

**USE OF INFORMATION COMMUNICATION  
TECHNOLOGIES IN PROVISION OF INFORMATION  
TO STAFF AT THE MINISTRY OF EDUCATION,  
SCIENCE AND TECHNOLOGY, KENYA**

**BY**

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ELDORET**

**2015**

## DECLARATION

### DECLARATION BY THE CANDIDATE

This thesis is my original work and has not been previously published or submitted for a degree or other qualification in any other university. All the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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### DECLARATION BY SUPERVISORS

This thesis has been submitted with our approval as university supervisors.

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## ABSTRACT

The use of ICT can improve efficiency and quality in the provision of information to staff at the Ministry of Education, Science and Technology (MoEST) in Kenya. However, the provision of information to staff at the ministry has not fully utilized the available ICT facilities. Due to the highly dynamic ICTs, staffs within the ministry need capacity building to be more effective in terms of information provision. Generally, government ministries still grapple with issues of low staff to computer ratio and manual systems in resource centers and registries. The aim of this study was to investigate the use of ICTs in provision of information to staff at MoEST with a view of developing strategies to address the shortcomings. The research objectives were to Determine the work activities which staffs at the ministry perform; find out the information needs of the staff; determine the extent to which the information needs are met; establish the extent to which ICT is used by the staff in accessing needed information; establish challenges faced in using ICT to provide information at the ministry and propose strategies of addressing shortcomings in the use of ICT to provide information to staff at the ministry. The study was guided by Niedźwiedzka's Information Behaviour Model and Rogers' Theory of Diffusion of Innovations. The research was qualitative in nature and adopted descriptive research design using a case study approach. The target population was 870 comprising staff at MoEST headquarters in Nairobi. Stratified random sampling was used to get a representative sample from each of the nine departments in the Ministry. Ten percent of the members of staff in each department were sampled to give a sample size of 90 from whom data was collected by way of interview. Key informants who included the ICT officer and records management officer were purposively sampled and interviewed. The data was analyzed by organizing it into themes from which generalizations were made. The researcher found out that ministry staff can use ICT in performing their work activities with minimum challenges; ICT can be used to improve provision of information required by staff; social media has not been adopted for official communication; most members of staff were satisfied with the range of information sources available; the ICT infrastructure is satisfactory; and there were some challenges affecting the use of ICT in provision of information. Based on the findings, the study concluded that the use of ICTs in provision of information to staff at the ministry was not optimally done. The following recommendations were made: improve the staff to computer ratio; adopt continuous capacity building in ICT; maximize use of available ICT resources; digitize records; subscribe to e-resources; automate the registries and resource centre; adopt the use of social media; deploy ICT staff to departments; fast track adoption of e-government standards; develop and disseminate the ICT policy; change the institutional culture; and lobby for increased budgetary allocation. The recommendations have been categorized as short term, medium term and long term.

**DEDICATION**

To my family – you are forever invaluable.

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**LIST OF ABBREVIATIONS**

ADSL	Asymmetric Digital Subscriber Line
AIE	Authority to Incur Expense
ALIA	Australian Library and Information Association
CAS	Current Awareness Service
CBK	Central Bank of Kenya
CCK	Communications Commission of Kenya
CD-ROM	Compact Disk – Read Only Memory
CS	Cabinet Secretary
CUE	Commission for University Education
E-Promis	Electronic Project Management Information System
FAO	Food and Agriculture Organisation
FOI	Freedom of Information
GHRIS	Government Human Resource Information System
GUMS	Government Unified Messaging System
IDRC	International Development Research Centre
ICDL	International Computer Drivers License
ICTs	Information Communication Technologies
ISO	International Standards Organisation
JKF	Jomo Kenyatta Foundation
KESI	Kenya Education Staff Institute
KIE	Kenya Institute of Education
KISE	Kenya Institute of Special Education
KIXP	Kenya Internet Exchange
KLB	Kenya Literature Bureau
KNADS	Kenya National Archives and Documentation Service
KNEC	Kenya National Examinations Council

KP&TC	Kenya Posts and Telecommunications Corporation
MoEST	Ministry of Education, Science and Technology
MoHEST	Ministry of Higher Education, Science and Technology
NACOSTI	National Commission for Science, Technology and Innovation
NCLIS	National Commission on Libraries and Information Science.
NCST	National Council for Science and Technology
PC	Personal Computer
PDA	Personal Digital Assistant
PGDE	Postgraduate Diploma in Education
PS	Permanent Secretary
PrS	Principal Secretary
SAGA	Semi Autonomous Government Agency
SDI	Selective Dissemination of Information
SEPU	School Equipment Production Unit
SPSS	Statistical Package for Social Scientists
TSC	Teachers Service Commission
TV	Television
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VOIP	Voice Over Internet Protocol
WAN	Wide Area Network
WAP	Wireless Application Protocol
WiFi	Wireless Fidelity
WWW	World Wide Web

## CHAPTER ONE

### INTRODUCTION AND BACKGROUND INFORMATION

#### 1.1 Introduction

Information is indispensable in any organization. Factors of production have been traditionally considered to be natural, human and capital resources. But as the world went through the four economic eras namely the agricultural economy, the industrial economy, service economy and now the information economy, information is now considered the fourth factor of production.

The information economy is present when majority of the income-earning activities in a society depend on the use of accurate, up-to-date information. Businesses (people) want instant access to accurate information and also want to transmit the information rapidly through telephone, computer etc. To be successful, an organization must have accurate and timely information about things like availability, location and quality of the factors of production it uses. Various ICTs such as computers, satellites and other new communication devices are now widely used in business to provide more and better quality information (Graf 1990).

Prasher (1991) supports the above by saying that “the supply of correct and precise information in time helps the policy-makers in making maximum use of the available resources as also in avoiding duplication of work”. He goes further to say that research and development programmes can be accomplished successfully only if the required information is available as and when required.

The Kenya ICT Policy (2006) defines ICT (Information and Communications Technologies) as the technologies including computers, telecommunication and audio-visual systems, that enable the collection, processing, transportation and delivery of information and communication services to users. ICT is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as videoconferencing and distance learning (the OnlineDictionary.com).

Morley (2011) defines information technology as “A term that encompasses all forms of technology used to create, store, exchange and utilize information in its various forms including business data, conversations, still images, motion pictures and multimedia presentations”. The author further says that commonly used information technology equipment includes computers, servers, peripheral devices, internet connectivity equipment and phone systems. From basic computer terminals to IP-based telephony systems, information technology is an integral part of most modern business operations. In other words, it is the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware.

The major challenge facing Government is to provide services in an efficient and effective way. E-government provides a framework for improved service delivery and enhanced communication and information provision within government, with the citizenry and the business community. There is need to develop adequate capacity within Government to implement e-government and realise the benefits of e-service delivery (Kenya ICT Policy 2006). Progressive governments recognise information as a resource which must be generated, collected, organized, leveraged, secured and preserved for national prosperity. One of the objectives in the Kenya ICT Policy is using e-government as a tool to improve internal efficiency and quality of public service delivery and help in the fight against corruption.

The introduction and rapid spread of Information and Communications Technologies (ICTs), such as the world wide web (www), e-mail, telephones, fibre optics and satellites is revolutionising the way in which societies interact, conduct their businesses, compete in international markets and set their economic and human development agendas. Amoth (2000) while writing about the use of information by workers in health care programmes says that “there is need to introduce information technology in health information centres to provide both local support facilities such as CD ROM searches and access to regional, national and international networks. In the context of the limited resources of most information centres, the use of information technology will result into the effective organisational network for resource sharing”. ICTs enable societies to produce, access, adapt and apply information in greater amounts, more rapidly and at reduced costs and offer enormous

opportunities for enhancing business and economic viability (<http://practicalaction.org/icts>).

Mitchell (2008) argues that “the migration of information resources and library use from predominantly print/on-site use to electronic/online use has created a fragmented set of systems for libraries and users. In addition, the growing complications associated with doing research in libraries as compared to the ease of use of Web-based search engines is causing libraries to review system design and review their approach to the provision of information and services”. Libraries will definitely not die. But they will have to adapt and change with technology – especially disruptive technology.

In his article on disruptive technologies and their impact on the library, Dillon (2002) observes that “libraries began in an age when information was scarce.” He goes on to ask, “Is the library wherever the librarian happens to be? Is the library a collection, or a service, or an information organization?” This sentiment echoes the comments made by Taylor (1968) thus “. . . the evolution of libraries from passive warehouses to dynamic communication centers”. Both authors point to the dramatic changes that have occurred in the library over the past 35 years. Changes in document formats, creation of new types of information, and the addition of high speed search and retrieval networks have had dramatic impacts on library collections.

The Kenya Vision 2030 is one of the most important policy documents guiding the country’s development now. It is worth noting that provision of information has been addressed in the Vision. For example in terms of transparency and accountability, the Vision’s strategy is encouraging public access to information and data. According to the Vision “Kenya intends to become a knowledge-led economy wherein, the creation, adaptation and use of knowledge will be among the most critical factors for rapid economic growth. Experience from countries such as South Korea, Malaysia, Finland, Ireland, China and Chile illustrates that rapid progress can be made over relatively short periods of time by pursuing coherent strategies to build the capabilities to create, access and use knowledge”. For effective exploitation of knowledge, the Vision proposes among other elements a dynamic information and

communication infrastructure that can facilitate processing, communication and dissemination.

The public sector in Kenya has been generally slow in adopting ICT but has remained one of the biggest consumers and generators of information. Civil servants are therefore ever providing or looking for information as part of their work activities. The Bill of Rights in the Constitution gives more impetus to this by guaranteeing citizens access to information in article 35 thus;

- (1) Every citizen has the right of access to —
  - (a) Information held by the State; and
  - (b) Information held by another person and required for the exercise or protection of any right or fundamental freedom.
- (2) Every person has the right to the correction or deletion of untrue or misleading information that affects the person.
- (3) The State shall publish and publicize any important information affecting the nation.

The constitutional provision above means that it will not be business as usual in terms of provision of information in the government ministries and the public sector generally. This calls for strategies to enhance information provision to civil servants and the public generally. The time has come for enhanced use of ICT in provision of information to officers and the public.

## **1.2 Background information**

### **1.2.1 Provision of information**

It is quite common to find government departments operating without a library or resource centre. This however does not mean that such departments do not have any information or that staff in such departments do not need information. Information is the life blood for the operation of any organizational set up. Without the uninterrupted flow of information, decision making would be difficult. Business information is not only required by the business community but also by the government at all levels - national and local. Ocholla (1993) while writing about library information services says that “an information service is a unit or system designed and organized to

provide information to users. Such a system or unit can be organized within a library or any other information centre”.

While providing information, the providers should keep in mind that not all users need the same information. Shera (1972) categorizes information into the following six types:

1. Conceptual information: The ideas, theories, hypotheses about the relationship which exists among the variables in the area of a problem;
2. Empirical information: Experience, the data of research, may be drawn from one's self or through communication from others. It may be laboratory generated or it may be a product of the 'literature search';
3. Procedural information: The methodology which enables the investigator to operate more effectively. Procedural information relates to the means by which the data of the investigation are obtained, manipulated and tested;
4. Stimulatory information: Man must be motivated and there are but two sources for such motivation, himself and his environment. Stimulatory information that is translated by direct communication – the contagious enthusiasm of another individual – but whether directly or indirectly communicated it is probably the most difficult of all forms of information to systematize. It is by nature fortuitous; it submits unwillingly to direction or compulsion;
5. Policy information: This is the focus of the decision making process. Collective activity necessitates the definition of objective and purpose, the fixing of responsibility, the codification of rights and privileges, and the delineation of functions;
6. Directive information: Group activity cannot proceed effectively without coordination, and it is through directive information that this coordination is achieved.

The services that information personnel provide have changed over years. Loan of books and periodicals now form a minor part in information services. Speedy replies to quick reference enquiries, on line searching (internet), Selective Dissemination of Information (SDI) and Current Awareness Services (CAS) need to be provided by business and industrial libraries. The availability of factual and numeric databanks



should be made part of the service without which no business and industrial library could be termed as complete. The services offered must be in response to known needs and any activity which could be termed speculative need to be avoided. In considering information services in this context, emphasis is given to those services that have a direct bearing to dissemination of information because it is through dissemination of information that provision of information takes place. Ocholla (1993) argues that “an information service is not the same as information dissemination. Information service differs from information dissemination in that the latter is a mechanism, a vehicle of realizing or fulfilling an information service. Thus, dissemination arises from an existing service”. He goes on to say that information dissemination activity takes information to the user and ensures that the patron receives the most relevant, comprehensive, desirable and reliable information on a regular basis.

The act of taking information to the user by use ICT is the core of this study. The traditional methods of information provision can be improved greatly if they infuse the use of ICT. Based on the premise by Ocholla (1993) that dissemination arises from an existing service it is paramount at this point to highlight the information services commonly provided in organizations:

### **Current Awareness Services (CAS)**

These are services designed to keep information users abreast with any current and relevant information needed for a variety of information demanding tasks they may be involved with normally by alerting them whenever such information sources are received in an organization.

According to Kumar (1987), CAS means different things to different people. It means knowledge regarding recent developments relating to matters of special interest to an individual. It may be either information on new circumstances affecting what people do and how they may do it. Ojiambo and Ocholla (1993) define it as a system of reviewing newly available documents, selecting items relevant to the needs of an individual /group and recording them so that notifications may be sent to those individuals /groups to whose needs they are related.

Current awareness services have traditionally involved providing tables of contents (TOC) of new journals to users, often accompanied by news clippings and other relevant publications. It involves a review of "publications immediately upon receipt, selecting information pertinent to the program of the organization served, and individual items to be brought to the attention, by one means or another, of those persons to whose work they are related". As more and more information becomes available at an increasingly rapid pace, business libraries are expected to provide faster, electronic delivery of current awareness, as discussed by Nina Platt (2007) "business and industrial people want immediate access to news about clients, prospective clients, industries, legal topics and more." This presents librarians with opportunity to provide a current awareness service that will: decrease information overload, minimize risk, promote authoritative primary and secondary legal sources and provide a value added service to the organization.

### **Selective Dissemination of Information (SDI)**

According to Kumar (1987), SDI is based on the concept of personal service. It is an information service directed towards individuals so as to cater for individual requirements. It is a refinement of the CAS idea. The author says that SDI is that service within an organization which concerns itself with channeling of new items of information from various sources to those points within the organization where they can usefully serve someone's interest. Reduced to its simplest form, it means seeing that the information is efficiently routed to the people who can most benefit from it. This means that the information officer must know the organization and the staffs very well, the goals, plans, and interests of key departments and people, and generally dedicate the information service to the working needs of the organization.

SDI entails matching information /documents with the profile (interest) of each individual of the clientele. The profile can be of a single user or group working on a same project or some limited subject field. Those information items which match are brought to the attention of the user. The aim is that a user should neither be provided too much information nor made to miss information essential towards their requirements. Too much information would make it difficult for the user to use information effectively.

SDI service on manual basis has been there in libraries for a long time. However in recent years, the trend is towards computer- based SDI. Manual SDI poses a number of challenges including:

- i) The volume and variety of literature being published in various fields especially in science and technology is enormous
- ii) The information professionals find it difficult to know all the interests of the users being served by them. Very often the interests keep on changing

Due to these problems, the matching of content of documents with the interest of users to be done manually became very difficult and thus Kumar (1987) suggested a machine system for handling a large scale work of matching. In recent years computers have been used to mechanize the matching procedures (user needs versus document contents). Thus for a successful business services, SDI should employ the use of ICTs.

### **Internet services**

The Internet has rapidly spread around the world in the past decade and has had an impact on the lives of millions of people. Over the past few decades a variety of new and exciting information services have appeared on the Internet, each with its own distinct characteristics. ICTs have revolutionized the whole world of information and have penetrated in areas beyond libraries transforming nearly every facet within society. Powerful PCs, sophisticated network technologies, affordable telephone lines have given a boost for Internet. Use of the Internet and other network resources is changing the traditional library functions. While in the 1980's and early 1990's the Internet's modality were changing traditional library functions and was used mainly for communications, database searching, and bibliographic access, today the Internet's modalities are changing or augmenting traditional functions of library services such as the information transfer process and the perceived nature of information itself.

### **Reference and referral services**

Ocholla and Ojiambo, (1993) assert that, these are modern yet old services. They are modern because of computerization and also the increased demand of quick reference

answers to queries. Today these services are more valued and both libraries and other information service points actively participate in their fulfillment.

Reference services are provided by libraries through use of their in-house information sources while referral services are provided by a library through linking with information sources from elsewhere. This can be done by use of telecommunication systems such as telephones, emails, normal postal services, interlibrary loans or interactive systems such as yahoo messenger and chats. Information seekers may usually require the address of a place, demand to know where a certain piece of information could be available e.g. titles of a document, names of the authors of a document whose topic he is searching on, abstracts on documents he/she is interested in, list of journal published in particular topic, or the date when an event took place, who was behind its success, why it happened, and how it happened. Libraries should develop an information service capacity capable of responding to such demands through use of their in-house information resources or by use of information linkages from elsewhere.

### **Abstracting services**

An abstract is a summary of intellectual content of a book. It is a brief summary of a research article, thesis, review, conference proceeding or any in-depth analysis of a particular subject or discipline, and is often used to help the reader quickly ascertain the paper's purpose. When used, an abstract always appears at the beginning of a manuscript, acting as the point-of-entry for any given scientific paper or patent application.

### **Information searching and retrieval services**

New developments in ICT have led to increased use of online and offline information services. Ocholla (1993) states that, "online services operate more or less like a telephone system. A caller sends a message and expects a response immediately from the recipient". Online information services are heavily dependent on the internet. The author says "an offline information service is non-interactive in so far as telephone or online systems operate. The most common type of offline system uses CD-ROM facilities for information retrieval". It is worth noting that many publishers now have

copies of their publications on CD therefore making access to the information more affordable.

Afolabi (1993) while writing about the roles of libraries and information centres says that “the information dissemination function involves several specific activities which include reference, circulation, bibliographic and current awareness services”. He says that the specific dissemination functions are outlined as follows;

1. Establishing and maintaining a collection of reference books;
2. Providing answers to simple, factual reference questions;
3. Directing users who need research information to possible sources of information;
4. Publicizing new issues of periodicals either through the display of new issues or communicating directly with users;
5. Routing information sources to users whose interests are known, particularly in research and special libraries;
6. Directing information seekers to relevant information in the library or obtaining such information from other libraries, using their knowledge of their collections;
7. Systematically gathering research information sources pertinent to a research query and conveying them to the person who needs it;
8. Compiling selective bibliographies based on the library’s collection;
9. Conducting comprehensive literature searches based on users’ requests;
10. Listing current literature received including the copying of abstracts in abstracting journals and distributing them to users;
11. Locating, synthesizing, evaluating information and providing it in a written, summarized form;
12. Preparing abstracts of current literature received and distributing them;

13. Translating articles written in other languages into languages understood by users;
14. Providing current information relevant to users' interests on an individual or group basis eg SDI;
15. Providing editorial assistance for publications produced by the organization through education and training programmes;
16. Identifying the resource persons who could be consulted in response to questions received from users, using previously acquired knowledge of the community.

Indeed the information dissemination activities outlined by Afolabi (1993) can still be catered for by providing the services earlier highlighted namely; CAS, SDI, reference and referral service, internet services and abstracting services. The authors only vary in the terminology used but all of them drive towards providing users with the right information. It is very likely the information dissemination activities can be enhanced if ICT is used.

Whichever way one looks at it, ICTs have basic advantages relating to speed, accuracy, capacity, versatility, cost and efficiency. For example Tanui (1993) argues that computerized information retrieval systems provide the following benefits. Information is: organized and retrieved faster than in manual systems; easily input and output; easily manipulated to suit different users' needs; stored in smaller room space; easily transported (exported and imported) from one place to another; and standardized for exchange.

### **1.2.2 Information policies**

McClure and Jaeger (2008) say that policy is “directives intended to shape decisions and actions of individuals, organizations, and government agencies.” Yet to Ohegbu (2008) it means simply “guidelines to regulate participation.” Rubin (2010) offers us a more general definition by stating that “policy” typically refers to political laws or regulations, yet can also mean a rule or practice followed more locally.

Where library and information issues are concerned, we would hope that a national policy would guide the development of both infrastructure – including for example telecommunications networks and computers and library buildings - and content (everything from copyright agreements to actual documents). Hence, “library and information policy” could be defined as those laws, regulations and practices intended to facilitate the creation and dissemination of information throughout society. A fundamental aspect of this goal is creating channels for this to happen. Computer networks are one example of a channel, and libraries are another (Case 2012).

An interesting observation is made by the Canadian International Development Research Centre (IDRC) (2002) to the effect that there is a time element in policy, depending on the stage of development of a nation, and its current concerns. Policies change as political leaders come and go. The elements that are emphasized may change as a nation evolves. This is why those policy goals concerning “Human Resources” need special emphasis in industrialized countries; physical infrastructure tends to be emphasized in developing nations more than it does in developed parts of the world.

Case (2012) says that libraries and other information agencies must develop policies that allow them to reach the following goals:

- Foster literacy among the population. Both school and public libraries must teach and encourage reading. Where possible, they must also help citizens learn to use computers and to understand what information they find on the Internet.
- Support education. This takes place through the proper development of school and university libraries, and the networks and cooperative agreements that help them. Our national and institutional policies governing Internet services and exchange of both electronic and physical materials are examples of these goals (e.g., Liu & Zhang, 2001).
- Recognize the importance of training new librarians to serve as intermediaries. That is, librarians to staff libraries and help the people they serve to find and understand information. Existing librarians may also need

re-training. Policies offering financial support for university education are examples of such goals.

- Provide for public access to information. This is especially true for information produced by the government itself (Lor & van As, 2002). The US federal, local and state governments, for example, have “e-government” websites and services, through which information is not only disseminated, but citizens may conduct transactions, e.g., applying for a permits or jobs, or asking questions to government officials.
- Play a key role in preserving national culture (Vitiello, 2000). They do this most often by preserving the artifacts of culture: everything from ancient statues to books to sound recordings of music. In North America digital preservation of documents is being helped by a new law that will make it easier for libraries to make digital copies of so-called “orphan works,” in which the owner is difficult to identify, or which may have no owners.
- Finally, promote trust among societal members, and in this way create social capital. In recent years many economists and political scientists have rediscovered the importance of social networks and trust in providing a framework for a sound economy and society (Fukuyama,1995; Lin, 2002). If we do not trust others, we will not trade with them. Neither are we likely to help them in times of natural disasters. This is one of the reasons that much attention has been paid to “the library as a place”; public libraries, in particular, want to be meeting places for their communities, so that people come to know each other as neighbors.

Various authors have highlighted some trends that will affect library- and information-related policies. Case (2012) is cautious about this and says that “Speculating on emerging events is a difficult and dangerous thing to do, because so often our predictions about the future turn out to be incorrect”. Nevertheless, the following are some changes that are happening worldwide, which influence policies relevant to libraries and information agencies.

Information technology: Although the effect is modest, it appears that information technology and telecommunications themselves influence policy-making (Shin,



2008). It does this by changing human communication patterns, allowing new influences on policy, especially in the form of spreading opinions and news. This in turn reflects things like the organization of workers and voters, affecting economic decisions and elections.

