MUNICATION TECHNOLOGY AS A STRATEGIC

APPROACH IN INFORMATION DISSEMINATION AT THE KENYA FOREST

RESEARCH INSTITUTE

BY

ESTHER MANYEKI

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# DECLARATION

This research study is my original work and has not been presented for the award of a degree in this university or any other institution of higher learning for examination.

Signature…………………………….. Date………

ESTHER MUGECHI MANYEKI

The research project has been submitted for examination with my approval as the University supervisor.

Signature…………………………….. Date………

MR. ELIUD MUDUDA

Lecturer

Department Of Business Administration

School Of Business

University Of Nairobi

# KNOWLEDGEMENTS

# DEDICATION

This work is dedicated to my parents Mr. and Mrs. Manyeki, my brothers Boni and Morris for their encouragement, moral and financial support that enabled me to complete the programme, and to my dear grandparents the late Mr. Humphrey Maina Maingi and Mrs. Esther Mugechi Maina, whose inspiration and guidance through the master's programme gave me the strength to continue.

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# ABSTRACT

Kenya has been grappling with many issues related to food security. This has seen some parts of the country experiencing periodic droughts year in year out. The world is also experiencing changing weather conditions due to factors such as global warming and climate change. This has mainly been blamed on declining levels of forest cover, as trees have been cut down to make room for growing populations. Kenya's forest cover stands at below 10%. Trees are viewed as a major solution to environmental challenges. It is for such reasons that the Kenya Forestry Research Institute carries out research in forestry and allied natural resources. Beyond carrying out research, there is a need for the research findings to be disseminated to the public, for it to be beneficial to the populace and to meet the purpose of the research. There are various methods used to disseminate forest research information. Information and communication technology provides a mechanism through which research information can be disseminated in a speedy, efficient, effective and reliable manner. This study sought to establish the nature of Information and Communication Technology as a tool for information dissemination, and to determine the extent to which Information and Communication Technology has been applied by the Kenya Forestry Research Institute for information dissemination purposes. The study collected primary data using an interview of individuals in policy making positions at the Kenya Forestry Research Institute. The study found that, there is application of information and communication technology at the Kenya Forestry Research Institute, and individuals at the policy making level have adequate training to use and implement information and communication technology for information dissemination. The study concluded that, while information and communication technology has been employed at the Kenya Forestry Research Institute, the avenues it presents for disseminating research information have not been exploited optimally. The study recommended an increase in the use of information and communication technology for disseminating research information.

# ER ONE: INTRODUCTION

## 1.1 Background of the study

The technological revolution that started in the late 20<sup>th</sup> century is transforming the world in a profound way. Thus, if well harnessed, information and communication technology has the potential to improve various aspects of our society. This transformation has permeated all sectors of the society, and forest research institutions cannot afford to be left behind. The United Nations Conference on Environment and Development (UNCED) and the United Nations Forum on Forests (UNFF) recognize the invaluable need for provision of high quality forest information, for sustainable management of forest resources (Sraku-Lartey, 2006). In the 21<sup>st</sup> century, Information and Communication Technology is at the core of all human activities, and the swiftness of sharing and accessing information determines the success of any institution (Dembner, 1995).

Information and Communication Technology refers to the use of computers, microchips and microelectronics, multimedia, telecommunication technologies such as the satellite, mobile technologies, broadcasting networks and technologies such as radio, television and biotechnology related information. Generally, this means integrating elements of computers, telecommunications, communications technologies and networks and other multimedia development and delivery technologies, to form a cohesive multimedia transmission and communication delivery infrastructure and platform with a national and global reach (Dzidonu, 2010).

nstitute has been facing a challenge in bridging the gap between the research work done at the institute, and the information available to the public for implementation. Various researches have proven that trees can be used to produce other products apart from furniture, decorating and making rain. These include making soaps, body lotions, baking flour, French fries and other edible products. In a country that experiences regular food shortages, people need to be informed on how to use trees as a substitute for the perennial maize and beans (KEFRI, 2013).

### 1.1.1 Concept of strategy

Strategy refers to the direction and scope of an organization over the long term, which enables the organization to achieve a competitive advantage in a changing environment. Strategy refers to a plan, method or a series of manoeuvres to achieve a specific goal. This can be achieved through its configuration of resources and competences with the aim of fulfilling stakeholder expectations (Mintzberg, 2001). Strategy is concerned about where the organization is trying to get to in terms of its direction, scope, advantage, resources, environment and stakeholders. The aim of a strategy is to steer the direction of the overall organization. This affects the long-term well-being of the organization, as it has a long time horizon, usually measured in years. In addition, a strategy has an impact that is felt throughout the entire organization rather than within a single component of the organization.

Strategy builds on and exploits to the fullest extent the organization's resources and abilities, to create the best possible fit between the organization, its mission and the

onment. Strategic decisions require major resource commitments, and may also affect other collaborating institutions (Mintzberg, 2001). A strategy is distinguished by the strength of the organization's commitment to it and reluctance with which it considers changing it. For organizations in a competitive environment, a strategy is frequently aimed at gaining an advantage over competitors. A strategy is future oriented and marked by uncertainty and risk, as it calls upon the organization to do something that it is not doing now (Jones & Bartlett, 2008). This inevitably requires change, sometimes profound, in many aspects of its operations. A successful strategy is the result of an integrated or collaborative effort by many parts of the organization.

## 1.1.2 Strategic approaches

A successful firm's strategy must be favorably aligned with the external environment. Strategic human resource management is one of the strategic approaches that can be used for information dissemination. This can be achieved by utilizing the available human resource, for example scientists, to carry out education of the public as a means of disseminating research information (Boeckmann, 2010 and Armstrong, 2006). Strategic intent as a strategy to information dissemination is achieved by the organization defining what the organization intends to achieve, how and when. It is based on the leadership position to be employed (Armstrong, 2006).

Knowledge management refers to any process or practice of creating, acquiring, capturing, sharing and using knowledge, wherever it resides, to enhance learning and

Mintzberg, 2001). The strategic approach of a learning organization is where an institution uses methods such as internships, craftsmanship, associations, understudy and tutorship, to pass on knowledge from an experienced individual to another (Balaji, 2011). This is vital in ensuring continuity of the organization, and ensuring that projects are not dependent on certain individuals, who in most cases are the initiators of the projects.

### 1.1.3 Information dissemination

Information dissemination refers to the distribution of information to the general public by an agency that is mandated to release information for any public sector. The information released to the public is regulated by the government in terms of its content and quality of content (Chiabai et-al, 2010). Scientists and forest managers often rely on printed material in the form of books, journals, conference proceedings and newsletters to provide up-to-date information relevant to their work. The ability of the scientists to access of this information varies greatly depending on the individualøs location and availability (Mungai, 2005). Ability to disseminate hard copy information is challenged by issues such as the cost of making and distributing the printed material, language barriers, literacy of the individual accessing the manuals.

