UNIVERSITY OF NAIROBI

SCHOOL OF JOURNALISM AND MASS COMMUNICATION

AN EVALUATION OF THE ROLE AND CONTRIBUTION OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) IN KNOWLEDGE COMMUNICATION AND SHARING PROCESSES: A CASE STUDY OF SELECTED ORGANIZATIONS IN KENYA

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K90/81721/2011

Thesis submitted as fulfillment for the award of a Doctor of Philosophy Degree in Information and Communication Studies at the School of Journalism and Mass Communication, University of Nairobi
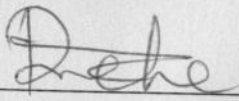
NOVEMBER 2012

DECLARATION

I declare that this is my original work and that it has not been submitted to any institution for the award of any degree.

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This thesis has been submitted with our approval as the supervisors on behalf of the School of Journalism and Mass Communication, University of Nairobi.
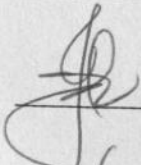
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DEDICATION

This work is dedicated to my family and my future generations. May you all be a good influence to the world and achieve a lasting legacy.

ACKNOWLEDGEMENTS

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ABSTRACT

The topic of the study was to evaluate the role and contribution of information communication technology (ICT) in knowledge communication and sharing in selected organizations in Kenya. Twenty two organizations were selected to participate in the study over a period of nine months involving more than 100 respondents and nine key informants. The specific objectives were; 1) to establish the kind of information communication technology infrastructural tools available in selected organizations; 2) to establish the level of training, acceptance and use of information communication technology in these organizations; and, 3) to assess how the information communication technology infrastructural tools combine with the training, acceptance and use of information communication technology to affect knowledge communication and sharing in these organizations.

In the general objective the study established that ICT play a central role in knowledge communication and sharing in the selected organizations. For objective one, the findings show that the selected organizations have well established ICT infrastructural tools for knowledge sharing purposes. In relation to objective two, the findings indicate that majority of the workers are highly trained in different areas of ICT use and that their level of acceptance in ICT use was high. Findings on objective three indicate that the ICT infrastructural tools work in combination with training, acceptance and use of ICT to positively affect knowledge communication and sharing in the selected organizations. In objective four, the study established that the organizational structures in the selected organizations were formal top-down structures that did not encourage an open culture of knowledge communication and sharing. The general conclusion of the study is that ICT have a positive role and contribution to knowledge communication and sharing in the selected Kenyan organizations. However, the study also established that social and human factors were intertwined with ICT factors in knowledge sharing processes and that these social and human factors were contributing to the knowledge communication and sharing processes as much as the ICT factors.

DEFINITION OF KEY TERMS

Informationalism

In this study, the concept is understood within the definition given by Manuel Castells (2004) as a technological paradigm based on the human capacity in information processing and communication made possible by the revolutions in microelectronics software and genetic engineering.

Knowledge

For the purposes of this study, knowledge is understood within the definitions given by Roy et al. (1995) and Styhre (2003) who say that knowledge is available information which is new to the people or to the organizations and which is refined, developed, used and transformed for different uses, and it may include ideas, concepts, research findings, guides, manufacturing processes, work methods and innovations.

Information Communication Technologies (ICT)

This study used the definition of information communication technology provided by Orlikowski (1992) which says that ICT are information and knowledge handling hardware and software tools that include information communication technologies such as personal computers, data base systems, network systems, digital media, internet, intranets, emails, mobile telephones, television, radio, compact disks, flash disks, robots and other emerging information processing technologies.

Knowledge communication and sharing

Knowledge communication and sharing in this study is understood within the context of what King (2006) says is the process of exchanging knowledge between and among individuals, and within and among teams, organizational units and across organizations. It is a process that links knowledge seekers to sources of knowledge through the various technologies. This understanding also includes collaborative networks of knowledge communication and sharing. In the study, the terms 'communication' and 'sharing' are used together or interchangeably since both of them involve some form of communication of knowledge from the source to the recipient.

ACRONYMS AND ABBREVIATIONS

CCK	Communications Commission of Kenya
CCTV	Closed circuit television
CD	Compact Disk
CDC	Centers for Disease Control and Prevention
ECOSOC	Economic and Social Council
FM	Frequency Modulation
GDP	Gross Domestic Product
ICT	Information Communication Technologies
IDRC	International Development Research Centre
ISP	Internet Service Providers
IT	Information Technology
ITU	International Telecommunication Union
OECD	Organisation for Economic Co-operation and Development
SIM	Subscriber Identification Modulation
SPSS	Statistical Package for the Social Sciences
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme

CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.0 Introduction

Knowledge has been defined in different ways by different people depending on the

context in which it is used. In the Western philosophical tradition, knowledge is seen as

being abstract, universal, impartial and rational. It is treated as a stand-alone artifact, or a

physical record, that can be captured in technology and which is truthful in its essence.

Roy et al. (1995) define knowledge as available information that is new to the people or

to the organizations and it can include research findings, guides, manufacturing

processes, work methods, and innovations. Piaget (1970) says that knowledge comes

from perceptions and experiences acquired through various means and it can constitute

the most concrete to the most abstract objects and facts, ideas, notions and concepts.

According to Donald (2002), knowledge occurs in two stages, the initial declarative

(information) stage and a subsequent procedural (application) stage. This means that

knowledge goes beyond just being information but also being able to apply that

information for a purpose.

It is believed that for information to be transformed into knowledge a kind of mediated

transformation is required because knowledge is based on information that is organized,

synthesized or summarized to enhance its comprehension. Thus, information is changed

to knowledge through the process of learning aimed at causing an action in people, and in

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this way, knowledge becomes embedded in an organization's documents or repositories and in the routines, processes and practices of the organization. Orlikowski (2002) defines knowledge as an ongoing social accomplishment, constituted and reconstituted in everyday practice while Styhre (2003) says that knowledge is always refined, developed, used and transformed for different uses among individuals and organizations. Knowledge application in organizations takes on different forms and is guided by what scholars refer to as knowledge transfer or knowledge communication and sharing.

1.1 Knowledge communication and sharing in organizations

Communication has for a long time, provided some form of control and coordination in organizations by guiding the principles of information exchange among and across the internal and external publics of an organization. Conrad and Poole (1998) say that communication is a process through which people create, sustain and manage meanings within a given context in an organization. Corman et al. (1995) further argue that communication is a critical component in the development of organizations. Traditional organizations are known to have used face to face human model of communicating knowledge more than other forms of communication. But the increased use of communication technologies by modern organizations has transformed work and organizational structures, subsequently changing communication practices in organizations.

Eisenberg and Godall (1997) argue that communication is a form of information and knowledge transfer and also a transactional process which is used for strategic control

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and for balancing creativity and restraint among workers. Miller (1995) adds that studying communication requires looking at how communication processes contribute to the coordination of behaviour in working toward individual and organizational goals that can be facilitated by knowledge sharing. Knowledge creating, sharing and utilizing is not only an organizational goal but it is also necessary for innovation in organizations.

Organizations create and communicate messages that constitute ideas that are meant to be acted upon and these ideas converge and combine to form an organization's knowledge base. Arrow (1999) says that organizations must be open to new ideas and have multiple sources of new ideas, and ensure that ideas are diffused through effective communication channels in order to achieve economic development and growth. Several authors have argued that in human organizations, it is important to communicate knowledge with other members (Davenport and Prusack, 2000; Dierkes et al., 2002; Monge and Contractor, 2003). Knowledge communication is seen as the process through which an individual passes from being in touch with knowledge to being able to understand that knowledge and accept and use the knowledge.

Communicating and sharing of knowledge between individuals and departments in the organization is considered to be a crucial process for the development of the organization. It is believed that when individual and group knowledge are translated to organizational knowledge, the organization starts to effectively manage its knowledge resources. Modern organizations are confronted with an ever changing environment and the increasing pace of change in society requires that organizations adapt to and cope with

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environmental uncertainties. Choo (1998) argues that in order to cope effectively with changing environments organizations and their employees should act as a learning organism and be adaptive, innovative, and able to process information about that environment, and be able to turn this information into knowledge and share this within and across the organization. Knowledge sharing in an organization is a way to enhance the productivity of knowledge and of knowledge workers. Alavi and Leidner (2001) observe that knowledge is of limited organizational value if it is not shared. The ability to integrate and apply specialized knowledge of organizational members is fundamental to an organization's ability to create and sustain a competitive advantage.

Knowledge is considered a critical organizational resource that provides a sustainable competitive advantage in organizations (Foss and Pedersen, 2002). For organizations to effectively use and exploit knowledge-based resources, they have to consider how to process and transfer the knowledge and skills from the experts who have it to novices who need to know. This means that organizations have to constantly communicate and share knowledge at different levels within and outside the organization (Hinds and Pfeffer, 2001).

Knowledge communication and sharing is the fundamental means through which employees contribute to knowledge application, innovation, and ultimately the competitive advantage of an organization (Jackson et al., 2006). Communication and sharing of knowledge between employees, within and across teams allows organizations to fully exploit and capitalize on their knowledge-based resources for organizational

performance (Damodaran and Olphert, 2000). Researchers say that knowledge sharing and its recombination is positively related to faster dissemination of innovation and development of new products, the increase of team and organizational performance, and reduction in production costs (Arthur and Huntley, 2005; Collins and Smith, 2006; Cummings, 2004; Hansen, 2002; Lin, 2007; Mesmer-Magnus and DeChurch, 2009). The goal of knowledge sharing according to Christensen (2007) is to create new knowledge by differently combining existing knowledge or to become better at exploiting existing knowledge. Due to the potential benefits that can be realized from knowledge communication and sharing, organizations have invested a lot of time and money into knowledge management systems that use state-of-the-art information communication technological tools to facilitate collection, storage, and distribution of knowledge.

Communication and sharing of knowledge in and across organizations can be likened to the transmission of messages from sources to recipients within a given context and for specific goals. Organizational learning theorist propose that effective knowledge transfer requires an ongoing process of learning interactions within and across organizations with the objective of transferring source knowledge successfully to a recipient (Szulanski, 2000). This successful transfer is founded on an organization's ability to learn and translate the learning into applicable skills through recreation and recombination of the different ideas that are communicated by using available technologies. In this way, knowledge takes on the characteristic of what Argote and Ingram (2000) call packages, which are embedded in different structures and elements of an organization such as the people, their skills, the technical tools, the routines and the systems used by the

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organization, as well as the networks formed between and among these elements. It is these packages that are exchanged through the process of knowledge sharing. Organizations have been recognizing that knowledge constitutes a valuable intangible asset for creating and sustaining competitive advantages. Shared knowledge offers different viewpoints and possible solutions to problems. Knowledge can help organizations to unlock their potential by changing the way people think and act. Knowledge sharing provides additional support to organizations by ensuring that people have real time access to the latest skills and competencies. Ipe (2003) says that in performing their day to day activities, individuals create, find, accumulate and share knowledge to enhance their work output.

Knowledge sharing processes help in the creation of newer and better products and services. It facilitates experience and skills transfer as well as organizational learning. Knowledge sharing also helps organizations to identify where new knowledge is located through transactional knowledge exchange among organizations and units. Specialized knowledge is used to solve problems or to provide a competitive advantage for the organization. But sharing of knowledge constitutes a major challenge in organizations because some employees tend to resist sharing their knowledge with other members of the organization while some organizations are reluctant to share what they know with other organizations.

1.2 Information Communication Technology (ICT) in knowledge communication and sharing

According to Gibson and Smilor (1991), there is a general agreement among the various proponents of knowledge communication and sharing that know-how and technology transfer involves both human and technological endeavours and that the sharing of knowledge is an interactive process requiring a great deal of back-and-forth exchange among individuals and technology mediation over an extended period of time. Some authors are of the opinion that since knowledge goes into the creation and provision of a product or service that constitutes technology, such knowledge should be seen as encompassing both the technical knowledge on which the end product is based, and the organizational capacity to convert the relevant productive inputs into the finished item or service. Consequently, technology should include both the knowledge and methods used to improve the production and distribution of goods and services as well as the entrepreneurial expertise and professional know-how of the human being. Scholars say that knowledge and technology developed in one part of the organization or one location can be exploited in other parts of the organization or in other locations for organizational goals through effective communication (Atamer and Schweiger, 2003; Frost, 1998; Hakanson and Nobel, 2001), hence the need for interactive human and technology mediated modes of knowledge communication and sharing in and across organizations.

Bair (1997) notes that knowledge sharing involves a systematic social and technological process for creating, valuating, organizing and classifying, storing, maintaining and refining, distributing, accessing, using, and applying organizational knowledge as a

resource. Malhotra (1996) says that the management of knowledge caters to the critical issues of organizational adaptation, survival, and competence in the face of increasingly discontinuous environmental changes. It embodies organizational processes that seek synergistic combination of data and information processing capacity of information communication technologies and the creative and innovative capacity of human beings. These processes focus on supporting the tacit-to-tacit knowledge sharing that takes place when people interface with each other to provide better access to digitally stored explicit or codified information.