**Information channels:** Obviously the number of information channels have expanded with the development of computers and high-speed networks for data and voice transmission. They have also become more interactive, allowing for two-way communication, not just one-way, as with the older publishing and broadcasting industries. We see more and more examples of the Integration of media, e.g., mobile phones that allow us to take and store and send photos, as well as voice and email, and to surf the Internet.

**Highly educated workforce:** It is perhaps a cliché that an educated workforce is key to taking advantage of the expanded channels of information. But the workforce must also be adaptable, willing to learn and change. This does not allow us to maintain our current habits in a global economy.

**Digital divide:** There has been much concern over so-called Digital Divides in national populations (Singh, 2002). This refers not just to physical access to computers and networks, but also to effective use of them to find information and communicate. Some groups, such as the poor, the less educated and those living on farms, differ from other segments of society in their access and use. These divides increase or decrease as new forms of IT diffuse throughout society. But gaps have not decreased very much among different income groups (Hundley, *et al.*, 2003).

**Digital libraries:** Digital libraries continue to evolve in useful ways. As they do they require more change in regulation and licensing agreements (Marcum & George, 2006). These also create complications with implications for libraries and for LIS schools: new librarians need to understand more about intellectual property and about licensing. They also need to be able to teach students about these things. We have not yet discovered a dominant business model for electronic publishing. Many different arrangements exist (NCLIS, 2008). As digital libraries evolve we may find that

academic libraries become major players, and perhaps even publishers, in scientific and scholarly communication (Mandel, 2006).

### **1.2.3 Legislative framework on public information in Kenya**

In 1946, the United Nations General Assembly adopted Resolution 59(1) on Freedom of Information whose terms were; "Freedom of Information is a fundamental right and is the touchstone of all the freedoms to which the United Nations is consecrated. Freedom of Information implies the right to gather, transmit and publish news anywhere and everywhere without fetters. As such it is an essential factor in any serious effort to promote the peace and progress of the word."

Khaseke (2014) says that the right to information is now recognized and codified under the Constitution of Kenya. Prior to the enactment of the new Constitution there existed no law that guaranteed this right and attempts to introduce the right to information law through an Act of Parliament did not prove fruitful.

The promulgation of the new Constitution of Kenya in 2010 therefore heralded a new chapter in the right to information in Kenya. Article 35 thereof codified for the first time the right to information.

Unlike other provisions in the bill of rights which bestow the specific right to "every person", Article 35 employs the words "every citizen". The right to freedom of speech has also generally been held to include the right to know or the right to information. Indeed Article 33 of the Constitution of Kenya provides in the relevant part that; "(1) Every Person has the right to freedom of expression, which includes; (a) Freedom to seek, receive or impart information or ideas..."

It is therefore arguable that the right to information in Kenya is governed by the provisions of both Article 35(1), and Article 33(1) as set out above. Further Article 232(1) (f) of the Constitution provides that the principles and values of public service include transparency, and provision to the public of timely and accurate information.

Murungi (2007) argues that "Information, particularly information held by public bodies, is a key economic resource and the raw material for the transition from a commodity-based economy to a knowledge-based economy. Moreover, the free flow of information is key to democratic governance: it empowers citizens and enables

them to participate in public affairs and it is an important tool for cultivating transparency and accountability in public bodies”. The statement is equally true with reference to staff working within a public body such as a government ministry. It is true that information empowers citizens – but it should be kept in mind that the definition of citizens includes the staff employed in public offices who should provide the information. This is where ICTs are most likely to play a major role to ensure free flow of information. To create a citizen’s right to public information and to foster the proactive provision of information by public bodies, there is need for appropriate legislation.

Currently, the regime of law governing the collection, storage and disclosure of public information is to be found in a host of statutes including the following:

- a) The Disposal of Records Act of 1962;
- b) The Public Archives and Documentation Service Act of 1966;
- c) The Official Secrets Act of 1968;
- d) The Statistics Act of 2006; and
- e) Several other statutes establishing public offices having the express or ancillary duty to collect certain kinds of public information eg The Age of Majority Act; Births and Deaths Registration Act; Registered Land Act; Companies Act, etc.

### **The Disposal of Records Act**

This Act makes provision for the disposal of public records in the custody of the High Court and the Registrar-General. In respect of the High Court, the Chief Justice may, subject to consultations with the Chief Archivist and in accordance with the Public Archives Act, make rules for the destruction of the records of the High Court or the subordinate courts which he considers to be of no further use or worthy of being permanently preserved. The Chief Justice is given the same powers with regard to the records in the custody of the Registrar-General.

However, the Act does not authorize the destruction of any document which is required to be preserved by any law. The Chief Justice has made subsidiary legislation, the Records Disposal (Court Rules), governing the destruction of court records.

### **The Public Archives and Documentation Service Act**

This Act creates the Kenya National Archives and Documentation Service (KNADS) and makes provisions for the preservation and public archives and public records. The Government Printer and all heads of government ministries, agencies and departments are obliged to furnish the Director of KNADS with two copies of any published or generally circulated document or report produced by their offices.

However, the Act does not expressly recognize any right of the citizen to access a public archive. It merely provides that public archives that have been in existence for not less than 30 years “may” be disclosed to the public though the Director is given the power to refuse the disclosure of such records. Moreover, public archives which have been in existence for a shorter period may only be disclosed with the authority of the Director.

### **The Official Secrets Act**

Since the enactment of the first edition in 1911, fewer laws have endured as much negative review and public scorn in Kenya as the Official Secrets Act. But much of the criticism may have been misplaced as it was inspired not so much by an understanding of the Act but by the interpretation of the actions of deceitful civil servants who may have wrongfully invoked it to conceal information which was otherwise not exempted from public disclosure. The purpose of the Act has remained noble: the preservation of state secrets and state security. All the Act does is to protect certain security installations from trespass; to restrict the improper use of the uniforms of the disciplined forces and the identity tools of government authorities and to allow government wire-taps on communication systems in certain circumstances.

Perhaps the only legitimate criticism that may be leveled against the Official Secrets Act is that it restricted access to public information long before an express right of access to public information was created. Nevertheless, the Freedom of Information Bill proposes to repeal this Act.

### **The Statistics Act, 2006**

This Act establishes the Kenya National Bureau of Statistics for the collection, compilation, analysis, publication and dissemination of statistical information and the co-ordination of the National Statistical System.

### **The Freedom of Information Bill (2012)**

It is vital to consider some of the salient aspects albeit if only for comparable reasons to discern the direction being taken in promotion of the right of access to information in Kenya. The Freedom of Information (FOI) Bill appears to have been drafted with the benefit of a comparative study of similar laws in well established democracies, including the USA, the UK, Australia, New Zealand, Ireland, Netherlands, France and Canada.

Kenya Country Report (2011) on Managing Records as Reliable Evidence for ICT/ e-Government and Freedom of Information (FOI) provides an overview of the regulatory framework that needs to be in place to successfully manage records in relation to ICT/ e-Government and to FOI. A ‘✓’ means that the framework element is in place; an ‘✗’ means that it is not in place.

***Table 1: Showing the status of the records management regulatory framework in Kenya***

<b>ICT/ e-Government</b>	<b>Status</b>
Planning for ICT/ e-Government systems ensures that the records needed for the proper functioning of the system are complete, accurate and accessible.	✓
Planning for ICT/ e-Government systems addresses functionality for the management of records from creation to disposition.	✓
The national records and archives authority is included in consultations on ICT/ e-Government initiatives.	✓
<b>Freedom of Information</b>	
An FOI law has been enacted.	✗
The FOI legislation is aligned with existing legislation, particularly the national records and archives legislation and other legislation relating to the release of information.	✗
FOI legislation specifically over-rides the 30-year access law if there is	✗

one.	
The FOI law stipulates mandatory response times.	✘
A plan for FOI implementation has been adopted by the Government.	✘
The plan for FOI implementation considers the completeness, accuracy and accessibility of government records in all formats.	✘
The plan for FOI implementation makes all government staff aware of their responsibilities for managing records.	✘
<b>Records Management</b>	
<i>Legislation</i>	
The records and archives legislation establishes a single authority on the management of government records, from creation to disposition.	✘
The records and archives legislation positions the national records and archives authority centrally within government so that it can fulfil its crosscutting function.	✘
<i>Policy</i>	
A government-wide records management policy has been adopted to define responsibilities for records management and relationships with ICT/ e-Government and FOI bodies.	✘
<i>Standards</i>	
The national records and archives authority has adopted a records management standard (i.e. ISO 15489).	✘
A standard for records management functionality in ICT systems has been adopted (ie ICA-Req or MoReq).	✘
A standard for archival management and digital preservation has been adopted.	✘
<i>Procedures</i>	
The national records and archives authority has issued or approved procedures for every phase of the management of records, from creation to disposition.	✘
A national retention and disposal schedule exists and is applied to all hard copy and electronic records.	✘
The national records and archives authority is mandated to enforce compliance with the retention and disposal schedule.	✘
<i>Staffing</i>	
A cadre of records management staff exists.	✓
A scheme of service exists for staff responsible for managing records in electronic or paper form, from creation to disposition. The scheme of	✘

service spans government and ranges from clerical to management positions.	
<b><i>Infrastructure and Facilities</i></b>	
The national records and archives authority is allocated sufficient funds to fulfil its mandate.	✘
MDAs have sufficient space and equipment to manage active records securely, in electronic and paper formats.	✘
Purpose built records centres have been provided for the storage of semi-active records.	✘
Purpose built archival repositories have been provided for the storage of inactive records.	✘
A digital repository has been created to preserve electronic records over time.	✘
<b><i>Capacity Building</i></b>	
Training in records management is available to staff at all levels and includes practical training in electronic records.	✘
University programmes offer in-depth education for records management with practical training in electronic records management.	✘

*Source: International Records Management Trust (2011)*

The implication of the status report above is that Kenya still has a lot to do in the area of records management with focus on legislation, policy, standards, procedures, infrastructure and capacity building.

#### **1.2.4 E-government**

According to the Department of e-Government website, <http://www.e-government.go.ke>, “e-Government is a fundamental element in the modernization of Government. It provides a common framework and direction across the public sector and enhances collaboration within and among public sector organizations and institutions, between Government and the business community, and between Government and the citizens that it serves in the implementation of Government Policies. It also identifies ways of developing the skills needed by public servants to realize the new opportunities offered by ICT advancement such as the internet”.

The e-Government Strategy is designed to achieve pre-determined set of goals and objectives, which are: better and efficient delivery of Government information and services to the citizens, promote productivity among public servants, encourage participation of citizens in Government and empower all Kenyans in line with development priorities outlined in the Economic Recovery Strategy for Wealth and Employment Creation.

Kenya has over 130,000 civil servants working in various ministries having been employed by the Public Service Commission. Following the devolution of some services to the counties, 70,000 public servants remained at the national level of government. About 900 of the civil servants are based at the ministry of Education, Science and Technology. The Civil Service carries out the practical and administrative work of government. Civil servants are politically impartial employees, who formulate and carry out the policies of the government departments.

E-government means different things to different people. E-government generally involves using ICTs to transform both back-end and front-end government processes and provide services, information and knowledge to all government customers, that is the public, businesses, government employees and other government agencies. E-Government uses a range of information technologies, such as the Wide Area Networks (WANs), internet and mobile computing, to transform government operations in order to improve effectiveness, efficiency, service delivery and to promote democracy.

However, the diversity of civil servants in terms of job description, location and area of specialization means that their information needs are as diverse and are satisfied in various ways. A highly informed public also places a lot of pressure on the civil servants to provide accurate and up to date information. This research looks at the use of ICT in provision of information to staff at the ministry of Education, Science and Technology.

### **1.2.5 Library and information service provision standards**

Standards are quality levels – goals for attainment – and they are presented at baseline and enhanced service delivery levels. Guidelines document best practice and are intended as operational suggestions for improving library performance. Kenya does



not have any published standards for information service provision in public service. Perhaps this may happen by way of regulations in future once the Freedom of Information Bill is enacted into law.

In drafting the national standards for information provision, a lot can be borrowed from other countries. A notable example is from Australia which has elaborate public library standards. There are 12 standards and 20 guidelines in Australia. The Standards cover Library expenditure per capita per annum; Members as a percentage of population; Visits per capita per annum; Staff ratio for population served; Qualified staff ratio for population served; Library materials expenditure per capita per annum; Items per capita in collection; Age of collection (last five years); Circulation (loans) per capita per annum; Turnover of stock – loans per volume; Provision of Internet computers; and Satisfaction with library services.

From the Standards are derived elaborate guidelines on Library management and operations; Library buildings; Staff; Opening hours; Library collection; Information technology; Information services; Inter-library loans; Programs; Customer service; Marketing and public relations; Mobile libraries; Local studies collections; Literacy services; Services for Indigenous Australians; Services for culturally diverse communities; Services for people with disability; Services for young people; Services for older people; and Home library services;

It is expected that library managers will use the standards and guidelines in conjunction with more detailed state and territory based information, and that they will be applied within the context of local challenges and opportunities.

However, Kenya has done well in terms of standards for academic libraries. The Commission for University Education has drafted Universities Standards and Guidelines. The fifth schedule consists of Standards and Guidelines for University Libraries in Kenya. Standards and Guidelines cover Vision, Mission and Objectives; Information Resources; ICT Resources; Organization and Access to Information Resources; Library Services; Library Facility; Staffing; Administrative Structure; Library budget; Information Literacy and Competency; Open, Distance and e-learning library services; and Library Outcomes Assessment.

It is gratifying to note that there is a draft policy on records management in Kenya. However, to avoid the existing variance from one government ministry to another, there is need for a national standard to govern provision of library and information services in Kenya.

### **1.3 The Ministry of Education, Science and Technology (MoEST) - Kenya**

The Ministry of Education, Science and Technology has existed in all successive governments in Kenya since independence. Depending on the political dispensation, the ministry has occasionally been split under different regimes into Science and Technology and Education. Regardless of name, the ministry has always been purposed to harmonize, implement, guide and coordinate education, science and technology towards the realization of a knowledge based economy.

MoEST currently has two State Departments namely State Department of Education and State Department of Science and Technology. According to Schedule four of the Constitution, Education – except Early Childhood Development and Education (ECDE) – is a function of the National Government. The County Governments only have a supplementary role to play in the education sector.

The ministry has its offices at Jogoo House B on Harambee Avenue and Telposta Towers on Kenyatta Avenue in Nairobi. The offices at Jogoo House are mainly administrative and basic education while those at Telposta Towers are technical departments for the State Department of Science and Technology. In addition, the ministry has offices in all the Counties with officers deployed up to the zones under the County Directors of Education.

#### **1.3.1 Mandate and Functions of MoEST**

The ministry derives its mandate from The Basic Education Act, 2013 and the Technical and Vocational Education and Training (TVET) Act, 2013. The Basic Education Act gives effect to Article 53 of the Constitution of Kenya and other enabling provisions; to promote and regulate free and compulsory basic education; to provide for accreditation, registration, governance and management of institutions of basic education; to provide for the establishment of the National Education Board, the Education Standards and Quality Assurance Commission, and the County Education Board and for connected purposes. On the other hand, the TVET Act 2013 provides

for the establishment of a technical and vocational education and training system; the governance and management of institutions offering technical and vocational education and training; coordinated assessment, examination and certification; instituting of a mechanism for promoting access and equity in training; to assure standards, quality and relevance. The Government has outlined the mandate and functions of this Ministry through Executive Order No. 2/2013 of May 2013 as;

- Education policy management
- Management of continuing education
- Administration of Early Childhood Education, standards and norms
- Management of education standards
- Management of national examinations and certification
- Curriculum Development
- Quality assurance in education
- Primary and Secondary Education institutions and management
- Teacher Education Management
- School administration and programmes
- Registration of Basic Education and training institutions
- Special Needs Education management
- Representation of Kenya in UNESCO
- Adult Education management
- University education policy management
- University education
- Public universities and tertiary institutions
- Science, Technology and Innovation policy
- Management of Technical Training Institute including Youth Polytechnics
- Management of Institutes of Science and Technology
- Management of National Polytechnics

The core functions of the ministry include provision of support for development activities in the school and training sector; management of learning and training programmes; career guidance and counseling and on matters relating to liaison between technical institutions and the industry, curriculum development, registration

and supervision of institutions. Other functions include supervision of training practices, programmes and co-curricular activities, promoting standards teaching and training and practical/industrial attachment, validation and approval of technical materials and textbooks, initiation of curriculum development, monitoring of standards and quality of curriculum implementation, monitoring of the administration of examinations, setting standards, inspections of institutional facilities and capacity, developing specifications for training equipment, classrooms, workshops, laboratories, libraries and students enrolment guidelines, setting admission criteria for students joining institutions, provision of professional advice on standards and co-curricular activities in institutions, recommending staffing levels and qualifications of teachers and developing management guidelines institutions.

The Ministry has several Semi Autonomous Government Agencies (SAGAs) including: Kenya Institute of Education (KIE), Kenya National Examinations Council (KNEC); School Equipment Production Unit (SEPU), Kenya Education Staff Institute (KESI); Kenya Institute of Special Education (KISE) Jomo Kenyatta Foundation (JKF); Kenya Literature Bureau (KLB) and National Council for Science and Technology (NCST) which is transiting to National Commission for Science, Technology and Innovation (NACOSTI). The Teachers Service Commission (TSC) is a constitutional commission under the ministry.

In fulfilling its mandate, the ministry generates and consumes a lot of information. Most of such information is held in files in the ministry's registries. The use of manual systems is not sufficient to handle such information. Therefore deliberate efforts have to be made to ensure use of ICT in provision of information to staff in the ministry.

#### **1.4 Statement of the problem**

The use of ICT has revolutionized information seeking and communication. However, the provision of information to staff at the ministry of Education, Science and Technology in Kenya has not fully utilized the available ICT facilities. Due to the highly dynamic ICTs, it is very likely that staff within the ministry need capacity building to offer proper services using modern ICT facilities. Where staffs are not up to date in terms of skills, they may not put the facilities to optimum use.

Information systems in any organisation should be established based on the needs of their users. The ministry of Education, Science and Technology has a resource centre and several registries which have not embraced ICTs highly. The use of manual systems is generally inefficient and does not provide any backup to the records maintained in the resource centre and registries. In case of a disaster, it will be almost impossible to recreate the records.

Members of the public are now quite informed and demand for the best service which can only be provided by officers who are well informed and can communicate well in an automated environment. The constitution promulgated in August 2010 added new strength to the public by guaranteeing citizens access to information in article 35.

Kenya's Jubilee government came to power in the year 2013 with a pledge to run a digital administration. Such digital revolution should be seen in the attempts made by various ministries to provide ICT facilities to its staff. However, it is not enough to provide staff with computers and connectivity to the internet. The focus should be on how they are utilised. Word-processing and reading email are some of the commonest uses to which computers are put oblivious of the other information provision opportunities offered by the facilities.

The user demands and current constitutional dispensation in Kenya mean that it will not be business as usual for staff in the various government ministries. The staffs who are slow in adopting the highly dynamic ICT may fail to satisfy their clientele and exploit the opportunities that come with ICT in terms of information provision. In addition the efficiency with which the information is provided to staff and the public in general is likely to be affected if ICT is not appropriately used.

The use of ICT will increase efficiency in the resource centre and registries and provide backup for information resources. In addition, ICT skill upgrading will ensure optimum utilisation of available ICT facilities and subsequent provision of information to staff using the facilities. In view of the foregoing, and given the new constitutional dispensation in the country, there is need for use of ICT in provision of information to staff at the ministry. This study therefore assesses the use of ICT in provision of information to staff at the Ministry of Education, Science and Technology in Kenya.

### **1.5 Aim of the study**

The study set out to investigate the use of ICT in provision of information to staff at the Ministry of Education, Science and Technology in Kenya with a view of developing strategies to address any shortcomings in the use of ICT to provide information.

### **1.6 Objectives of the study**

The specific objectives of the study were to;

1. Determine the work activities which staff at the ministry perform in the discharge of their duties
2. Determine the types of information disseminated by use of ICT the staff
3. Determine the level of satisfaction of the staff with the information available to them in the ministry
4. Establish the range of ICTs used by the staff in accessing needed information
5. Establish individual and institutional challenges of using ICT to provide information at the ministry
6. Propose strategies of addressing shortcomings in the use of ICT to provide information to staff at the ministry

### **1.7 Research questions**

The study was guided by the following research questions;

1. What are the work activities performed by staff in the discharge of their duties at the ministry?
2. Which are the types of information disseminated by use of ICT to the staff at the ministry?
3. How adequate is the range of information sources available to the staff at the ministry?
4. What is the range of ICTs used by the staff in accessing needed information?
5. Are there any challenges faced when seeking for and communicating information at the ministry?
6. What strategies can be used to improve use of ICTs in provision of information to the staff?

### **1.8. Assumptions of the study**

The study was premised on the following assumptions;

- i. Information systems and services at the Ministry of Education, Science and Technology in Kenya have remained inefficient and ineffective due to inadequate use of ICTs in the provision of the services.
- ii. It is possible to improve information services at the ministry if appropriate strategies are formulated and implemented.
- iii. The scattered location of offices in the ministry affects effective information provision and the use of a common information system.

### **1.9 Significance of the study**

The Bill of Rights in the Constitution of Kenya guarantees citizens access to information in article 35 thus creating a challenge for public servants in terms of information provision. This new constitutional dispensation requires new strategies of information provision which can be proposed through such a study.

In addition, the findings and recommendations of the research can be applied on other government ministries in the country because their operating environment is almost similar.

The research findings will also be useful in policy formulation by the government because the ministries are funded by the exchequer. It is important that the investment being made by government in terms of information provision goes to the right areas such as ICT.

### **1.10 Scope and limitations of the study**

#### **1.10.1 Scope**

The study was carried out at the Ministry of Education, Science and Technology headquarters in Nairobi. It focused on the use of ICT in provision of information in all the departments through which the ministry's mandate was discharged. The study did not include the Semi Autonomous Government Agencies (SAGAs), field officers in the county offices and the offices of the Principal Secretary and Cabinet Secretary.

### **1.10.2 Limitations**

The restructuring of government departments following the national elections held on March 4<sup>th</sup> 2013 took quite some time. At one time, two directorates of the Ministry – Directorate of Quality Assurance and Standards and Directorate of Technical Accreditation and Quality Assurance – were supposed to transit to a council and an authority namely Education Standards and Quality Assurance Council (ESQAC) and Technical and Vocational Education and Training Authority (TVETA) respectively. However, the uncertainties did not affect the area of study i.e. the use of ICT in provision of information.



## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

The literature review focuses on the theoretical framework of the study and other thematic issues already dealt with by other authors who have carried out related research. The study adopted Niedźwiedzka's Information Behaviour Model (2003) and Rogers' Theory of Diffusion of Innovations (1995). There are other theories that come close to the context of this research including Uses and gratifications theory and the two-step flow theory both of which however are more focused on mass media. Other theories include the system theory, the modernization theory and gate keeping theory.

The thematic issues covered in this chapter include information as a resource, evolution of ICT, use of ICTs in provision of information, information seeking behaviour, barriers to information seeking and communication in government.

#### 2.2 Theoretical framework

This study was guided by Niedźwiedzka's Information Behavior Model (2003) and Rogers' Theory of Diffusion of Innovations (1995). Barbara Niedźwiedzka is a medical librarian in Poland and was involved in a study of the Polish health care system in 1999. The health care system was characterized by large deficiencies of data and research evidence and a lack of organized systems for information provision. The same can be said of the ministry of Education, Science and Technology which does not have adequately organized systems for information provision. In the Polish health care system then, professionals who seemed to need effective information systems were mostly policy makers and health care managers. So, a study was conducted to identify the information needs and behavior of this category of users.