Information dissemination is far more than the simple distribution of paper or products. Rather, it is a process that requires a careful match of the creation of products or knowledge, and the context of that creation, the needs, contexts, prior experiences, values, and beliefs of target audiences, and the content, media, formats, and language

into the hands, minds, and activities of those target audiences. The goal of information dissemination should be utilization (CIARD, 2012). Therefore, the outcome must be critically and thoroughly digested, and the individual (or organization) must fit the new information with their prior understandings and experience. Effective dissemination is significantly linked to the timeliness and comprehensiveness of information.

The information and communication technology methods that can be applied in information dissemination include using the internet, which is an electronic network linking people and information through computers and other digital devices, allowing person-to-person communication and information retrieval. This is reinforced by the fact that there are about 600 million people connected to the Internet, and another 31 million Kenyans have access and use mobile phones. Mobile technology is another approach that can be employed. This is especially considering that there are about 30 million Kenyans using the mobile phone. Virtualization is another approach, which enables users to access data locally even when they do not have the software needed for the data. The cloud computing concept, where resources, both hardware and software can be shared by users in diverse locations.

The benefits of information dissemination are sensitizing the public on the importance and relevance of forest information, to provide practical information for problem solving and environment management, to spread awareness on the research findings on forestry, to assist communities in identifying markets for their forest produce, products, and skill sets, and introducing and publicizing such produce and products in the identified markets,

...nt market data on best market prices for forest products (Garvey, 2010).

### 1.1.4 Research organizations in Kenya

Kenya Agriculture Research Institute which is an institution that brings together research programmes in food crops, horticultural and industrial crops, livestock and range management, land and water management, and socio-economics.

International Centre for Research in Agroforestry conducts research in agroforestry so as to address both the need for improved food security and increased resources for energy, as well as the need to sustainably manage agricultural landscapes for the critical ecosystem services they provide.

The International Livestock Research Institute is a research organization that carries out research aimed at improving food security and reducing poverty in developing countries through research for better and more sustainable use of livestock.

International Centre of Insect Physiology and Ecology is mandated to help alleviate poverty, ensure food security and improve the overall health status of peoples of the tropics by developing and extending management tools and strategies for harmful and useful arthropods, while preserving the natural resource base through research and capacity building.

Nyayo Tea Zones Development Corporation is a research organization mandated to protect the gazetted forests from human encroachment by establishing continuous belts of

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species, which acts as a buffer between forests and communities living adjacent to the forests. The tea zones not only help to protect the forests but also in the rehabilitation of ecologically fragile areas.

### 1.1.5 Kenya Forestry Research Institute

The Kenya Forestry Research Institute is a state corporation established in 1986, under the science and Technology Act (Cap 250) of the Laws of Kenya. The Act has since been repealed by the Science, Technology and Innovation (STI) Act No. 28 of 2013. Kenya Forestry Research Institute undertakes research in forests and allied natural resources. The institute conducts research and development activities under five thematic areas namely: Forest productivity and Improvement theme, Biodiversity and Environment Management theme, Forest Products Development theme, Social-economics, Policy and Governance theme, Technical Support Services theme, and the Enterprise division.

The Kenya Forestry research Institute works through sub regional centers known as eco-regional centers. Each center represents a forestry eco-region, and carries out research to support forestry activities within the region. The eco-regional centers include the Central Highlands Eco-region Research Programme (CHERP), the Forest Products Research Centre (Karura), the Dry lands Eco-region Forestry Research programme (Kitui), the Rift Valley Eco-Region Forestry Research programme (Londiani), Lake Basin Eco-Region Forestry Research Programme (Maseno), and the Coastal Eco-Region Forestry Research Program (Gede).

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The advance in the use of the internet and mobile phone technology in Kenya provides an avenue for reaching the public, in a timely and cost effective manner. Information and Communication Technology also provides a solution for generating and disseminating higher quantity and quality information, to facilitate decision making, and enhancing linkages with other researchers (Sraku-Lartey, 2006). Global challenges of climate change and global warming, and their consequences, necessitate distribution of research information in a faster way. Forestry plays a key role in mitigating on climate change, which is a key cause of food scarcity and increased aridity in Kenya. There is also an urgent need to inform the citizens on the various uses of forests for food production and manufacture of household products such as oils and soaps.

A number of studies have been carried out on forestry and Information and Communication Technology. However, none of the studies addresses the issue of disseminating forestry research information. Kenya Agricultural Research Institute developed the Kenya Agricultural Information Network (KAINet) system, which is used to by agricultural researchers to share agricultural information (CIARD, 2012). Pitkanen (2013) targeted on enhancing research and extension for sustainable management of natural resources. The aim of the study was to improve forestry education at universities in Kenya. Mungai, (2005) addressed the issue of using forestry to enhance poverty reduction in Kenya. (Gachanja et-al, 2011) addresses the issue of using information and communication technology for forestry sector reform and governannce.

is given to environmental management and the consequences of poor environmental management (Chiabai, 2010). Nsita, (2010) focused the need for using information and communication technology to speed up forest law enforcement in Uganda. Bamgbade et-al, (2012) broadly studied on the diverse ways in which information and communication technology can be applied in agroforestry, but exempted the concept of information dissemination.

The significance and use of information and communication technology to Agroforestry practices in the 21st century is of remarkable value. These studies do not concentrate on the information dissemination aspect of information and communication technology. It is with this background that this study asks the question: to what extent has the Kenya Forestry Research Institute applied information and communication technology as a strategic approach in its information dissemination?

## 1.3 Research objectives

The objectives of this study are;

i) To establish the nature of Information and Communication Technology as a tool for information dissemination.

ii) To determine the extent to which Information and Communication Technology has been applied by the Kenya Forestry Research Institute for information dissemination purposes.

Decision makers at various levels of management at the Kenya Forestry Research Institute will gain value added information on adapting business strategy in response to changing environment. For example, the managers responsible for strategy may use the findings to formulate effective monitoring and control systems to mitigate challenges for adopting this business strategy.

Academics and business researchers will be able to borrow from the findings of this research to support literary citations as well as develop themes for further research. Specifically, the study hopes to make theoretical, practical and methodological contributions. The findings will contribute to professional extension of existing knowledge in business strategy management, by helping to understand the current challenges for adopting strategy and their effects on environmental response in various organizations in general.

Non-governmental organizations and donors can use the findings from this research to aid them in implementing their organizational strategies, and determining the need for funding projects. The findings will also enable the business people to appreciate how the relationship between strategy and structure contributes to a firm's performance in a changing environment.

# TWO: LITERATURE REVIEW

## 2.1 Introduction

This section draws on literature in the area of business strategies in response to changing environment. Secondary materials such as books, journals, websites and articles which carry previous research work on the study topic are analyzed. The material is of importance to this study as it forms a basis for observations which will be made during the study in line with the study aims and objectives.