Knowledge sharing stimulates the exchange of experiences, ideas, and thoughts between people and organizations. Drucker (1988) says that the modern economy require information-based organizations to be organizations of knowledge specialists where manual labour is replaced by information and knowledge as the means of production. Ezzell and Zorpette (1999, pp 4-5) comment that, "in the century that is now ending, we have gone from gaping at electric light bulbs and telephones to channel-surfing past images of a sunrise on Mars, to outbursts of impatience if our e-mail takes more than a few minutes to get to the other side of the world". This shows how important information and knowledge delivery through technology has become to our lives. The above scholars believe that it is likely that the productivity of knowledge and knowledge workers will become the decisive factor in the world economy. Acquisition, creation, manipulation, interpretation, and use of information and knowledge will be a crucial competitive advantage for organizations and that the paradigm of the advanced economy will focus

more on connectivity rather than disconnectedness, integration rather than disintegration, real-time simultaneity rather than sequential stages (Stata, 1989).

Several forces have been cited by Senge (1992) as contributing to the increasing pace of change that requires the application of knowledge and technology by organizations. He observes that an array of forces of change in the contemporary organizational context is discernible. The forces include; increased uncertainty, economic and political turbulence, changing demographics, the increasing interdependence of global markets and global enterprises, strategic alliances, re-engineering, restructuring, reorganizing, downsizing and rightsizing of the organization, shorter life-cycle of products, rapid technological developments, and instantaneous communications.

Jarvenpaa and Ives (1994) argue that there are several social and technological developments that have led to organizational realignment and increased use of knowledge and technology for organizational performance. These developments include increased complexity of society that also raise organizational complexities as the issues that organizations face become complex with new societal needs and challenges. Solutions to these social complexities are often complicated, requiring synergetic effort of several heterogeneous knowledge and technology experts. Global competition is also another contributor to organizational changes as it demands swift reactions to continuous and rapid developments in new environments. If one organization fails to pursue a particular innovation, another organization will, forcing other organizations to do likewise or else be left behind economically. The pressure forces organizations to establish faster

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communication flows through technology and an easy access to the necessary information and knowledge.

Most economies today have become 24/7 economies and organizations have to provide 24 hour services, especially those in technology driven service provision as well as those in essential and emergency services. This type of economy is focused on the fulfillment of the needs of the individual who has only a limited amount of time at his disposal or requires a service urgently. This means that for an organization to keep its customer or client base, it has to have cutting edge information and knowledge that can respond appropriately and within deadlines. Thus, organizations that do not have quick access to information and knowledge will most often lose their clients to those that do. Jarvenpaa and Ives (1994) also note that the knowledge content of products and services in modern organizations is increasingly intensifying.

As the knowledge content of work rises, jobs become more individualized and knowledge workers are becoming less and less replaceable. As a result, the cost of replacing a knowledgeable worker keeps rising and this is why organizations continue investing more in their knowledge workers as a way of keeping their expertise and competence and controlling brain drain (Andriessen, 2001). The desire for elaborate knowledge communication and sharing has led organizations to invest in well trained and better paid knowledge workers. The changing character of work has further led to manual labour being replaced by brain work, mostly carried out in dynamic virtual workgroups.

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The workplace has become more and more digital and electronic and due to increased work mobility through technology, work processes are no longer tied to a physical location. This has led organizations to be more information and knowledge based as workers no longer need to meet face to face in order to network to perform their duties. As individuals grow in their work places, they face the need to climb the hierarchy of human needs. They desire to satisfy more than just their basic needs and seek for individual development, progress, growth, self-respect and esteem, autonomy, and self-actualization (Krause, 1996; Senge, 1990). For them to get these fulfillments, they require information and knowledge, and the technology through which to access the knowledge.

The leveraging effect of technology and the use of microchips are seen as an important accelerator to organizational change and work performance. The interlocked face of technology implies that changes in technology go hand in hand with changes in society. As Malhotra (1993) argues, the increasingly turbulent environment in society feeds the need for further advancements in information technology. Information and communication technology is now capable of processing vast quantities of information and knowledge and is able to close the barriers of time and geographical location to increase organizational performance. According to Conlon and Simpson (2003), this has been propelled by the steady drop in computer power cost enabling organizations to create faster, smaller, and cheaper digital devices that can be integrated into everyday information and knowledge needs. The exponential increase in connectivity facilitated by the growth of the internet keeps multiplying the knowledge user base of the internet as it continually provides a faster and convenient channel for transmitting digital products,

services, information and knowledge. The more people, objects or computers are connected to the internet, the greater its efficiency and value becomes. The digitalizing effect of technology enables the technology to reproduce information and knowledge endlessly and this means that there is a continuous flow of information and knowledge that an organization can tap into at any given time to deal with challenges and seek solutions in work performance. The increased pace of change in society requires continuous and collaborative effort by workers and organizations to meet new demands and to be connected to solve complex and interrelated problems together. This collaborative effort has to be supported by adequate technology infrastructure and sufficient information and knowledge data bases.

1.3 Organizational learning in knowledge sharing processes

According to McGee and Prusak (1993), organizations need to move from mechanical routine based systems into adaptive, open, and learning organisms in order to increase their performance. Malhotra (1993) also argues that organizations are open, adaptive systems that live in constant interaction with their environments and they form alliances with other adaptive systems and engage in information processing that changes the range of their objectives and the boundaries within which they attract and use resources to achieve their goals. The ultimate criterion of organizational performance is seen as its long term survival and growth. For their survival and growth, organizations operate just like other organisms, depending on their ability to accrue sufficient resources in their environment to support their existence. In this process they have to compete with other organizations for the limited amount of available resources, including technological and

knowledge resources, and only the most prepared of them survives. Adaptation to and

learning from the environment is the crux of their survival and which organizations will

be successful is determined foremost by its technology and knowledge environment.

Hence, it becomes a 'survival of the fitting' more than 'survival of the fittest'.

Stewart (1997) says that organizations concentrate on their core activities, what they do

best, and learn how to do it better by creating an improved chance of survival and

forming alliances to create a synergy with the environment, and contracting out their

other work to create dependencies in surrounding systems for support. This requires that

they remain interconnected through technology and knowledge collaborations. Choo

(1995) adds that to cope effectively with their changing environment, organizations and

their workers should act as a learning organism and be adaptive, innovative, and able to

process information about that environment, and be able to turn this information into

knowledge. An organizations learns when it gains new knowledge and insights, and

applies this actively to its performance. Organizational learning is the product of

combined efforts, discussions, shared knowledge, ideas, insights, thoughts, and mental

models. According to Kharabsheh (2007), knowledge sharing can be seen as a process of

employee learning because it creates common understanding and belief among workers

in the organization which in turn increases the success of the organizational goals and its

performance. Geus (1997) states that organizations must be able to alter their marketing

strategy, their product range, their form, and where and how they conduct their business.

Stata (1989) argues that the rate at which individuals and organizations learn may

become the only sustainable competitive advantage, especially in knowledge intensive

industries. Adler and Cole (1993) also observe that consensus is emerging that the hallmark of tomorrow's most effective organizations will be their capacity to learn and that the competitive advantages in organizations can be attained through collective learning, combination and coordination of skills, competencies, knowledge and technologies. This means that communication, involvement of workers, and recombination and sharing of knowledge across organizational boundaries should be reflected in each organization's performance. Organizational learning therefore entails providing access to digitally stored knowledge as well as the sharing of this knowledge between people through communication, coordination and collaboration in organizations.

1.4 Factors that contribute to knowledge communication and sharing

Knowledge sharing process involves individuals mutually exchanging implicit and explicit knowledge and jointly creating new knowledge for organizational use. This process is essential in translating the individual tacit knowledge to explicit organizational knowledge. Determining which factors promote or impede the sharing of knowledge within groups and organizations constitutes an important area of research, not just for individuals but also for organizations that want to improve their performance by tapping into their knowledge resource.

Various scholars argue that knowledge communication and sharing is often impacted by either human and technology factors or a combination of the two (Cabrera and Cabrera, 2002; Osterloh and Frey, 2000; Davenport et al. (1998); Dixon, 2000 and Riege, 2005). It is these factors that lead to behaviours of knowledge sharing that are counterproductive,

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making the sharing less effective. Human factors in knowledge communication and sharing constitute the social dilemmas of knowledge being both a common good and a public good. Sharing of knowledge is facilitated by some kind of personal or virtual network between individuals. Without social or technology networks, there are no opportunities for accessing knowledge. People can be unwilling to share knowledge either because of their perceptions of knowledge as a personal good or because they have no knowledge. Fishbein and Ajzen (1975) say that an individual's beliefs influence their attitude, which in turn shapes their behavioral intention to engage in a particular behavior. These beliefs are influenced by perceived behavioral control whereby an individual sees themselves as lacking the control or resources necessary for carrying out the targeted behavior such as knowledge sharing despite having a positive attitude towards the behaviour. Other scholars believe that organizations can mitigate these factors by intensifying technology application and increasing financial incentives to motivate workers and improve knowledge sharing behaviours and cultures, and thereby increase organizational efficacy.

Chiu et al. (2006) argue that much focus has been given to the human and technological factors affecting knowledge sharing while little attention has been paid to the quality of the knowledge shared in organizations. They say that knowledge sharing can be meaningless if quality is not guaranteed and therefore the quality of the knowledge is increasing becoming a concern to many innovative organizations. The quality of knowledge can be measured in terms of its relevancy, ease of understanding, accuracy, completeness, reliability and timeliness. The quality of the knowledge shared can affect

the effectiveness of the knowledge sharing spiral. Senge (1990) says that effective knowledge sharing occurs when an individual has the right disposition and technological know-how and is truly committed to helping others develop new capabilities for action. Individuals in an organization should however, be willing to share whatever they possess or create with their colleagues. Thus, when studying the human and technological factors that affect knowledge communication and sharing, it should also be useful to study the quality of the knowledge shared.

While trying to understand the factors behind the success and failure of some Japanese firms, Nonaka and Takeuchi (1995) came up with the knowledge spiral model to explain how the human and technology factors combine to facilitate knowledge communication and sharing. The two scholars say that there are two types of knowledge; tacit and explicit knowledge. Tacit knowledge is personal and is embedded in an individual's personal experience. It cannot be expressed in words, sentences, numbers or formulas because it is mostly context specific. It involves intangible factors such as personal belief, perspective and value system.

Explicit knowledge is objective and rational and can be expressed in words, sentences, numbers and formulas. It is context free and it may include theoretical approaches, problem solving, manuals and databases. In addition, the two scholars also propose a knowledge spiral model which explains four modes of knowledge conversion that contribute to successful knowledge sharing. These modes include socialization, externalization, combination and internalization. Socialization is the process that transfers

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tacit knowledge from one person to another. This process is experiential and active and involves direct personal interaction between individuals within and outside the organization, thus capturing knowledge and acquiring skills in the process.

The socialization process relies on having shared experience among the individuals for effective knowledge sharing. From the socialization mode of knowledge, organizations can tap into an individual's personal employment experience from another organization. This is perhaps why many hiring organizations require that individuals applying for a job justify their unique contribution to the organization and also demonstrates that individuals acquire valuable knowledge through their experience while working for organizations and that their personal experience can be useful to the new employer. Externalization is the process by which tacit knowledge is converted to explicit knowledge. This is attained through articulation of the individual's tacit knowledge and by eliciting and translating the tacit knowledge of others into an understandable form.

During face to face communication, people share their beliefs and thoughts through dialogue in an effort to convey these beliefs and values. It is this articulation that can be translated into explicit knowledge. Many innovative organizations hire experts who are believed to have a track record of high performance to translate their personal skills and experiences into actionable explicit knowledge by showing the ropes to others in the workplace, thus translating their tacit knowledge into explicit knowledge for the benefit of the organization. Combination is the mode through which explicit knowledge is transferred and conveyed through documents, electronic mail, data bases, as well as

meetings and briefings. Combination requires the use of technologies that help in collecting relevant internal and external knowledge, disseminating it, processing it, and making it more readily usable. Combination facilitates knowledge sharing among co-located and dispersed groups in organizations through the mediation of technology. The combination mode of knowledge is important to knowledge based organizations that apply information communication technologies to their daily processes. It can help organizations to expand beyond the immediate boundaries through the help of technologies that have no geographical limits.

The internalization mode of knowledge involves understanding and absorbing explicit knowledge and subsequently reducing it back into tacit knowledge. This mode of knowledge conversion is important because by bringing explicit knowledge back to the personal tacit level, it makes the knowledge actionable by the owner. Internalization helps individuals to actualize concepts and methods through the actual doing or through simulation. The internalization process transfers organizational and group explicit knowledge to the individual, thus building capacity in them to act upon the knowledge.