The study's primary goal was to obtain preliminary data about current information needs, preferences and the limitations of health care managers as information users. This is quite related to this research which also considered the current information needs but of staff at the ministry of Education, Science and Technology. The secondary goal was to identify significant environmental factors influencing their

information behavior. In this research however, it was not just environmental factors to be identified, but rather the use of ICT in provision of information.

Niedźwiedzka's model presents a critical description of Wilson's (1996) Global Model of Information behaviour and proposes major modification on the basis of research into information behavior of managers. Wilson's model suggests that information-seeking behavior arises as a consequence of a need perceived by an information user, who, in order to satisfy that need, makes demands upon formal or informal information sources or services, which result in success or failure to find relevant information. If successful, the individual then makes use of the information found and may either fully or partially satisfy the perceived need - or, indeed, fail to satisfy the need and have to reiterate the search process. The model also shows that part of the information-seeking behavior may involve other people through information exchange and that information perceived as useful may be passed to other people, as well as being used (or instead of being used) by the person himself or herself.

However, Niedźwiedzka argues that Wilson's (1996) model, for example, cannot be used to describe managers' information behavior, since managers basically are not the end users of external information sources from an organization or computerized information services, and they acquire information mainly through various intermediaries. Therefore, the model cannot be considered as a general model, applicable to every category of information users. The proposed new model encompasses the main concepts of Wilson's (1996) model, such as:

- person-in-context,
- three categories of intervening variables (individual, social and environmental),
- activating mechanisms,
- cyclic character of information behaviors,
- the adoption of a multidisciplinary approach to explain them.

However, the new model introduces several changes including;

- identification of 'context' with the intervening variables;

- immersion of the chain of information behavior in the 'context', to indicate that the context variables influence behavior at all stages of the process (identification of needs, looking for information, processing and using it);
- stress is put on the fact that the activating mechanisms also can occur at all stages of the information acquisition process;
- introduction of two basic strategies of looking for information: personally (independent user) and/or using various intermediaries (dependent user)

A fully independent user applies their own knowledge, available sources and interacts with search systems and information services (uses databases, catalogues, archives, search-engines etc.). Such a user also selects and processes the acquired information personally. More often people also use various intermediaries and their services (information specialists, subordinates, co-workers), and utilize the effects of their information seeking and processing (we might call this person a semi-independent user). A user can also almost entirely depend upon intermediaries, and he or she acts independently only at the stage of mental processing of information. Essentially it is an intermediary who engages in systematic information activities: asking, seeking and searching, for this kind of user.

In light of Niedźwiedzka's research, it can be said that managers belong to the last category i.e. dependent users. They predominantly turn to the various intermediaries to obtain necessary data and evidence. This will be confirmed in this research in the ministry in relation to how the intermediaries use ICT to provide information. This does not exclude the marginal use of other strategies; those applied by independent or semi-independent users, but show the predominant behavior.

Predominant behavior is very important for the design and organization of information systems for a particular category of users. It allows defining the range and type of problems which are to be taken into consideration in designing certain information services. In fact Niedźwiedzka argues that the closer the cooperation between a user and an information professional, the better results can be achieved in the effect of information seeking processes. Perhaps this justifies the need for a functional resource centre in the ministry of Education, Science and Technology and

suitably qualified information professional to provide the intermediary to improve information provision. Of course this will be enhanced by provision of appropriate ICT facilities. Such identification of the predominant behavior allows defining the range and type of problems, which are to be taken into consideration while outlining the area of necessary research, or designing certain information services. For instance, in regard to the categories of persons who are not the end-users of information systems some investigations, such as learning about their search skills, or about specific cognitive processes taking place in their interaction with computerized systems, are not so important. Much more important would be finding out about their social interactions or communication skills.

The results of Niedźwiedzka's research into managers' information behaviour showed that Wilson's 1996 model is not suitable to describe this numerous category of information users, because it applies only to those who personally seek information, and this is not the predominant behaviour of managers. Since, most probably the managers are not the only group, which uses mediation of other people to such a big extent, it can be said that the model does not reflect the important information behaviour of large groups of information users as may be found in a government ministry.

Niedźwiedzka's emphasis on the use of intermediaries to improve information provision and the need for provision of appropriate ICT facilities ties in well with Rodgers theory of diffusion of innovations. This is because ICT is new technology whose adoption is not uniform across various users. Some government departments use it more than others and even within a ministry; some staff use it more than others.

Diffusion of Innovations is a theory that seeks to explain how, why and at what rate new ideas and technology spread through cultures. Everett Rogers, a professor of rural sociology, popularized the theory in his 1962 book *Diffusion of Innovations* organized systems for information provision which is now in its fifth edition published in 1995. Dr. Everett M. Rogers was a Distinguished Professor in the Department of Communication and Journalism at the University of New Mexico where he taught and conducted research on the diffusion of innovations. One interesting thing worth mentioning is that Rogers' father was a farmer who resisted adopting the hybrid seed

corn (Singhal, 2005). Due to the drought in Iowa in 1936, the Rogers' farm withered, which made Rogers personally involved in the diffusion research. Rogers retired from University of New Mexico in 2004 and passed on in October, 2005.

He explains how new ideas spread via communication channels over time. Such innovations are initially perceived as uncertain and even risky – just as the case is with the use of ICT in provision of information. To overcome this uncertainty, most people seek out others like themselves who have already adopted the new idea. Thus the diffusion process consists of a few individuals who first adopt an innovation, then spread the word among their circle of acquaintances - a process which typically takes months or years. But there are exceptions according to Rogers (1995): use of the Internet in the 1990s, for example, may have spread more rapidly than any other innovation in the history of humankind. Furthermore, the Internet is changing the very nature of diffusion by decreasing the importance of physical distance between people. The fifth edition of Rogers' book addresses the spread of the Internet, and how it has transformed the way human beings communicate and adopt new ideas.

Rogers (1995) suggested that the four main elements in the diffusion of innovation process were innovation, communication channels/ diffusion, time, and social system;

- The invention - Rogers defines an invention as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption".
- Diffusion/ Communication channels - Communication is a process in which participants create and share information with one another to reach a mutual understanding.
- Time - Rate of adoption is the relative speed with which an innovation is adopted by members of a social system.
- A social system - "A social system is defined as a set of interrelated units that are engaged in joint problem solving to accomplish a common goal".

That is, diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. In this case the innovation is the use of ICT in provision of information and the social system is the ministry of Education, Science and Technology.

Diffusion of innovation theory offers that media as well as interpersonal contacts provide information and influence opinion and judgment. The information flows through networks. The nature of networks and the roles opinion leaders play in them determine the likelihood that the innovation will be adopted. In the case of a government ministry, the opinion leader could be the Principal Secretary previously called Permanent Secretary (PS) or a Director of a department. The ministry departments form the networks and the PS can influence by way of directives issued downwards. Innovation diffusion research has attempted to explain the variables that influence how and why users adopt a new information medium, such as the Internet. Opinion leaders exert influence on audience behavior via their personal contact, but additional intermediaries called change agents and gatekeepers are also included in the process of diffusion. In a government ministry, ICT officers are the change agents and gatekeepers and play a major role in adoption of new technology.

Individuals in a social system progress through 5 stages:

- Knowledge - In this stage the individual is first exposed to an innovation but lacks information about the innovation. During this stage of the process the individual has not been inspired to find more information about the innovation.
- Persuasion - In this stage the individual is interested in the innovation and actively seeks information/detail about the innovation.
- Decision - In this stage the individual takes the concept of the change and weighs the advantages/disadvantages of using the innovation and decides whether to adopt or reject the innovation. Due to the individualistic nature of this stage, Rogers notes that it is the most difficult stage to acquire empirical evidence
- Implementation - In this stage the individual employs the innovation to a varying degree depending on the situation. During this stage the individual determines the usefulness of the innovation and may search for further information about it.
- Confirmation - Although the name of this stage may be misleading, in this stage the individual finalizes his/her decision to continue using the innovation and may end up using it to its fullest potential (Rogers 1995).

If the innovation is adopted, it spreads via various communication channels. The process occurs over time. Finally, social systems determine diffusion, norms on diffusion, roles of opinion leaders and change agents, types of innovation decisions and innovation consequences.

Rogers (1995) outlines several intrinsic characteristics of innovations that influence an individual's decision to adopt or reject an innovation.

1. Relative Advantage - How improved an innovation is over the previous generation.
2. Compatibility - The level of compatibility that an innovation has to be assimilated into an individual's life.
3. Complexity or Simplicity - If the innovation is too difficult to use an individual will not likely adopt it.
4. Trialability - How easily an innovation may be experimented with as it is being adopted. If a user has a hard time using and trying an innovation this individual will be less likely to adopt it.
5. Observability - The extent that an innovation is visible to others. An innovation that is more visible will drive communication among the individual's peers and personal networks and will in turn create more positive or negative reactions.

The intrinsic characteristics fit in very well in terms of adoption of ICT in provision of information in the ministry of Education, Science and Technology. Users will definitely ask for its advantage, compatibility, simplicity and reliability.

The rate of adoption is defined as the relative speed with which members of a social system adopt an innovation. It is usually measured by the length of time required for a certain percentage of the members of a social system to adopt an innovation. The rates of adoption for innovations are determined by an individual's adopter category. In general, individuals who first adopt an innovation require a shorter adoption period (adoption process) than late adopters.

### **Adopter categories**

Rogers (1995) defines an adopter category as a classification of individuals within a social system on the basis of innovativeness. Five adopter categories are: (1) innovators, (2) early adopters, (3) early majority, (4) late majority, and (5) laggards. These categories follow a standard deviation-curve, very few innovators adopt the innovation in the beginning (2.5%), early adopters making up for 13.5% a short time later, the early majority 34%, the late majority 34% and after some time finally the laggards make up for 16%.

*Innovators* - Innovators are the first individuals to adopt an innovation. Innovators are willing to take risks, youngest in age, have the highest social class, have great financial lucidity, very social and have closest contact to scientific sources and interaction with other innovators. Risk tolerance has them adopting technologies which may ultimately fail. Financial resources help absorb these failures.

*Early adopters* - This is the second fastest category of individuals who adopt an innovation. These individuals have the highest degree of opinion leadership among the other adopter categories. Early adopters are typically younger in age, have a higher social status, have more financial lucidity, advanced education, and are more socially forward than late adopters. They are more discrete in adoption choices than innovators and realize judicious choice of adoption will help them maintain central communication position

*Early majority* - Individuals in this category adopt an innovation after a varying degree of time. This time of adoption is significantly longer than the innovators and early adopters. Early Majority tend to be slower in the adoption process, have above average social status, contact with early adopters, and seldom hold positions of opinion leadership in a system

*Late majority* - Individuals in this category will adopt an innovation after the average member of the society. These individuals approach an innovation with a high degree of skepticism and after the majority of society has adopted the innovation. Late Majority are typically skeptical about an innovation, have below average social status,



very little financial lucidity, in contact with others in late majority and early majority, very little opinion leadership.

*Laggards* - Individuals in this category are the last to adopt an innovation. Unlike some of the previous categories, individuals in this category show little to no opinion leadership. These individuals typically have an aversion to change-agents and tend to be advanced in age. Laggards typically tend to be focused on “traditions”, likely to have lowest social status, lowest financial fluidity, be oldest of all other adopters, in contact with only family and close friends, very little to no opinion leadership opinion leadership.

It is worth noting that government ministries have all sorts of staff because of the nature of government business and are therefore likely to have the whole range of adopter categories in their midst. The opinion leaders and change agents therefore have a lot of work to ensure adoption of new technology such as use of ICT in provision of information.

### **2.3 Information as a resource**

The key role played by information in decision making has elevated it to its new status as a strategic resource just like labour, land and capital. Our entrance into the information age has resulted into functions performed by workers becoming increasingly information oriented. We are now working in an information economy -- with information as the key resource. Information falls within the resource hierarchy which starts with data, which leads to information, coming together as knowledge, and resulting in wisdom.

Prasher (1986) says that “For socio-economic development, information is an indispensable resource. The supply of correct and precise information in time helps the policy-makers in making maximum use of the available resources as also in avoiding duplication of work. Similarly, a research and development programme can be accomplished successfully only if the required information becomes available as and when it is needed. Without proper and complete information no worthwhile decision can be taken. In fact, no progress is possible without the support of information”. The author goes on to say that since progress of every type is linked

with the availability of the right information at the right time, access to it as also its dissemination is of vital importance. He concludes by asserting that “There should be a free flow of information. And, as far as possible, there should be no barriers restricting this free flow”.

Kumar (1989) concurs with Prasher (1986) by stating that “Information plays an important role in today’s complex economic, political and social environment. It has a crucial role in the advancement of knowledge (eg a researcher would need information to keep himself up to date and well informed in his field of specialization), decision making (eg a manager of a business firm should have enough information to be able to take a right decision), planning (eg the planners of national or regional or local plans need information to be able to plan properly), avoidance of duplication of efforts and technology transfer. Research aims to provide solutions to problems. However, solutions to problems require information.

Data can be defined as the undigested observations, or unvarnished facts. Information follows as the organized form of data. Knowledge is then the organized information which is internalized by its user and integrated with other bits and fields resulting from experience, study, or intuition . The final step is the integration of the knowledge into wisdom, which is information which has been made useful by theory relating the bits of knowledge to each other (<http://capita.wustl.edu>).

Similar to other resources, information must be produced, consciously used, and effectively deployed. It is important to be aware of the characteristics of our newest resource, so that we are able to use it efficiently, and benefit from it, as well as not abuse it. There are six inherent characteristics of information as a resource:

1. Information is expandable: it is recognized that for specific purposes information may deplete, but in general, the more we have, the more we use, and the more useful it becomes. Information is certainly not scarce, and is available in profusion. This concept of "information-rich" may not necessarily be good, but may instead mean being "swamped". There are limits to the growth of information, but they lie in the time and capacity of people.
2. Information is compressible: It is possible to concentrate, integrate, and summarize information for easier handling.

3. Information is substitutable: Information can and does replace land, labor, and capital. It is the use of computers and telecommunications that aids in this phenomenon.
4. Information is transportable: Information can be tapped into just about anywhere; this has led to the idea of being remote as much more difficult to achieve since people and information can be taken to the remotest of places.
5. Information is diffusive: There tends to be an ability for information to leak. This leakage allows us to have more, and more of us to have it.
6. Information is shareable: No exchange transaction of information can take place, only sharing transactions, and this leads to an entire sharing environment. (<http://gunston.gmu.edu/>)

Organisations should give priority to information management and communication to benefit from it as a resource. However fears emerge when one considers the trend noted by Odini (1995) that “whenever economic pressures become intense, libraries and other information related services are normally the first types of services to be abolished or to have their budgets cut. This is especially true of government departments”. Whereas the author did not mention ICTs directly, the current reality in government is that the budget for ICT had always suffered whenever the national treasury releases circulars for austerity measures. Sheila (2005) argues that many government ministries and organizations, especially small ones, get by without a resource centre and continue to survive or even to thrive nevertheless. Communities such as societies and other non-commercial bodies often appear unable to afford to establish a library or the post of a qualified information specialist or librarian. But this is no excuse for a government ministry.

## **2.4 Evolution of ICT**

The evolution of the application of ICT can be traced through various phases namely the large electromechanical calculator, the microcomputer phase, the *web* phase and the digital phase. The web phase in the late 1990s which marked the advent of the internet meant that instead of free-standing systems located in specific centers, websites could be developed which individuals could access instantly from a wide variety of sites, including their homes. The ease of developing such websites

produced a massive increase in their number; the ease of interconnecting them meant that they no longer needed to be viewed as discrete entities. What is important about this evolutionary phase of ICT is that users have built social networks to make them useful and effective.

The digital phase is where the world is now. The hitherto separate “analogue streams” of the computer, the television and the telephone are merging into an integrated “digital river” (Cunningham & Fröschl, 1999). Individuals are now able to access the internet not only through their personal computers but also through their televisions and mobile phones. Greatly enhanced bandwidth will shortly enhance its speed and its capacity for transmitting video and audio as well as text. This stage encompasses wireless connectivity and covers the invention of the mobile phone. The initial mobile phones were large and bulky. Reduction in size has been accompanied by a greatly expanded range of functions. Now, depending on the age of the user, mobile phones are used for talking, transmitting messages, pictures and music. Linking without phone lines is now taking place not just inter-continentially but via satellite. High frequency short-range radio transmitters that cover a specific area and “blue tooth” and infra red communication within buildings make wireless communication a world-wide phenomenon.

Across these four phases, three key trends can be discerned. The first is increased *accessibility*. Whereas initially ICT-based information services were available only at a select number of technically-equipped service locations, they are now available in a vast range of other locations – homes, workplaces, community locations. The second is increased *interactivity*. In the early stages, resources were developed as separate systems, offering only limited interactivity with users. Now, they are highly interactive not only with users but also with each other and across inter-media boundaries. The third is much more diffused *origination*. Whereas the initial computer-aided information systems were developed by large organizations with substantial resources at their disposal, anyone can now develop their own website.

## **2.5 ICTs in provision of information**

Information and communication technologies (ICTs) generally refer to an expanding assembly of technologies that are used to handle information and aid communication.

These include hardware, software, media for collection, storage, processing, transmission and presentation of information in any format (i.e., voice, data, text and image), computers, the Internet, CD-ROMs, email, telephone, radio, television, video, digital cameras etc. The advent of personal computers, the Internet and mobile telephony during the last two decades has provided a much wider choice in collection, storage, processing, transmission and presentation of information in multiple formats to meet the diverse requirement and skills of people (Kwadwo, A. O. and Mekonnen, D. A. (2012).

Almost every single activity in the modern world is becoming more dependent on the application of ICTs for one use or another. Its use will be found in engineering, health care, manufacturing etc and perhaps the most outstanding use is provision of information. Mechin (1997) argues that access to computers should be unlimited and total because information age workers need a computer and a phone and all information wants should be free. Computers give people a chance to develop their own ideas, to programme their own worlds and to distribute results of their work. He further says that the internet allows us to publish ideas very cheaply and even assume more responsibility for what we produce. It also provides more interactivity. The most commonly used ICTs for provision of information apart from computers include the following:

### **Phones**

Phones are not new to the business world, but some of their features are. Besides making and receiving calls, employees can use their phones to check email, schedule appointments and chat with coworkers. Some devices even contain built-in cameras with videoconferencing applications, so employees may participate in virtual meetings when they are out of the office. They ensure that staff are always connected and in communication.

### **Email**

Email, or electronic mail, is an efficient and convenient way of communicating in the business world, and often replaces the need for face-to-face meetings. According to Business Link, email is a low-cost communication method that businesses use for marketing, mass mailings, instant communication and the exchange of electronic files, photos and videos. Another convenient aspect of email is that employees can send and

receive email messages from their offices, homes and their phones. As long as they have an Internet connection or wireless data plan, email can be accessed. Emails are ideal because attachments such as files and pictures can be sent along with the email. Organizations usually have an inside provider they use to setup email accounts for their employees, clients and other personnel.

### **Fax machines**

Facsimile - fax for short - was more common before electronic mail came along. Distance is not an issue with fax machines. Employees can send faxes to coworkers in other departments or to people in other countries. Fax machines transmit images of documents that come in a read-only format; they cannot be edited or changed by the recipient. Faxes are frequently sent for legal documents that require physical signatures. A fax is sent over a telephone network. Information that is sent over a telephone network travels through the phone line and is picked up by the receiving fax machine. Fax machines can also be digital, meaning the transmission may be sent over a wireless connection and picked up by the recipient's fax machine.

### **TV and radio**

In the early 1900s, researchers discovered how to use the radio waves that pervaded the planet. They eventually learned how to broadcast using these radio waves, so that audio could be delivered directly into people's homes. In the 1950s, television was invented, and in addition to audio broadcasts, people could now view actual visual broadcasts of people and places.

### **The internet**

The Internet arguably ranks among the greatest inventions ever made, as it has made communication relatively instant even for people on opposite sides of the planet, and has provided access to even remote parts of the earth.

### **Video conferencing**

Video conferencing is ideal for business communication when different persons may need to be reached across the country or across different time zones. Video conferencing uses a camera, microphone monitor, loudspeakers and an Internet connection. This equipment allows you to see, listen and speak with one another; you can also communicate without leaving home offices.

**Telephone conferencing**

Telephone conferencing allows you to plug one party into another party. Organizations and businesses utilize telephone conferences when they have audio portions for participants to listen to. Phone conferences function as listen-only sessions or allow listeners to participate. Participants are connected into a telephone conference by being phoned; they also have the option of calling into the conference with a code or special number to bridge the call. At times, telephone and video conferencing may be combined when cameras and microphones are not available.

**Digital networks**

Modern telephone systems use digital networks that don't rely on physical line connectivity between two callers. Instead, they use fiber optics to carry and transmit the digital connection, and can handle thousands of calls simultaneously. Along with this development, the Asymmetric Digital Subscriber Line (ADSL) network was established. ADSL provides faster Internet connectivity, and allows use of the phone and Internet at the same time.

**Packet Switch Network**

The latest development in communication is a cheaper and faster network using packet switching. This is called Voice Over Internet Protocol (VOIP). Instead of cable or fiber optics, it uses "packets," or small bits of data transmitted on the Internet. Around the same time, Wireless Fidelity, or WiFi, networks were established. WiFi describes an Internet connection setup that allows handheld users to connect quickly using radio signals, and to move comfortably without using any cable wires. Wireless Application Protocol (WAP), likewise, is a current technology that enables access for handheld devices programmed with advance networking hardware and software.

**Personal Digital Assistant**

A personal digital assistant (PDA) is a handheld computer device designed for users who need small but flexible electronic utilities. It is often called a "personal diary" because it allows fast organization and manipulation of information for a reasonably limited storage size.

## 2.6 Social media

The Merriam-Webster online dictionary defines social media as “forms of electronic communication (as Web sites for social networking and micro blogging) through which users create online communities to share information, ideas, personal messages, and other content (as videos)”. According to Kietzmann (2011), social media refers to interaction among people in which they create, share, and/or exchange information and ideas in virtual communities and networks. He goes on to say social media depend on mobile and web-based technologies to create highly interactive platforms through which individuals and communities share, co-create, discuss, and modify user-generated content. They introduce substantial and pervasive changes to communication between organizations, communities, and individuals. “Social Media is a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content“(Kaplan 2010)

Government agencies regularly may rely on social media to engage with their customers for improved citizen services and cost savings. Social Media integrates technology, social interaction, and content creation to collaboratively connect online information. Through social media, people or groups can create, organize, edit, comment on, combine, and share content, in the process helping agencies better achieve their mission goals.

