Licensing	5	
6	Prov. Lands Surveyor	21	
7	Director of Agriculture	30	
8	Prov. Youth Training Officer	3	
9	Prov. Youth Development Officer	7	
10	Director of Fisheries	13	
	Director of Probation	9	
12	Prov. Gender and Development Officer	12	
13	Commissioner for Cooperatives	15	
14	Enterprise Development Officer	2	
15	Director of Music	3	
16	Director of Veterinary	17	
17	Director of Adult Education	6	
18	Prov. Director of Culture	3	
19	Prov. Training Levy Inspector	5	
20	Kenya National Bureau Of Statistics	6	
21	Prov. Planning Officer	6	
22	Principal Registrar	8	
23	Principal State Counsel	8	
24	Prov. Director of Children Services	7	
	Senior Auditor	32	

26	Prov. Director of Medical Services	33	
27	Prov. Director of Public Health	28	
28	Principal Sports Officer	6	
29	Prov. Technical Training Officer	5	
30	Principal Occupational Health Safety	6	
131	NCPD Central Rift	2	
32	Special Programs	3	
j33	Immigration Services	20	
34	NSIS	45	
35	Prov. Information Officer	22	
36	Internal Audit	2	
37	Prov. State Law Office	12	
38	NEMA	7	
39	Public Trustee	12	
40	Prov. Livestock Officer	17	
41	Prov. Councilor	3	
42	Prov. Director of Music	3	
43	Prov. Commissioner	120	
| 44	Prov. Director of Tourism	39	
	TOTALS	668	

Source: **Kenya National Bureau of Statistics office -Nakuru**

APPENDIX IV : TRANSMITTAL LETTER TO THE RESPONDENTS

Kiprotich Keter Tiony

Department of Immigration

Box 17632

Nakuru25th Nov201t

Dear colleagues,

As you may be aware, the Government has implemented a number of reforms whose impact on the service delivery has not been evaluated academically, as yet. Among these reforms is the introduction of information technology in the public service delivery by the government which embraces the use of information communication technology as a tool in public service delivery. Information technology has of late been introduced in all the ministries and government departments for effective, efficient and timely delivery of Government services and participation of government clients. It is imperative that the success or failure of this reform in this county/district be evaluated academically and documented.

I am therefore carrying out a research on the adoption of ICT in Public Service Delivery in Kenya and specifically focusing on government departments in Nakuru county/district. This is for purely academic purposes only; however, evaluation results may guide policy makers in making improvements on the application of the innovation.

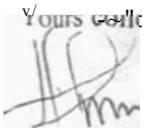
The attached questionnaire is designed to gather empirical data for academic purpose only. All information you provide will strictly be used for this study and the confidentiality of your identity and disclosures will be maintained. However, the generalization from the findings of the research may become publicly available. You are therefore requested to provide information as objectively and honestly as possible to help achieve the intended purpose.

A sampling frame has been used to determine the number of likely respondents for each station and random sampling will be used to give each respondent a fair chance of participating in the survey.

Kindly, fill in the questionnaire allocated to you to make the study representative. Follow the instructions while filling the questionnaire .When it's dully completed, please return it to the coordinator who will forward the questionnaire to the undersigned.

I look forward to your cooperation.

Yours colleague



Kiprotich Keter Tiony

APPENDIX V: ACKNOWLEDGEMENT LETTER FROM DISTRICT EDUCATION OFFICE

MINISTRY OF EDUCATION

Telegrams: 'LEARNING'
'elephone: 2216529/2216563
When replying please quote

DISTRICT EDUCATION OFFICE
NAKURU DISTRICT
P.O. BOX 1028
NAKURU

REF: NKU/ED/122 VOL II (208) **18TM JUNE, 2012**

The **National Council for Science and Technology**
P O Box 30623
NAIROBI

RE: RESEARCH AUTHORIZATION ACKNOWLEDGEMENT
MR. TIONY KETER KIPROTICII

This is to acknowledge that the above mentioned gentleman visited the District Education Office for the purpose of carrying out research on:-

"Factors influencing the adoption of information and communication Technology in Public Service Delivery in Nakuru District, Kenya."

Any further assistance will be accorded to him whenever he requires the service.

DAVID K. SABULGONG
FOR: DISTRICT EDUCATION OFFICER
NAKURU

The District Commissioner
P O Box 81
NAKURU

APPENDIX VI: LETTER OF AUTHORIZATION

OFFICE OF THE PRESIDENT
PROVINCIAL ADMINISTRATION

Telegram: "DISTRICTER" Nakuru
Telephone: Nakuru 051 2212515
When replying please quote

THE DISTRICT COMMISSIONER
NAKURU DISTRICT
P.O. BOX 81
NAKURU.

Ref No. ED 12/10 Vol.Vl/111

llkith June, 2012

TO WHOM IT MAY CONCERN

RE:- RESEARCH AUTHORIZATION
TIONY KETER KIPROTICH

This is to confirm that the above named has been authorized to cariy out ***research on factors influencing the adoption of information and communication technology in public service delivery in Nakuru District***"

Please accord him all the necessary support to facilitate the success of his research.