The four modes of knowledge transfer help to keep the knowledge sharing process constant by circulating knowledge from the individual to the organization and from the organization back to the individual through interpersonal and technology mediated communication. The four modes demonstrate that knowledge sharing is a continuous learning process that may start from the individual to the organization and from the organization to the individual and that is why Nonaka and Takeuchi (1995) present the

four modes of knowledge as a spiral that feeds from the individual to the organization and from the organization to the individual and subsequently deepening and enriching the knowledge sharing process.

Figure 1: A summarized illustration adopted from Nonaka and Takeuchi's (1995) knowledge transfer spiral model.

Dialoguing

Socialization   Externalization

Extraction   Organization   Consolidation

Internalization   Combination

Learning by doing
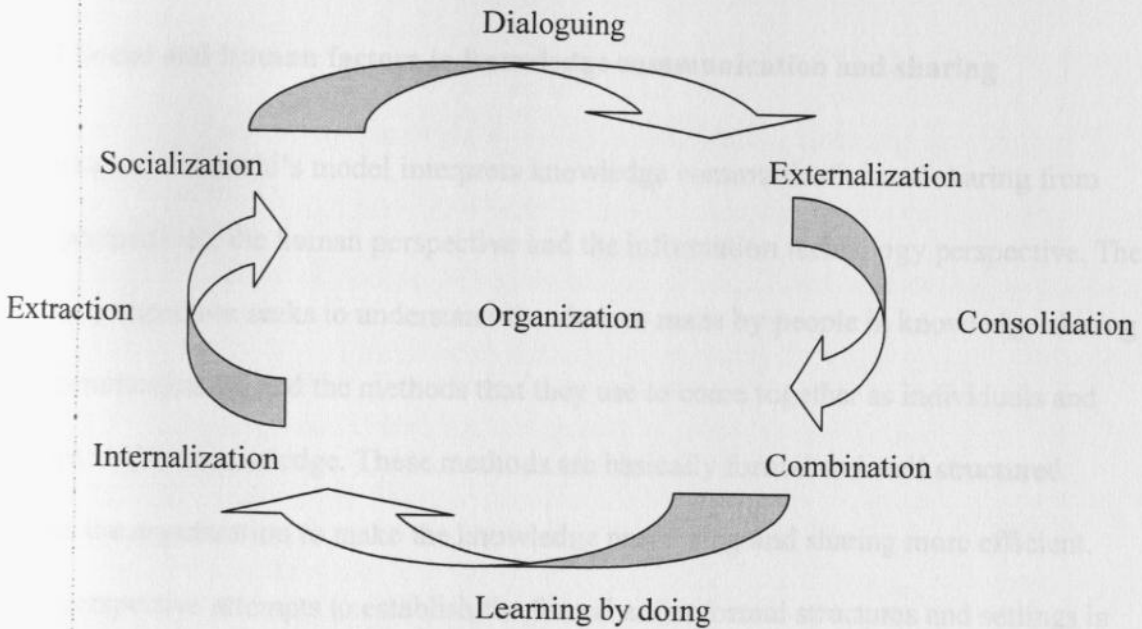
Source: Researcher, 2012

Figure 1 illustrates the four modes of knowledge transfer that show how knowledge moves from the individual to the organization and back to the individual for action as proposed by Nonaka and Takeuchi. In the socialization mode, the knowledge is created through shared experiences and shared mental models and technical skills which connect people through tacit knowledge. At the externalization level, tacit knowledge is made explicit and the creation of conceptual knowledge occurs through knowledge articulation, which is made possible through human dialogue. At the combination level, explicit

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knowledge is transformed through consolidation, integrating and categorizing of the knowledge through the use of communication technology. The knowledge is then dispersed to individuals for task oriented use. At the level of internalization, explicit knowledge is reduced to the tacit level by transferring it back to the individual through extraction based on individual needs, thus completing the organizational learning process.

1.4.1 Social and human factors in knowledge communication and sharing

Nonaka and Takeuchi's model interprets knowledge communication and sharing from two perspectives: the human perspective and the information technology perspective. The human perspective seeks to understand the choices made by people in knowledge sharing and communication and the methods that they use to come together as individuals and groups to share knowledge. These methods are basically formal and well structured within the organization to make the knowledge processing and sharing more efficient. This perspective attempts to establish the formal and informal structures and settings in which people interact for knowledge sharing purposes. The information technology perspective affects the implementation and utility of information communication technologies in facilitating effective knowledge sharing in organizations. This perspective evaluates the structuring and utility of technologies that enable real time gathering, integration and dissemination of knowledge within an organization.

The factors that are said to impact on knowledge communication and sharing in organizations are both human and technological. Scholars argue that problems in knowledge sharing often stem from social or human dilemmas and knowledge dilemmas,

or a combination of the two (Cabrera and Cabrera, 2002; Osterloh and Frey, 2000). It is these dilemmas that lead to behaviour of knowledge sharing that is counterproductive, making the sharing less effective. Social dilemmas are about knowledge being a common good and a public good. The knowledge dilemmas relate to knowledge being either tacit or explicit and existing either at the individual or organizational level (Hinds and Pfeffer, 2003; Nonaka and Takeuchi, 1995).

The knowledge dilemma exposes the weakness of knowledge as having no common identity. The lack of a common knowledge identity means that people do not have similar approaches to knowledge sharing. For knowledge communication and sharing to be effective, people require a formal structure to guide them on what is required of them in relation to information and knowledge processing and how to make sense of the knowledge that is processed. This structure helps to ease the complexities created by the human and social dilemmas in knowledge communication and sharing. The human factors that impact on knowledge communication and sharing are believed to either enable knowledge sharing or impede knowledge sharing.

The social and human dilemmas further contribute to the human factors that impact on knowledge communication and sharing. These factors are reflected in the relationships between the sources of knowledge and the recipients of the knowledge, the form and location of the knowledge, the knowledge recipient's learning predisposition, the source's knowledge-sharing capability and the environment in which the sharing occurs.

Relationships in organizations are important in knowledge sharing because they shape the tacit knowledge interactions. If individuals do not trust each other, they are less likely to trust and accept knowledge based on each other's experiences. Poor individual relationships not only constrain people from freely interacting but also affect their knowledge sharing habits. Szulanski (1996) explains that when the relationship between the source and recipient is distant or problematic, knowledge sharing becomes more difficult. When the structures that guide the human relationships in an organization are not explicitly stated, workers do not know who or what to follow and this affects their knowledge communication and sharing habits and subsequently compromises the effectiveness of the knowledge communication and sharing. Hsu et al. (2007) say that the biggest challenge in the knowledge sharing effort is the willingness of people to share knowledge with others in their groups and across groups in organizations due to the constraining human relationships.

The form and the location of the knowledge in an organization affect the types of sharing processes and may determine how challenging these processes can become. Sometimes knowledge is hard to extract because of the limitations of accessing where it resides and the way it has been captured or stored. Some forms of specialized knowledge are said to be harder to extract than general knowledge (Hinds and Pfeffer, 2003).

Knowledge locations affect the flow of knowledge sharing because of either their technical formats or bureaucratic procedures of availing it. If an organization does not

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have a well structured procedure of acquiring, storing and retrieving knowledge, then it becomes more difficult to communicate and share the knowledge available.

The recipient's learning predisposition can affect how individuals respond to the internalization mode of knowledge sharing and whether the individuals will respond to new organizational knowledge or not. Some people learn new things faster than others and may be more willing to understand and implement the processes of knowledge sharing. Others may lack both the human and technical capacities that are required to facilitate knowledge sharing. Organizational agreements, rules of engagement and managerial practices adopted by the organizations tend to shape both the flows of resources and knowledge transfer between the parties and the actions taken to overcome and accommodate differences between the parties.

These rules of engagement and practices have to be structured and well distributed to workers so that they may be able to understand them clearly and follow them. The knowledge sharing capabilities of sources can affect and may be affected by the environment within which knowledge sharing occurs either due to lack of sufficient training or as a result of bureaucratic barriers. The specific knowledge-sharing activities in an organization play an important role in that they are the means through which workers seek to facilitate knowledge sharing within and across organizations.

These human factors inevitably influence the use of information communication technology in knowledge sharing processes in organizations. When knowledge moves

from the individual to the organizational level, it requires some sort of technological mediation. Although knowledge sharing can take place either through technology mediated channels or non-technology mediated channels as argued by Lee and Al-Hawamdeh (2002), the position of Nonaka and Takauchi (1995) on the knowledge spiral model is that technology is important in knowledge transfer through combination of various sources and types of knowledge in order to make the application of knowledge possible. The use of technology for knowledge sharing becomes paramount in the knowledge spiral model because it facilitates knowledge sharing among co-located and dispersed groups of workers in the organization. Technologies play a critical role as enabling tools in increasing the level of knowledge sharing among workers because they have the potential to affect the functions, coordination and application of knowledge in and across organizations.

1.4.2 Technology factors in knowledge communication and sharing

According to McDermott (1999) current developments in information communication technology encourage organizations to think of new ways of sharing knowledge such as storing documents in a common knowledge base and in the use of electronic networks to share knowledge among organizations. ICT contribute to organizational development by providing a platform for the exchange of data, information and knowledge among workers in organizations to improve knowledge sharing. Contemporary organizations use electronic repositories and search engines to enable workers to access, store and retrieve knowledge and subsequently making knowledge sharing more efficient and effective. Büchel (2001) argues that the role of ICT in an organization is twofold. First, ICT are

tools for knowledge development that establish and support links between people. Second, ICT play a critical role in raising the consciousness about the existing links within the organization because their implementation and use requires renewed thinking about the process of information acquisition, distribution, interpretation and storage. According to Jian and Jeffres (2006), ICT have been widely adopted by organizations to facilitate work processes, to store and distribute work knowledge and the main reason for ICT implementation in organizations is to improve knowledge sharing. In modern economies, acquisition of knowledge and the sharing of knowledge are considered to be a factor of outstanding strategic importance for organization's development. This argument is advanced by various scholars who view ICT as being supportive to processes of knowledge sharing in organizations (Huysman and De Wit, 2002; Malhotra, 1996; Nonaka and Takeuchi, 1995, and Senge, 1992).

Riege (2005) identifies seven information communication technology factors that impact on knowledge communication and sharing. These include the lack of integration of information technology process and systems which limits employees' flexibility in their work, lack of internal and external technology support, unrealistic expectation of what technology can or cannot do in an organization, the mismatch between technological needs, systems integration and information technology processes, the reluctance by employees to use information technology because they are not familiar with them, lack of training among employees on how to use new information technology systems and processes, and lack of use of newer systems that are more advantageous than old systems. These factors can be summarized into three issues that Riege (2005) says should be

addressed by organizations to reduce their negative effects on knowledge sharing. These issues include: technology infrastructure, technology tools and technology know-how. Beckman (1999) argues that a well structured information communication technology infrastructure needs to be in place to facilitate efforts in knowledge sharing, particularly to support the creation, structuring, penetration and use of knowledge by workers.

Brink (2003) adds that it is impossible for organizations to embark on knowledge sharing without proper information communication technology structures. This is because a supportive information communication technology infrastructure encourages workers to use the technology and subsequently contributes to the quality of knowledge sharing. Lin (2007d) also adds that an effective ICT infrastructure and tools enable the capture, organization, reuse and transfer of experience-based knowledge that resides within the organization, making that knowledge available to everyone in the whole organization. Orlikowski and Iacono, (2001) argue that ICT should be seen as being dynamic and changing and should be supported with a good and reliable infrastructure in order to contribute effectively to knowledge communication and sharing processes. Grant (1996) and Leonard (1995) identify different types of information communication technologies as comprising the infrastructure needed by organizations for knowledge communication and sharing purposes. These infrastructures include business intelligence systems, collaboration systems, distributed learning systems, knowledge discovery systems, knowledge mapping systems, opportunity generation systems, and security systems. These infrastructures allow organizations to track knowledge resources internally and

externally and make it possible for individuals in need of specific types of knowledge to access it for knowledge sharing activities and in work processes.

The use of simple information communication technological tools is seen to contribute to the success of knowledge sharing (Hasanali, 2002). Employees can easily become frustrated if they have to use several technologies before they arrive at what they are searching for. Too many steps and processes in using a particular technology can discourage an employee from using that technology because they find it time consuming. This means that organizations must supply their employees with easy to use information communication technology tools that encourage them to utilize them effectively, especially for knowledge sharing activities.