Various authors including Kietzmann (2011), Ahlqvist, (2008), Morgan (2012) and Eugene (2008) discuss the following most commonly-used types of social media in government:

**Blogs:** A blog is an easy-to-update website or webpage where authors write regular entries in a diary-like format. The most effective and interesting blogs allow readers to engage in conversations with the author and other readers. Blogs can provide great benefits, but they can require a large investment in time. A blog can help an agency to:

- Engage with and serve customers
- Put a human face on the work you do
- Explain the agency’s mission, policies, and goals



- Promote discussion
- Spot trends early and head off potential problems
- Gather feedback and ideas

**Social networks:** Social networking sites are platforms that connect people and allow them to engage. The most popular sites, such as Facebook and MySpace, also have groups and listing features, which allow targeted organization of dialogue and sharing. Members can share comments, links, photos, videos, and more. A professional networking site, LinkedIn, offers sections for jobs, recommendations, and questions. Social networking sites make it easy for members to connect with others who have similar interests or affiliations, and establish contact networks. Many tools such as photo-sharing (e.g., Instagram) or location-based services (e.g., FourSquare) now incorporate social networking features. Social networking sites can help an agency promote government information and services. Many government agencies now use tools like Facebook to bring people together around their agency's work and information. Social networks expand the government's outreach capabilities and improve our ability to interact with and serve the public.

**Instagram:** This is a free online photo-sharing, video-sharing, and social networking service that allows its users to take pictures and videos, apply digital filters to them, and share them on a variety of social networking services, such as Facebook, Twitter, Tumblr, and Flickr.

**Microblogs:** As its name suggests, microblogging is writing extremely short blog posts, kind of like text messages. Twitter is currently the most popular microblog service and lets users post entries up to 140 characters long. Users can read these messages online or have them sent as a text message to a cell phone or other mobile device. The popular social networking websites Facebook, MySpace, and LinkedIn also have a microblogging feature, called "status update." The best use for microblogging is to engage a community in a public forum. Some sites even let you reply to posts, and automatically bring replies to your posts to your attention. For example, on Twitter, you can reply to a post by typing the @ symbol followed immediately by the user name, a space, and then the message.

**Wikis:** A wiki is a type of collaborative work space, it's a collection of Web pages that encourages users to contribute or modify the content. A simple Web interface can help a community collaboratively develop a document or web page, from anywhere. Wikis can be public facing, meaning that anyone can see the content, or only open to a defined community within or across organizations. Wikipedia is one of the most well-known public wikis.

**Podcasts:** Podcasting is a way of publishing MP3 audio files on the Web so they can be downloaded onto computers or portable listening devices, such as iPods or other MP3 players. Podcasting allows users to subscribe to a feed of new audio files using "podcatching" software (a type of aggregator), which periodically checks for and downloads new audio files automatically. Any digital audio player or computer with audio-playing software can play podcasts. Users can also download podcasts to their desktop computer. The benefit of podcasts is that users can listen to them whenever they want.

**RSS feeds:** RSS stands for Really Simple Syndication (among other things). It is a Web content format which, when used with an RSS aggregator, can allow you to alert users to new or exciting content on your website. These news feeds enable users to avoid the conventional methods of browsing or searching for information on websites. Now the content they want is delivered directly to them. RSS feeds are commonly used on weblogs (blogs), news web sites and other places with frequently updated content. Once users subscribe to an RSS feed, they can gather material from Web sites of their choosing. It's a very convenient format because it allows users to view all the new content from multiple sources in one location on their desktop.

Social media are distinct from industrial or traditional media such as newspapers, television, and film as they are comparatively inexpensive and accessible. They enable anyone (even private individuals) to publish or access information. Industrial media generally require significant resources to publish information as in most cases the articles goes through many revisions before being published. Morgan (2012) highlights some of the properties that help describe the differences between social and industrial media are:

1. **Quality:** In industrial (traditional) publishing—mediated by a publisher—the typical range of quality is substantially narrower than in niche, unmediated markets. The main challenge posed by content in social media sites is the fact that the distribution of quality has high variance: from very high-quality items to low-quality, sometimes abusive content.
2. **Reach:** Both industrial and social media technologies provide scale and are capable of reaching a global audience. Industrial media, however, typically use a centralized framework for organization, production, and dissemination, whereas social media are by their very nature more decentralized, less hierarchical, and distinguished by multiple points of production and utility.
3. **Frequency:** The number of times an advertisement is displayed on social media platforms.
4. **Accessibility:** The means of production for industrial media are typically government and/or corporate (privately owned); social media tools are generally available to the public at little or no cost.
5. **Usability:** Industrial media production typically requires specialized skills and training. Conversely, most social media production requires only modest reinterpretation of existing skills; in theory, anyone with access can operate the means of social media production.
6. **Immediacy:** The time lag between communications produced by industrial media can be long (days, weeks, or even months) compared to social media (which can be capable of virtually instantaneous responses).
7. **Permanence:** Industrial media, once created, cannot be altered (once a magazine article is printed and distributed, changes cannot be made to that same article) whereas social media can be altered almost instantaneously by comments or editing.

## **2.7 User studies**

However we define it, and from whatever year we choose to date it, information science has been concerned with the information user (Wilson 2000). If we know more about the people that our information institutions serve, it is much more likely

that we can serve them effectively. That is basically what user studies are about. User studies are the precursor of research on information seeking behavior.

User studies are one of the most researched areas in library and information science. Earlier user studies were mainly related to scientists involved with biochemistry, medicine, engineering, physics etc. Siatri (1999) says that the high concentration of user studies in these sciences can be partially attributed to the fact that the publication of professional and scientific information in these disciplines was much more developed at the time in comparison with the humanities. This resulted in the earlier development of information handling tools like abstracts, and indexes. Naturally the information providers wanted to acquire as much information as possible on reading and searching habits of their users as well as their preferences and channels of communication among them. Such projects were concerned with the flow of information and the role of informal and/or formal communication channels in scientific communities.

But it was not until the early 1980s when the environment in which information was used was considered and a distinction was made between the cognitive and social aspects of information (Odini 1993). He argues that “early studies were generally exploratory in that the desired result was a description in general terms of the information gathering habits and needs, quantified as far as possible, of the users studied. They thus had shallow and poor conceptualization with poor theories and methodologies”. Since then, researchers have carried out user studies in different fields in various parts of the world. The studies aim at helping to design better information system, which would quickly and efficiently meet the needs of their users.

Various authors including Wendell (1998) and Sheila (2005) are in agreement that to create a successful library and information service – irrespective of size – the following steps should be put in consideration:

- Outlining the reasons for setting up a library and information service
- Carrying out the information audit
- Establishing the library: premises, design and technical requirements

- Staffing: recruitment and management
- Managing budgets and finance
- Networking and locating sources of information
- Acquisition, organization and dissemination: print and electronic
- Determining services to be provided by the library
- Sources of support for the library inside and outside the organization
- Promotion of the library
- Training staff and users.

Odini (1993) while writing about setting up an industrial information service highlights the following important milestones: Identifying potential users; Assessing the information needs of potential users; Setting goals and objectives in relation to the needs; Developing and evaluating strategies for achieving aims and objectives; Identifying and collecting the information and facilities required; Information storage and retrieval; and Dissemination of information and publications.

The authors above are in agreement and only differ in terminology. For example where Wendell (1998) talks of carrying out the information audit, Odini (1993) refers to assessing the information needs of potential users which is actually inherent in information audit. Another example is where Odini (1993) talks of developing and evaluating strategies for achieving aims and objectives and Wendell (1998) on the other hand gets specific with the strategies including staffing, managing budgets and finance and networking and locating sources of information.

The commonality among the authors above is the need to know the users and by extension the organization within which they operate. Odini (1993) is very candid about this. He says that “No information service which aims to provide an effective service can afford to neglect research into the needs of its potential users. The purpose of the information needs analysis is to establish the main areas in which information will be sought and to set up an appropriate collection of resources to satisfy those needs”.

The author identifies the following groups off potential users:

1. Technically qualified users on technical assignments. This group includes engineers and scientists, and is likely to be the most important group as far as the information service is concerned.
2. Technically qualified persons on non-technical assignments. This group includes management and marketing staff.
3. Non-technically qualified persons on technical assignments.
4. Persons who themselves are information sources for others in the industry.
5. Persons outside the company to whom information will be provided. These may range from important customers to industry lobby groups to whom information may be provided either for reasons of commercial interest or public relations.
6. Routine job workers. This group includes the non-technical non-graduates in the routine entry level positions.

The potential user groups can map well over the staff in a government ministry. For example technically qualified users are those based in the departments that implement the core functions of a ministry. In the ministry of Education, Science and Technology such departments include quality assurance, technical accreditation, basic education, secondary education and higher education. Technically qualified persons on non-technical assignments in the ministry include planning officers, accountants and administrators. Non-technically qualified persons on technical assignments may include the support staff in the technical departments such as secretaries. Persons who themselves are information sources for others in the industry may include ministry staff at the level of directors and above. This cadre of staff can authoritatively issue statements on behalf of their departments or even the ministry. Persons outside the ministry to whom information will be provided include all other ministry stakeholders such as parents, curriculum developers, examination bodies, trainers, students and development partners. Routine job workers are such staff as cleaners, clerks and drivers.

The same view is stated by Wilson (2000) thus “Until recently the computer science and information systems communities have equated ‘information requirements’ of users with the way users behave in relation to the systems available. In other words, investigations into information requirements were concerned almost entirely with how

a user navigated a given system and what he or she could do with the data (rather than information) made available by information systems". He goes on to say that this is now beginning to change as ethnographic methods are introduced into the requirements definition stage of systems design. However, even when such methods are employed, the designers appear to be asking, "How is this person using the system?" rather than seeking to determine what the individual's (or the organization's) information needs may be and how information seeking behavior relates to other task oriented behavior.

According to an analysis done by Wilson (2000), the contexts that appear to be appropriate for 'user studies' and within which investigations have been carried out include:

- the user as *communicator*, drawing upon personal or organizational information resources in communicating with organizational colleagues or fellows in society; the research literature in these areas is to be found in social psychology and in communication studies generally
- the user as *information-seeker*; 'communicator' covers virtually all other contexts, but within communication, information-seeking may be identified as a separate task and one which involves not only inter-personal communication, but also:
- the use of *formal information systems*, defined widely, as any device, product or system intended for information representation, storage, conservation, retrieval, or re-packaging. That is, for example, any library, information service, abstracting journal, primary journal, on-line bibliographic data base, organizational record file, etc. User studies in the past have often been studies of the interaction of people with systems or enquiries into the use of systems in general rather than the study of underlying needs;
- the user as a *recipient* of information services: not all information systems/services are passive, some take their products to the user: SDI and current awareness bulletins are the most common examples in information science but radio or TV news bulletins can be looked at in the same way. The typical mode of research in this area is evaluation, principally of automated

SDI services, which seeks to establish some kind of index of 'success' for the service;

- the user as a *user* of information: paradoxically, user studies has been concerned with almost everything apart from the use to which information is put by the recipient or information seeker. The reason for this seems to be a desire to draw policy conclusions (either for a single information agency or more generally) from data on aggregated behaviour rather than a desire to understand the user.

(Wilson's paper available at <http://informationr.net/ir/5-3/paper76.html>). The various contexts for 'user studies' when considered in totality form the basis for information seeking behavior considered hereafter.

Nicholas (1996) says that information systems are still largely free from user evaluation and are rarely challenged with user needs data. Rarely is high quality data routinely fed into the design, evaluation and running of information systems. He wonders "why this should be the case when there is no doubt that libraries, librarians and information services and databases are there solely to serve the needs of their users". The author considered several impeding factors:

1. there are still many (quite eminent) information professionals who believe it is not necessary to consult the user on what they consider to be professional matters
2. information professionals tend to be occupied with information systems to the detriment of the user
3. the profession is plagued by insular attitudes and poor communication skills, something that does not lead to a close relationship with the user
4. the expenditure of resources involved in the obtaining of the needs data is not thought to be justified in these hard budgetary times
5. there is no universally agreed framework for assessing information needs
6. it is by no means easy getting hold of the necessary data.



Regardless of the impeding factors above, it is worthwhile to consider what Kibwarata (2002) says in her thesis – that “most users judge information systems as unsatisfactory perhaps because they were dissatisfied once. This could be due to the fact that most information providers are reactive rather than proactive to the needs of their users. They overlook the fact that information needs of their users are highly personal and varied and that some users are not aware of their own needs or of the existence of some information that could be of help. They need to be pointed to the unknown or unthought-of information materials that will help them. The purpose of the information analysis should be to establish the main areas in which information will be sought and set up an appropriate collection or resources to satisfy these needs”. Indeed this is the view held by Ojiambo (1993) when he writes that “knowledge of users of users’ information needs is a major prerequisite for establishing an information service capable of meeting the information requirements of users”. The situation in Kenya was captured well by Odi (1995) who states that “the prevailing information systems in Kenya had been designed without proper analysis of the needs of the users. The approach in user studies has been piece-meal and fragmented and as a result there is neither a clear picture of information needs in the country nor a complete systematic understanding of the communication process for any group of users”.

## **2.8 Information seeking behaviour**

Information seeking behaviour refers to the way people search for and utilize information. The work place in any sector of the economy is highly dependent on availability of good quality information. Wilson (2000) described information behaviour as the totality of human behaviour in relation to sources and channels of information, including both active and passive information-seeking, and information use. He described information seeking behaviour as “purposive seeking of information as a consequence of a need to satisfy some goal. Information seeking behaviour is the micro-level of behaviour employed by the searcher in interacting with information systems of all kinds, be it between the seeker and the system, or the pure method of creating and following up on a search”.

Information seeking behavior involves personal reasons for seeking information, the kinds of information which are being sought, and the ways and sources with which

needed information is being sought (Leckie 1996). This definition ranks lower to that of Wilson by its use of the phrase “personal reasons”. In a work place like in a government ministry, the reasons for seeking information may not always be personal. Most of the time, information is sought because it is work related. However, the author makes very interesting conclusion about the information seeking behavior of engineers. He says that the information seeking behavior of engineers is the result of a complex interplay of variables from job function, work environment, qualifications, discipline, career stage, accessibility of information, its ease of use and technical quality. These are useful parameters which can be applied even to this study.

Sadaf (2011) argues that there is a universal assumption that man was born innocent or ignorant and should actively seek knowledge. The author in his paper on ‘Information Seeking Behaviour of B.Tech. and M.B.B.S. Students in Lucknow: A Comparative Study’ quotes Marchionini, (1995) thus: "Information seeking is thus a natural and necessary mechanism of human existence". Information seeking behavior is the purposive seeking for information as a consequence of a need to satisfy some goal. In the course of seeking, the individual may interact with manual information systems (such as a newspaper or a library), or with computer-based systems such as the Web.

Wilson (1997) makes it clearer by explaining that Information seeking behavior results from the recognition of some needs, perceived by the user, who as a consequence makes demands upon formal systems such as libraries, information centers, on-line services or some other person in order to satisfy the perceived need. In a government ministry, the need could be tasks assigned or envisioned new development which results in a knowledge gap that must be filled for proper discharge of duty.

Rouse (1994) argues that “in general, human information seeking is affected by such factors as payoffs and costs, resources available, expected value, update rates, amount of information available, diagnosticity of data, distributional characteristics of data and conflicts among sources. Information seekers will not go for high cost information despite its high diagnosticity and tend to over and under-sample information sources. They select information sources that are highly related to the

type of questions being asked so that the way the question is framed affects the choice of sources. Information needs vary in quality with the stage of problem solving. Problem solving proceeds as the rate at which information is sought decreases. People seek information to solve problems, to allocate resources and to make informed decisions. Information seeking is thus not an end in itself but a means to an end”.

## **2.9 Information seeking behaviour models**

Researchers have come up with a number of information seeking behavior models to explain this complex phenomenon. One of them is Marchionini (1989) who says that “Information-seeking is a special case of problem solving. It includes recognizing and interpreting the information problem, establishing a plan of search, conducting the search, evaluating the results, and if necessary, iterating through the process again”. Marchionini and White (2008) outline the core actions within general information seeking process as follows;

- Recognizing a need for information,
- Accepting the challenge to take action to fulfill the need,
- Formulating the problem,
- Expressing the information need in a search system,
- Examination of the results,
- Reformulation of the problem and its expression, and
- Use of the results.

The above is what is referred to as the standard model of information seeking.

Some researchers have examined how the information seeking process develops over extended periods of time giving rise to what is referred to as the information seeking in stages model. Kuhlthau (1991) conducted studies that showed that, for complex information seeking tasks, searchers go through different stages, both in terms of their knowledge of and their attitude towards the task. To develop her model of the information seeking process, Kuhlthau conducted numerous field studies as well as focused case studies. The final field study was very large (compared to most such studies), involving 385 academic, public and school library users at 21 sites. Participants were primarily students in high school or college whose task was to write a term paper or research paper. In these studies, the information seeking task took

place over several months, and in most cases the students were assigned the topic rather than choosing it themselves.

Kuhlthau (1991) divides the process of information seeking into six stages:

- *Initiation:* The task is to recognize a need for information. Searches relate to general background knowledge. As the participant becomes aware of their lack of understanding, feelings of uncertainty and apprehension are common. Thoughts center on comprehending the task and relating the problem to prior experience.
- *Selection:* The task is to select the general topic or the approach to pursue. Thoughts are general and undifferentiated, and center on requirements, time constraints, and which topic or approach will yield the best outcome. Feelings of uncertainty often give way to optimism after the selection is made.
- *Exploration:* The task is to investigate information on the general topic in order to extend understanding. At this stage, an inability to express what information is needed degrades the participant's ability to formulate queries and judge relevance of retrieval results. Information encountered at this stage often conflicts with pre-existing knowledge and information from different sources can seem contradictory and incompatible. This phase is characterized by feelings of confusion, uncertainty, and doubt, and participants may feel discouraged or inadequate, or may feel frustrated with the information access system itself.
- *Formulation:* This phase marks the turning point in the process, in which a focused perspective on the topic emerges, resolving some of the conflicting information. Searches may be conducted to verify the working hypotheses. A change in feelings is experienced, with uncertainty reducing and confidence growing. Unfortunately, half of the study participants did not show evidence of successfully reaching a focused perspective at any time during their search process.
- *Collection:* At this stage the search system is most productively useful for the participant, since the task is to gather information related to a focused topic. Searches are used to find information to define, extend, and support the focus. Relevance judgments become more accurate and feelings of confidence continue to increase.
- *Presentation:* In this phase, the final searches are done; searches should be returning information that is either redundant with what has been seen before or of

diminishing relevance. The participants commonly experience feelings of relief, and satisfaction if the search went well, or disappointment if not.

It is worth noting that these stages characterize changes in searches over time for a deep and complex information need, and are not necessarily representative for more light-weight tasks. Note also that these studies reflect the experiences of students doing required, challenging tasks; it is likely that the feelings of apprehension reported might not be observed in other information-intensive task environments.

Ellis (1989) proposes and elaborates a general model of information seeking behaviors based on studies of the information seeking patterns of social scientists, research physicists and chemists, and engineers and research scientists in an industrial firm. Ellis model of information seeking behavior describes six categories of information seeking activities as generic: starting, chaining, browsing, differentiating, monitoring, and extracting.

- **Starting:** Comprises those activities that form the initial search for information -- identifying sources of interest that could serve as starting points of the search. Identified sources often include familiar sources that have been used before as well as less familiar sources that are expected to provide relevant information. The likelihood of a source being selected depends on the perceived accessibility of the source, as well as the perceived quality of the information from that source. Perceived accessibility, which is the amount of effort and time needed to make contact with and use a source, has been found to be a strong predictor of source use for many groups of information users. However, in situations when ambiguity is high and when information reliability is especially important, less accessible sources of perceived high quality may be consulted as well.
- **Chaining:** While searching the initial sources, these sources are likely to point to, suggest, or recommend additional sources or references. Following up on these new leads from an initial source is the activity of chaining. Chaining can be backward or forward. Backward chaining takes place when pointers or references from an initial source are followed, and is a well established routine of information seeking among scientists and researchers. In the reverse

direction, forward chaining identifies and follows up on other sources that refer to an initial source or document. Although it can be an effective way of broadening a search, forward chaining is much less commonly used, probably because people are unaware of it or because the required bibliographical tools are unavailable.

- **Browsing:** Having located sources and documents, browsing is the activity of semi-directed search in areas of potential search. The individual often simplifies browsing by looking through tables of contents, lists of titles, subject headings, names of organizations or persons, abstracts and summaries, and so on. Browsing takes place in many situations in which related information has been grouped together according to subject affinity, as when the user views displays at a conference or exhibition, or scans periodicals or books along the shelves of a bookshop or library.
- **Differentiating:** During differentiating, the individual filters and selects from among the sources scanned by noticing differences between the nature and quality of the information offered. For example, social scientists were found to prioritize sources and types of sources according to three main criteria: by substantive topic; by approach or perspective; and by level, quality, or type of treatment. The differentiation process is likely to depend on the individual's prior or initial experiences with the sources, word-of-mouth recommendations from personal contacts, or reviews in published sources. Ellis points out that for information to be relevant and consequential, it should address not only the subject matter of the problem but also the particular circumstances that affect the resolution of that problem. He identifies six categories of criteria by which individuals select and differentiate between sources: ease of use, noise reduction, quality, adaptability, time savings, and cost savings.
- **Monitoring** is the activity of keeping abreast of developments in an area by regularly following particular sources. The individual monitors by concentrating on a small number of what are perceived to be core sources. Core sources vary between professional groups, but usually include both key personal contacts and publications. For example, social scientists and physicists were found to track developments through core journals, online

search updates, newspapers, conferences, magazines, books, catalogues, and so on (Ellis 1993).

- **Extracting** is the activity of systematically working through a particular source or sources in order to identify material of interest. As a form of retrospective searching, extracting may be achieved by directly consulting the source, or by indirectly looking through bibliographies, indexes, or online databases. Retrospective searching tends to be labor intensive, and is more likely when there is a need for comprehensive or historical information on a topic.

Although the Ellis model is based on studies of academics and researchers, the categories of information seeking behaviors may be applicable to other groups of users as well.

In the diagrams for most of the models discussed so far, a sequential progression of information behaviour is depicted: the individual experiences an information need, goes out to seek information, finds it and thus solves the need. The simplicity of such a depiction is usually pointed out by authors. Wilson (1999) for example, says 'Feedback loops must exist within all models, since progression towards a goal is hardly ever unproblematic'. Dervin stated 'it is not intended to suggest that all situation-facing is linear or purposive' (Dervin 1992). Observation confirms that information seekers do not necessarily follow ideal, optimized routes. The authors argue that the order of information seeking tasks may be reversed or convoluted, and includes dead-ends, changes of direction, iteration, abandonment and beginning again.

## **2.10 Barriers to information seeking and provision**

In Wilson's (Wilson, 1981) model, three sets of "barriers" to information-seeking behaviour were shown, which were related to the dimensions of the situation in which the person finds himself or herself:

- personal barriers;
- social or role-related barriers; and
- environmental barriers.