## 2.2 Theoretical foundation

Dissemination is far more than the simple distribution of paper or products. Rather, it is a process that requires a careful match of the creation of products or knowledge, and the context of that creation, the needs, contexts, prior experiences, values, and beliefs of target audiences, and the content, media, formats, and language used in getting the outcomes into the hands, minds, and activities of those target audiences. This is in line with the knowledge management theory (Gray, 2013). The goal of information dissemination should be utilization. Therefore, the outcome must be critically and thoroughly digested, and the individual (or organization) must fit the new information with their prior understandings and experience (Mungai, 2005). Effective dissemination is significantly linked to the timeliness and comprehensiveness of information.

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**theory**

Scientific knowledge generated through research is key to sound forest policy formulation and sustainable forest management. Yet forestry research faces tremendous challenges due mainly to inadequate institutional capacities, and human and financial resources for research (Dembner, 1995). Making the forestry information generated through research accessible is also a great challenge. So much information is being generated in diverse areas of forestry that great skill is needed to manage such information effectively. Efforts are being made under several initiatives to mobilize forestry information in order to make it accessible (Sraku-Lartey, 2006). Changes in the world of forestry, which include increasing alarm for sustainable and more diversified management of forest ecosystems encompassing wood and non-wood products and benefits, are resulting in new demands on the sector and in the expansion of the people involved in forest management.

## 2.2.2 Network theory

The network theory, identifies a  need for recognition of the important role of multiple partnerships in sustainable forest management - including local people, non-governmental organizations (NGOs) and the private sector as well as governments - is resulting in an expansion of the audiences for forestry information and in a need for communication based on dialogue, feedback and flexibility (Dembner, 1995). Simultaneously, technologies are evolving, offering new, more extensive, often faster and more cost-effective tools for the exchange of forestry information (CIARD, 2012). Video,

ing and networking offer exciting opportunities. The emerging new demands for information are related to the nature of appropriate communication strategies.

### 2.2.3 Empirical review

Cloud computing, also called the cloud, is a type of computing that relies on sharing computing resources rather than having local servers or personal devices to handle applications. It is a type of Internet-based computing, where different services such as servers, storage and applications are provided to an organization's computers and devices through the Internet. The goal is to apply traditional supercomputing power to perform multiple computations per second, so as to deliver personalized information, to provide data storage or to power large, immersive computer games. This shared infrastructure contains large pools of systems that are linked together. Often, virtualization techniques are used to maximize the power of cloud computing (Lorenzo, 2012).

Virtualization is the creation of a virtual (rather than actual) version of something, such as an operating system, a server, a storage device or network resources. Operating system virtualization is the use of software to allow a piece of hardware to run multiple operating system images at the same time. The goal of virtualization is to centralize administrative tasks while improving scalability and workloads. The types of virtualization include network virtualization where available resources are combined thus information is accessed in real time. Storage virtualization is the pooling of physical storage from multiple network storage devices into a single storage device as used in storage area

...ization which is the masking of server from server users to enable sharing (Lorenzo, 2012).

Mobile phone technology is the most advanced information and communication technology that can be employed in Kenya. A cell phone is an extremely sophisticated radio. With 95% penetration, mobile phones are the most lucrative tool for information dissemination. The Internet is a global system of interconnected computer networks that use the standard Internet protocol suite (TCP/IP) to link several billion devices worldwide. It is an international network of networks that consists of millions of private, public, academic, business, and government. The Internet carries an extensive range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), the infrastructure to support email, and peer-to-peer networks for file sharing and telephony (Lorenzo, 2012).

## 2.3 Information and communication technology

Information and Communication Technology refers to technologies that provide access to information through telecommunications. While it is similar to Information Technology (IT), it focuses principally on communication technologies (Gachanja, 2011). This includes the Internet, wireless networks, cell phones, and other communication mediums. Information and communication technology 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

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ns associated with them, such as videoconferencing and distance learning (Jones & Bartlet, 2008).

The importance of Information and communication technology lies less in the technology itself, than in its ability to create greater access to information and communication in underserved populations. Information and communication technologies provide society with new communication capabilities. Information and communication technologies have created a new "global village," where people communicate as if they were living next door. For this reason Information and communication technology is often studied in the context of how modern communication technologies affect society (Pitkanen, 2013). That access to and provision of high quality forest-related information is crucial to the sustainable management of the world's forest resources, was by recognized by both the United Nations Conference on Environment and Development (UNCED) and the United Nations Forum on Forests (UNFF), and seen as a priority for the implementation of Agenda 21 and the UNFF/IFF proposals for action. However, addressing this priority is a great challenge for developing countries, where significant investment in information and communication technologies (ICT) and information management strategies is urgently needed (Sraku-Lartey, 2006).

## 2.4 Dimensions of information dissemination

For research to be relevant, it must be linked to practice. Also, if research results are not accessible and usable by those who need them, they are of limited practical use. There are

dissemination (Thomas, 2004). There are four elements in the information dissemination process. These are as illustrated in the diagram below.

The dimensions of information dissemination
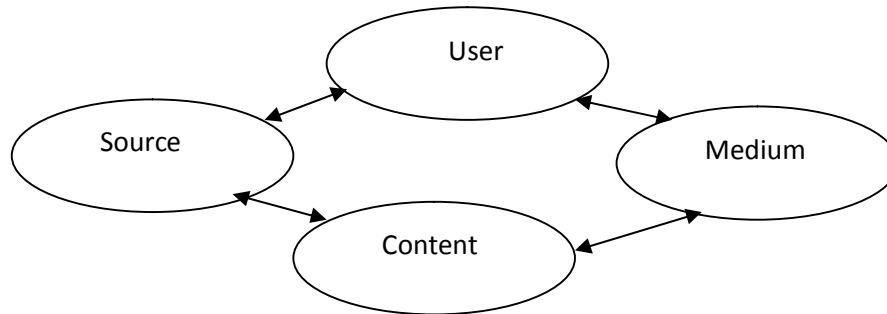


Source: Author.

The first dimension is the source. The source is the most important element in the information dissemination process. The source is guided by their relationship with the information to be disseminated, the potential users of the information, the credibility of the source and the strategies involved in improving the dissemination of the information (SEDL, 1996). The processes of conducting research and disseminating the results to potential users are manipulated by the source's personal experience and prior knowledge on the information they are disseminating. Researchers, in the process of disseminating their results, will operate within the guidelines of their values and assumptions, which may differ from the values and assumptions of their potential users. By explicitly stating how their values and assumptions potentially influence their results, researchers provide the opportunity to interpret and use results in ways that make the most sense to the intended users. Researchers who are not aware of their biases, or who do not inform their

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risk biasing their results, and affect the credibility of research (Gray, 2013).