Adequate information communication training of workers is one of the factors perceived to significantly contribute to the success of knowledge communication and sharing (Hasanali, 2002). Properly trained workers are important in the knowledge sharing spiral as they play a critical role of ensuring that knowledge is continually moving from one person to another and one place to another. As such, sufficient and appropriate technological training among workers has a positive relationship with knowledge sharing processes. Employees who are familiar with technology are more readily and willing to share knowledge than those that are not. Appropriate training should therefore enable an employee to feel that their technological literacy is sufficient enough to positively affect the quality of their knowledge sharing habits. Both the human and information communication factors impact on knowledge communication and sharing for various

reasons. Workers accept or reject the use a particular technology based on their competence or lack of it.

Competence in the use of technology is gained through training and know-how that can be acquired through experience. If an organization fails to train its workers on ICT use, they are less likely to accept and use the technologies. Complex ICT also pose a challenge to many workers, making their work processes less efficient. In the absence of simple ICT tools, knowledge creation, storage and retrieval becomes difficult and workers are unlikely to use the technology for knowledge sharing purposes. Thus, as argued by different scholars, human relationships and the conditions of ICT infrastructure, ICT tools and workers know-how have a significant impact on effective knowledge communication and sharing in organizations.

1.5 Background to the study

Although knowledge has been in existence and in use since time immemorial, it is not until recently that it has increasingly gained recognition as a critical resource for organizational development and efficiency, in organizational performance and as an economic resource that is essential for the postindustrial societies (Drucker, 1993; Penrose, 1959). The World Bank's World Development Report (1999) says that knowledge has become the most important contributing factor in determining the standard of living – more than land, tools and labour. The report notes that today's most technologically advanced economies are knowledge based.

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Scholars such as O'Dell and Grayson (1998) and Osterloh and Frey (2000) argue that the sharing of knowledge between individuals with similar or dissimilar practices in and between organizations is a crucial process for both individual and organizational learning. Consequently, research concerning the different factors influencing the degree and way in which workers share their knowledge is increasingly gaining relevance. Such research has identified some of the variables under study as technologies and tools (Hlupic, Pouloudi and Rzevski, 2002), human relationships and motivations, organizational structures and the communication climate (Ardichvili et al., 2003; Hinds and Pfeffer, 2003; Moffett et al., 2003; Zárraga and García-Falcón, 2003). These scholars indicate that the collective use of information communication technology has a potentially positive contribution to knowledge sharing in communities of practice and this is why information is seen as the key ingredient of social organization.

Researchers who have been investigating whether "information-age organizations" need to develop and transfer knowledge in order to survive tend to agree that it is important to use workers' knowledge in order for organizations to thrive in the present knowledge economy (Badaracco, 1991and Peters, 1992). In the modern society, knowledge and information tends to bestow power 'to act' on the individual, the organization and the community. Actors in knowledge sharing are expected to be more adept at identifying, locating, interpreting and effectively using knowledge.

Bell (1973) and Bell et al. (2002) say that the development of human capital through formal education and training characterises the information society today. He adds that

professionalization and formal certification as well as organized technological knowledge are the drivers of economic growth. Castells (2004) explains the importance of formal training of knowledge workers. According to Castells (2004), information communication technologies have become a critical tool to the service productivity of organizations because they enable the mechanization of information work. He notes that as information systems become complex and interactively connected to data bases and information sources, knowledge workers require the additional capability to research and recombine knowledge. This demands appropriate training in skills and the creative capacity of workers. He adds that the information economy requires highly intelligent labourers who can manage and control the technologies that transmit knowledge. In addition, the transition of communication practices in the modern organization as a result of technology has led to an increasingly techno-savvy workforce as employees discover that they have to adapt their information communication technology use and knowledge to maximize their potential in the organizations for survival (Quan-Haase et al., 2005 and King, 2007). Work has become more complex and faster, requiring greater coordination and interaction as workers get more distributed.

Knowledge-intensive work is capable of transforming input to output through human creativity and is considered to be the primary input for the attainment of high level job autonomy (Alvesson, 1995 and Starbuck, 1992). In this respect, human creativity is enhanced by high-level formal education and experiential understanding. This requires that knowledge workers be highly skilled and specialized in their area of work and be

knowledgeable about the tools they use, especially technological tools. But knowledge

work comes with many challenges that are both human and technological.

Mutula (2003) identifies constraints that make it harder for workers in Africa to

communicate and share knowledge as high cost of access to telecommunications,

government policy towards ICT, under utilization of existing technologies, limited

indigenous base and digital illiteracy. Jain (2002) adds to these constraints by including

lack of skilled and trained manpower, inadequate ICT exposure, lack of national ICT

policy, poor communication infrastructure, and ignorance of ICT benefits, expensive ICT

equipment and resistance to change.

1.5.1 The case of organizations in Kenya

Although many Kenyan organizations are familiar with the concepts of information

communication technology and knowledge sharing, the practice of knowledge

communication and sharing in and across organizations is only visible in very few

organizations while the majority of other organizations lack a well structured knowledge

communication and sharing process. The situation in Kenyan organizations can be

attributed to what some scholars have identified as the human and technology factors that

hinder effective knowledge sharing in organizations, including poor human relationship

structures in organizations that do not encourage knowledge sharing and communication

practices and poor information communication technology infrastructure that does not

allow for effective use of technology in knowledge communication and sharing (Cabrera

and Cabrera, 2002; Osterloh and Frey, 2000; Hinds and Pfeffer, 2003 and Riege, 2005).

Kenya's ICT policy seeks to improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services. The policy has four guiding principles that include ICT infrastructure development, human resource development, stakeholder participation and appropriate policy and regulatory framework. The policy hopes to facilitate sustained economic growth and poverty reduction; promote social justice and equity; mainstream gender in national development; empower the youth and disadvantaged groups; stimulate investment and innovation in ICT; and achieve universal access (Ministry of Information and Communications, 2006). Kenya Vision 2030 also seeks to transform Kenya into a newly industrializing, middle-income country providing a high quality life to all its citizens by the year 2030. The Vision proposes three pillars as benchmarks for the achievement of this transformation. These pillars include the economic pillar, the social pillar and the political pillar. The economic pillar aims to improve the prosperity of all Kenyans through an economic development programme, covering all the regions of Kenya, and aiming to achieve an average Gross Domestic Product (GDP) growth rate of 10% per annum beginning in 2012. The social pillar proposes to build a just and cohesive society with social equity in a clean and secure environment, and the political pillar aims to realize a democratic political system founded on issue-based politics that respects the rule of law, and protects the rights and freedoms of every individual in the Kenyan society (Government of the Republic of Kenya, 2007). Both the ICT policy and Vision 2030 recognize the necessity to avail information and knowledge to all Kenyans that would improve their livelihoods. For this information and knowledge to reach the Kenyans, information communication technologies ought to be involved in the deliverables of the ICT policy and the Vision 2030. Thus, information

communication technology and knowledge communication and sharing become part and parcel of the policy and vision. Kenyan organizations have to therefore pay attention to the implementation of the ICT policy and Vision 2030 as they seek to make a positive contribution in the lives of their beneficiaries.

Current local trends in the communication field indicate that some organizations are borrowing from both traditional and modern sources of knowledge and communication technologies to increase their performance and enhance innovative practices. For example, *Safaricom*, a local mobile telephony service provider has been able to successfully tap into traditional resources such as money and information exchange between the rural and urban family units and combined this with modern technology to form one of the most popular and respected money transfer service in Kenya. The company has a well distributed network of information and knowledge sharing for its customers through mobile telephony and relies heavily on knowledge sharing to sustain its product performance and innovative competitiveness. Other companies such as *Tangaza, Airtel, Yu* and *Orange* have been able to borrow from *Safaricom*'s success due to its open knowledge sharing practices that are familiar to many of its customers. The Communication Commission of Kenya has been making some effort towards open knowledge sharing practices by readily availing detailed annual reports and other statistical information about the performance of the communication industry. Previously, such information was unavailable even from media and communication organizations that are active players in this industry. This shows that knowledge communication and sharing can significantly contribute to an organization's success and lead to new innovations, thus perpetuating the knowledge spiral proposed by Nonaka and Takeuchi.

But whereas some organizations like *Safaricom* and the Communication Commission of Kenya are able to leverage knowledge communication and sharing for high performance, others organizations in competitive business environments may be unable or unwilling to do so for fear of losing their intellectual materials to competitors. This lack of sharing of knowledge is especially more pronounced between organizations that are not at par in terms of knowledge creation and knowledge consumption needs.

Majority of Kenyan organizations in both the public and private sector are operated bureaucratically, thus constraining the free and open human relationships that would otherwise contribute to effective sharing of knowledge among workers. A typical Kenya organization has a top down structure where workers report to and are accountable to the person above them, thus limiting interaction between those above and those below. What this means is that the sharing of knowledge between the source and the recipient, either from the top to down or down to top, is limited by the bureaucratic barriers that define each person's position within the organization. This scenario leads to workers' being suspicious of each other as a source of reliable knowledge since their positions do not clearly define the boundaries of knowledge in the bureaucratic relationships.

Hinds and Pfeffer (2003) say that incentives and disincentives in an organization can influence whether people share or do not share knowledge. The authors add that team level rewards, internal competition, status differences, and the degree of formalization and individual's relationship to the organization all contribute to the motivational

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limitations. In addition, the authors add that trust between the individual workers and towards the organization is an important element in knowledge sharing. Individuals trust that when they share their knowledge the coworkers will reciprocate by sharing theirs. Workers also trust the organization not to use the knowledge they share against them. If this trust does not exist, it becomes harder for knowledge sharing to take place. In highly competitive environments, distrust in others tends to inhibit sharing of knowledge and this could be what is happening in Kenyan organizations.

Many Kenyan workers are not formally trained on how to harness and share knowledge through positive human relations and information communication technology, and most of the time they do not even recognize what constitutes and doesn't constitute knowledge. This means that majority are also not sure whether their skills and experience constitute knowledge. They have no proper training on how to use technology for knowledge sharing purposes. Lack of clear procedures of acquiring and sharing new knowledge becomes a hindrance to their ability to decide when to share or not to share what they know. In other situations, the workers have no capacity to share their knowledge due to lack of proper channels or motivation to do so. Some organizations do not provide a good environment through which workers can interact to share their knowledge. This is further complicated by lack of a clear policy on knowledge sharing among organizations.

The public service sector and the non governmental sector in Kenya tend to treat information and knowledge as a secret and therefore limit the communication of it. In this scenario, technology is treated as a stand alone tool that is used only in specific tasks and

when needed. This means that there is limited integration between day to day human activities with technological processes and systems due to the secrecy of the knowledge, thus reducing the worker's ability to interact fully with technology in their work. Workers lack proper training on technology use, leading many to exhibit techno-phobic behaviour which reduces their interest in the use of technology for knowledge sharing since they are unfamiliar with the technology.

As argued by scholars, organizations that are not conversant with the potential of technology in knowledge sharing tend to overlook the need to identify their technological needs and integrate them and match them to the information communication processes of their organizations, thus missing the opportunity to harness and share knowledge for their organizational performance. Such organizations take ICT for granted and see them as fixed and independent tools that are useful only in specified tasks (Orlikowski and Iacono, 2001). This may well be the situation among many Kenyan organizations. Some organizations are known to overlook the importance of technology support and the regular maintenance of their information communication systems. It is not unusual to see many organizations' websites and information pages remaining un-updated for several years. This means that the knowledge being shared on these pages is out of date and probably no longer useful. In some cases, organizations tend to see technology as solution to all problems and do little to upgrade and mainstream the technology into the ever changing daily needs. In the long run, technologies become obsolete and no longer useful even in knowledge sharing activities.

One might therefore want to know why some organizations are more open to knowledge sharing while others are uptight with their knowledge. This question takes us back to the factors that were discussed earlier that affect knowledge sharing processes and creates a desire to understand whether the reasons behind some organizations sharing knowledge and others not sharing knowledge are in any way linked to the human and technological factors that impede knowledge sharing. Thus we may want to know, for example, if Safaricom has better human and technological structures that promote knowledge sharing than, for example, a government ministry or a non governmental organization. Some of the questions we might want to answer would be: what are the human factors that exist among Kenyan organizations that impede knowledge communication and sharing? What kind of information communication technology infrastructure exists in Kenyan organizations that facilitates or hinders knowledge communication and sharing processes? Answering these questions would provide a clearer picture on the kind of knowledge communication and sharing habits being practiced in Kenyan organizations and what are the impediments to these practices.

1.6 Problem statement

Although the acceptance and use of ICT is common among Kenyan organizations and the application of knowledge in work processes is a familiar concept, this does not appear to translate into visibly effective knowledge communication and sharing practices in the organizations. Kenya has in the last decade witnessed significant growth in the ICT sector as demonstrated by the number of telephone lines, mobile telephones, Internet Service Providers (ISPs), the number of Internet users, broadcasting stations, and the market

share of each one of them. These new developments are expected to contribute towards more efficient and effective information and knowledge communication practices for the improvement of peoples' lives.