Various authors are of the opinion that search for and provision of information may be restricted because of several reasons, including:

- **Time.** Managers may not have the time to search comprehensively for the needed information. The more decisions managers have to make, the less time they have to investigate each decision. Cameron (1994) found information exchange between patients and doctors was inhibited by the lack of time available, the stress of the situation and the use of unfamiliar terminology. Hannay (1992) found that a typical consultation with a doctor lasted between 12 and 15 minutes, during which time any examination, diagnosis and explanation of treatment necessary had to be made, which left little or no time for the doctor to act as a source of other forms of health information.
- **Decision making characteristics.** Rogers (1983) suggests that, “individuals generally tend to expose themselves to ideas that are in accordance with their interests, needs or existing attitudes. We consciously or unconsciously avoid messages that are in conflict with our predispositions”. Employees often use less than optimal decision making procedures. Instead of having a comprehensive list of alternatives they rely on a short list. Instead of postponing decisions until all information is collected, they decide as they go; often breaking the search process before necessary information is collected.
- **Structural barriers.** Organizations restrict access to some information. Only specific groups within the organization have access to these information. This is often done for security purposes. Sometimes it is done to enable work units to focus their attention on single tasks and allow other units to address other tasks. Sometimes this is done in order to make some decisions more consistent with organization priorities. When organization decentralize decision making and remove structural barriers to information, workers have more latitude in decision making and may follow various decision making procedures. One purpose of restricting access to information is to make sure that the organization applies consistent criteria to similar decisions. In examining the behaviour of scientists in acquiring information relevant to research and development, Sheen (1992) notes that: “...some technologists effectively manage to draw a boundary round their expertise in order to protect



their position and status within a firm: external information sources are utilized but then internalized and used to develop a personal power base”.

- Cultural factors. In innovation research, the "...established behavior patterns for the members of a social system" (Rogers, 1983) may also act as a barrier to change and, hence, as a barrier to information-seeking leading to change. Cultural factors draw the line between curiosity and intrusiveness. These factors restrict information seeking by making some topics taboo or requiring the person to follow particular rituals for getting certain information. Both the society and the organization affect the culture and milieu in which employees seek information. Organization cultures that value formal communications, that encourage group consensus, and that enforce hierarchical ranks are more likely to restrict information search and innovation on the part of their employees.
- Organization policies and rules. Certain organization policies and rules may restrict information seeking behavior. For example, policies on privacy of employees restrict access to information on use of employee assistance programs.
- Individual impediments. Employees may prefer to remain ignorant about some issues in order to not to have to choose sides on some issues. Employees may not have the cognitive ability to process large amount of information. Sorrentino (1990) suggest that: "...many people are simply not interested in finding out information about themselves or the world, do not conduct causal searches...and do not give a hoot for resolving discrepancies or inconsistencies about the self”.
- Technical issues in search procedures. Employees may not be aware of sources of information or procedures for access to these sources.
- Cost of search. Both the dollar cost of search as well as the cost of thinking (tolerance of uncertainty until some future time) may restrict search for information. A fundamental requirement for information-seeking is that some source of information should be accessible. The lack of an easily accessible source may inhibit information-seeking altogether, or may impose higher costs than the enquirer is prepared to pay.

It is important to keep cognisance of the barriers so that they can be overcome during information seeking and provision. Paisley(1969) on the other hand has identified a number of external and internal factors affecting the information seeking behaviour of a user: “The full array of information sources that are available; The uses to which information will be put; The background, motivation, professional orientation, and other individual characteristics of the user; The social, political, economic and other systems that powerfully affect the user and his work; and the consequences of information use – e.g., productivity”.

## 2.11 Communication

Communication is the sharing of information for a variety of purposes including informing, persuading, motivating or influencing. The term communication is derived from the latin verb *communicare* which means “to talk together, confer, discourse and consult one with another”. The essence of communication is to share information. Prasher (1991) puts it more clearly by saying that “information does not or should not exist for its own sake, it is for use. To ensure its maximum use, it is to be communicated and shared. Its free flow is to be ensured. In this context, communication is an essential attribute of information” (<http://www.expressyourselftosuccess.com>).

Adair (2004) highlights the following pertinent issues in communication which emphasize its importance in any organization:

- You must be in social contact with the other person or people
- You must want to communicate
- It is better to risk familiarity than be condemned to remoteness
- The best way to empower others is to impart information (along with the delegated authority to make decisions and act on the information given)
- Get out of your office – meet, listen, provide information and give people the context in which they operate – to communicate and encourage
- Good communication is the core of customer care
- Remember customers (and suppliers) communicate with others about you
- To communicate with your customers you must handle complaints (as an organisation) as personally as possible – by a meeting or phone call in

preference to letter or fax; you must listen to what customers suggest and communicate product/service changes/ developments with them in advance

- Presentation skills are important in communicating with colleagues as well as customers/clients
- Meetings, internal and external are key indicators of a person's communication (including listening) skills
- Communication is a business requirement: establish proper systems and ensure all use them
- Remember the equation: size + geographical distance = communication problems
- Communicate with poor performers to improve their contribution and in appraisals be truthful, helpful and tactful
- Help others to improve their communication skills
- Assess your own communication skills and strive to improve them bit by bit. (Also, assess the communication skills of colleagues and identify areas for improvement).

## **2.12 Communication in Government**

Providing citizens with information on priorities, programmes and activities is a vital government function which underpins state-society relations (CommGAP, 2009). The CommGAP report further says that governments in the developed world are acutely aware of the need to communicate effectively both to influence public opinion and maintain their legitimacy, and often construct elaborate structures of press offices, and information ministries to perform the communication function. But in many developing countries, governments lack communication capacity, and the development of the communication function is hampered by a combination of weak incentives (e.g. no culture of disclosure), lack of professional training and communication infrastructure, and lack of supportive legal framework (e.g. access to information laws). Kenya is ahead of many developing countries because of Article 35 of the Constitution which guarantees citizens access to public information. Institutional culture often plays an important role in shaping a government's approach to communication, but changing institutional culture takes time.

Adair (2004) argues that “organisations have a degree of permanence, hierarchy and formal communication. There are two general ways of delivering information: formal and informal communication channels. Informal communication supplements the formal communication that is needed in organizations”. The author considers the internal function of communication in an organization by saying that the content of communication in organisations should be (in relation to): The task (the purpose, aims and objectives, plans, progress and prospects); The team (changes in structure and deployment, ways to improve team work, ethos and values) and The individual (pay and conditions, safety, health, welfare, education and training). He goes on to say that the direction of flows of communication within an organization must be downward, upward and sideways. Decisions on what to communicate should bear in mind the must-know priorities and distinguish them from the should-know or could-know lower priorities. The best method for must-know items is face-to-face backed by the written word. Two-way communication should be used and encouraged to: Communicate plans/ changes/ progress/prospects; Give employees the opportunity to change/improve management decisions (before they are made); Use the experience and ideas of employees to the full; and understand the other side’s point of view.

### **2.12.1 Formal communication**

Formal communication is organized and managed information that is shared with relevant individuals in order to secure coordinated action throughout the organization. Formal communication channels are based on an individual’s role in the organization and distributed in an organized way according to the established chain in organizational charts (Wilhem 2011).

Typically, formal communication flows “downward” from executives to directors to managers to staff regarding company direction and instruction and “upward” from staff to managers to directors to executives in the form of data and reports. The communication flowing through these channels is specific to the jobs and departments.

Such formal communication is well established and planned. For example, reports and data from staff are organized and generally submitted in prescribed templates and according to a set schedule. Communication focused on a company’s strategy and

direction, which originates from company executives, is funnelled through the organizational chart and changed in such a way to be relevant to each department and manager. What starts out as “high-level” communication on corporate strategy needs to be thought out through planning sessions so that the communication provides direction and is actionable for the individuals who implement the tasks of the strategy. The better the communication the better employees and staff will understand what is expected and required of them.

### **2.12.2 Informal communication**

On the other hand, informal communication in the workplace satisfies a variety of needs, particularly social and emotional, and are not based on the positions individuals occupy within the organizations. As a result, the communication is not managed or planned in any organized fashion. It’s more relaxed, casual and tends to be spread by word-of-mouth quickly throughout a department or organization because it’s not restricted to approvals and an established path of distribution (Prasher 1991).

Probably the most common term used for the informal communication in the workplace is “grapevine” and this communication that is sent through the organizational grapevine is often considered gossip or rumour. While grapevine communication can spread information quickly and can easily cross established organizational boundaries, the information it carries can be changed through the deletion or exaggeration of crucial details thus making the information inaccurate – even if it’s based on truth.

The use of the organizational grapevine as an informal communication channel often results when employees feel threatened, vulnerable, or when the organization is experiencing change and when communication from management is restricted and not forthcoming. When used with thought and planning, however, there are several advantages of grapevine communication. It can spread information quickly throughout an organization, serve a social purpose, reduce stress and anxiety and can be used to identify problems or lack of satisfaction in the workplace.

While the organizational grapevine can never be eliminated, even if there are several advantages of grapevine communication, it can be reduced by removing the need for

information. Managing the grapevine can be partly achieved by providing information through good, effective communication such as: supplying sufficient information through the formal communication channel about the concerns that are of importance to employees and staff; present as much factual information as possible as soon as it is obtained; keep information coming on a regular basis especially during times of change when the employees are stressed and wondering what's going on. Daily communication with them will reduce the pressure of uncertainty; open the lines of the formal communication channels to receive feedback and concerns. Respond to these as quickly as possible. If concerns are submitted from staff and no response is given by management, rumours through grapevine communication will begin to fill in the communication gap which was created by management.

Formal and informal communication channels exist in every organization. Formal communication requires thought and planning prior to distribution; informal communication, however, usually succeeds on its own mostly because of the very effective grapevine. While there are several advantages of grapevine communication, managing the grapevine also requires thought and planning. Even so, it's very difficult to formalize informal communication, therefore, the best way to cut the grapevine is to provide accurate, respectful and timely formal communication.

The former Ministry of Higher Education, Science and Technology had provision for both internal and external communication in its ISO procedure manuals. According to the manuals, the following means constitute the official internal communication means: Memos/ Circulars; Notices; Intercom; Meetings; Letters and Emails. On the other hand, the following constitute the official external communication means: Email; Fax; Telephone; Letters or Circulars and Meetings. In both cases there is no provision for social media which is still quite challenging to use for official communication.

A Food and Agriculture Organisation (FAO) (2007) report on Communication and Governance says that on a practical level, communication can be seen as essential to the development of state capability, accountability and responsiveness in the following ways:

- *Capability*: Consultation and dialogue between state and citizens can in principle improve public understanding of and support for government policies and encourage citizen ownership of reform. Without the support of the public, governments often lack the capability to get things done.
- *Accountability*: Access to information and government transparency are in theory vital for enabling citizens to monitor and hold government to account for its actions. There is significant evidence that transparency can reduce opportunities for corruption.
- *Responsiveness*: An informed and politically active electorate in theory strengthens the demand for governments to be accountable. There are several examples where communication processes (e.g. debate through the media, public information campaigns and social accountability mechanisms) have encouraged government responsiveness to citizens' demands and resulted in better public services.

Kenya is the first developing country to have an open government data portal, the first in sub-Saharan Africa and second on the continent after Morocco. The initiative has been widely acclaimed globally as one of the most significant steps Kenya has made to improve governance and implement the new Constitution's provisions on access to information. As of November 2011, there were close to 390 datasets that have been uploaded to the site, with a plan currently in place to upload more data over the next year. There have been over 17,000 page views and over 2,500 dataset downloaded and embedded to various websites and portals. There are now over a hundred requests from the public for new datasets, and there is a clear demand for more data to be made available. (<https://opendata.go.ke>). Kenya's information is a national asset, and this site is about sharing it. The goal of [opendata.go.ke](https://opendata.go.ke) is to make core government development, demographic, statistical and expenditure data available in a useful digital format for researchers, policymakers, ICT developers and the general public.

In an interesting turn of events, some government agencies have embraced social media. The Standard newspaper on 17<sup>th</sup> September, 2012 reported that government ministries were embracing social media as they seek to interact with the public and easily disseminate information. According to the report, "the institutions are running social media pages, mainly on *Facebook* and *Twitter*, as they try to catch up with

private organisations, which actively use the platforms to reach their publics. Now, from the comfort of their homes or offices, Kenyans can seek information, post complaints about poor service and comments on various programmes carried out by various ministries and departments”. Top on the list of government institutions that have embraced social media is Central Bank of Kenya (CBK), Ministry of State for Planning, National Development and Vision 2030, Ministry of Public Works and Ministry of Wildlife.

However, a look at social media pages of various institutions indicated that they have fewer followers on social media compared with private organisations or individuals who have thousands. For example CBK had 130 likes, Ministry of Planning 118 likes and Ministry of Wildlife 98 likes. The minimal following of state agencies on social networks is attributed to the attitude that government ministries are not early adopters of new forms of technology. The former Ministry of Higher Education Science and Technology is on *Facebook* with 54 likes but has not posted anything on the page and does not respond to issues raised on the platform. In fact a follower on April 2<sup>nd</sup> 2012 simply posed, “Hi. Be active”.

### **2.13 Chapter summary**

The topic “ Information communication technologies” is not short of literature. Many authors have written extensively about various aspects of ICT. Niedzwiedzka’s Information Behaviour Model and Rogers’ Theory of Diffusion of Innovations have been discussed in the context of the research. Considering newspaper articles, the literature is as recent as last week. A lot has been written on information as a resource, evolution of ICT, use of ICTs in provision of information, information seeking behaviour, barriers to information seeking and communication in government.

However, not much has been written about standards of government information systems and the use of ICT in provision of information in government. This leaves a gap that can be filled through such research.



## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter deals with the logistics of the research. It presents the research design, target population, sampling, data collection and analysis techniques. It also explains the pre-test of the interview schedule as well as ethical considerations. The research was basically a case study drawing its population from the staff of the ministry of Education, Science and Technology in Kenya.

#### **3.2 Research design**

The research was qualitative in nature and adopted descriptive research design using a case study approach. Kothari (2004) says that the objective of descriptive research is to answer the "who, what, when, where and how" of the subject under study. The author goes further to say that the case study is a form of qualitative descriptive research which looks intensely at an individual or small participant pool, drawing conclusions only about that participant or group and only in that specific context.

Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them. (Denzin & Lincoln, 2005)

According to Creswell (2007) qualitative researchers tend to collect data in the field at the site where participants' experience the issue or problem under study. They do not bring individuals into a lab (a contrived situation), nor do they typically send out instruments for individuals to complete. This up-close information gathered by actually talking directly to people and seeing them behave and act within their context is a major characteristic of qualitative research. In the natural setting, the researchers have face-to-face interaction over time.

Case study can be viewed as a methodology, a type of design in qualitative research, or an object of study, as well as a product of the inquiry. Case study research is a qualitative approach in which the investigator explores a bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information (e.g., observations, interviews, audiovisual material, and documents and reports), and reports a case description and case-based themes (Creswell 2007).

Creswell (2003) highlights four worldviews that inform qualitative research - post positivism, constructivism, advocacy/participatory, and pragmatism. The author says that individuals holding the pragmatism worldview focus on the outcomes of the research-the actions, situations, and consequences of inquiry-rather than antecedent conditions. Thus, instead of a focus on methods, the important aspect of research is the problem being studied and the questions asked about this problem. He gives the following attributes of pragmatism:

- Pragmatism is not committed to anyone system of philosophy and reality. .. Individual researchers have a freedom of choice. They are "free" to choose the methods, techniques, and procedures of research that best meet their needs and purposes.
- Pragmatists do not see the world as an absolute unity. In a similar way, mixed methods researchers look to any approaches to collecting and analyzing data rather than subscribing to only one way (e.g., quantitative or qualitative).
- Truth is what works at the time; it is not based in a dualism between reality independent of the mind or within the mind.
- Pragmatist researchers look to the "what" and "how" to research based on its intended consequences-where they want to go with it.

In practice, the individual using this worldview will use multiple methods of data collection to best answer the research question, will employ both quantitative and qualitative sources of data collection, will focus on the practical implications of the research, and will emphasize the importance of conducting research that best addresses the research problem. Creswell's argument informs the choice of dualism – mainly qualitative but with aspects of quantitative techniques in the analysis of data for this research.

The Government of Kenya has eighteen (18) ministries established via Executive Order No. 1- Structure of the National Executive, 2013. The ministries include: Interior and coordination of national government; Devolution and planning; Foreign affairs; Defense; Education, Science and Technology; The National treasury; Health; Transport and infrastructure; Environment, water and natural resources; Land, housing and urban development; Information, communication and technology; Sports, culture and the arts; Labor, social security and services; Energy and petroleum; Agriculture, livestock and fisheries; Industrialization and enterprise development; East African affairs, commerce and tourism; and Mining. Therefore, the ministry of Education, Science and Technology being one of the 18 ministries was the case under study in this research. The staff of the ministry formed the participant pool in the research.

### 3.3 Target population

The target population of the study was 870 comprising the staff of nine departments at the Ministry of Education, Science and Technology. The population was segmented based on department as shown in the following table;

*Table 2: Showing the target population*

No	Department	Number of staff	Percentage
1	Administration	380	43.7
2	Directorate of Technical Accreditation and Quality Assurance	53	6.1
3	Directorate of Quality Assurance and Standards	90	10.3
4	Directorate of Technical Education	42	4.8
5	Directorate of Higher Education	30	3.5
6	Directorate of Research Management and Development	38	4.4
7	Directorate of Basic Education	120	13.8
8	Directorate of Adult Education	85	9.7
9	Central Planning and Project Management Unit	32	3.7
	<b>Total</b>	<b>870</b>	<b>100</b>

It is worth noting that the population included employees of the State Departments of Education and Science and Technology based at the ministry headquarters in Nairobi. Common departments in the two State Departments namely Administration and Central Planning and Project Management Unit were combined in the tabulation above. The percentages in the last column depict the staff in a department as a proportion of the total staff in the ministry.

### 3.4 Sampling

Krejcie and Morgan (1970) developed a chart that has been widely used to come up with samples that represent entire populations. The chart is summarised below;

(Random Sample Sizes (n) Required for Population (N) Representation)

Population Size (N) ----- Sample Size (n)

50 ----- 44

100 ----- 80

500 ----- 217

1,000 ----- 278

1,500 ----- 306

3,000 ----- 341

5,000 ----- 357

10,000 ----- 375

50,000 ----- 381

100,000 ----- 384

**Source:** Krejcie, R.V. & Morgan, D.W. (1970) *Determining sample size for research activities. Educational and Psychological Measurements*, 30, 607-610.

Therefore for a population of 870, the sample size would be 278 according to the table above. However, foreseeable constraints especially budget and to ensure practicality, the researcher was forced to use an inadequate sample size of 90 being 10% of the population. The sample having been picked from all the departments was considered adequately representative.

The sample size is within the range provided by Bartlett, Kotrlik, & Higgins (2001) who developed a table presenting sample size values appropriate for many common sampling problems.

**Table 3: Table for Determining Minimum Returned Sample Size for a Given Population Size for Continuous and Categorical Data**

Population size	Sample size					
	Continuous data (margin of error = .03)			Categorical data (margin of error = .05)		
	alpha = .10 $\underline{t} = 1.65$	alpha = .05 $\underline{t} = 1.96$	alpha = .01 $\underline{t} = 2.58$	p = .50 $\underline{t} = 1.65$	p = .50 $\underline{t} = 1.96$	p = .50 $\underline{t} = 2.58$
100	46	55	68	74	80	87
200	59	75	102	116	132	154
300	65	85	123	143	169	207
400	69	92	137	162	196	250
500	72	96	147	176	218	286
600	73	100	155	187	235	316
700	75	102	161	196	249	341
800	76	104	166	203	260	363
900	76	105	170	209	270	382
1,000	77	106	173	213	278	399
1,500	79	110	183	230	306	461
2,000	83	112	189	239	323	499
4,000	83	119	198	254	351	570
6,000	83	119	209	259	362	598
8,000	83	119	209	262	367	613
10,000	83	119	209	264	370	623

Where  $t$  = value for selected alpha level of .025 in each tail = 1.96. (the alpha level of .05 indicates the level of risk the researcher is willing to take that true margin of error may exceed the acceptable margin of error).

Where  $(p)(q)$  = estimate of variance = .25. (maximum possible proportion (.5) \* 1 - maximum possible proportion (.5) produces maximum possible sample size).

The margins of error used in the table were .03 for continuous data and .05 for categorical data. Researchers may use this table if the margin of error shown is appropriate for their study; however, the appropriate sample size must be calculated if these error rates are not appropriate. *(Table developed by Bartlett, Kotrlik, & Higgins)*

In view of the foregoing, stratified random sampling was used to get a representative sample from each of the nine departments in the Ministry. Ten percent of the members of staff in each department were sampled to give a sample size of 90. This is broken down as follows;

**Table 4: Showing the sample size**

No	Department	Number of staff	Sample
1	Administration	380	38
2	Directorate of Technical Accreditation and Quality Assurance	53	6
3	Directorate of Quality Assurance and Standards	90	9
4	Directorate of Technical Education	42	5
5	Directorate of Higher Education	30	3
6	Directorate of Research Management and Development	38	4
7	Directorate of Basic Education	120	12
8	Directorate of Adult Education	85	9
9	Central Planning and Project Management Unit	32	4
	<b>Total</b>	<b>870</b>	<b>90</b>

The use of a 10% sample across all departments ensured that the resultant total sample was adequately representative. It should be kept in mind that apart from the 90 members of the sample, three key informants were also interviewed. The key informants were drawn from the ICT department, resource centre and registries. This

technique is supported by Burgess (1989) who says that “most members of any community or society do not know the full repertory of forms, meanings and functions of their culture. Key informants, as a result of their personal skills, or position within a society, are able to provide more information and a deeper insight into what is going on around them”. The main advantage of the key informant technique relates to the quality of data that can be obtained in a relatively short period of time.

### **3.5 Data Collection**

Data was collected by way of interview. This is a research method consisting of a series of questions and other prompts for the purpose of gathering information from respondents (<http://en.wikipedia.org/wiki/>).

This data collection technique was chosen because it investigates issues in an in depth way, ambiguities can be clarified and incomplete answers followed up and it usually achieves a high response rate. Interviews may be limited by the fact that they can be very time-consuming. However, this limitation did not affect this particular research because the target population was not widely scattered.

Two interview schedules were prepared for use during data collection. The first interview schedule was meant for the sampled staff members of the ministry while the second one was meant for the key informants. Apart from the sampled staff, the researcher also interviewed three key informants from the ICT department, resource centre and registry unit.

The following information was sought during interview; Identity of the respondent, their information needs, information sources available to them, ICT facilities available, information seeking methods used, purpose of information seeking, methods used in communicating information by respondents, challenges faced when seeking and communicating information at the ministry and proposed strategies of improving provision of information.

The key informants were able to provide more information and a deeper insight into the activities in their departments because of their personal skills and position within

the ministry of Education, Science and Technology. The information they provided was used to validate responses from other respondents.

Prior to the interview, the researcher made appointments with the various respondents. On many occasions, the respondents were available for interview immediately while a few requested for more time. But generally, the interviews were carried out at the respondents' convenience.

In the course of interview, the researcher recorded the responses on the interview schedules which had been prepared with blank spaces to capture data and in a note book for additional information.

Before embarking on data collection, the researcher obtained a letter of introduction from Moi University addressed to the Chief Executive Officer of the National Commission for Science, Technology and Innovation (NACOSTI) (*See Appendix 3*). The letter of introduction together with an application to conduct research in Kenya (*See Appendix 4*) and a copy of the research proposal was presented to NACOSTI who after consideration issued the researcher with a research permit number NACOSTI/RCD/13/013/115 (*See Appendix 5*). The research permit was issued with a letter of research authorization which in part required the researcher to submit two hard copies and one soft copy in PDF of the research report/ thesis to NACOSTI (*See Appendix 6*).

### **3.6 Validity and reliability**

The researcher ensured validity and reliability of the data collected by piloting the data collection instrument and interviewing key informants on the use of ICT in information provision in the ministry to confirm some of the information provided by respondents. Because of the sheer size of the ministry of education, some staff may not be in a position to know the information resources available to them and what future plans the ministry may have. The key informants were most instrumental in clarifying such information.