The second dimension is content. The attributes of content that have the potential to influence adoption of the use of results include the quality of the content of results, the compatibility of users' needs and beliefs with the content of results, kinds of information that promote utilization of research results, and the comprehensibility of results. Some kinds of information are seen to be particularly important in promoting utilization of research results. For instance, emphasizing positive behaviours and current rewards, rather than negative consequences of current behaviour promotes use of information. (Davis, 1994) stresses that utilization is a process that takes time. The research content should take the user from awareness to understanding to commitment. This is vital in ensuring that the information is not only availed to the user, but provokes the user into utilizing it. A key issue in the dimension of content is the applicability of the information availed (Nsita, 2010). This is mainly due to the researcher lacking in focus on the area of research, thus the results may not be of relevance to the user. In this regard, disseminated research results must be comprehensible, capable of being inferred and used, if the information is going to be worthwhile for the user.

The third dimension is the medium of disseminating information, as it can either enhance or detract the information from utilization. The widespread use of small media, such as personal computers, mobile phones, the Internet and other electronic networks, have introduced new, cost-effective dissemination channels to an ever-expanding audience (Thomas, 2004). Direct personal interaction is considered to be the most important aspect

seminating information, and is most effective when the intended user is involved in the entire process of gathering and analyzing research data (Davis, 1994). A combination of media and interpersonal strategies is an important consideration in meeting the needs of a diverse audience when disseminating information.

The fourth dimension is the user of the information. The appreciation that individuals and groups are active participants in the consumption of knowledge is a vital aspect of disseminating research results to users. This means that, the information to be disseminated must be relevant to the user's daily life, and the intended user should be ready and willing to change. Relevance can be achieved by ensuring user involvement in the process of acquiring knowledge that guides the information, and the researcher ensuring that the information will impact on the user's daily life. Moreover, the user should be ready to incorporate the results in their personal plan (Sraku-Lartey, 2006). A vital task for disseminators is to understand the internal and external incentives that influence potential users to change.

The process of information dissemination can be relayed in a simulation model. The model begins with the disseminator (Agent Ai) selecting the type of information to be disseminated to a certain recipient, the disseminator then selects the way to communicate. This can be by posting a piece of new information or forwarding the information from others. If the agent chooses to forward a piece of old information, then the agent selects the information sender, then selects the information from the sender. Once the information has reached the intended recipient, the model updates the links of

e related parameters. The last step is vital as a point of reference (Yang et-al, 2010). Below is a diagrammatic description of the process of information dissemination, outlined as a simulation.

A simulation of the process of information dissemination
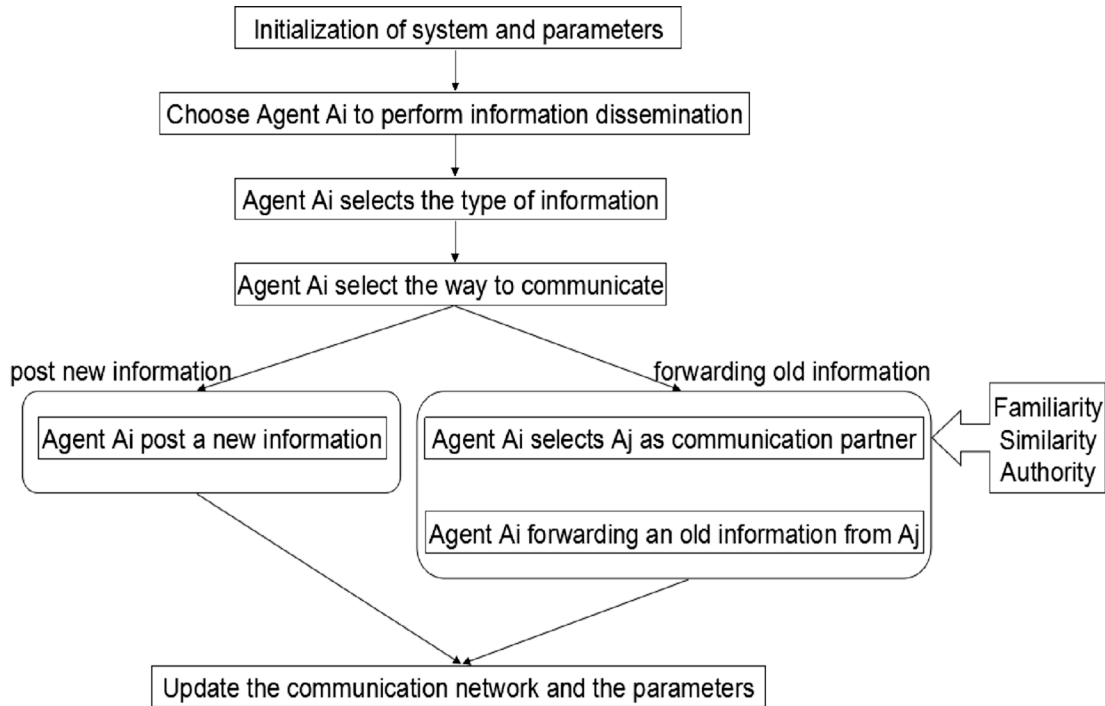


Source: (Yang et-al, 2010)

## 2.5 Challenges involved in using information and communication technology for information dissemination

The increasing demand for online facilities for forest information in Africa is creating a challenge in determining how to organize electronic systems efficiently and effectively. Some inexpensive approaches can contribute to a vibrant and cost-effective system of

nstance, continuous and regular updating of databases is essential. Active dissemination of existing information makes access to information better, quicker and cheaper (Sraku-Lartey, 2006). Service centres have been encouraged to use multiple formats for harvesting data so that as much information as possible can be covered. Applying metadata standards such as Dublin core and using standard thesauri are useful in developing a high quality database.

Another challenge is the geographic location of the researchers and the intended recipient of research findings. Information management personnel are located in different regions, and for a great part of the time, they work independently from the intended recipients (Sraku-Lartey, 2006). Furthermore, there is the challenge of human resource capacity. The inadequacy of skills affect the quality of information, a situation that is confounded by the lack of funds to train researchers and users on using information and communication technology tools to access and disseminate information.

The political structure of any government affects the extent to which policy makers recognize the value of information and communication technologies in creating a knowledge based society. Many developing countries are lagging behind in using information and communication technology for disseminating forest information (Rajesh, 2003). Such a situation also brings up the issue of infrastructural bottlenecks and high user charges on information and communication technology tools. For instance, it is very expensive in Kenya to use the internet, and also some areas lack network coverage. There is also a limited spread of information and communication technology tools such as television and radio, factors attributable to inadequate spread of energy supply.

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challenge in the use of information and communication technology for information dissemination (Rajesh, 2003). Developing countries lack the funds necessary to make meaningful investments in information and communication technology (SEDL, 1996). Also, developing countries acquire costly technology, but lack to implement the necessary supporting infrastructure. This renders the technology irrelevant.