Knowledge sharing can improve competitiveness among Kenyan organizations by connecting and sharing the knowledge from experts. For example, some of Kenya's organizations such as *Safaricom* and Equity bank have been identified as having cutting edge innovations and this means that they have practices that are admired worldwide. This means that their knowledge can have a positive spill over effect on many other individuals and organizations. Indeed *Safaricom's Mpesa* service has been one of the most replicated innovations in the country. This goes to show that when knowledge is shared freely, it can have a wide impact on development and on people's lives. But a study conducted by the Communications Commission of Kenya in 2006 indicates that some of the communication technology such as the internet has a much lower uptake in the country due to low literacy levels, lack of good infrastructure and lack of relevant content (CCK, 2008). The Commission notes that although it had issued 78 licenses to prospective internet service providers, only 35 were operational at the time of its study. The mobile phone service alone had 26.4 million mobile subscriptions by September 2011 with an access rate of over 80%.

Recognizing that the provision of modern telecommunications infrastructure and information networks is key to rapid economic and social development of the country, the government of Kenya through the Ministry of Information and Communication initiated

the *pasha* centres (digital villages) in 2010 as ICT hubs in every constituency across the country in an effort to enable thousands of aspiring entrepreneurs to access information and knowledge as well as receive ICT and business training. The *pasha* centers were expected to serve all citizens, from students to farmers and business owners and each village was to form the basis for e-commerce in the country. They were to boost access to Kenya's expanding "electronic government and help citizens to access services and information from various government agencies and thereby save on time traveling to major towns where most of these agencies are located. The *pasha* centres were supposed to impact on other online activities in other sectors such as agriculture, health, education and commerce. Medical practitioners in rural areas would be able to use e-learning in the centres to complete training in their remote locations instead of going to the city centre. The *pasha* centres should have ideally led to an explosion of information and knowledge exchange throughout the entire country and created an improved business and organizational performance environment but little has been heard of them since their launch. It appears that there must be some factors that have caused their slow takeoff.

Information communication technologies are a platform for the exchange of data, information, knowledge, and act as tools for the implementation of organizational activities and thereby play a catalytic role as an enabler to development (UNDP, 2001). Many of the knowledge communication and sharing information communication technologies are not only available in most organizations in Kenya but they are also widely used in a number of these organizations. What remains to be accounted for, however, is the question on how they have been transforming and affecting knowledge

communication and sharing processes and the improvement of organizational
performance, particularly in the selected organizations in this study.

1.7 OBJECTIVES OF THE STUDY

1.7.1 GENERAL OBJECTIVE

The general objective of the study was to evaluate the role and contribution of
information communication technology in knowledge communication and sharing in
Kenyan organizations.

1.7.2 SPECIFIC OBJECTIVES

1. To establish what kinds of information communication technology infrastructural
   tools are available in selected Kenyan organizations.
2. To establish the level of training, acceptance and use of information
   communication technology in selected Kenyan organizations.
3. To assess how the information communication technology infrastructural tools
   combine with the training, acceptance and use of the ICT to affect knowledge
   communication and sharing in selected Kenyan organizations.

1.8 Research Questions

1. What are the information communication technology infrastructural tools that support
   knowledge communication and sharing?

2. What are the levels of training, acceptance and use of information communication technology in the selected Kenyan organizations?

3. How do the information communication technology infrastructural tools combine with the training, acceptance and use to affect knowledge communication and sharing in the selected Kenyan organizations?

1.9 Hypotheses

1. A good ICT infrastructure and easy to use ICT tools have a significant effect on knowledge communication and sharing in Kenyan organizations.

2. ICT training, acceptance and use of ICT contribute positively towards the communication and sharing of knowledge in the selected Kenyan organizations.

1.10 Justification

According to research there were 137 million workers worldwide participating in technologically mediated work by the end of 2003 and this was expected to rise by 40 percent by 2010 (Solomon, 2001). According to Stephens (2007) ICT are said to be responsible for the paradigm shift that occurred in the late twentieth century which created a change from centralized, co-located to decentralized and dispersed communication structures in organizations. Ever since, the use of multiple ICT in organizations has been a growing trend requiring constant research due to the changing nature of technology. Communication technologies have continued to reshape organizational communication and the concept of organizing throughout the 20th century. Due to these developments, many scholars have been focusing on technology research to establish how technologies have been transforming societies in the world. Most of the

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research conducted on ICT is mainly from the Western world with minimal research being conducted in Africa. As a result, there is a gap in knowledge on how ICT are performing in the African context. This gap can be filled by the contribution of new research focusing on ICT and organizations in African countries, particularly in Kenya.

ICT have become central to economies in the world because of their capacity to facilitate the sharing of information and data across geographical regions and among large numbers of people, thus being in a position to deliver specific development goals such as the Millennium Development Goals. Van Dijk (1999) argues that the globalization of the world economy is intensified by the use of ICT and that these technologies contribute to organizational development by providing a platform for the exchange of data, information and knowledge in organizations to improve knowledge sharing. Contemporary organizations use electronic repositories and search engines to enable workers to access, store and retrieve knowledge and subsequently making knowledge sharing more efficient and effective. Literature on ICT in organizations indicates that there is need for research in this field. D'Urso and Rains (2008) say that research on ICT use in organizations has been relatively scanty and faced by many theoretical difficulties in the search for a common ground. UNDP (2001) recognizes that there is need for baseline studies to ascertain how information is gathered, stored, shared and evaluated as these baselines would help identify appropriate technologies and opportunities. Sharing of knowledge between individuals and departments in organizations is a crucial process and determining which factors promote or impede the sharing of knowledge within groups and organizations constitutes an important area of research for individuals and

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organizations that want to improve their performance (O'Dell and Grayson, 1998; Osterloh and Frey, 2000).

Nelissen et al. (2008) say that ICT performance as guide versus as facilitator in processes of knowledge sharing needs to be studied in organizations to develop understanding of how ICT contribute to knowledge communication and sharing. Gomez et al. (1999) and Kenny (2001) say that understanding the impact of information and new technologies on development and social change is a complex and long-term task that requires constant studies and further research. They argue that organizations should continually collect and disseminate knowledge for their own benefit, their members and partners. In a way, the purpose of this study was to contribute towards the process of collection of new knowledge on the use of ICT in organizations. Kenyans have different expectations of how ICT should impact on their lives and these expectations can best be met through informative research on ICT performance that clearly explains to the people the possibilities and challenges of applying ICT in their lives. Information Communication Technologies are expected to facilitate business development through improved access to information and knowledge on product prices, on markets, and on services in the production sectors of the economy in Kenya. For example, farmers expect ICT to facilitate access to information and knowledge on crop varieties, farm inputs, credit facilities; and information on how to improve their farming.

Students and teachers expect ICT to improve learning and teaching methods and to boost research activities through new knowledge. In the health sector ICT are expected to help

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access information on improved preventative health education. The information and knowledge delivered through various ICT helps people to make better choices in life. Research on the effects of ICT on people and organizations in Kenyan is needed to give a direction to these expectations. ICT enable modern, reliable, and fast communication systems that provide real time information and knowledge to many communities in Kenya. In remote and land-locked regions, ICT help to reduce the isolating effects of distance and allow communities to be in touch with family and friends in far off cities and countries. Research on how ICT can further improve the livelihoods of such communities is needed. Mutula (2003) cites several factors that make it harder for workers in Africa to communicate and share knowledge. Such factors include the high cost of access to telecommunications, government policy towards ICT, under utilization of existing technologies, limited indigenous base and digital illiteracy. Jain (2002) adds to this list by including lack of skilled and trained manpower, inadequate ICT exposure, lack of national ICT policy, poor communication infrastructure, and ignorance of ICT benefits, expensive ICT equipment and resistance to change. These challenges need to be researched into in order to provide information on what can be done to improve the situation and the way people apply ICT in their individual and organizational capacities.

The government of Kenya recognizes the importance of providing modern telecommunications infrastructure and information networks to improve information and knowledge sharing for rapid economic and social development in the country. As a result, it launched the pasha or ICT hubs that were expected to distribute information and knowledge to the various sectors of the economy in the country. Since their launch, little

has been seen or heard about these hubs and Kenyans can hardly account for their impact on their lives. Research into what goes on in such ICT initiatives is long overdue because the initiatives consume public funds that can be better utilized by resolving the challenges that face the initiatives. Studies by different scholars indicate that mobile telephony in Kenya has been able to transform lives in both rural and urban communities. *Safaricom*'s *Mpesa* service is a good example. Mobile communication has helped rural Kenyans to respond to medical emergencies and link up with relatives in urban centres. In other cases, the mobile phones are used to disseminate specific and localized information and knowledge to communities thereby helping to bridge the digital divide between and within rural and urban areas in Kenya. The mobile phones are also being put to use in recording digital stories that are shared within and outside communities (Laura, 2009; Kemibaro, 2010, and Kilwake and Bertarelli, 2005). Further studies on these and other technologies can shed light on how people are benefiting from the knowledge shared through the technologies.

According to UNDP (2001), ICT have continued to revolutionize knowledge-sharing and empower citizens and communities but these positive changes need to be accounted for through research. UNDP et al. (2001) note that uneven access to ICT tools and networks threatens to exacerbate existing inequalities in African societies but the study also says that ICT can be leveraged by poor countries, communities and individuals to "leapfrog" into a more empowered, equitable and prosperous future. As such, continuous research is needed to inform policy making and organizational strategists on the best ICT practices. Most of the research conducted on ICT and knowledge communication and sharing is

done in the western world and little has devoted to the African continent. The arguments advanced by the different scholars cited in the various sections help to justify the need for research in the area of ICT acceptance and use in organizations and especially with reference to the way they are applied in knowledge communication and sharing in organizations in Kenya.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

Some leading thinkers such as Drucker (1993) and Penrose (1959) in the management field advance the view that knowledge has for a long time been recognized as a critical factor for organizational development and efficiency in performance and as an economic resource that is essential for the postindustrial societies. Knowledge can be seen as a resource that is created through interactions of individuals, organizations and technology. The World Bank's World Development Report (1999) says that knowledge has become the most important contributing factor in determining the standard of living – more than land, tools and labour. A knowledge-driven economy is one in which the generation and exploitation of knowledge play the predominant part in the creation of wealth.

O'Dell and Grayson (1998) and Osterloh and Frey (2000) argue that the communication and sharing of knowledge between individuals with similar or dissimilar practices in and between organizations is a crucial process for both individual and organizational learning. Consequently, research concerning the different factors influencing the degree and way in which people share their knowledge is increasingly gaining relevance. Such research has identified some of the variables under study as technologies and tools (Hlupic et al., 2002, and Riege (2005), and human motivations, organizational climate, and communication climate (Cabrera and Cabrera, 2002; Osterloh and Frey, 2000; Ardichvili

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et al., 2003; Hall, 2009; Hinds and Pfeffer, 2003; Moffett et al., 2003, and Zárraga and García-Falcón, 2003). These authors indicate that well structured human relations and the collective use of ICT have a potentially positive contribution to knowledge sharing in communities of practice and this is why information is seen as the key ingredient of social organization and flows of messages and images between networks constitute the basic thread of social structure.

The general goal of knowledge sharing is to create new knowledge by differently combining existing knowledge and to exploit existing knowledge effectively. There are many discussions on what form knowledge can take and where it exists. Knowledge is tacit, explicit and organizational. For this reason it can exist in various places and forms such as in the individual, in organizational routines or embedded in formal guidelines. Since tacit knowledge is embedded in the individual, it requires that individuals should be willing to share their knowledge. Kankanhalli et al. (2005) say that for knowledge to be shared, it has to be stored to make it accessible and reusable. The knowledge repository process is supported by electronic devices that link various users through directories, networks, electronic forums and discussion boards that allow people to interact with each other in their knowledge sharing activities. Hsu et al. (2007) note people's willingness to share knowledge is the biggest challenge in the knowledge sharing effort that knowledge sharing is not only affected by technology software and hardware but also the ability and willingness of team members to actively participate in the knowledge sharing process.

2.2 Expectations of people on what ICT should contribute to their lives

Many people in the world and in Africa specifically are said to be interacting with different types of ICT every day directly or indirectly. Although ICT use is a recent phenomenon in the Africa context, a number of countries on the continent have been using technologies such as mobile phones and the internet both for social and economic benefits (Thioune and Sene, 2001; Reitmaier et al., 2010; and Kemibaro, 2010). A study conducted by Laura (2009), shows that timely mobile communication in rural Kenya has been helping people to handle emergencies, attend urgent meetings, and plant maize in time for a bumper crop. She adds that these important actions have the potential to trigger shifts in project funding, seed supply, health care, family structure, and feasible rural livelihoods. The author says that in rural Kenya, the mobile phone reflects the interpretive flexibility of artefacts and the malleability of "users," whereby a handset (which is rarely opened in the West) is dismantled by different non-owning users who exchange the *SIM* card and battery to make calls for seeds and to "greet" grandchildren. In many cases, calls blend harvest logistics, gospel messages, and child-rearing troubles.