The pilot study helped to refine the data collection instrument before the full scale data collection. To ensure consistent data, the interview question number nine which read; "*Which ICT facilities are available to you in the ministry?*" was changed to read



*“Which ICT facilities are available to you at your place of work?”*. This was because some respondents were struggling to mention ICT facilities in other offices. The corresponding question number seven for key informants was changed to read; *“Which ICT facilities are available in the ministry?”* instead of *“Which ICT facilities are available to you in the ministry?”*. This was because the ICT officers knew about all the ICT facilities in the ministry; not only the ICT facilities available to them. Another question item which was modified was question number 12 which initially read; *“What methods do you use for communicating official information in the ministry?”*. This was modified to read *“What methods do you use for sending and receiving official information in the ministry?”*. The change was deemed necessary because some respondents wanted clarification about the two – sending or receiving.

Mugenda (1999) says that “reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials”. The author goes further to say that inconsistent data can arise from inaccurate coding, ambiguous instructions to the subjects, interviewer’s or interviewee’s fatigue, interviewer’s bias etc.

Validity on the other hand is the accuracy and meaningfulness of inferences which are based on the research results. It has to do with how accurately the data obtained in the study represents the variables of the study.

Kothari (2004) brings out the difference between the two concepts by stating that “reliable measuring instrument does contribute to validity, but a reliable instrument need not be a valid instrument”. After reviewing the interview schedule as highlighted above, the researcher was confident that it would yield valid and reliable data.

### **3.7 Ethical considerations**

Throughout all phases of the research process we are sensitive to ethical considerations. These are especially important as we negotiate entry to the field site of the research; involve the participants in our study; gather personal, emotional data that reveal the details of life; and ask participants to give considerable time to our projects (Creswell 2007).

Hatch (2002) summarizes some of the major ethical issues that researchers need to anticipate and often address in their studies. Giving back to participants for their time

and efforts in our projects – reciprocity – is important, and we need to review how participants will gain from our studies. How to leave the scene of a research study – through slow withdrawal and conveying information about our departure – so that the participants don't feel abandoned is also important. .... We need to anticipate how to address potential illegal activities that we see or hear, and in some cases report them to authorities. As we work with individual participants, we need to respect them individually, such as by not stereotyping them and using their language and names. It is important to consciously consider ethical issues – seeking consent, avoiding the conundrum of deception, maintaining confidentiality, and protecting the anonymity of individuals with whom we speak.

The researcher maintained a high level of integrity by acknowledging all other people's works referred to in the course of research, kept information collected from respondents confidential and maintained anonymity. Citations are given within the body of the work showing the author and year the cited work was published. A full citation is given in the alphabetically arranged references at the end of this work. In addition, at no point is any respondents name given or a description given that reveals the identity of respondents.

The researcher also obtained a research permit from the National Commission for Science, Technology and Innovation (NACOSTI) as a requirement (*See appendix 5*). However, it is important to take note of the provisions Section 12(2) of the Science, Technology and Innovation Act, 2013. The Act in Section 12 states as follows:

12. (1) Subject to the provisions of any other law, a person shall not undertake scientific research in Kenya without obtaining a licence under this Act
- (2) Subsection (1) shall not apply to a person conducting scientific research under a university or a research institution programme.

Inquiries at NACOSTI on Section 12(2) of the Act showed that it may not have been well thought out. This is because the commission would not be able to monitor research activities in the country if researchers in universities stopped going there for licensing of research. The commission had also not yet come up with regulations to aid implementation of the Act. Perhaps the Kenyan university fraternity will be involved in the development of such regulations.

### **3.8 Chapter summary**

The chapter has presented the research design, target population, sampling and data collection techniques. It also explains data validity and reliability as well as ethical considerations. The research was basically a case study drawing its population from the staff of the ministry of Education, Science and Technology. The target population of the study was 870 comprising the staff of nine departments at the Ministry. Stratified random sampling was used to get a sample size of 90 from whom data was collected using the interview method. In addition, key informants from the ICT department, resource centre and registries were interviewed.

## CHAPTER FOUR

### DATA PRESENTATION, ANALYSIS AND INTERPRETATION

#### 4.1 Introduction

This chapter presents the data analyzed under various themes along with its interpretation. The themes include; experience at the ministry and age bracket of staff, educational level and area of specialization, nature of work, information requirements, information sources available and their adequacy, the ICT infrastructure, ICT training for staff, methods of information seeking, methods used for communicating official information, challenges faced when using ICT, social media prevalence, adequacy of support provided by the ICT staff, measures to improve the use of ICT in provision of information, plans to improve the use of ICT in provision of information, digitization of ministry records and budgetary allocation for ICT. This resulted in a largely narrative report with descriptions and generalizations derived from the data.

However, the descriptions are supported by tables where statistical data is available. The use of visual presentations was found good so as to give a visual image of the information in comparison tables. Creswell (2007) says that data analysis in qualitative research consists of preparing and organizing the data (i.e., text data as in transcripts, or image data as in photographs) for analysis, then reducing the data into themes through a process of coding and condensing the codes, and finally representing the data in figures, tables, or a discussion. Rejecting the artificial dichotomy between qualitative and quantitative research strategies in the social and behavioral sciences, Newman and Benz (1998) argue that “the two approaches are neither mutually exclusive nor interchangeable; rather, the actual relationship between the two paradigms is one of isolated events on a continuum of scientific inquiry”.

#### 4.2 The Response rate

Data was collected from 90 respondents from the ministry’s nine departments namely Administration, Technical Accreditation and Quality Assurance, Directorate of Quality Assurance and Standards, Technical Education, Higher Education, Research Management and Development, Basic Education, Adult Education and Central Planning and Project Management Unit. This was as anticipated in the methodology and the data could therefore be relied on for making generalizations. Perhaps this

confirms the advantage attributed to the interview method of data collection as having a high response rate unlike questionnaires. The data collected is presented and analyzed in the following sections.

#### **4.3 Age bracket of staff and their experience at the ministry**

The researcher sought to know age bracket of staff and how long they had worked at the ministry. The following data was obtained in relation to the age bracket of staff at the ministry.

*Table 5: Showing age distribution of respondents*

<b>Age bracket</b>	<b>No of respondents</b>	<b>Percentage</b>
Below 30	0	0
31 – 39	30	33.3
40 – 45	40	44.4
Above 45	20	22.3
<b>Total</b>	<b>90</b>	<b>100</b>

From table 4, more than 77% of the respondents were below 45 years of age. The implication is that the ministry generally has a middle age population. This is the kind of age group that went through their college education in the age of computers. By the time they were going through college, ICT had been infused in most courses even though rudimentary. Therefore such staff should not have any excuse for not using ICT.

None of the staff had worked at the ministry for less than three years. However, 54 (60%) of them had worked there for more than six years. The remaining 36 (40%) of the staff who had been at the ministry for less than six years were mostly from the departments of quality assurance and Central Planning and Project management. It was noted that the two departments also had a higher percentage of staff below 45 years of age.

#### **4.4 Educational level and area of specialization of staff**

The respondents were asked about their educational level and area of specialization. The resultant data about their educational level was as follows:

**Table 6: Showing educational level of respondents**

<b>Educational level</b>	<b>No of respondents</b>	<b>Percentage</b>
O-level	10	11.1
Certificate	10	11.1
Diploma	5	05.6
Degree	20	22.2
Postgraduate	45	50.0
<b>Total</b>	<b>90</b>	<b>100</b>

It was realized that the ministry had a very good human resource development program that ensured that its staff were adequately qualified for purposes of competence at work and career development. The respondents with diploma and certificate level of qualification were secretaries and clerical officers (item 2 in the interview schedule asked for the position one held in the Ministry). The respondents with o-level education were senior support staff and drivers. Generally, the majority of respondents ie 65 (72.22%) had at least degree level of education. This caliber of staff should be able to use ICT with minimum challenges or have their capacity for the same developed quite easily.

The data showed that most of the respondents in technical departments had degree qualifications while the administration department had the highest number of staff with diploma or below qualifications. This was because the administration department is where the ministry support staff belonged.

In terms of area of specialization, most of the respondents were educationists having previously worked as teachers. However, a variety of specializations were noted in the departments of Technical Accreditation and Quality Assurance, Technical Education, Research Management and Development and Central Planning and Project Management Unit. Apart from education, other areas of specialization were engineering (mechanical, electrical and civil), business, human resource management, public administration, economics, geology and secretarial service. The key informants

on the other hand were specialists in ICT and records management. Even the person in charge of the resource centre was a records manager not a librarian!

Of the 870 members of staff at the ministry, only 10 (i.e. 1.15%) were ICT specialists. This small number is not a problem considering Rodgers theory of diffusion of innovations. According to the theory, “Opinion leaders exert influence on audience behavior via their personal contact, but additional intermediaries called change agents and gatekeepers are also included in the process of diffusion”. The few ICT officers are the change agents and gatekeepers and should play a major role in adoption of ICT.

#### **4.5 Nature of work**

During interview, respondents were required to describe their nature of work. The responses varied depending on the department one worked in and the position held. The exception was in regard to finance officers and support staff including secretaries, clerical officers and drivers whose work activities were the same regardless of the department they worked in.

The finance officers dealt with budgeting, disbursement of funds, payroll management, preparation of expenditure reports and maintaining books of account. The secretaries in the sample said their work involved office organisation, handling telephone calls and appointments, security of office records, managing correspondence, filing, attending to visitors, typing official documents and maintaining file movement registers. The clerical officers said they dealt with filing, file movement, ensuring proper handling of documents, assisting with registry duties, running official errands and collection and dispatch of letters.

Other department-related work activities were as presented in the following table;

*Table 7: Showing the nature of work in departments*

<b>Department</b>	<b>Work activities</b>
Administration	Coordination of transport, human resources management (deployment within the ministry, leave, welfare), training, training needs assessment, capacity development, public communication, exhibitions, coordination of cross cutting issues, procurement, supervision of stores, auditing
Directorate of Technical Accreditation and Quality Assurance	Assessment of technical institutions for registration, standards and course approval, maintaining register of institutions, preparing assessment reports, preparation of registration certificates, preparation of assessment programs, developing specifications for training equipment
Directorate of Quality Assurance and Standards	Registration of Basic Education and Training Institutions
Directorate of Technical Education	Policy formulation, curriculum development, supervision of TVET institutions, provision of support for development activities in the technical and vocational training; management of TE programs; career guidance and counseling and on matters relating to liaison between technical institutions and the industry, co-curricular activities
Directorate of Higher Education	Administering university scholarships, appointment of university councils, project management, maintaining database of scholarship applicants, processing scholarship applications, award of charters
Directorate of Research Management and Development	Integrate research into national development, formulate National Research Policy, co-ordinate research, research inventory and dissemination, mobilize resources for R&D, research promotion and sensitization of R&D stakeholders and to create regional and international collaboration on R&D.
Directorate of Basic Education	Administration and management of education programmes, Quality assurance in and Supervision of Pre-Primary education, Examination and certification, registration of basic education institutions
Directorate of Adult Education	Administration and management of education programmes
Central Planning and Project Management Unit	Coordination of performance contract activities, preparation of performance reports, setting ministerial performance targets, monitoring, evaluation and reporting



The ICT officers who were key informants were involved in carrying out analysis, design and programme specifications in liaison with users, developing, implementing and maintaining systems, ensuring adherence to established ICT standards, advising on ICT issues, recommending and supervising hardware/ software specifications for ICT equipment, training of users and coordinating preventive maintenance of ICT infrastructure. The other key informants from records management were involved in receiving and dispatching letters, maintaining related registers, ensuring security of files and documents, preparing disposal schedules, maintaining file movement registers and filing.

It is worth noting that all work activities need information for their satisfactory accomplishment. More importantly, the information needs of staff are highly influenced by the work activities they are engaged in. ICT comes in handy in the provision of such information.

#### **4.6 Use of information sought**

Respondents were asked for what use they needed information in their course of duty. The responses included the following:

**Table 8: Showing the use to which information is put**

<b>Information use</b>	<b>No. of respondents</b>	<b>Frequency (%)</b>
Policy formulation	5	5.6
Keep up to date	80	88.9
Research	20	22.2
Advice the public	15	16.7
Maintain high performance	32	35.6
Accurate reporting	10	11.1
Monitoring	4	4.4
Project evaluation	10	11.1
Bench marking against best practice	5	5.6
Planning	10	11.1
Personal growth and further education	60	66.7

Most staff used information to keep up to date, maintain high performance, research and for personal growth and further education. Generally, the use of information was work related except in the case of personal growth and further education.

The kind of information required to satisfy the need included legal notices, executive orders, resolutions of meetings, training projections, government policies and circulars. It was realised that the higher the position one held, the more the information they required. Whereas lower cadre staff only mentioned circulars and government policies, those holding higher positions expressed more need for information and a wider range of kinds of sources. The important thing to note is that ICT can be used to enhance provision of the said information and therefore help meet the declared need in the course of duty.

#### **4.7 Information sources available and their adequacy**

The interview went further to ask what information sources were available in the ministry to satisfy the information needs mentioned above and the adequacy of the information sources. The number of users of the various information sources and resultant frequency of responses as a percent of all the respondents was as follows:

*Table 9: Showing the information sources and the frequency of use*

<b>Information source</b>	<b>No. of users</b>	<b>Percentage</b>
Newspapers	90	100
Internet	81	90
Colleagues	63	70
Reports	51	56.7
Syllabuses	32	35.6
Memos	75	83.3
Circulars	70	77.8
Executive Orders	25	27.8
Minutes	35	38.9

The staff responses were limited to what information sources they made use of which included newspapers, the internet, colleagues, reports, syllabuses, memos, circulars, executive orders and minutes. From the data above, it can be seen that the most frequently used information sources were newspapers, the internet and memos in that order. The least frequently used information sources were executive orders and syllabuses. This could be attributed to their rarity and specialized nature.

The key informants concurred with the staff in terms of the information sources available but went further to mention other information sources including the following:

- Personal staff files in the registries
- Training needs assessment reports
- The ministry websites (there were two websites belonging to the former Ministry of Education and Ministry of Higher Education, Science and Technology at the time of data collection)
- The electronic display and
- The Government Human Resource Information System (GHRIS).

The question to ask is can the information in the sources above be provided using ICT? The provision can actually be enhanced by the use of ICT. Provision of information will be cheaper and more likely to reach more people in a shorter time.

As to whether the available information sources were satisfactory to the information needs of the staff or not, the opinion was divided. Out of the 90 respondents, 63 (70%) of the respondents said the resources were satisfactory. The remaining 27 (30%) of the respondents said the resources were not satisfactory. Those who were not satisfied with the available information sources recommended additional resources to be acquired including:

- Books
- Journals in their areas of specialization and
- Subscription to commercial databases.

However, the key informants contented that the additional information sources suggested were for personal use and not performance of duty as assigned in the

ministry. This could be true because all the 20 respondents whose educational level was degree also mentioned that they were undertaking post graduate studies. Whereas the additional information sources recommended could be for personal use, they could be important for general information which is important in developing a more informed and perhaps more efficient workforce. It will not be in vain for the ministry to subscribe to some e-resources.

#### **4.8 The ICT infrastructure at the ministry**

The distribution of ICT facilities among respondents was as follows;

*Table 10: Showing the ICT facilities available to staff*

<b>ICT facilities</b>	<b>No. of respondents with facility</b>
Desktop computers	60
Laptop computers	15
iPads	4
Printers	4 (shared)
Telephones	10 (shared)

The staffs at the ministry were provided with a range of ICT facilities including desktop computers, laptops, iPads, printers and telephones. Desktop computers were the most common ICT facilities available to staff followed by laptop computers. Only senior staffs at the level of Assistant Directors or above were allocated iPads. Printers and telephones on the other hand were shared within offices. The staff recommended additional ICT facilities to be acquired including projectors, scanners and photocopiers.

The key informants however said that apart from the facilities mentioned by staff, the ministry also had 3 LCD projectors, a scanner, 10 fax machines and one photocopier per department. They also mentioned that all ministry offices were well cabled with adequate internet ports for staff. The ICT officer further mentioned that the ministry had reliable high speed internet supply.

Considering what the key informants said, it is apparent that the staffs are not aware of all the ICT facilities available in the ministry- especially the shared facilities

allocated to departments not individuals. It could be helpful to have inventories of available ICT facilities displayed or kept by secretaries or designated support staff.

In addition the ICT officer put the staff to computer ratio in the ministry at 1:1 for technical staff and 1:20 for support staff. It was clarified that the target ratio was 1:1 for technical staff and 1:10 for support staff. Therefore the staff to computer ratio was optimal for technical staff but still needed improvement for support staff.

#### **4.9 ICT training for staff**

The ICT courses undertaken by staff at the ministry were as presented in the following table:

*Table 11: Showing the ICT related courses undertaken by staff*

<b>Course Name</b>	<b>No. of respondents</b>	<b>Percentage</b>
ICDL	10	13.33
SPSS	3	4
e-Promis	4	5.33
ICT Integration in Teaching	14	18.67
Introduction to ICT	18	24
Diploma in ICT	2	2.67
MIS	3	4
Computer Packages	21	28
<b>Total</b>	<b>75</b>	<b>100</b>

The ministry was doing quite well in terms of capacity building for its staff in ICT. When asked whether they had undertaken any ICT related course, 75 (83.3%) respondents answered in the affirmative.

Majority of the respondents had undertaken courses in Computer Packages, Introduction to ICT and ICT Integration in teaching which accounted for 21 (28%), 18 (26.7%) and 14 (21.3%) respondents respectively. Generally, the ICT literacy level in

the ministry was quite high (83.3%) and therefore the use of ICT in provision of information should not be a problem to most of the staff.

In addition, the key informant ICT officer said whenever there was a new development, they would organize to sensitize staff. The example given was sensitization of ministry staff on the Government Unified Messaging System (GUMS) which is a project being implemented by the department of e-government.

The respondents who had undertaken the ICT related courses were asked when they did the course. The overall distribution of when the courses were undertaken was as follows:

**Table 12: Showing when the ICT related courses were undertaken by staff**

<b>Period</b>	<b>No. of respondents</b>	<b>Percentage</b>
Within the last 2 yrs	20	26.7
In the last 3 – 5 yrs	45	60
More than 5 yrs	10	13.3
<b>Total</b>	<b>75</b>	<b>100</b>

It was realized that 55 (73.3%) respondents had undertaken the course in the last three or more years. Given the dynamic nature of ICT in terms of both hardware and software, continuous capacity building should be undertaken. Only 20 (26.7%) respondents had undertaken their ICT related course within the last two years. The rest (73.3%) undertook their training more than three years ago.

Three years is a long time in terms of what can happen in the ICT sector. A lot has changed in ICT since their last training. The staff in this category would be better off if they refreshed their ICT skills. However, the key informants said ICT officers were trained whenever new hardware or software was acquired. All the key informants had undertaken training within the last two years.

#### **4.10 Methods of information seeking in the ministry**

Respondents in the research sought for information mostly from the internet. Other methods used include:

- Consulting others (face to face, telephone and SMS)
- Checking the notice boards
- Visiting the registries
- Visiting the resource centre and
- Assigning other staff to find it.

All the respondents said they used the internet which was readily available in the offices. More than 63 (70%) of them consulted their colleagues either face to face, by telephone or through SMS. A small number i.e. 30 (33.3%) of the respondents sought for some of the information they required from the registry and resource centre. However an even smaller number i.e. 4 (4.4%) comprising senior officers sent their subordinates to find some of the information they required. It is important to note that all the respondents said they used the internet because this means that information can be provided to them by use of ICT. Whichever method is used to seek for information can be enhanced by the use of ICT.

#### **4.11 Methods used for communicating official information in the ministry**

While answering the question on what methods they used for communicating official information in the ministry, respondents mentioned the following:

- Letters
- Memos
- Circulars and
- E-mails.

Memos were apparently the most commonly used with all the respondents mentioning them. Letters and circulars were mentioned by 85 (94.4%) and 73 (81.1%) respondents respectively. The key informants from records management unit however clarified that official internal communication in the ministry was through:

- Memos
- Circulars
- Notices
- Intercom
- Meetings
- Letters and

➤ Emails.

It should be noted that memos, circulars, notices and letters can all be scanned and provided to target audiences through e-mail. Even minutes of meetings can be disseminated through the same means instead of printing them for all who attended. ICT can as well be employed in teleconferencing. The same means of communicating official information shall be in use but enhanced by the use of ICT. The apparent shortfall is the small number of scanners available in the ministry as can be seen in section 4.8 of this report.

Asked about other methods they would wish to use for communicating official information, 60 (66.7%) respondents were conservative and said the status quo was appropriate. But the other 33.3% suggested face book, twitter or SMS. The key informants said official information on social media would not be easy to control. They did not suggest any other means of communicating official information.

#### **4.12 Challenges faced when using ICT at the ministry**

In response to the question that required them to explain the challenges faced when using ICT at the ministry, the following data was obtained:

*Table13: Showing challenges faced when using ICT at the ministry*

<b>Challenge faced</b>	<b>No. of respondents</b>	<b>Percentage</b>
No challenge faced	72	80
Printing	10	11.11
Lack of personal computers	8	8.89

From the responses, 72 (80%) respondents said they did not face any problems. But 10 (11.1%) respondents said they had problems printing their work while the other 8 (8.9%) respondents said they lacked personal computers. Those who lacked computers were clerks and drivers in the administration department.

On the other hand, the key informant from ICT mentioned that some staff were not able to install programs, download updates, undertake simple troubleshooting and



observe safety standards while using ICT equipment. The informant also lamented the shortage of scanners in departments.

However, the challenges mentioned are not of the magnitude to stop the use of ICT in provision of information in the ministry. Perhaps the shortage of scanners can affect the provision of information to a small extent.

#### **4.13 Social media prevalence**

Respondents were asked whether they were on social media and whether they used their real name. The social media networks named included the following:

**Table14: Showing social media networks to which staff at the ministry belong**

<b>Network</b>	<b>No. of respondents</b>	<b>Percentage</b>
Twitter	70	77.8
Face book	60	66.7
LinkedIn	55	61.1
Badoo	34	37.8

In response, 82 (91.1%) respondents said they had social media accounts on one or several networks. Of the 82 respondents who were on various social media networks, only 55 said they used their real names. The remaining 25 used pseudo names.

The tendency to hide their true identity on social media could be the reason why the key informant from ICT insisted that social media could not be used for provision of official information. Only 30 (33.3%) respondents said social media can be used for official communication. The justification given was that it was widespread, could reach many people at ago and very fast. However the other 60 respondents disapproved of the use of social media saying it can easily be distorted and was generally casual. The key informant from ICT said the use of social media would not be easy to control and that it is not easy dealing with a faceless clientele.

#### **4.14 Adequacy of support provided by the ICT staff**

All the respondents admitted to having sought assistance from the ICT staff at one or other time. The staff would always solve their ICT related problem. However, the respondents from departments of Technical Education, Technical Accreditation and Quality Assurance, Higher Education and Research Development and Management raised the issue of promptness in response by ICT staff. The aforementioned departments are based at Teleposta Towers and Utalii House yet the ICT staffs are based at Jogoo House. It was apparent that the scattered nature of offices at the Ministry affected service delivery by ICT staff.