Cultural factors also hinder the use of information and communication technology for information dissemination (Rajesh, 2003). For instance, language barriers hinder the assimilation of information in countries such as Kenya, where there are forty two tribes and lack of a way of translating all the information into the forty two languages. Information and communication technology are also affected by cultural beliefs, where some communities would demean some media of communication due to their norms. Cultural beliefs make policy makers either pro implementers or anti implementers, and cultural moorings make a community either reject or accept technology (Davis & Botkins, 1994).

Similarly, exposure to of information and communication technology influences an individual's acceptance of information (Thomas & Randhu, 2004). This is also influenced by literacy levels in a community. A community with a high level of literacy is more likely to be receptive of information presented using of information and communication technology, than one with low literacy levels.

## ...EE: RESEARCH METHODOLOGY

### 3.1 Introduction

The chapter discusses the research design, the methodology applied, sampling procedure, data collection and data analysis technique used in this study. The discussion in this chapter includes study limitations and other pertinent issues related to the study at hand.

### 3.2 Research Design

This research adopted as a case study approach. A case study is preferred because it enables the researcher to have an in-depth analysis of approaches to information dissemination employed by the Kenya Forestry Research Institute. This is crucial in identifying if information and communication can be employed as a strategic approach to information dissemination.

Research design refers to the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure (Saunders et-al, 2009). Research design is a systematic plan to study a scientific problem. It is also a detailed outline of how an investigation will take place. A research design typically includes how data is collected, what instruments are employed, how the instruments are used and the intended means for analyzing data collected.

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Data was collected using an interview guide which was administered to the heads of various research departments such as the deputy director in charge of technical support services, heads of units such as the Biotechnology department, field research coordinator, training coordinator, the head of corporate communication, and the head of information technology unit at the Kenya Forestry Research Institute as the informants.

The Interview guide was divided into three sections, and was administered by conducting an individual interview. This is a one-to-one interview between the researcher (Interviewer) and informant.

## 3.4 Data Analysis

Research questions was analyzed using content analysis. The data was first edited to identify the items wrongly responded to and spelling mistakes in the responses. Information was then categorized into topics. The data collected from the informants will be qualitative in nature (Gay, 1996)

The researcher used content analysis to analyze the data through describing phenomena, classifying it and seeing how the concepts interconnect as was indicated by the informants. This approach of analysis is preferred because it gives results that are predictable, directed, or comprehensive. Content analysis also enables the researcher to shift through large volumes of data with relative ease in a systematic fashion.

# A ANALYSIS, RESULTS AND DISCUSSION

## 4.1 Introduction

This chapter contains research findings and discussion of the same. The objective of the study was to establish the nature of Information and Communication Technology as a tool for information dissemination, and the extent to which the Kenya Forestry Research Institute has applied information and communication technology as a strategic approach in its information dissemination. This study targeted to interview seven (7) informants drawn from the head of departments that are involved in research and information dissemination. This is because they are the individuals charged with obtaining new research information and knowledge, and determining the appropriate information and communication technology that can be used for information dissemination. They are also involved in the formulation of policies at the Kenya Forestry Research Institute. All the targeted individuals were successfully interviewed, which represented 100% response rate.

## 4.2 Informants information

The informants were asked to answer some questions regarding themselves and the organization.

### 4.2.1 Designation of the informant

The informants were asked their designation. This is a represenation of the policy formulation level of the respondent. This included the individuals heading research and

rtments at the institute, who are in a position to advice the management on the appropriate approach for disseminating research information, and a member of the directorate who is incharge of adoption and implementation of policies through the technical support services.

One respondent is a deputy director, Technical Support Services, who receives requests and information from the heads of department, and advices the directorate accordingly. Five informants were heads of departments that are involved directly with the process of research and information dissemination.

**4.2.2 Period of service at the Kenya Forestry Research Institute**

The informants were asked the number of ears they have worked at the Kenya Forestry Research Institute.

One of the informants has worked at the Kenya Forestry Research Institute for a period of exceeding 20 years. The other informants have worked at the Kenya Forestry Research Institute for an average of 10 years. This means that they are in a position to provide relevant historical data on the nature of Information and Communication Technology as a tool for information dissemination at the institute, and the extent of the use of information and communication technology for information dissemination at the Kenya Forestry Research Institute.

**sure to information and communication technology**

The informants were asked to what extent they can use information and communication technology tools for information dissemination, and if they have received training.

All the informants have basic knowledge and exposure to using information and communication technology for information dissemination. This means that they are in a position to use information and communication technology tools for information dissemination. They also have a high level of understanding of the nature of Information and Communication Technology as a tool for information dissemination. The informants are also in a position to evaluate and explain the extent to which the Kenya Forestry Research Institute has employed information and communication technology for information dissemination.

## 4.3 Nature of information dissemination at the Kenya Forestry Research Institute

The informants were asked questions relating to their knowledge of tools used to disseminate information. They were also asked on the tools used at the Kenya Forestry Research Institute, and the extent of their use for information dissemination.

### 4.3.1 Information and communication technology policy on information dissemination

The informants were asked if the Kenya Forestry Research Institute has an information dissemination policy, which requires members to use information and communication technology to disseminate information?

he Kenya Forestry Research Institute has a policy on printing. The policy states that employees of the Kenya Forestry Research Institute should not print unless it is completely necessary. This means that, all information within the Kenya Forestry Research Institute should be transmitted through email communication, which is an information and communication technology tool.

**4.3.2 Informants knowledge of tools for information dissemination.**

The informants were asked to identify the information dissemination tools that they are aware of.

According to the informants, the methods of information dissemination they know of include; booklets and brochures, publication manuals, oral training through seminars and conferences, field training, institute open days, television, the internet through the institutions website, radio talk shows, trade fairs, social media such as Facebook and twitter.

**4.3.3 Information dissemination tools used by the Kenya Forestry Research Institute.**

The informants were asked the information dissemination tools used by the Kenya Forestry Research Institute.

According to the informants, Kenya Forestry Research Institute uses the following media to disseminate information; booklets and brochures, publication manuals, oral training through seminars and conferences, field training, institute open days, the internet through

national and international trade fairs, radio, television talk shows and social media sites.

### 4.3.4 Information and communication technology tools used in the information dissemination process.

The informants were asked to identify the information and communication technology tools used in information dissemination.

According to the informants, the institute uses the following information and communication technology tools for information dissemination; social media such as Facebook and twitter, television, radio, Email, computers,

### 4.4 The extent of the use of information and communication technology for information dissemination.

The informants were asked questions regarding the extent of use of information and communication technology tools for information dissemination at the Kenya Forestry Research Institute. Moreover, they were asked of their opinion on the viability of using information and communication technology tools for information dissemination.

### 4.4.1 Involvement in disseminating forest research information

The informants were asked if they have been involved in disseminating forestry research information.