Having seen the potential of the mobile phone in transforming rural Kenya, a group of youthful entrepreneurs formed the Information Convergence Technology firm to launch an SMS based service called *MwananchiSMS* which seeks to employ young people in rural areas by using mobile phones to disseminate specific and localized information and knowledge (Kemibaro, 2010). According to the firm, enabling push-down services such as sending alerts, reminders, updates, and vital information via a mobile phone can bridge the digital divide between and within rural and urban areas of Kenya whilst serving as a

useful medium for interaction between all stakeholders – from government, to organizations and individuals country-wide. Emerging research on the role played by mobile phones in rural Kenya indicates that there are many opportunities for rural people to integrate the mobile phone into their regular livelihoods as well as in their search for education and knowledge. A research done by Reitmaier et al. (2009) shows that a rural community in Adiedo in western Kenya was able to record digital stories using a basic mobile phone which were then shared within and outside the community. This means that rural dwellers can be assisted to enhance their story telling activities through the mobile phone and other technology devices and be able to share their stories with larger audiences through these technologies.

Kilwake and Bertarelli (2005) propose different communication models that can use a mobile phone with an in-built FM receiver to broadcast educational content in an e-learning context with minimal costs to the students. They argue that their demonstration of effective mobile technologies for distant education means that the technology and their findings can be adapted for use in the public and private education sectors to enable access to higher education by many people, especially those in marginalized areas (rural and pastoralists). It would also be a boost to adult learners who have to sacrifice family time due to the rigidity of available distance learning facilities. These accounts help to demonstrate that with a well structured knowledge base and reliable ICT tools, Kenyans can realize many of their dreams and satisfy their knowledge needs through information communication technology without having to incur high costs of accessing information and knowledge.

New developments on ICT in Africa indicate that the technologies have been playing an important role in transforming communication and the economic lives of people in rural Africa (Reitmaier et al., 2009). There is therefore a need to continually provide knowledge on the ever changing technological environments as they impact on the social and economic landscape of many people on the continent. According to UNDP (2001), ICT have continued to revolutionize knowledge-sharing and empower citizens and communities but these positive changes need to be accounted for through research. UNDP et al. (2001) note that uneven access to ICT tools and networks threatens to exacerbate existing inequalities in African societies but the study also says that ICT can be leveraged by poor countries, communities and individuals to "leapfrog" into a more empowered, equitable and prosperous future.

Everybody, regardless of where they are in the world, expects that the use of ICT will make positive changes in their personal lives, in their work performance, in education, health, in agriculture, in the environment, and generally improve their ways of life. In many African and Kenyan communities, citizens are mostly engaged in agricultural production, small businesses, and the service sector, and the expectations they have of ICT is that they will improve their productivity in these sectors. Information Communication Technologies ought to facilitate business development through improved access to information and knowledge on product prices, on markets and on services. In agriculture, the hope of farmers is that ICT will help them to access information and knowledge on high-yielding varieties of crops at competitive prices, input suppliers, credit facilities; and information on how to improve their farming practices to increase

yield. They expect to access new knowledge on irrigation techniques and crop varieties. ICT can facilitate communication and reduce the time needed for transactions. In the education sector for example, students and teachers hope that ICT will help them improve their learning and teaching methods, and enable them to complete their work faster.

ICT have the ability to boost research and assist in acquiring new knowledge. In the health sector ICT can help to access information that would improve preventive health education. For instance, the Kenyan Ministry of Health in conjunction with the Centers for Disease Control and Prevention (CDC) has been able to use mobile phone technology to conduct disease surveillance and to communicate health messages, updates and urgent outbreak alerts especially in remote parts of the country. The information and knowledge delivered through ICT can help people to make better and more rapid decisions in their daily activities and help to improve the capacities of grassroots organizations to communicate and make their voices heard. ICT allow the access to new communication tools and provide a medium for discussions and the exchange of ideas in organizations. ICT also provide modern, reliable, and fast communication systems that combine with traditional community communication systems. In remote and land-locked regions ICT are expected to reduce the isolating effects of distance and allow effective participation of scattered actors in community life. In the modern society, knowledge and information bestows power 'to act' to the individual, the organization and the community and actors are expected to be more adept at identifying, locating, interpreting and effectively using knowledge in their decisions and actions.

Bell (1973) and Bell et al. (2002) says that the development of human capital through formal education and training characterises the information society today. The scholar argues that the professionalization and formal certification as well as organized technological knowledge are the drivers of economic growth. Castells (2004) explains the importance of formal training of knowledge workers. According to him, ICT have become a critical tool to the service productivity of organizations because they enable the mechanization of information work. He notes that as information systems become complex and interactively connected to data bases and information sources, knowledge workers require the additional capability to research and recombine knowledge. This demands appropriate training in skills and the creative capacity of workers. He adds that the information economy requires highly intelligent labourers who can manage and control the technologies.

Researchers who have been investigating whether "information-age organizations" need to develop and transfer intellectual material in order to survive tend to agree that it is important to use workers' knowledge in order for organizations to thrive in the present knowledge economy (Badaracco, 1991, and Peters, 1992). Other authors argue that in any work based on knowledge, expertise is the most important resource and knowledge capital allows organizations to increase the value of their products and services (Anand et al., 1998; Argote and Ingram, 2000; Faraj and Sproull, 2000; Klein and Prusak, 1994). Although not every individual who uses information communication technology is trained on how to use them, the above scholars demonstrate that training on ICT use can

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have a significant effect on the way knowledge is communicated and shared at the individual and organizational level.

2.4 The role of information communication technology in organizational work performances

The transition of communication practices in the modern organization as a result of technology has led to an increasingly techno-savvy workforce as employees discover that they have to adapt their ICT use and knowledge to maximize their potential in the organizations for survival (Quan-Haase et al., 2005, and King, 2007). Work has become more complex and faster, requiring greater coordination and interaction as workers get more distributed. Knowledge-intensive work is capable of transforming input to output through human creativity and is considered to be the primary input for the attainment of high level job autonomy (Alvesson, 1995, and Starbuck, 1992). In this respect, human creativity is enhanced by high-level formal education and experiential understanding. This requires that knowledge workers be highly skilled and specialized in their area of work and be knowledgeable about the tools they use, especially technological tools.

According to Yates et al. (1999), communication technologies have increasingly reshaped organizational communication and the concept of organizing throughout the 20th century Other authors such as Dans (2002) and Francalanci and Maggiolini (2002)argue that the adoption of ICT is economically valuable when complemented with changes in organizational design and work practices, such as the increased use of teams, redesigned business processes, and inclusion of broader decision-making authority.

ICT contribute to organizational development by providing a platform for the exchange of data, information and knowledge in organizations to improve knowledge sharing. Contemporary organizations use electronic repositories and search engines to enable workers to access, store and retrieve knowledge and subsequently making knowledge sharing more efficient and effective. Büchel (2001) argues that the role of ICT in an organization is twofold. First, ICT are tools for knowledge development that establish and support links between people. Second, ICT play a critical role in raising the consciousness about the existing links within the organization because their implementation and use requires renewed thinking about the process of information acquisition, distribution, interpretation and storage. Alavi and Leidner (2001) add that some of the tasks performed with the help of ICT tools include finding a knowledge expert on directories, looking for recorded source of knowledge using online directories, searching knowledge databases, sharing knowledge and collaborating in virtual teams, accessing information on past projects, and learning about customer needs and behavior by analyzing transaction data. Hansen et al. (1999) says that ICT help to design and implement the codification and personalization strategies in knowledge communication and sharing in organizations. The codification strategy helps organizations to externalize their knowledge using technology aided media such as electronic databases and documents to make the knowledge accessible in the absence of the knower. This strategy is good for the explicit type of knowledge. The personalization strategy helps to link knowledge seekers to knowledge owners and is good for tacit knowledge which is difficult to extract from the knower. Information communication technologies are

intensively used in the two strategies to process and facilitate the dissemination and sharing of the explicit and implicit knowledge in organizations.

Though ICT are widely used in work processes and organizational performance, their use has often been characterized by many challenges. The major challenges identified by various authors are ICT infrastructure, ICT tools and ICT know-how. Binz-Scharf (2003) notes that the relationship between knowledge and technology led to the invention of the computer to facilitate the mediation and transfer of information. Computers are today linked to several other information processing and sharing technologies and the potential of the computer in knowledge sharing is expansive. Brink (2003) says that a good technological infrastructure is required in an organization to support the creation, structuring, penetration and usage of knowledge.

Hasanali (2002) argues that it is impossible for an organization to embark on knowledge sharing without proper ICT infrastructure as the presence of new forms of technology and systems could increase technological motivation among workers to share knowledge. Up-to-date technology can help workers create, transfer and share knowledge faster and efficiently and more effectively. This means that the kind of ICT infrastructure that exists in a given organization will significantly impact on the effectiveness of knowledge communication and sharing in that organization. Yet, many organizations in general, and in particular in Kenya, are unable to share knowledge effectively as a result of the technological factors identified by Riege (2005) such as lack of integration of information technology process and systems which limits employees' flexibility in their work, lack of

internal and external technology support and the mismatch between technological needs, systems integration and information technology processes. It is these factors that organizations need to address in order to realize the full potential of ICT use in knowledge communication and sharing processes.

Hasanali (2002) says that one of the challenging factors contributing to the success of knowledge sharing is the use of simple technology that is easily accessible and understandable to workers. Workers become frustrated when they have to use several technology steps to find knowledge in the system. ICT tools that support knowledge sharing should be simplified for the ease of use among workers. Some of the tools available in organizations include office applications such as e-mail, messenger, electronic calendar and timetable, and groupware tools that support teamwork and collaboration. These tools provide technological support to teamwork through databases forum, sharing application, and electronic meeting systems. Others are document systems that support document creation, storage and information management life recycle and digital documentation. Tools such as work process systems help to monitor work flow generation. Analytical systems support analysis and translation of structured data for strategic planning, operation and decision making. ICT tools can sometimes be complex to use and may require simplified operation for ease of use because they could have a significant impact on workers ability to share and communicate knowledge effectively. Lack of simplification of these tools can lead to the factors hindering effective knowledge sharing such as unrealistic expectation of what technology can or cannot do in an organization and lack of use of newer systems that are more advantageous than old

systems. It can therefore be hypothesized that simple ICT tools significantly impact on effective knowledge sharing.

The training of knowledge workers on technology use has been identified by various scholars as being critical to effective knowledge sharing (Riege, 2005; Bell, 1973; Bell et al. 2002, and Castells, 2004). Bell, for example, says that the professionalization and formal certification of knowledge workers as well as organized technological knowledge among them are the drivers of economic growth. (Castells, 2004) says that ICT have become a critical tool to the service productivity of organizations because they enable the mechanization of information work and adds that as information systems become complex and interactively connected to data bases and information sources, knowledge workers require the additional capability to research and recombine knowledge. This demands appropriate training in skills and the creative technological capacity of the workers. He adds that the information economy requires highly intelligent labourers who can manage and control the technologies that are used in knowledge sharing.

Riege (2005) notes that lack of training among employees on how to use new information technology systems and processes leads to the reluctance by workers to use them because they are not familiar with how they are used. According to Gurteen (1999) sufficient and appropriate ICT training among workers has a positive relationship with knowledge creation and knowledge sharing. Workers who are familiarized with ICT know-how are more ready and willing to share knowledge than those who are not (Syed and Rowland, 2004). ICT know-how may be seen as the degree to which a worker considers their level

of technology literacy as sufficient for effective knowledge sharing. This implies that ICT training and know-how significantly impacts on effective knowledge sharing in organizations. The type of training that each worker receives is dependent on the value that each organization places on its workers and which is a reflection of its human relationship structure.

In many situations, when the factors that contribute to ICT use in knowledge sharing are not addressed and the environment for the sharing of the knowledge is not conducive, many of the expectations of people on what ICT should do for them are not met. In some cases, people have available ICT tools but they do not know how to use or how to access the knowledge that is channeled through these ICT. There is need to streamline the expectations of people on ICT use with the factors that affect knowledge communication and sharing to ensure that ICT are playing their rightful roles in peoples' lives.

2.2 The role of individuals in knowledge communication and sharing in organizations

The extent to which individuals can share knowledge is influenced by what Hinds and Pfeffer (2003) call the cognitive and motivational limitations. The cognitive limitations are linked to the way experts store and process knowledge for application. According to the authors, as the level of expertise increases, the level of abstraction in that knowledge increases. It then becomes harder for the experts to store knowledge in a way that is easily understandable to non experts. However, the manner in which many experts process and store knowledge ignores information processing capabilities and the basic

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knowledge levels of non experts. They overlook the amount of time it will take non experts to extract the knowledge, understand it, and complete tasks, hence making it harder for knowledge sharing to take place efficiently.