All the assistance accorded to him will be appreciated.

KHALIF D. ABDULLAHI
FOR DISTRICT COMMISSIONER
NAKURU DISTRICT

APPENDIX VII: LETTER OF REQUEST FOR RESEARCH FROM THE DISTRICT COMMISSIONER

Kiprotich KeterTiony
P.O. BOX 17632
NAKURU

IIthJune, 2012

The District Commissioner,
NAKURU

RE: RESEARCH AUTHORIZATION

I refer to letter Ref. NCST/RCD/13/012/33 dated 4th June, 2012 to me from the National Council for Science and Technology on the above. The letter is also copied to you. This is to inform you that I will embark on the research with effect from 11/6/2012.

Yours faithfully,

K. KETER

NAiUjRU

C.C.

District Education Officer
NAKURU

End.

APPENDIX VIII: AUTHORIZATION LETTER FROM NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telephone: 254-020-2213471. 2241349
254 020-**310571, 2213123. 2219420**
Fax 2S4-**020-31824S. 31S249**
When replying please quote
secret*ry€> nest.go.ke

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

•Our Ref: **NCST/ltCI)/13/0I2/33**

Date: **41" June 2012**

Tiony Keter Kiprotich
University of Nairobi
P.O.Box 30197-00100
Nairobi.

RE: UESKAKC1-1 AUTHORIZATION

Following your application for authority to cany out research on *"Factors influencing the adoption of Information and Communication Technology in public service delivery in Nakuru District, Kenya,* " I am pleased to inform you that you have been authorized to undertake research in Nakuru **District** for a period ending **31s' July,** *2012.*

You are advised to report to **the District Commissioner and the District Education Officer, Nakuru District** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our olfice.

DR. (VI. K. KUGUTT, PhD IfSeP
DEPUTY COUNCIL SECRETARY

Copy to:

The District Commissioner
The District Education Officer
Nakuru District.

-.-A »lat'0."a/ Cuiiiic'l for Stlenc^ unci Technology » Committed :<> -fu> frOrrMtktn vf &tenC* art* Ttfcf'rfrtoffv for NotXmnt Oe ~~wuHy4/H~~*. '*

APPENDIX IX: AUTHORIZATION LETTER FROM THE PROVINCIAL COMMISSIONER

OFFICE OF THE PRESIDENT

Telegrams:" PROVINCER", Nakuru
Telephone: Nakuru 2216566/221652
When replying please quote

E-mail: provriftvalley@yahoo.com
provriftvalley@gmail.com

PROVINCIAL COMMISSIONER
RIFT VALLEY PROVINCE
P.O. BOX 28,
NAKURU.

Ref. No *ADM. 15.1/5 VOL.IV/67*

11th May, 2012

Mr. Kiprotich KeterTiony,
P.O. Box 17632,
NAKURU.

RF, REQUEST FOR PERMISSION TO CARRY OUT RESEASRCH

Your letter dated 9th May, 2012 refers.

You are hereby permitted to carry out research on "The Factors Influencing the Adoption of Information Communication Technology in Public Service Delivery"

The research will run from 11th May, 2012 to 29th June, 2012.

A. N. GATHECHA, MBS, [1]ndc'(K)
FOR: PROVINCIAL COMMISSIONER
RIFT VALLEY PROVINCE

APPENDIX X: LETTER OF INTRODUCTION

UNIVERSITY OF NAIROBI

COLLEGE OF EDUCATION AND EXTERNAL STUDIES
SCHOOL OF CONTINUING AND DISTANCE EDUCATION
DEPARTMENT OF EXTRA - MURAL STUDIES

Tel 051 -2210863

P. O Box 1120, Nakuru
26th April 2012

Our Ref: UoN/CEES/NKUEMC/1/12

To whom it may concern

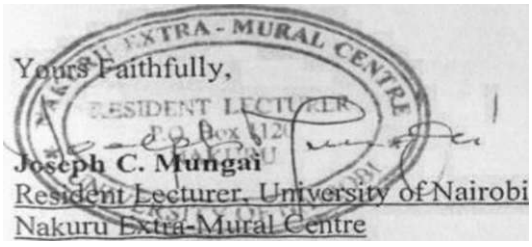
RE: **TIONY KETER K1PKOT1CH - L50/65993/2010**

The above named is a student of the University of Nairobi at Nakuru Extra-Mural Centre Pursuing a masters degree in Project Planning and Management.

Part of the course requirement is that students must undertake a research project during their course of study. He has now been released to undertake the same and has identified your institution for the purpose of data collection on "Factors Influencing the Adaption of Information Communication Technology in Public Service Delivery in Nakuru District-: **Rift** Valley Provincial Head Quarters Nakuru.

The information obtained will strictly be used for the purpose of the study.

I am for that reason writing to request that you please assist him.



APPENDIX XI: NAKURU DISTRICT MAP