All the informants said they are involved in disseminating forestry research information at the Kenya Forestry Research Institute. They are also involved in determining the

disseminate various types of information. In addition, they advise management on the tools to be used to disseminate information, and in formulation of information dissemination policies.

## 4.4.2  Extent of use of information and communication technology at the Kenya Forestry Research Institute.

The informants were asked if Kenya Forestry Research Institute uses information and communication technology for information dissemination, and to what extent they felt that information and communication technology tools are used at the Kenya Forestry Research Institute to disseminate information. The informants were asked to give a percentage rate at which they felt information and communication technology was used for information dissemination. All the informants said that the Kenya Forestry Research Institute uses information and communication technology for information dissemination.

According to the feedback received, none of the informants feel that the Kenya Forestry Research Institute exploits information and communication technology up to 100%. One respondent felt that the institute uses information and communication technology up to 80% for information dissemination. However, the other informants felt that only about 35% of information dissemination is done through information and communication technology.

**various tools of information and communication technology**

The informants were asked to identify the tools of information and communication technology they have used for information dissemination.

The informants indicated computers, the internet, social media, Email, databases mobile phone, television and radio, as the information and communication technology tools that they know. All the informants have used Email and computers. These are mainly for carrying out official duties and communicating within the office. Only 20 percent have used television, and 30 percent have used radio. Television and radio were used during talk shows that happened during events such as the launching of strategic plan and the Central Highlands research program. 70 percent indicated that they have used social media. This was by posting comments on twitter and Facebook. All the informants have a mobile phone.

**4.4.3 Level of success in disseminating intended information**

The informants were asked of their opinion on whether they felt that the use of information and communication technology for information dissemination was successful and to what extent. This is important in justifying the use of information and communication technology to disseminate forestry research information.

According to the informants, the use of information and communication technology tools to disseminate forestry research information was successful. This is because the process led to the effects increased sales revenue from the sale of the institute's products such as, timber products, tree seedlings and tree seeds, and usage of the institutes facilities such as

mmodation facilities, increased number of requests for information on forestry practices, wider reach of the information, reduced costs of disseminating information, increased partnerships and collaborations in research with institutions of higher learning and other similar organizations, increased stakeholder participation in the institute's activities, faster internal and external communication, increased interdepartmental coordination, improved efficiency and faster access to information.

### 4.4.4 Comparing other channels of information dissemination with information and communication technology

The informants were asked to compare between using other channels of information dissemination with using information and communication technology. This means to determine which method they would consider superior to the other, and provide their feedback on their opinion on the same.

The informants were in agreement that using information and communication technology is better and more effective than using manual channels of information dissemination that have been used in the past at the Kenya Forestry Research Institute.

### 4.4.5 Advantages of using information and communication technology for information dissemination?

The informants were asked on what benefits they felt the institute achieved by using information and communication technology. This is important in determining the viability of the project.

advantages of using information and communication technology include increased sales revenue as more people can order tree products from the Kenya Forestry research Institute. This is because of the level of awareness it would create, and taking from the past experience where information and communication technology was used. There would also be an increase in the reach of the information to areas that the institute may not be able to access.

It would lead to increased stakeholder participation and awareness as people will get to know about the Kenya Forestry research Institute's products and activities. There would be an improvement in levels of efficiency among staff. Information and communication technology tools such as the internet and social media sites provide a point of reference for people who are not able to attend field days. They can also be accessed later and people can obtain the information they need.

Television and radio talk shows create an avenue for the public to interact with the directorate at the Kenya Forestry research Institute, which was essential in propagating the institute's activities and products such as seedlings forest products.

There would be an increase in the number of organizations and institutions that desired to partner with the Kenya Forestry research Institute. This meant that there was increased funding for ongoing activities and those that the institute wanted to initiate.

There would be a reduction in the cost of disseminating information as the information could be accessed digitally. The institute would be better able to comply with government regulations such as the e-government regulation on automation.

in the recognition on the role of information and communication technology in forestry research. This has led to the institute recognizing the information and communication technology unit as an independent department, as opposed to it being a sub division within the technical support services department, headed by an information and communication technology manager. This would also lead to increased funding for the information and communication technology department.

There would be an improvement in farm forestry and agro-forestry practices among farmers. This includes farmers who did not attend the open days and field days. There would be an increase in accountability in the various departments in the institute due to automation of processes and activities.

### 4.4.6 Advice to the Kenya Forestry Research Institute on using information and communication technology to disseminate forest research information.

The informants were asked if they would encourage the Kenya Forestry research Institute to use information and communication technology based on the benefits they listed above.

All the informants applaud the use of information and communication technology for the dissemination of forestry research information, and in all of the institutes operations. The management offered to become champions in advocating for the use of information and communication technology in the day to day operations at the Kenya Forestry research Institute. This is because of the realization of the impact information and communication technology would have on forestry research and dissemination of findings.

All the informants interviewed work within the Kenya Forestry Research Institute, and are either in decision making level in the institute, or are in a position to influence decision making. The individuals have also worked at the institute for an average 10 years, which means they were in a position to provide reliable information on the use of information and communication technology for information dissemination. Moreover, all the individuals are involved in forestry research, and have been involved in disseminating forestry research information.

The study ascertained that there is minimal usage of information and communication technology at the Kenya Forestry Research Institute. The institute has not fully embraced information and communication technology as a tool for disseminating information. Varied information and communication technologies have wide-ranging impacts on the forestry sector (Hetemäki, 2012), which the Kenya Forestry Research Institute cannot be ignorant of, if it desires to continue providing reliable services and to achieve its mandate of disseminating research information. One of the policies of the institute that inspires this research is that, employees of the institute should not print unless it is completely necessary (KEFRI, 2013). This should translate to increased use of information and communication technology for passing information within and without the institute. While this is the case for internal communication among the senior management, there seems to be a disconnect with the official communication (such as memos), other levels of the employees and the general public. For instance, the institute's management sends out printed memos to heads of departments while passing information. This means that

...dures is not achieved. Moreover, the institute prints tree planting manuals and advisories that have to be collected from the centers by individuals seeking the information. This would be made easier if the manuals and advisories were place on the website or sent to people via email.

From the study, it is evident that the Kenya Forestry Research Institute has not exploited information and communication technology effectively in the process of combining resources to achieve desired results of information dissemination (Chiabai, 2010). This can be explained by the effect witnessed when information and communication technology tools were used. For instance, the increase in sales revenue can be attributed to the public knowing of the forest products that can be obtained from the Kenya Forestry Research Institute, which led to an increase in orders. In this era of the green economy, it is important that an institution that is involved in forestry research would discourage the use of paper in order to conserve trees. It would also seem that the institute would advocate for tree planting and forest conservation (Balaji, 2011), through the use of information and communication technologies available.