The motivational limitations are related to people's willingness to share knowledge. Hinds and Pfeffer (2003) say that incentives and disincentives in an organization can influence whether people share or do not share knowledge. The two authors say that team level rewards, internal competition, status differences, and the degree of formalization and individual's relationship to the organization all contribute to the motivational limitations. In addition, these authors add that trust between the individual workers and towards the organization is an important element in knowledge sharing. Individuals trust that when they share their knowledge the coworkers will reciprocate by sharing theirs. Workers also trust the organization not to use the knowledge they share against them. If this trust does not exist, it becomes hard for knowledge sharing to take place. The level of knowledge sharing among organizations in Kenya may be influenced by some of the issues raised by these authors. Some organizations are highly advanced in terms of technology application and interactive human networks, thus enabling better knowledge sharing than in other organizations that are closed minded.

Another factor identified by Hinds and Pfeffer (2003) in the willingness to share knowledge is the extent to which individuals identify with the team or a group of which they belong. The more individuals identify with teams and groups, the more they are willing to share knowledge within the teams and groups. However, the authors say that

this strength can also work against knowledge sharing outside teams and groups. Strong identification with a specific group can also lead to a reduced willingness to share knowledge outside of the group. Social identification has also been seen to be an important condition for cooperation in knowledge sharing (Wiesenfeld et al., 1999). Identification with the community or with the organization can influence how and whether people will share their knowledge. Organizations that have expansive human and technology networks like *Safaricom* seem to be in a better position to share knowledge as their mode of operation and the market demands an intensive knowledge sharing. In organizations where operations are mainly for immediately and routine needs, there is likely to be less knowledge sharing since human and technology interactions are limited to basic needs and tasks.

Trust between individual knowledge sharers has been identified as influencing how knowledge is shared in an organization. In a survey conducted by the International Business Machines-IBM (2002) it was established that trust was the missing link in effective knowledge sharing. The study says that the results they obtained were similar across all the companies that participated in the survey. The study identified two types of trust prevailing in companies, benevolent trust and competence-based trust. In the first, an individual remains civil towards others and shares knowledge out of civility. In competence based trust, an individual seeks knowledge from another because they think the person is knowledgeable in a specific area. The study says that both type of trust can exist and affect knowledge sharing independently of the other but knowledge exchange was more effective where a person was viewed as being both benevolent and competent.

Knowledge internalization, which refers to degree of ownership and commitment in knowledge sharing among individuals, has been identified by various scholars as influencing the extent to which people will share or not share knowledge. Individuals own knowledge by fully internalizing it, and thereby being in control of it. When people begin to own knowledge, it is at their discretion how they are going to use it. Pierce et al. (2001) say that the higher the individual exercises discretion, the more likely they will invest their own ideas, unique knowledge and personal style into the knowledge thereby personalizing it. A deep understanding of the knowledge and investments made by individuals add to solidify the ownership of the knowledge.

When knowledge is individually owned, the owner determines whether it is worth to share with others or if it is prudent to keep the knowledge. Individuals develop and interact with knowledge based on their perceived value of it. Commitment towards knowledge acquisition affects one's level of competence in using knowledge and the amount of satisfaction they derive from using it. Satisfaction in using a particular type of knowledge reduces the amount of stress that a person is exposed to in work processes.

Argote and Ingram (2000) say that in order to facilitate knowledge ownership and commitment, researchers propose that organizations need to adopt an active learning environment that encourages situations of knowledge sharing where the source and recipients can actively re-appropriate, adapt and reconfigure the knowledge to its needs among the individuals and in the organization. The two scholars emphasize that the factors that matter most to knowledge sharing processes are those that tend to support or

inhibit the individual's ability to internalize knowledge. Individuals with limited absorptive capacity and with a limited stock of prior knowledge were less likely to see the value of new knowledge and therefore less likely to appreciate the value of actively participating in knowledge sharing.

2.5 Theoretical framework

2.5.1 Main concepts and theories on ICT and knowledge communication and sharing

Information and communication technology systems have been widely used in modern knowledge economy organizations. Their use has had many favourable consequences as they are said to support interaction and collaboration, as well as workplace learning and work performance (Andriessen, 2003). Studies by Bharadwaj et al. (1999), and Hitt and Brynjolfsson (1996) demonstrated that ICT investments are beneficial for performance and productivity in organizations. However, other studies also indicated that the implementation of ICT systems for knowledge sharing entail both organizational and individual changes and their adoption has proven challenging at the individual and organizational level. The challenges and problems associated with the implementation and adoption of ICT systems in knowledge sharing have led scholars and practitioners to seek to understand the processes and structures necessary for effective knowledge sharing in organizations (Jeyaraj et al., 2006). Most of these challenges concern both the theoretical and methodological approaches used in investigating ICT and knowledge communication and sharing.

Studies on knowledge communication and sharing are considered to be multi-disciplinary and therefore use theoretical triangulation to come up with a synergized theoretical and conceptual framework. This study highlights four major approaches to ICT and knowledge communication and sharing in organizations. These approaches are: the network society concept; inter organizational knowledge networks theory; the organizational information processing theory; and, the technology acceptance model.

2.5.2 The network society concept

Proponents of organizational networks in information and knowledge communication argue that the network revolution was brought about by the increased use of technology leading to new competitive market forces among organizations. In addition, this revolution is said to have led to a radical transformation of business and development models in both developed and developing economies and societies. The new network economics and dynamics combine multiple feedback mechanisms and network effects to impact on organizational development through knowledge creation and application. As a result ICT are no longer seen as an end in themselves but rather as critical enablers of the organizational development process. Scholarly interest in information and networks has been focused on the macro-structures and processes of information and communication and Castells (2007) identifies what he calls mass self-communication as networks of horizontal communication rooted in mobile and online technologies that link individuals locally and globally.

In the age of globalization, the boundaries of traditional organizations have broken down, and organizations are now gaining competitive advantage by embedding themselves in different types of inter-organizational networks and utilizing the resources in the network instead of developing them in-house (Castells, 1996; Monge and Contractor, 2003). The networked society concept is used by Castells (1996-1998) to refer to a society that is interconnected by telecommunication networks in information and knowledge sharing.

In the networked society, key structures and activities are organized around electronically processed information as the basic units of modern life. Castells' notion of the network society is that which is connected by telecommunication networks where both social and media networks shapes its mode of organization and structure - individual, organizational and social. In this society, social structures and activities are organized around electronically processed information networks which are the basic units of modern life. Being located within a network holds more power than being ranked among the global cities. The timeless nature of the network society breaks down the biological sense of time and the sequences of time, thus bringing closer the physical distances among organizations in the society and easing the transmission of information, thus annihilating the logical concept of space. Castells (2000) defines the global economy as a network of financial transactions, production sites, markets, and labour pools on a planetary scale. This definition lays emphasis on the "linkages between economic agents" which are essentially horizontal and flexible relationships in which the operating economic agents such as organizations enact a project or activity as 'nodes' in the networks.

The linkages among organizations are networking nodes and are open systems which can increase their value exponentially as they add new nodes and can create infinite linkages among other agents for their goals. Castells argues that Africa is dropping behind the global economy with each leap forward by the techno-elite as a result of the inherent nature of technology. New networks and communication technologies enable people or nodes to build relations with others and the decision of making relations is up to the comparative value of each node. Africa, which lacks a legacy from the industrial era composed of less valuable segments which remain isolated or utilized for cheap wage labour in the new economy. This inequality is reflected in the consumption of information because the majority of the people on the continent remain unwired. However, the rapid diffusion of mobile phones in the developing world, especially in Africa and Asia, is believed to be helping even the poorest nations to participate on a more equitable footing in the global network society (de Silva and Zainudeen, 2007; Librero and Arinto, 2007). Thus, the viability of the network society concept can be challenged on the basis of emerging trends in ICT use in globally and in Africa. Technological networks have become a major factor in the world's economies as they enable development worldwide and improve communication and the exchange of knowledge and information to strengthen and create new social and economic networks. Network research seeks to explain organizational phenomena in terms of formal and informal organizational structures such as communication networks, knowledge networks, influence networks, advice networks, task networks and the networks of innovation diffusion which can be integrated into the emergent communication networks.

2.5.3 Inter organizational knowledge networks theory

Scholars argue that when looking at how organizations benefit from each other through human skills and technology, it is necessary to establish the types of linkages that connect them and the levels of connectivity. Thus different theoretical approaches can be used to explain the various approaches used by organizations to give and take knowledge for mutual benefits. The inter-organizational knowledge networks theory attempts to integrate two major research traditions: the network analysis studies and knowledge management studies (Castells, 1996; Monge and Contractor, 2003). This approach explains two distinctive inter organizational knowledge networks: the transactional knowledge network and the interactive knowledge network. The interactive knowledge network is based on long-term, interactive collaborative relationships among different organizations and allows for the sharing of a broad range of knowledge.

The transactional knowledge network is based on short-term, transactional relationships among organizations and may include material and data transfer and generally shares only codified knowledge. While the transactional knowledge network allows the transfer of knowledge among organizations, the interactive knowledge network enables the creation of new knowledge through long-term communication and interaction. The resource-based view of organizations posits that organizations participate in inter organizational relations to acquire the resources they need in order to survive and to manage their dependency on the environment. Organizations in this case are expected to encourage collaborative networks in knowledge sharing activities by creating awareness of work processes, developing connections and socialization, giving more power to

employees in their knowledge work, focusing relationships in the organization on partnerships rather than on hierarchies, promoting understanding of sharing, and encouraging positive values on sharing choices. When an individual can easily find knowledge through networks and collaborations, the visibility of the knowledge sharing activities and the contributions of every individual is enhanced and this encourages the intention to share knowledge in and across organizations. In the view of the proponents of inter organizational knowledge network theory, a network can constitute a metaphor, a method, or a theory (Borgatti and Foster, 2003; Monge and Contractor, 2003).

Literature on inter organizational knowledge network paradigm indicates that current studies on organizational networks are generally flawed by a gap between network structure and network content, overemphasizing on network structure at the expense of network content. There is lack of effort to integrate the network perspective with other theoretical perspectives and the existing studies are cross-sectional, creating a need to focus on the process (Parkhe et al., 2006). Organizations depend on their environment for resources and they need to effectively manage their relationships with the environment and other organizations in it. This dependency is more prominent in the current age of globalization where the boundaries of traditional organizations are breaking down and organizations gain their competitive advantages by embedding themselves in different types of inter organizational networks and utilizing the resources in the network instead of developing them in house (Castells, 1996; Monge and Contractor, 2003).

Gulati et al. (2000) say that strategic knowledge sharing networks are composed of inter-organizational ties that are enduring and are of strategic significance to organizations' work. A key characteristic of knowledge networks is the repeated and enduring knowledge exchange relationships between the various actors in the network. Network members occupy different positions along the network's value chain and members are well organized to achieve certain knowledge related goals.

Attention continues to be paid towards the understanding of knowledge communication and sharing through inter organizational networks approach especially in the areas of new ideas, best practices, information, and new technologies among organizations through research on the inter organizational knowledge network. The authors reviewed in the literature on inter-organizational knowledge networks generally acknowledge the complex nature of knowledge sharing in inter organizational networks and most of their studies do not explicitly specify the characteristics of the knowledge flowing in different types of networks among organizations. One way to address this weakness would be to combine the study of network content with that of network structure by looking at different types of content flowing through different networks. Part of this study attempted to identify the types and directions of knowledge communication and sharing through different networks that link the selected organizations in their knowledge communication and sharing as well as the kind of knowledge that they share through these networks.

2.5.4 Organizational information processing theory

The information processing theory has its origin in organizational research and the proponents of the theory are many (Thompson, 1967; Galbraith, 1973; Tushman and

Nadler, 1978; and, Larkey and Sproull, 1984). The relevance of the theory in this study is its interrelation of organizational information processing capacity and organizational performance which affect the effectiveness of information and knowledge communication and sharing. Various approaches in the organizational information processing theory view organizations as information processing systems that face internal and external uncertainties in their performance. These uncertainties prevail if the amount and quality of information required to perform organizational tasks cannot be provided and processed by the organization itself. An organization is seen to be effective only if there is proper fit between its information processing capacity and the information processing requirements of its environment. In this case, decision makers receive the right amount and quality of information and knowledge required to cope with the uncertainty and the complexity that the organization is facing. From the perspective of this theory, organizations need to balance between their knowledge processing capacity and the knowledge processing requirements of their environments. When this situation is prevailing, the knowledge workers in the organization receive the right amount and quality of knowledge needed for various tasks and activities. As such, different organizational structures, including human and technology structures, are supposed to be adaptable for different environments to enable effective knowledge processing and consumption. This theory borrows ideas from the contingency theory by assuming that the choice of the structure in an organization is contingent on its information processing capabilities and the information processing requirements of its environment. Large organizations often have to deal with increased organizational complexities related to their information and knowledge needs. Besides having diverse product lines, the

organizations have to coordinate subsidiaries operating in different national and cultural environments. The formal structures of these organizations are considered as the basis of their information and knowledge processing capacity.