#### **4.15 Measures to improve the use of ICT in provision of information**

Respondents were asked to propose measures that could be put in place to improve the use of ICT in provision of information at the ministry. In response, various proposals were made including the following:

- Provide computers to staff who did not have
- Establish a common utility office where staff who had not been assigned computers could access them
- Acquire scanners for offices which did not have them
- Regular capacity building of staff in ICT skills
- Encourage use of idle ICT facilities including teleconferencing facility and electronic display
- Reduce the budget for stationary especially printing paper
- Review the ministerial ICT policy

Basically, the respondents focused on provision of ICT facilities, capacity building and change of institutional culture.

#### **4.16 Plans to improve the use of ICT in provision of information at the ministry**

Information on plans to improve the use of ICT in provision of information at the ministry was sought from the key informant from ICT. The officer said the Ministry was following automation guidelines provided by the department of e-government. Using the guidelines, the Ministry was at 60% automation level and was targeting

65% automation level at the end of the financial year 2013/2014 by undertaking the following activities:

- (i) Develop and disseminate the ICT strategy for the Ministry.
- (ii) Adoption and operationalization of e-Government standards
- (iii) Ensure staff sign the Ministry's ICT security compliance agreement
- (iv) Implement ICT training programmes as per the ICT strategy
- (v) Develop and Implement the Ministry's ICT policy.

However, to take the Ministry's automation level to 100%, the department of e-government had prescribed a range of activities apart from the above as follows:

- Progressively increase the percent of the Ministry ICT budget line against the total budget to the industry standard of 10%.
- Centralize user authentication within the LAN
- Adopt Electronic Document Management System (EDMS)
- Increase the percent of Ministry data which has been digitized and is accessible against total number of manual records kept
- Adopt and use Voice Over Internet Protocol (VOIP)
- Automate core public services ( e-services) for citizens, business, employees and Government
- Undertake on-line annual customer service rating of services (e-services) to ascertain feedback from recipients of service.
- Utilize e-service delivery channels i.e. methods used to provide services, e.g. SMS, Unstructured Supplementary Service Data (USSD), portal services, Interactive Voice Response System (IVRS)
- Increase the number of services hosted in common Government infrastructure (GDC).
- Roll out electronic payment systems
- Deploy qualified ICT staff as per Ministry approved structure

Whereas the ministry appears on course towards 100% automation, it should be kept in mind that this is a highly dynamic sector and change of technology can render what has already been done obsolete. The e-government standards being used by the ministry are quite comprehensive in terms of provision of systems and service

delivery to customers. It is up to the ministry staff to get innovative in using the same systems to provide information within the ministry.

#### **4.17 Digitization of Ministry records**

The key informants were asked whether the ministry had digitized any of its records and if so, what percent had been digitized. In response they said that no records had been digitized at all. The records management officer said it was an idea they were willing to execute but the ministry lacked the requisite hardware and software. All the ministry records were in paper files in various registries.

The paper based records are not easy to share by use of ICT. Therefore to enhance provision of information by use of ICT, it would be important to digitize the records. It is gratifying to note that that one of the activities planned to improve the use of ICT in provision of information at the ministry was to increase the percent of Ministry data which has been digitized and is accessible against total number of manual records kept. The undertaking will depend on availability of appropriate hardware and software for digitization.

#### **4.18 Comments on the budgetary allocation for ICT in the ministry**

It was disheartening to hear the ICT officer lament that the budgetary allocation for ICT in the ministry was inadequate and erratic. For example in the financial year 2012/2013, there were vote heads for maintenance of computers, software and networks as well as purchase of computers, printers and other IT equipment. But come the financial year 2013/2014, the same votes were not in the printed estimates. Where the vote heads existed in financial year 2012/2013, they only amounted to 2% of the total ministry budget. The e-government standards require that the allocation is progressively increased to 10% of the total budget.

Furthermore, the Head of ICT in the ministry did not have Authority to Incur Expense (AIE). Instead, it was the head of administration who was the AIE holder for ICT related vote heads. This led to a situation whereby such funds could be diverted to other so called high priority activities.

#### **4.19 Chapter summary**

The chapter makes a presentation, analysis and interpretation of the data under various headings derived from the interview schedules. The headings include experience and age bracket of staff, their educational level and area of specialization, nature of work, information requirements, information sources available and their adequacy, the ICT infrastructure at the ministry, ICT training for staff, methods of information seeking in the ministry, methods used for communicating official information in the ministry, challenges faced when using ICT, Social media prevalence, adequacy of support provided by the ICT staff, measures to improve the use of ICT in provision of information, plans to improve the use of ICT in provision of information at the ministry, digitization of ministry records and comments on the budgetary allocation for ICT in the ministry.

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter discusses the major findings, conclusion and outlines the recommendations. The study concluded that the use of ICTs in provision of information to staff at the ministry was not optimally done. The chapter therefore presents recommendations on how to improve use of ICT in provision of information to staff at the ministry.

#### **5.2 Summary of findings**

The research sought to find answers to the following questions;

1. What are the work activities performed by staff in the discharge of their duties at the ministry?
2. Which are the types of information disseminated by use of ICT to the staff at the ministry?
3. How adequate is the range of information sources available to the staff at the ministry?
4. What is the range of ICTs used by the staff in accessing needed information?
5. Are there any challenges faced when seeking for and communicating information at the ministry?
6. What strategies can be used to improve use of ICTs in provision of information to the staff?

##### **5.2.1 The work activities performed by staff in the discharge of their duties**

To elicit response to this question, the interview schedule had questions that sought to know the staff in terms of their age range, qualifications and their nature of work.

###### **5.2.1.1 Staff of the ministry in relation to ICT use**

The data presented in table 4 shows that more than 70% of staffs at the ministry were below 45 years of age. The implication is that the ministry generally has a middle age staff. The ministry workforce was also highly qualified as depicted in table 5 whereby most of the respondents had at least degree level qualification. The ministry had a very good human resource development program that ensured that their staffs were

adequately qualified for purposes of competence at work and career development. They were the caliber of staff that could be able to use ICT with minimum challenges or have their capacity for the same developed quite easily.

The ministry had few ICT specialists among its staff. Of the 870 members of staff at the ministry, only 10 (1.2%) were ICT specialists.

#### **5.2.1.2 The work activities performed by staff**

The work activities at the ministry were wide-ranging and varied depending on the department one worked in and the position held. The activities included:

- Financial transactions
- Procurement
- Administration
- Human resource management
- Planning
- Monitoring and evaluation
- Policy formulation
- Registration of learning institutions
- Project management
- Coordination of research and
- Quality assurance.

It is worth noting that all work activities need information for their satisfactory accomplishment. ICT comes in handy in the provision of information to support the work activities of staff.

### **5.2.2 Information needs of the staff at the ministry**

To address the question, data was collected in relation to the information needs of the staff and the methods of information seeking and communication at the ministry.

#### **5.2.2.1 Information needs of the staff at the ministry**

The information needs of the staff at the ministry were highly influenced by their work activities. The kind of information required to satisfy the information needs was in form of legal notices, executive orders, resolutions of meetings, training projections, government policies and circulars. The important thing to note is that ICT

can be used to enhance provision of the said information and therefore help meet the declared need in the course of duty.

#### **5.2.2.2 Methods of information seeking and communication**

The researcher found out that the staff sought for information from sources including newspapers, the internet, colleagues, reports, syllabuses, memos, circulars, executive orders and minutes. It is important to note that all the respondents said they used the internet because this means that information can be provided to them by use of ICT.

The key informant from ICT said the use of social media would not be easy to control and that it is not easy dealing with a faceless clientele. Therefore while grapevine communication can spread information quickly and can easily cross established organizational boundaries, the information it carries can be changed through the deletion or exaggeration of crucial details thus making the information inaccurate – even if it's based on truth.

#### **5.2.3 Adequacy of the range of information sources available to the staff**

Among the information sources available at the ministry and which the staffs were able to name were newspapers, the internet, colleagues, reports, syllabuses, memos, circulars, executive orders and minutes. Other information sources mentioned by key informants included personal staff files in the registries, training needs assessment reports, the ministry websites (there were two websites belonging to the former Ministry of Education and Ministry of Higher Education, Science and Technology at the time of data collection), the electronic display and the Government Human Resource Information System (GHRIS).

The most frequently used information sources were newspapers, the internet and memos in that order. The least frequently used information sources were executive orders and syllabuses. This could be attributed to their rarity and specialized nature. The mention of colleagues as sources of information is in agreement with Niedźwiedzka's argument that "managers basically are not the end users of external information sources from an organization or computerized information services, and they acquire information mainly through various intermediaries". The intermediaries in this case are the colleagues who may be making reference to an original source elsewhere.



Most members of staff were satisfied with the information sources available. The few who were not satisfied proposed additional information sources including books, journals in their areas of specialization and subscription to e-resources. However, the key informants contented that the additional information sources suggested were for personal use and not performance of duty as assigned in the ministry. This could be true because all the 20 respondents whose educational level was degree also mentioned that they were undertaking post graduate studies.

#### **5.2.4 The range of ICTs used by the staff in accessing needed information**

The staffs at the ministry were provided with a range of ICT facilities including desktop computers, laptops, iPads, printers, telephones, LCD projectors, a scanner, fax machines and photocopiers. Desktop computers were the most common ICT facilities available to staff followed by laptop computers. Only senior staffs at the level of Assistant Directors or above were allocated iPads. Printers and telephones on the other hand were shared within offices.

In addition, all ministry offices were well cabled with adequate internet ports for staff and had reliable high speed internet supply. The staff recommended additional ICT facilities to be acquired including projectors, scanners and photocopiers.

The staff to computer ratio was optimal for technical staff but still needed improvement for support staff going by the e-government standards. However, the staffs were not aware of all the ICT facilities available in the ministry - especially the shared facilities allocated to departments not individuals.

#### **5.2.5 Challenges of using ICT at the ministry**

One of the challenges expressed by the ministry staff was that the support provided by the ICT staff was not adequate. The ICT officers are based at Jogoo house yet the ministry has other offices at Teleposta Towers and Utalii House. The officers were therefore not prompt enough or were simply not available whenever they were requested for assistance by staffs that were not based at Jogoo house. It was apparent that the scattered nature of offices at the Ministry affected service delivery by ICT staff.

Another challenge faced was the lack of the requisite hardware and software for digitization of records. In as much as the records management staff were willing to undertake digitization, the ministry lacked the requisite equipment. All the ministry records were in paper files in various registries. The paper based records were not easy to share by use of ICT.

In terms of provision of ICT facilities, it was found out that a few members of staff lacked personal computers and printers. Those who lacked computers were support staff comprising of clerks and drivers in the administration department. In terms of use of the facilities, some staffs were not able to install programs, download updates, undertake simple troubleshooting and observe safety standards while using ICT equipment. There was also a general shortage of scanners in departments.

Inadequate and erratic budgetary allocation was another challenge. Budgetary constraints had led to a situation where only 2% of the total ministry budget went to ICT. This was far below the e-government standards which require that the allocation is progressively increased to 10% of the total budget. This scenario means that the existing ICT facilities cannot be replaced by new ones in the market. In addition those facilities that were not there at all such as hardware and software for digitization may not be acquired very soon if the budgeting trend continues. The situation was made worse by the fact that the Head of ICT in the ministry did not have Authority to Incur Expense (AIE). Instead, it was the head of administration who was the AIE holder for ICT related vote heads. This led to a situation whereby such funds could be diverted to other so called high priority activities.

The institutional culture was an indirect challenge. It was generally accepted to provide information in the ministry using paper based channels. This is evident from the range of information sources available at the ministry

#### **5.2.6 Strategies to improve use of ICTs in provision of information to the staff**

The ministry was in the process of adopting e-government standards. The e-government standards were quite comprehensive in terms of provision of systems and service delivery to customers.

Of all the provisions of the e-government standards, the development of the Ministry's ICT policy and ICT strategy is paramount. The ministry did not have the two documents. The documents provide the operational framework and a roadmap for the use of ICT in provision of information

It is gratifying to note that that one of the activities planned to improve the use of ICT in provision of information at the ministry was to increase the percent of Ministry data which has been digitized and is accessible against total number of manual records kept.

The ministry had facilitated its staff to attend various training programs in ICT including ICDL, SPSS, e-Promis, Computer Packages, Introduction to ICT, MIS and ICT Integration in teaching. Generally, the ICT literacy level in the ministry was quite high.

However, it was found out that only a small number of staff had undertaken their ICT related courses within the last two years. The majority of staffs had their training more than three years earlier.

It was also found out that the ministry had adopted an approach whereby it outsourced all the ICT capacity building. This approach is more logistically involving and therefore takes longer to effect.

### **5.3 Conclusion**

In view of the foregoing findings, the study generally concluded that there was no optimum utilization of ICTs in provision of information to staff at the ministry. The ministry had made good attempts at providing ICT facilities and the staff had the competencies to use the facilities. However, there was still need for innovative use of the facilities to enhance provision of information. This is supported by Kwadwo and Mekonnen (2012) who say that "the advent of personal computers, the internet and mobile telephony during the last two decades has provided a much wider choice in collection, storage, processing, transmission and presentation of information in multiple formats to meet the diverse requirement and skills of people".

The work activities of the staff required a lot of information to be accomplished. The work activities were the kind that also generated a lot of information which ended up

in printed formats. Whereas the work activities had great influence on the information needs of the staff at the ministry, other environmental factors such as academics also had a bearing. It is worth noting the assertion made by Wilson (2000) that “if we know more about the people that our information institutions serve, it is much more likely that we can serve them effectively”.

The information needs of the staff were met only in as far as their work was concerned. From the submissions by respondents, work related information was adequately provided but there were gaps in provision of general information. There was therefore need to devise ways of filling the information gap. Indeed this is in agreement with Odini (1993) who says that “No information service which aims to provide an effective service can afford to neglect research into the needs of its potential users. The purpose of the information needs analysis is to establish the main areas in which information will be sought and to set up an appropriate collection of resources to satisfy those needs”.

The ministry has good ICT infrastructure which needs innovative users for optimum utilization in provision of information. Generally, the ICT literacy level in the ministry was quite high and therefore the use of ICT in provision of information should not be a problem to most of the staff. ICT can be used to enhance provision of information to support the work activities of staff. The extent to which ICT was used by the staff in accessing needed information was limited by the culture of paper trails in official transactions. There was a conservative culture of using printed media for official communication.

There were challenges that needed to be addressed to optimize use of ICT in provision of information at the ministry. The challenges were not only at individual level but also at organizational level. It is gratifying to note that the challenges mentioned by staffs are not of the magnitude to stop the use of ICT in provision of information in the ministry.

There is room for ICT to be used in the ministry of Education, Science and Technology to enhance the provision of information to staff. The conclusion draws its strength from the ministry staffs that were highly qualified and therefore should not have any excuse for not using ICT to provide or receive information. Among the

strategies that the ministry can employ to enhance the use of ICT is the automation of the resource centre and registries and adoption of e-government standards. Of all the provisions of the e-government standards, the development of the Ministry's ICT policy and ICT strategy is paramount.

#### **5.4 Recommendations**

From the foregoing findings and conclusion, recommendations have been made focusing on the staff to computer ratio; continuous capacity building; maximum utilization of the available resources; digitization; additional hardware; social media; deployment of ICT staff; adoption of e-government standards; ICT policy and strategy; institutional culture; and budgetary allocation. The recommendations have been categorized into short term, medium term and long term.

##### **5.4.1 Short term recommendations**

These are recommendations to be implemented almost immediately or which can be planned for within the current financial year and budget. They include the following;

###### **5.4.1.1 Improve staff to computer ratio**

At the time of research, the staff to computer ratio in the ministry was 1:1 for technical staff and 1:20 for support staff. The ratio was optimal for technical staff but still needed improvement for support staff. It is therefore recommended that the staff to computer ratio for support staff be improved to 1:10 as per the e-government standards in Kenya.

Whereas most of the support staff do not have offices, it is still possible to create a common work area with shared facilities. The shared office can be equipped adequately to attain the required ratio. This can be accomplished if the officer in charge of ICT in the ministry initiates the process and seeks the support of the department of administration.

###### **5.4.1.2 Maximize use of available ICT resources**

The ministry staff were adequately provided with computers and their offices were well cabled with adequate internet ports. In addition there was reliable high speed internet supply. But it should be kept in mind that ICT is just an enabler. Walubengo (2013) argues thus; "In the history of civilisation, nations fought over new lands,

conquered and occupied them in order to increase their wealth and domination. Today, these battles continue online, with the new land being the digital superhighway – otherwise known as the internet. The nation that holds the greatest influence on when, where and how the internet evolves essentially has the advantage in as far as increasing its wealth and domination over the others is concerned”. Therefore it is not enough to have good ICT infrastructure. The ministry staff should go further and get creative in how they use the ICT resources available to deliver on their mandate.

The creative use of ICT in provision of information can be in terms of better internal communications and better administration. Better internal communication can be achieved through sharing information and work files with colleagues on a server; using remote access, email, internet telephone services and video conferencing so that staff and volunteers can be flexible and work on multiple sites; making sure induction manuals, internal policies and other key documents can be found easily using the intranet; and using bulletin boards. Better administration on the other hand can be achieved through managing ministry information in a more methodical way and spending less time finding things by using a shared file server; using mail merge to save time when sending out large numbers of documents – whether in the post or by email; using shared calendars and email to schedule meetings; and saving time and money by sharing resources such as printers, rather than transferring information from PC to PC.

Furthermore, there is need for accurate and accessible inventories of all ICT facilities in the ministry. The inventories should be displayed or kept by secretaries or designated support staff. Better still, the inventories can be shared on the intranet. This will avoid a situation where some facilities are available but only a few people know about them. This should be undertaken by the officers in charge of supply chain management.

In light of Niedźwiedzka’s research, it can be said that senior staff in the ministry are dependent information users. They predominantly turn to various intermediaries to obtain necessary data and evidence. The intermediaries in turn can use the available ICTs to provide information to their colleagues.

The provision of good broadband by the ministry is a relevant prerequisite for enabling higher ICT usage. It is important to remember that ICTs — whether mobile phones, computers or telephones — are not ends in themselves; they are simply the means by which information can be recorded, summarized, displayed, and passed on more quickly. It is the information itself that is important. This is every member of staff's responsibility and the ICT officers can only facilitate from time to time.

#### **5.4.1.3 Adopt the use of social media**

There is informal communication in all organizations. Such kind of communication happens in informal groups at work. The informal groups are no longer physical – they are virtual. The virtual social groups are highly dependent on social media which is the modern grapevine. Prasher (1991) says that informal communication in the workplace satisfies a variety of needs, particularly social and emotional needs. Such communication is not based on the positions individuals occupy within the organizations. As a result, the communication is not managed or planned in any organized fashion. It's more relaxed, casual and tends to be spread by word-of-mouth quickly throughout a department or organization because it's not restricted to approvals and an established path of distribution. This is the reason why social media should be given a second thought.

Interesting observations are made by Walubengo (2014) while writing about social media and workplace productivity. He states thus “The proponents of social media networks argue that these networks do actually increase productivity - both at organizational and at individual levels. They claim that any modern organization wishing to be known and felt by its customers must by all means be present and active on social media. Indeed this is proving to be choice of communication between companies and customers, with most of them opting to effectively engage with customers on Twitter, Face book and other social media platforms”. According to him, customers find it easier and perhaps cheaper to raise concerns and queries through social media platforms. Companies feel compelled to respond to social media queries much faster due to the fact that the queries are publicly available and any delayed response is potentially a PR disaster in waiting. At an individual level, it can

be argued that social networks provide the much needed break that all employees deserve in order to get re-energized and re-focused on the task at hand. Connecting to a social network site can therefore be equated to taking a coffee-break - with the expected benefit of coming back much more refreshed and focused on the job.

The ministry staff should therefore be encouraged to positively embrace social media. Here they will interact in a more relaxed and casual way. Already most of the staff belong to one or other social network but use pseudonyms. The ministry should therefore sustain its presence in the social networks not only for internal informal communication but to capture public sentiments on topical issues. Policy makers can spearhead the undertaking and seek the support of ICT officers.

#### **5.4.1.4 Fast track adoption of e-government standards**

The plans to improve the use of ICT in provision of information at the Ministry are largely pegged on the automation guidelines provided by the department of e-government. The guidelines provide a roadmap to be followed by government Ministries, Departments and Agencies in Kenya. However, they do not provide an implementation schedule and timelines.

It is therefore important that the Ministry comes up with a realistic implementation schedule and stipulates clear timelines to guide those in charge of the activities. As it is now, a government ministry can remain at 10% level of automation for many years without any penalty whatsoever. It is Steve Jobs who said that mastery lay in the ability to develop products that the customers did not know they needed, and then have them wonder how they survived before without them. Akinyemi (2013) argues that “What we call development today is simply the external manifestations of minds that were not afraid of benchmarking their imagination and thinking beyond the obvious. Those who do not think beyond the obvious will never achieve beyond the ordinary. This may be responsible for the mediocre and lackluster performance by many”.

The Ministry of Education, Science and Technology can make a departure from the norm and fast track implementation of the e-government guidelines. This will be undertaken by the ICT officers with support from the administration department whose head is the AIE holder.



#### **5.4.1.5 Develop and disseminate the ICT policy**

Provisions of the e-government standards include the development of an ICT policy and ICT strategy. The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) says that “The ICT evolution will take place with or without a systematic, comprehensive and articulated policy. However, the lack of a coherent policy is likely to contribute to the development (or prolonged existence) of ineffective infrastructure and a waste of resources”. The easiest option for the ministry is to domesticate the National Information and Communication Technology policy of 2006.

From the ministerial ICT policy should be derived the ICT strategy which spells out the deliverables for the ministry in terms of ICT. The ICT strategy will define how technology will be used in the ministry, describe the technology to be used in discharging the ministry mandate and outline the steps to be followed to achieve the ministry’s ideal ICT status. The strategy should be prepared keeping in mind the ministry’s vision and mission, strategic objectives, stakeholders, functional processes, current and future state of ICTs, skills mapping and industry trends.

The two documents will provide the operational framework and a roadmap for the use of ICT in provision of information. The information professionals in the ministry should lead this undertaking.

#### **5.4.2 Medium term recommendations**

Unlike the short term recommendations, the medium term recommendations require more input and even slight change of policy. Committees can be set up to ratify and implement them within a five year period. They include the following;

##### **5.4.2.1 Subscribe to e-resources**

The ministry staffs need more than just the memos and circulars used for communicating official information. They need additional information sources for general information which is important in developing a more informed and perhaps more efficient workforce. Whereas the additional information sources recommended by staff could be for personal use, they could be important for general information which is important in developing a more informed and perhaps more efficient workforce. Apart from the work activities, it should be appreciated that there are other

significant environmental factors influencing the information behavior of staff at the ministry.

It will not be in vain for the ministry to subscribe to some e-resources. Most organizations including government ministries are familiar with the idea of outsourcing noncore services to third parties in order to reduce the Human Resources administrative overheads. Since the ministry's core business is not offering library services, it is better off if it offloaded this service to third parties who are more focused and competent in this area. The ministry should therefore consider outsourcing the provision of information materials from commercial databases and benefit from the providers huge and current collections. This undertaking can be accomplished by the concerted effort of the information professionals in the ministry and supply chain management officers.

#### **5.4.2.2 Automate the registries and resource centre**

The entire ministry's paper-based records end up in files in the registries all of which still use manual systems. It is not easy to search for files in the registries or trace those that have been issued out. The case is the same in the resource centre. There is need to improve the search tools and file movement registers. It is not acceptable to allow the "lost-files" culture in this ICT age. The tracing or validating ministry records could easily be done online.