The study found that, all the interviewees have been exposed to information and communcation technology to a basic level, which would enable them to use the technologies. This explains the use of email for internal communication, and the use of computers for general office work. However, other tools such as radio, television and mobile are yet to be explored to an extent that can lead to economic and competitve benefits for the institute (World Bank, 2012). The challenge in this case would be to encourage the management of the Kenya Forestry Research Institute on the benefits  that

and communication technology was used to disseminate research information. For instance, radio is widely used in Kenya hence it can come in handy in reaching the remote areas of Kenya. Such areas are often not reached during field trainings. Moreover, radio is the only information and communication technology that is accessible to the remote areas of Kenya (Mungai, 2005). People living in those areas will be able to listen in and make enquiries on trees and afforestation. This would increase the knowlegde base on forestry research findings (Lorenzo, 2012). There are also radio stations running in different local languages, which would support dissemination of information to rural areas of Kenya, that are in dire need of the information as a tool to fight hunger or to increase forest coverage in Kenya (Boeckmann, 2010).

The use of information and communication technology tools led to an increase in interest by investors and stakeholders. This was evident by the number of institutions that declared interest in working with the Kenya Forestry Research Institute on research projects. There was also an increase in the number of learning institutions that requested to bring their students for field learning and workshops. This was attributed to the strategic plan that was uploaded on the website, talk shows on radio and television, and a documentary that was aired on television preceding the launch of the strategic plan. It is therefore evident that, increased usage of information and communication technology tools will lead to increased donor funding for forestry research, and increase the number of projects, local and international, that the Kenya Forestry Research Institute is involved in. Moreover, there is an increased recognition of the Kenya Forestry Research Institute

s who follow their activities on social media and from the discussions emanating from the television and radio talk shows (Garvey, 2010).

The study found that, another competitive advantage will be felt in the increase in the usage of non-forest products and services that the Kenya Forestry Research Institute offers. These products and services include cleaning products developed from forest products, accommodation facilities at the center, conference facilities and grounds facilities within the Kenya Forestry Research Institute campuses, For instance, use of social media informed the public on the presence of hotels, conference, grounds and accommodation facilities at the Kenya Forestry Research Institute, which led to an increase in their usage for conferences, training, organization team building, weddings and social events and places to stay at when visiting the country. This led to an increase in funds for projects that the Kenya Forestry Research Institute funds internally. The institute can also use the funds generated to support scientists to further their research agenda, increase or broaden their research projects, and the institute can also identify other projects to invest in or increase the number of researchers.

The study established that, the Kenya Forestry Research Institute has not utilized mobile telephone technology as a tool for information dissemination. This is evident in that only one (1) person of those interviewed has used mobile technology to disseminate forestry research information. There are 31 million Kenyans who own a mobile phone, and 12 million people can access the internet over their mobile phones (Mungai, 2005). 26 million Kenyans can read a short text message. This creates a potent field for disseminating forestry research information, to the millions of Kenyans that need it.

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# : SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Introduction

This chapter presents the summary of the data findings on the use of information and communication technology for information dissemination at the Kenya Forestry Research Institute, the conclusions and recommendations are drawn there to. The chapter is therefore structured into summary of findings, conclusions, recommendations, limitations of the study and suggestions for further research.

## 5.2 Summary

There was a high level of knowledge on the information and communication technology tools and the use of information and communication technology among the informants. This is because the individuals use the information and communication technology tools for personal duties. This includes performing their mundane office duties, interacting with friends over the internet and carrying out research through elements such as Google and other websites. The institute also has a website, and social media pages such as Facebook and twitter. While the Kenya Forestry Research Institute has used information and communication technology tools, the institute has not exploited fully the information and communication technology tools as a strategic measure to achieving the strategic goal of information dissemination.

There is a high level of reliance on the traditional manual methods of information dissemination. This includes methods such as printed manuals given as handouts to

itions and open days, formal training during field days, workshops and open days, exhibitions and having copies of research work stored in the library. While such efforts are laudable as the information can be accessed, they are unreliable as spread of information is limited to the accessibility of areas affected by the research, the availability of people to be trained and the ability of the individual to access the storage area for the specific information. The interviewees also felt that there was a challenge in using manual methods, such as inconsistency in the people trained as different people could be available at different times, local biases such as tribal biases and stereotypes between the researcher who is the trainer and the individual being trained, high cost of delivering the information, and it is labor intensive as the researchers have to travel to the region designated for training. This is unlike using information and communication technology, where people get the information from the comfort of their homes or offices. For example, the radio interview led to significant feedback from both the target population and other individuals who were able to listen in. Also, social media has led to increased awareness of the Kenya Forestry Research Institute projects, products and activities.

It is apparent that some of the informants feel that, there is optimal use of information and communication technology. This could be attributed to policies such as the printing rule, and the e-government requirements on automation. It could also be attributed to their increased use of computers as opposed to the manual methods that were employed earlier by the institute. It is noteworthy that, at this level, some of the individuals have worked in the institute for more than twenty years. Therefore, they could have been

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thods they employed as young employees to the current methods where they use computers, the internet and mobile phones. However, the younger informants felt that the usage of information and communication technology is not at optimal level as would be expected due to the growth in information and communication technology of the 21st Century.

The use of information and communication technology, however minimal, has led to an improvement in most elements of the institute. For instance, there was increased revenue due to advertising and radio and television talk shows. There is also increased participation in field days and open days by the community surrounding the areas where the activities take place. Moreover, there was increased funding for the Kenya Forestry Research Institute's activities and projects, and an increase in partnerships and collaborations on research, forestry related projects and forestry training. There was also a reduction in the cost of disseminating information as people could request for the information through the institute's social media pages. This was an important element as the researchers were able to identify the key training areas to concentrate on during the open days and field trips. It was also essential in assessing the institute's impact on the communities the Kenya Forestry Research Institute intended to reach.

The mobile telephone technology is a fertile ground due to the widespread use of mobile phones in Kenya. This is because there are 31 million mobile phone users in Kenya. These are widespread in Kenya, and could be reached through applications such as automated short text messages. There are also 23 million people, who have access to the internet half of whom can use the internet over their mobile phones. It is evident that the

itute has not exploited this avenue. This area can be exploited to disseminate information via mobile and internet. Such an avenue could reach more people than a field trip would. This is because people, who are informed, will tell others about their new found knowledge.

## 5.3 Conclusion

The following are the conclusions from the study.

There is minimal use of information and communication technology for information dissemination at the Kenya Forestry Research Institute. This means that there is a need for advocacy on the use of information and communication technology tools to disseminate research information. The Kenya Forestry Research Institute employs the use of information and communication technology tools for mundane office activities such as official email. All the informants use computers for their work, and have access to the internet and mobile phones. This means that they do not need training to implement information and communication technology for information dissemination. This creates confidence that, the individuals will easily translate, and become the champions for the use of information and communication technology as a strategic approach in information dissemination.

There is a general appreciation among the informants on the need for adopting information and communication technology as a tool for information dissemination. This is because of the evidence in the increased sales revenue, increased partnerships and collaborations, ease of accessing information, increased speed and reduced cost of

also to move with the trend of using information and communication technology tools for information dissemination.

The existence of policies, such as the print only when it is necessary rule and sending memo's via email, are a clear indicator of the management's commitment to using information and communication technology. Such policies will come in handy when introducing information and communication technologies to the rest of the staff.

The use of social media such as Facebook and twitter are an indicator of the management's desire to keep up with the information and communication technology trends. This is a critical element in advocating the use of information and communication technology for information dissemination, as the social media pages will be used to educate the public. It is also noteworthy that the staff know how to use information and communication technology tools. This will reduce the amount of training needed in introducing and implementing information and communication technology for information dissemination. It is also a clear indicator that the Kenya Forestry Research Institute uses information and communication technology, and only minimal championing is needed to increase the extent of using information and communication technologies.

The feeling by the informants that information and communication technology is not applied optimally at the Kenya Forestry Research Institute is important in championing the use of information and communication technology. This is because the informants interact with the researchers, and understand their need to disseminate their research findings to the community the research were intended for. These will act as the

...mployees, which is vital in eliminating resistance from the employees who are key stakeholders in the project. It is also noteworthy that the heads of department prefer using information and communication technology to the traditional methods of information dissemination.

## 5.4 Recommendation

This study recommends increased use of information and communication technology at the Kenya Forestry Research Institute for information dissemination. This is in line with the benefits the institute has obtained through the areas where the institute has used information and communication technology.

The increased use of mobile telephone technology and the internet create an opportunity for the Kenya Forestry Research Institute to disseminate information to individuals in diverse places that may not be reached through seminars and training. This will also reduce the cost of disseminating information, and reduce the labor hours per researcher in disseminating information. The result will be that the researchers will have more time to carry out research activities, thus increasing the institute's knowledge base.

The use of information and communication technology will enable the Kenya Forestry Research Institute keep up with other research institutions that are using information and communication technology for information dissemination. It will also enable the public to access research carried out at the Kenya Forestry Research Institute. Thus, this research recommends the use of databases to store research data. Databases provide a more

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controlling and regulating access to research information. This is the case especially with ongoing research to avoid duplication.

The institute can also benefit from the use of cloud computing and the use of databases to store research data and findings. This will make it possible for the institute to share information with interested individuals, while maintaining control by regulating access and usage of the information. Cloud computing will also ease the burden of storing data, as the institute does not need to have servers but could take advantage of public clouds availed by companies such as Safaricom.

## 5.5 Limitations of the study

The study required to acquire information from top level management, who are involved in policy making and implementation. The top level management at the Kenya Forestry Research Institute are not involved much in research and disseminating information, which could be the reason for their opinion that there is optimal use of information and communication technology at the institute.

It is also noteworthy that the data could have been affected by the lack of exposure to using information and communication technologies to disseminate research information. This could have led to individuals responding out of their emotional status. For instance, the younger informants may want to use information and communication technologies more than is already being used, and to explore new information and communication technology trends, due to the current trends in information and communication

the older informants appreciate the use of computers to perform mundane tasks, which make their work easier.

## 5.6 Suggestion for further research

In order to deal with the issue of emotional responses during face to face interviews, further research could be carried out using a questionnaire. This would enable the researcher to get feedback such as the interviewee's perceived rating of the use of information and communication technology at the Kenya Forestry Research Institute, within a wider scale. It will also enable the researcher to ask more personal questions, which the respondent will answer due to the security of anonymity, for example the respondent's age bracket.

This research would also be improved by incorporating other members of staff, such as the heads of eco-regional research centers, researchers and the individuals directly involved in disseminating information, such as field trainers. This is because they are on the ground and have a better understanding of the situation and the challenges in using manual methods of information dissemination as opposed to using information and communication technology for information dissemination.

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**APPENDICES**

# APPENDIX I: LETTER OF INTRODUCTION

**UNIVERSITY OF NAIROBI**

SCHOOL OF BUSINESS

MBA PROGRAMME

| | |
|---|---|
| Telephone: 020-2059162<br>Telegrams: "Varsity", Nairobi<br>Telex: 22095 Varsity | P.O. Box 30197<br>Nairobi, Kenya |

DATE. 29th August, 2014

**TO WHOM IT MAY CONCERN**

The bearer of this letter ..... ESTHER MUGECHI MANYEKI .....

Registration No...... D61 75560/12 .................................

is a bona fide continuing student in the Master of Business Administration (MBA) degree program in this University.

He/she is required to submit as part of his/her coursework assessment a research project report on a management problem. We would like the students to do their projects on real problems affecting firms in Kenya. We would, therefore, appreciate your assistance to enable him/her collect data in your organization.

The results of the report will be used solely for academic purposes and a copy of the same will be availed to the interviewed organizations on request.

Thank you.

PATRICK NYABUTO
MBA ADMINISTRATOR
SCHOOL OF BUSINESS

*[Stamp: UNIVERSITY OF NAIROBI, SCHOOL OF BUSINESS, 29 SEP 2014, P.O. Box 30197 – 00100, NAIROBI]*

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**APPENDIX II: INTERVIEW GUIDE**

**INFORMATION AND COMMUNICATION TECHNOLOGY AS A STRATEGIC APPROACH IN INFORMATION DISSEMINATION AT THE KENYA FOREST RESEARCH INSTITUTE**

**Section A: Respondent Information**

This section will seek to gather background information about the respondent. This will be used in analyzing further the data which will be collected.

1. What is the designation of the respondent?

2. How many years has the respondent worked for the Kenya Forestry Research Institute?

3. What is the respondentø level of training or exposure to information and communication technology?

**Section B: Information dissemination at the Kenya Forestry Research Institute**

This section seeks to gather information on the use of information and communication technology at the Kenya Forestry Research Institute for information dissemination.

1. Does the Kenya Forestry Research Institute have an information and communication technology policy on information dissemination?

2. Which methods of disseminating information do you know?

Kenya Forestry Research Institute use to disseminate information?

4. Which information and communication technology tools were used in the information dissemination process?

**Section C: Using information and communication technology for information dissemination**

This section seeks to gather information on the informants understanding of information dissemination, and the information and communication technology tools.

1. Have you ever been involved in disseminating forest research information?

2. Has Kenya Forestry Research Institute used information and communication technology to disseminate information? And in your opinion, to what extent was it used?

3. Which tools of information and communication technology do you know? And have you used the use of any of the above you have indicated?

4. Do you think you succeed in disseminating the information as intended? And to what extent would you rate the success?

5. Compared to other channels of information dissemination, (if you have used information and communication technology), is information and communication technology more prominent than the other in disseminating information?

ider to be the advantages of using information and

communication technology for information dissemination?

7. Would you advice the Kenya Forestry Research Institute to employ information

technology to disseminate forest research information?