The ministry should acquire an appropriate library management system which can be used in both the resource centre and registries. The metadata maintained in the system can then be synchronized with other databases once digitization has been undertaken. This task should be undertaken by the information professionals in the ministry who include the Records Management officers and ICT officers. Digitization is given special mention under the long term recommendations.

#### **5.4.2.3 Deploy ICT staff to departments**

The scattered nature of offices at the Ministry affected service delivery by ICT staff. The Ministry has some of its departments at Teleposta Towers and Utalii House yet the ICT staffs are based at Jogoo House. This makes the response of ICT officers slow whenever there is an issue for them to address.

It is hereby recommended that the Ministry deploys ICT officers to the departments that are not based at Jogoo House to hasten response whenever they are required. For a start, only two officers may be required – one at Teleposta Towers and the other at Utalii House. This measure has no cost implication because the officers are already available and office space is not an issue.

The small number of ICT officers is not a problem considering Rodgers theory of diffusion of innovations. According to the theory, “Opinion leaders exert influence on audience behavior via their personal contact, but additional intermediaries called change agents and gatekeepers are also included in the process of diffusion”. The few ICT officers are the change agents and gatekeepers and should play a major role in adoption of ICT. The department of human resource management is the best placed to implement this recommendation in conjunction with the Public Service Commission where additional officers are required.

#### **5.4.2.4 Lobby for increased budgetary allocation**

The e-government standards in Kenya require that the budgetary allocation for ICT is progressively increased to 10% of the total budget. Not much can be achieved if the ministry continues operating at the current 2% budgetary allocation. Considering the proposal to fast track adoption of e-government standards, there is need to enhance the budgetary allocation.

It will be much easier to convince the National Treasury if proposals relating to ICT are presented as a package and not isolated items. The trend so far has been to acquire computers and software apart from their routine maintenance. This should change to an approach whereby the funding proposals emphasize the benefits of the hardware and software ie the utility value of the equipment to acquire.

The ICT policy and strategy if well prepared will come in handy as tools to justify higher budget demands. The two documents will be bargain tools to make it easier for National Treasury and even development partners to see the need for higher investment in ICT at the ministry. Basically, the financiers should be able to see the long term benefit of the hardware and software being acquired. The ministry’s planning officers are the best placed to accomplish this undertaking.

### **5.4.3 Long term recommendations**

Long term recommendations reflect where the ministry should be in terms of strategy. Their implementation will take longer than the first two categories. These recommendations include the following;

#### **5.4.3.1 Undertake continuous capacity building**

Whereas the ICT literacy level is quite high, it is important to undertake continuous capacity building given the dynamic nature of ICT in terms of both hardware and software. Training undertaken more than three years ago may not assure proficiency in the use of current hardware and software. It is generally known that training rejuvenates staff performance and positively impacts their motivation.

Apart from the training undertaken by staff in training institutions, the ministry should consider using the ICT experts within to offer refresher programs to other staff. In-house training is easier to organize and is also more affordable. The approach is in concurrence with Rogers's theory of diffusion of innovations which in part says that "most people seek out others like themselves who have already adopted the new idea. Thus the diffusion process consists of a few individuals who first adopt an innovation, then spread the word among their circle of acquaintances". The ICT officers should keep themselves up-to-date and cascade their skills and knowledge to other staff in the ministry. However, the overall responsibility lies with the human resource development unit in the ministry.

#### **5.4.3.2 Digitize records**

Digitizing information makes it easier to preserve, access, and share. Digitized documents can be accessed from any computer with an internet connection, which can reduce or eliminate the staff movement time and even expenses. The paper based records are not easy to share by use of ICT. Therefore to enhance provision of information by use of ICT, the ministry should digitize the records. It is gratifying to note that that one of the activities planned to improve the use of ICT in provision of information at the ministry was to increase the percent of Ministry data which has been digitized and is accessible against total number of manual records kept.

Digitization is highly dependent on availability of appropriate hardware and software. The basic hardware the ministry should acquire includes computers and scanners. The

computer should have enough memory to process large images, high-speed data ports to connect to the scanner and monitors to support high quality. A flatbed scanner will suffice for every department. Each scanner comes with its own software for interfacing with the scanner. The software should be bundled with the scanner by the manufacturer thus giving little choice once a scanner has been selected.

The provision of information in the sources named can actually be enhanced by the use of ICT. The cost of providing the same information can be drastically reduced and the same information can reach more people in a shorter time if ICT is appropriately used. Digitization of records within the ministry should be spearheaded by the records management officers but with the support of all departmental heads.

#### **5.4.3.3 Change the institutional culture**

The use of ICT to provide information can only be enhanced if there is a change in institutional culture. The culture at the Ministry of Education, Science and Technology – Kenya is to provide information using paper based channels. There should deliberate efforts to change how information is provided.

Such change is more effective if it starts at the top. Rogers's theory of diffusion of innovations emphasizes the role of opinion leaders in determining the likelihood that an innovation will be adopted. The opinion leader in this case is the Cabinet Secretary who can exert his influence through the Principal Secretaries down to the Directors of departments.

ICT officers who are the change agents and gatekeepers will play a major role in adoption of new technology. If they are deployed to departments as proposed in section 5.4.2.3 above, they should be able to positively influence the institutional culture because they will be closer and more available to other staff in the ministry.

### **5.5 Chapter summary**

The chapter presents the findings, conclusion and recommendations of the research. It was found out that ministry staff can use ICT with minimum challenges; ICT can be used to provide information required by staff; social media has not been adopted for official communication; the ICT literacy level was quite high; the ministry is in the process of adopting e-government standards; and the ICT infrastructure is

satisfactory. The researcher concluded that there is room for ICT to be used in the ministry to enhance the provision of information to staff. Based on the findings, the following recommendations were made: improve the staff to computer ratio; adopt continuous capacity building in ICT; maximize use of available ICT resources; digitize records; subscribe to e-resources; automate the registries and resource centre; embrace social media; deploy ICT staff to departments; fast track adoption of e-government standards; develop and disseminate the ICT policy and strategy; change the institutional culture; and lobby for budgetary allocation.

### **5.6 Suggestions for further research**

ICT is a highly dynamic area of study. The ever changing hardware and software renders what is considered modern today obsolete tomorrow. Therefore a study on the use of ICTs in provision of information still leaves a lot room for further research. In the course of this study, the researcher came across related areas which need further interrogation. The specific topical areas include the following:

1. Organization of government ministry resource centers
2. The use of electronic journals/ e-resources in government ministries
3. Information audit/ User needs analysis in government ministries
4. Staffing of libraries in government ministries
5. Standards for information provision in government ministries
6. The use of social media in government ministries

Generally, the provision of information in government seems to be driven by individual information officers where they exist instead of articulate policies. The existent national policies mostly address ICT thus giving little or no attention to library and records management.

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**APPENDIX 1: INTERVIEW SCHEDULE FOR STAFF**

USE OF ICT IN PROVISION OF INFORMATION TO STAFF AT THE  
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

**SECTION A**

**BIO DATA**

1. What is the name of your department?  
.....
2. What position do you hold in the Ministry?  
.....
3. How long have you worked for the Ministry? (Less than 1 yr) (1 – 3 yrs)  
(4 – 6 yrs) (More than 6 yrs)
4. (a) In which age bracket do you fall? (Below 30) (31 – 39) (40 – 45) (Above 45)  
(b) What is your educational level? (O-level) (Certificate) (Diploma) (Degree) (PG)  
(c) Which is your area of specialization?  
.....
5. Briefly describe your nature of work  
.....  
.....  
.....

**SECTION B**

6. For what use do you need information in your course of duty?  
.....  
.....  
.....
7. What information sources are available in the ministry to satisfy the information needs mentioned in (5) above?  
.....  
.....  
.....

8. (a) Are the available information sources satisfactory to your information needs? .....

(b) If the answer to 7(a) is “No”, which additional information resources would you recommend to be acquired?

.....  
.....  
.....

9. (a) Which ICT facilities are available to you at your place of work?

.....  
.....  
.....  
.....

(b) Which additional ICT facilities would you recommend to be acquired?

.....  
.....  
.....  
.....

10. (a) Have you undertaken any ICT related course? Yes [ ] No [ ]

(b) If the answer to 10 (a) is ‘Yes’, name the course you undertook  
.....

(c) When was the course undertaken? Within the last 2 yrs [ ] In the last 3 – 5 yrs [ ] More than 5 yrs [ ]

11. How do you seek for information in the ministry? Internet [ ] Consulting others [ ] Resource Centre [ ] Registry [ ] Any other (please specify)

.....  
.....  
.....  
.....

12. What methods do you use for sending and receiving official information in the ministry?

.....  
.....  
.....

13. Suggest other methods you would wish to use for communicating official information in the ministry

.....  
.....  
.....

14. Explain the challenges faced when using ICT at the ministry

.....  
.....  
.....

15. (a) Are you on social media? Yes [ ] No [ ]

(b) If ‘Yes’, do you use your real name or pseudonym?

(c) Comment on the use of social media for official communication .....

.....  
.....  
.....

16. Is the support provided by the ICT staff adequate?

.....

17. What measures can be put in place to improve the use of ICT in provision of information at the ministry? .....

.....  
.....  
.....

**APPENDIX 2: INTERVIEW SCHEDULE FOR KEY INFORMANTS**

USE OF ICT IN PROVISION OF INFORMATION TO STAFF AT THE  
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

**SECTION A**

**BIO DATA**

1. What is the name of your department?  
.....
2. What position do you hold in the Ministry?  
.....
3. How long have you worked for the Ministry? (Less than 1 yr) (1 – 3 yrs)  
(4 – 6 yrs) (More than 6 yrs)
4. (a) In which age bracket do you fall? (Below 30) (31 – 39) (40 – 45) (Above 45)  
(b) What is your educational level? (O-level) (Certificate) (Diploma) (Degree) (PG)  
(c) Which is your area of specialization?  
.....

**SECTION B**

5. What information sources are available in the ministry  
.....  
.....  
.....
6. Which additional information resources would you recommend to be acquired?  
.....  
.....  
.....
7. (a) Which ICT facilities are available to you in the ministry?  
.....  
.....  
.....

(b) Which additional ICT facilities would you recommend to be acquired?

.....  
 .....  
 .....

(c) What is the current staff to computer ratio in the ministry?

.....

8. Does the ministry have an ICT strategy?

.....

9. (a) Has the ministry digitized any of its records? Yes [ ] No [ ]

(b) If ‘Yes’ What percent of ministerial data has been digitized and is accessible against total number of manual records kept?

.....

10. Does the Ministry have a LAN? Yes [ ] No [ ]

11. What security measures have been put in place to protect information in the network?

.....  
 .....

12. (a) Have you undertaken any ICT related course? Yes [ ] No [ ]

(b) If the answer to 9 (a) is ‘Yes’, name the course you undertook

.....

(c) When was the course undertaken? Within the last 2 yrs [ ] In the last 3 – 5 yrs [ ] More than 5 yrs [ ]

13. (a) Do you offer ICT training to ministry staff? Yes [ ] No [ ]

(b) If ‘Yes’, what kind of training is offered? .....

.....  
 .....

14. What methods do you use for communicating official information in the ministry?

.....  
 .....  
 .....

15. Suggest other methods you would wish to use for communicating official information in the ministry .....

.....  
.....

16. Explain the challenges faced by staff when using ICT at the ministry

.....  
.....  
.....

17. What plans are there to improve the use of ICT in provision of information at the ministry?

.....  
.....

18. Comment on the budgetary allocation for ICT in the ministry

.....  
.....

## **APPENDIX 3**

# **Letter of Introduction from Moi University**



MOI UNIVERSITY

SCHOOL OF INFORMATION SCIENCES

Tel. 053-43720, 43620, 43231(Dean)

Fax No. 053-4304, 43360

Telex No. MOIVERSITY 35047

Email: [deanis@mu.ac.ke](mailto:deanis@mu.ac.ke)

P.O. Box 63056-00200

NAIROBI

Kenya

Our Ref: MU/NRB/IS/SA/14

11<sup>th</sup>, October, 2013

**THE SECRETARY**  
**NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY,**  
**P.O. BOX 30623-00100,**  
**NAIROBI**

Dear Sir/Madam,

**RE: TIMOTHY NYONGESA KATIAMBO      REG. NO. IS/MPHIL/032/011**

The above named person is a bona fide student of Moi University, Nairobi Campus, School of Information Sciences, pursuing Master of Philosophy in Information Sciences.

Timothy has successfully defended his Thesis proposal entitled: "Use of Information Communication Technologies in Provision of Information to Staff at the Ministry of Education, Science and Technology".

Any assistance accorded him will be highly appreciated.

For further information, please contact the undersigned.

for 

**James Kimutai**  
**School of Information Sciences**  
**Nairobi Programme Coordinator**



## **APPENDIX 4**

# **Application for Authority to conduct research in Kenya**



FORM A (Revised 2009)

REPUBLIC OF KENYA

MINISTRY OF HIGHER EDUCATION, SCIENCE AND TECHNOLOGY

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

P.O. BOX 30623-00100

NAIROBI

APPLICATION FOR AUTHORITY TO CONDUCT RESEARCH IN KENYA

*(To be completed by Kenyans)*

## PART I

*(Notes to be read before completing the Forms)*

1. An application for a research permit must be submitted in **two(2)** copies to reach the Executive Secretary, National Council for Science and Technology, P.O. Box 30623-00100, Nairobi, Kenya (herein referred to as NCST) at least **one month** before the date the Applicant intends to start conducting the research in Kenya.
2. The research clearance application forms must be accompanied by the following:
  - (a) Comprehensive curriculum vitae of all the applicants (**2 copies**).
  - (b) A comprehensive project proposal, including details of objectives, hypothesis, literature review, methodology and envisaged application of the research results (**2 copies**).
  - (c) A letter from the sponsor, if any (**2copies**) (*Sponsor is the person or body providing primary financial and or material support towards the project*).
  - (d) A copy of National Identity Card.
  - (e) Two current passport-size photographs of the Applicant(s) duly endorsed by the Sponsor or Referee.
  - (f) Non-refundable research application fees payable to the Executive Secretary, National Council for Science and Technology, P.O. Box 30623-00100, Nairobi.
 

i. Student Attachment/Undergraduate/Diploma.....	Ksh.100.00
ii. Research (Academic) MSc.....	Ksh.1,000.00
iii. Research (Academic) PhD.....	Ksh.2,000.00
iv. Research (Individual/Post Doctoral).....	Ksh.5,000.00
v. Research (Public Institutions).....	Ksh.10,000.00
vi. Research (Private Institutions/Companies).....	Ksh.20,000.00
vii. Extensions.....	Half of the rate concerned.
3. An Applicant who has been permitted to conduct research in Kenya must undertake to deposit **two (2) bound copies** of his/her research report/thesis with the NCST on completion of the research. If the research is to be completed outside Kenya, the raw, unfinished material must be endorsed by the affiliating institution and the relevant Government office before such materials may be taken out of Kenya. The final research reports must be submitted within a year from the date indicated as the completion date on this application form unless an extension has been approved in writing by the NCST.
4. For projects which take longer than a year, **two (2) copies** of yearly progress report, duly endorsed by the affiliating institution, must be submitted to the NCST.
5. Any loss or damage to materials or documents made available to a researcher must be made good by him/her.



6. Materials, specimens, information or documents obtained in the course of the research work must not be used or be disposed of, in a manner prejudicial to the interests of the Republic of Kenya.
7. Research association/affiliation with a relevant Kenyan research institution intended or finalized, must be shown on this application form (see Part II, No.4). It is the applicant's responsibility to negotiate for the affiliation and provide the necessary documentary evidence of this affiliation. No Research Permit will be issued until the affiliation is confirmed. A list of institutions approved for affiliation purposes is appended.
8. For short and medium-term projects, the research permit will be issued for a period **not exceeding two (2) years**, with a provision for renewal for a further one year. An application for renewal shall be submitted to the NCST at least **two (2) months** before the expiry of the permit, a renewal fee of half of the original fee, shall be paid.
9. For long-term projects taking more than three years, Applicants are advised to request for guidance and further information from the NCST before submitting their application.
10. The Government of Kenya will have access to Data and Research premises of the Projects.
11. Persons who have not submitted satisfactory final reports/thesis on the previous research work in Kenya may not be cleared for new projects.
12. Attention is drawn to the sponsoring institutions and referees on the shared responsibility of making sure that researchers sponsored by them observe the foregoing regulations. A breach of the regulations could result in refusal of permits for other researchers sponsored by same institutions or referees.

#### PART II

(To be completed by the applicant)

##### 1. Personal Information

- (a) Surname of the Applicant... NYONGESA .....
- (b) Other Names... TIMOTHY KATIAMBO .....
- (c) National Identification Number (ID No.) ... 10858174 .....
- (d) Permanent Residence Address .....
- .....
- (e) Postal Address... PO. Box 9583 - 00200, NAIROBI .....
- (f) Contacts: Telephone... 0722 290 238 ..... Fax .....
- E-mail... timkatiambo@yahoo.com .....
- (g) Age... 42 ..... Sex... M .....
- (h) Qualifications... BSc. (Information Sciences), PGDE .....
- (Please attach the above details for other research staff and their curriculum vitae)

##### 2. Personal References



(Give names and full addresses of two senior academic/professional Referees. These should be professionally qualified in the field of research which the applicant wishes to undertake).

(i) Name PROF. CEPHAS ODINI  
 Address BOX 3900, ELDORET  
 Occupation PROFESSOR OF INFORMATION SCIENCES - MOI UNIVERSITY  
 Contacts: Tel: 0733 506 323 Fax.....  
 E-mail: Cepodini@gmail.com  
 Date 27/8/13 C Odini  
 (Referee's Signature)

(ii) Name MR. JUNCAN AMOTH  
 Address BOX 3900, ELDORET  
 Occupation LECTURER - INFORMATION SCIENCES - MOI UNIV.  
 Contacts: Tel: 0722 792834 Fax.....  
 E-mail: duncanamoth@yahoo.com  
 Date ..... M Amoth  
 (Referee's Signature)

3. (a) Have you applied for a Permit to conduct research in Kenya before? Yes/No

(b) Title of the research (if any) previously applied for ... N/A

(c) The application was approved/rejected vide the NCST's letter Ref. No. ... N/A

.....Dated ... N/A

4. (a) Have you sought affiliation with a Kenyan Institution approved for affiliation purposes?

Yes/No..... YES.....if yes, please give name of institution... MOI UNIVERSITY  
SCHOOL OF INFORMATION SCIENCES

(b) If No, you should seek research affiliation with a relevant approved Kenyan institution and provide name of the Institution (A list of Institutions approved for affiliation is appended). Affiliation is mandatory before a permit can be issued. It is the responsibility of the researcher to look for such affiliation at own cost, if any.



Note-- Affiliation is not required for researchers under approved bilateral or multilateral aid schemes.

5. Name of University/ Organization under which the research Project is being undertaken  
MOI UNIVERSITY
6. (a) Source(s) of Finance
- (b) Amount
7. Title of the research project USE OF INFORMATION COMMUNICATION TECHNOLOGIES IN PROVISION OF INFORMATION TO STAFF AT THE MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
8. Purpose of the research (e.g. MSc., PhD., Post-Doctoral, others (specify))  
MPHIL
9. Location of Fieldwork: Location/Division  
District SIREHE Province NAIROBI
10. Estimated period of the project: from AUGUST 2013 to DEC 2013
11. I will need access to the following Public Records —
12. I will interview the following Government Officials ICT officers, Records Management officers
13. I will need to interview members of the Public whom I will select as follows:  
Staff of MoEST (10% per Directorate)  
(Please incorporate details of sampling procedures, if relevant in the description of your project).
14. I intend to use the attached copies of questionnaire(s) (if applicable)
15. I certify that I have read and understood the conditions given in parts I and III. I do agree to abide by them as required and that the information given by me in part III is correct to the best of my knowledge.
16. I Timothy Nyongesa Katiamba (Name) do agree to deposit two (2) bound copies of a final comprehensive report/thesis on my research project with the NCST within a year from the date indicated as the completion date of the project in No. 10 in part III above.  
Signature Katiamba Date 6/6/2013



PART III

(For official use by institution where research is undertaken)

- 1. Name of the institution: MOI UNIVERSITY
- 2. Recommendation by the Head of the institution: Highly recommended for issuance of a research permit

3. Name: DR. ISICE MARU

4. Position: DEPUTY DIRECTOR, NAIROBI CAMPUS

5. Official Stamp and Signature: [Signature] MOI UNIVERSITY

Date: 11/10/2013

DEPUTY DIRECTOR'S OFFICE  
P.O. Box 63055-00200 NAIROBI  
TEL: 020 211236 FAX: 020 2229247

PART IV

(For official use only)

- 1. Comments by NCST Specialist Sub-Committee

Date: \_\_\_\_\_ Chairman of the Sub-committee

- 2. NCST Research Committee Recommendations

- 3. Approved/Not approved.

Date: \_\_\_\_\_ Chairman, NCST Research Committee

## **APPENDIX 5**

**Research Permit No.  
NACOSTI/RCD/13/013/115**



PAGE 2

PAGE 3

Research Permit No. NACOSTI/RCD/13/013/115

Date of issue 25<sup>th</sup> November, 2013

Fee received KSHS. 1000

THIS IS TO CERTIFY THAT:  
Prof./Dr./Mr./Mrs./Miss/Institution  
Timothy Nyongesa Katiambo  
of (Address) Moi University  
P.O.Box 3900-30100, Eldoret.

has been permitted to conduct research in

Location  
District  
County

Nairobi



On the topic: Use of Information Communication  
Technologies in provision of information to staff  
At the Ministry of Education, Science and  
Technology

for a period ending 30<sup>th</sup> June, 2014.

Applicant's  
Signature

For: Secretary

National Commission for Science  
Technology & Innovation



# **APPENDIX 6**

## **Research Authorization**



**NATIONAL COMMISSION FOR SCIENCE,  
TECHNOLOGY AND INNOVATION**

Telephone: +254-20-2713371,  
2713366, 310371, 2719420  
Fax: +254-20-278245, 318246  
Email: [secretary@nacosti.go.ke](mailto:secretary@nacosti.go.ke)  
Website: [www.nacosti.go.ke](http://www.nacosti.go.ke)  
When writing please quote

9<sup>th</sup> Floor, Uhuru House  
Uhuru Highway  
P.O. Box 30023-00100  
NAIROBI-KENYA

Ref: No.

Date:

25<sup>th</sup> November, 2013

NACOSTI/RCD/13/013/115


Timothy Nyongesa Katiambo  
Moi University  
P.O.Box 3900-30100  
ELDORET.

**RE: RESEARCH AUTHORIZATION**

Following your application dated 15<sup>th</sup> November, 2013 for authority to carry out research on *"Use of Information Communication Technologies in provision of information to staff at the Ministry of Education, Science and Technology."* I am pleased to inform you that you have been authorized to undertake research in Nairobi County for a period ending 30<sup>th</sup> June, 2014.

You are advised to report to the Principal Secretary Ministry of Education, Science and Technology 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 office.

  
SAID HUSSEIN  
FOR: SECRETARY/CEO  
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Copy to:

The Principal Secretary  
Ministry of Education, Science and Technology.