Some of the organizational information processing theorists say that in multinational corporations, information processing is even more crucial than in national organizations because their information and knowledge demands are greater and need to be distributed across a large client base (Tihanyi and Thomas, 2005). As a result, their human and technology structures are well advanced and highly refined for the organization to sustain the knowledge demand. For example, Safaricom requires a more highly refined human and technology structure to cope with the complexities of its work locally and across the borders than an organization that provides only localized services. Hence, the assumption of this theory is that the larger the organization is, the more it requires a highly refined human and technology structure to support its information and knowledge needs.

The arguments of these scholars seem to converge with what other scholars say about the human and technology factors impacting on knowledge communication and sharing, noting that human relationships in the workplace have to be formalized and well structured to encourage positive knowledge sharing while ICT have to be formalized through good infrastructure, accessible tools and proper ICT training (Cabrera and Cabrera, 2002; Osterloh and Frey, 2000; Szulanski, 1996, and Riege, 2005).

The need for formal structures in human relationships and ICT infrastructure is therefore critical in supporting a positive knowledge sharing process in organizations because these structures help to determine the information processing capacity of the organization vis-à-vis its knowledge needs. If an imbalance prevails between the human and ICT structures that produce knowledge on the one hand, and the knowledge consumption demand of the organization, on the other, the performance of the organization is likely to be affected. The information processing theory therefore helps us to understand how the factors impacting on knowledge sharing can be encouraged by an organization through the formalization of human and ICT structures. For example, positive human relationships are determined by the authority and reporting structures in an organization and these structures can either encourage or discourage effective knowledge sharing based on how each worker views those that they have to share their knowledge with.

A good ICT infrastructure that provides accessible ICT tools and has well trained workers is more likely to produce effective knowledge sharing processes than one that lacks these structures. However, this theory only helps us to understand the balance required in the knowledge processing capacity of an organization and its knowledge needs but does not demonstrate how the knowledge generated is transmitted between various individuals, groups and organizations.

Huber (1991) argues that an entity learns only if information processing helps to change its range of potential behaviors and that this holds whether the entity is a human or other animal, a group, an organization, an industry or a society. Information processing can

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involve acquiring, distributing or interpreting information and therefore learning entails assimilating, creating, and applying information and knowledge that enables the organization to accomplish tasks that it could not perform before. Thus, learning in this case is a result of knowledge sharing.

2.5.5 Technology acceptance model

Several theoretical reviews have been conducted on ICT implementation and adoption in knowledge driven organizations. Venkatesh et al. (2003) reviewed user acceptance literature and discussed eight prominent models in ICT use in knowledge sharing and came up with a unified theory of acceptance and use of ICT which they called the Technology Acceptance Model (TAM). Several other scholars conducted analysis on this theory and found that it was the most commonly cited theory in research on ICT use and acceptance in organizations (Lee et al., 2003; Legris et al., 2003; Turner et al., 2010). The Technology Acceptance Model is used to predict and explain ICT usage behaviour in organizations, that is, what causes potential adopters to accept or reject the use of information technology in their work processes and how this affects knowledge sharing and performance in organizations. The theory borrowed heavily from the concepts of Theory of Reasoned Action (TRA) and combined two theoretical constructs: perceived usefulness of ICT and perceived ease of use of ICT to try and predict human attitudes towards the use of ICT systems and their willingness to use them. In this model, perceived usefulness refers to the degree to which a person believes that using a particular ICT tool will enhance their work performance and contribute towards efficient knowledge sharing while perceived ease of use refers to the degree to which a person

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believes that using a particular ICT tool will be free of laborious effort, making its use more efficient.

This view of human behaviour towards ICT is also emphasized in Riege (2005) in the discussion of the seven ICT factors that impact on knowledge sharing. Davis et al. (1989) in an earlier study had empirically compared the ability of the technology acceptance model together with the theory of reasoned action to explain the acceptance and rejection by users of the voluntary use of computer-based technology. The scholars argue that ease of use of ICT has a significant influence on technology acceptance as well as perceptions of its usefulness. They add that this factor is related to the skills and level of training of knowledge workers in ICT since effort oriented huddles decrease with sufficient and appropriate training, enabling workers to perform their duties with ease.

Other scholars like Cabrera and Cabrera (2002), Osterloh and Frey (2000), Hinds and Pfeffer (2003) and Riege (2005) compared different ICT adoption models and developed extensions of the technology acceptance model and also replicated it in various situations. They used the theory of reasoned action to define the links between the beliefs, attitudes, norms, intentions, and behaviors of individuals. In their study, the assumption was that a person's behavior is determined by the person's behavioral intention to perform it, and the intention itself is determined by the person's attitudes and his or her subjective norms towards the behavior. The subjective norm in this case refers to the person's perception of what people who are important to the person think he should or should not perform a particular action or behaviour.

Karahanna et al. (1999) conducted another study that examined users' ICT pre-adoption and post-adoption beliefs and attitudes by combining aspects of the theory of reasoned action with that of diffusion of innovations theory which explains how new ideas are spread and adopted in a community, and demonstrated how communication channels and opinion leaders shape the adoption of innovations. However, their study has many contextual limitations in relation to ICT adoption and use in organizations. The diffusion of innovation theory, for example, was developed for a general development context and is based on individualized voluntary adoption decisions. The theory of reasoned action on the other hand assumes that individual workers have the capability to rationalize the usefulness of ICT tools on their own and therefore decide to adopt or not adopt them. In reality ICT adoption is mostly driven by organizational needs (Gallivan, 2001). Many of the theories identified by various studies in the field of ICT adoption and use help to explain individuals' intentions to adopt ICT in work processes, including knowledge communication and sharing processes.

The study of workers' attitudes is identified by various researchers as being important because attitudes influence organizational decision making about the acquisition of ICT infrastructure, ICT tools and the level of training (Davis et al., 1989). According to Yousafzai (2007) the technology acceptance model is more suitable in the field of ICT use because it provides a parsimonious, clear and tested framework for ICT adoption and implementation research. The applicability of the technology acceptance model in this study is that it explains the conditions in which individuals voluntarily decide whether to

use technology personally and when the targeted technology requires comparatively little effort to learn to use (Gallivan, 2001). The theory also focuses on the benefits of the use of ICT from the perspective of an individual, thus explaining the impact ICT have on knowledge communication and sharing among individual workers. As earlier expounded by Nonaka and Takeuchi's (1995) knowledge spiral model, knowledge begins at the individual level and then moves to the organizational level through ICT mediation. Thus, individuals' attitudes play an important and active role in making ICT systems work in organizational settings, especially where motivation is high and the human and ICT structures are well implemented (McLaughlin and Skinner, 2000).

According to Deci and Ryan (2000), understanding human motivation requires the consideration of innate psychological needs such as competence (being effective in dealing with the environment), autonomy (a sense of volition and the experience of the possibility of choice), and relatedness (the desire to feel connected to others). The technology acceptance model discusses two of these needs: ease of use, referring to competence; and usefulness, referring to benefits in work processes. According to the theory, an individual decides whether an ICT tool is useful or not and whether it is simple enough to use before adopting it in their work processes and this further impacts on knowledge sharing processes. Though this theory gives a clear framework on assessing ICT acceptance and use in organizations, its critics argue that it ignores the contextual factors that influence the use of ICT in organizations. They say that it does not explain how power relations related to ICT use affect work performance and yet it is quite clear

that in many organizations those perceived to hold more power are also said to be in a position to decide who gets to use a particular ICT tool.

Some of the critics such as Gallivan (2001) and Lee et al. (2003) also argue that the theory wrongly assumes that each individual is left to independently decide whether to use or not use an ICT tool while in reality ICT implementations in modern organizations are harmonized and centrally coordinated, and individuals often have little to say about the organization-wide adoption of ICT. In addition, social networks and interaction among groups have become an important issue along with the development of ICT systems. ICT systems used to be single-user systems, but now they are used in a process-oriented way by multiple users, and also in inter- organizational and global settings (Benbasat and Barki, 2007 and Lyytinen, 2010).

The theory is further criticized for failing to address social contexts such as group interaction and the coordinating of work tasks through ICT systems. It does not fully explain human behavior in organizational change processes in which a joint effort on the part of organizations and individuals is required in order to master the use of new ICT tools to create new shared work practices (Lyytinen and Damsgaard, 2001). Korpelainen and Kira (2011) argue that future research in the area of ICT adoption might benefit from studies that focus on the implementation and adoption processes and their consequences and such research should also exploit more qualitative and interpretive approaches generating new and unexpected knowledge.

In their criticism of the technology acceptance model, some scholars like Orlikowski and Baroudi (1991) argue that previous studies conducted using this model have been based on field surveys with positivist research assumptions and the researchers do not question their data collection procedures and whether these procedures were the best methods to answer their research questions. The two scholars add that ICT system research could gain more if a plurality of research perspectives were effectively employed. They further suggest that if researchers go into research situations with open questions instead of testing theories, they may have opportunities to identify new topics coming out of the data. Other critics feel that the technology acceptance model may have attracted research with a narrow focus and less innovativeness, and therefore little attention has been given to some key problems related to technology acceptance (Bagozzi, 2007; Benbasat and Barki, 2007; and Lee et al., 2003). They claim that the technology acceptance model has reduced the amount of attention given to the role of technology and design, and the factors which make technology useful and easy to use. The research is also said to overlook essential determinants of decision making and action, and the different consequences such as adaptation and learning behaviors in order to reach a more comprehensive understanding of the factors influencing ICT adoption in organizations (Bagozzi, 2007; Benbasat and Barki, 2007). But despite all these criticisms, scholarly reviews conducted by several scholars from respected journals indicate that the theory is the most commonly cited model in ICT adoption and use studies (Jeyaraj et al., 2006; Venkates et al., 2003; Lee et al., 2003; Legris et al., 2003; Turner et al., 2010, and Yousafzai et al., 2007).

Based on the various approaches in the reviews of the conceptual and theoretical models used in the field of ICT and knowledge sharing, the technology acceptance model was adopted as the main theory in this study, while key aspects of the network society, the inter organizational knowledge networks, and the organizational information processing theories were retained because of their linkage to the main topic of the study. These aspects included knowledge networks, knowledge creation and conversion processes, and human relationships in knowledge sharing processes. The technology acceptance model was adopted as the main theory because it explains the phenomenon under investigation more clearly and enjoins the key variables of the study that affect knowledge communication and sharing in the selected organizations. The theory identifies three key variables of measurement in ICT adoption and use, namely, the acceptance or rejection of use of the communication information technology based on one's competence; the perceived usefulness of the information communication technology; and, the perceived ease of use of the information communication technology. These variables are directly linked to the ICT factors identified by Riege (1995) as contributing to knowledge communication and sharing in organizations such as technology infrastructure, technology tools and technology know-how. Bedard et al. (2003) also observe that the training of workers on ICT enhances their acceptance and use of the technology as it impacts on their perceptions of their tasks and technology self-efficacy, which in turn impacts on perceptions of usefulness and ease of use. Thus, the variables of acceptance, use and training are all intertwined in explaining the role and contribution of ICT in knowledge communication and sharing activities in the selected organizations. The type of ICT infrastructure and ICT tools available in an organization affects how workers

perceive the relevance and usefulness of the technology in the work place while ICT know-how based on training determines whether the workers will be willing to use the technology or not based on their training and competence. These variables have a relationship with effective knowledge communication and sharing since the processes of knowledge communication and sharing require competence and ease of use of ICT as well as workers' willingness to share knowledge.

This study linked the ICT adoption variables to the ICT factors that impact on knowledge sharing discussed by Riege (1995) to demonstrate that the state of ICT adoption and use in an organization has a direct effect on knowledge communication and sharing since knowledge sharing is related to both human and ICT factors in organizational work. For example, the learning predisposition of the knowledge recipient and their knowledge-sharing capability is dependent on their level of ICT know-how. The environment in which the sharing occurs is also dependent on the ICT infrastructure and ICT tools available in the organization. Again, the form and location of the knowledge shared is dependent on the availability of ICT systems for knowledge storage and retrieval. The organizational information processing theory and the technology acceptance model were found to explain these relationships more clearly and were therefore used as the main theories in investigating the role and contribution of ICT in knowledge communication and sharing in organizations in Kenya.

CHAPTER THREE
METHODOLOGY

3.1 Introduction

This study sought to understand the impact of ICT on knowledge communication and sharing in organizations in Kenya. The study relied on lived experiences and organizational structures that provide a good ICT infrastructure, easy ICT tools and proper ICT training of workers in support of knowledge communication and sharing. The study investigates the acceptance and use of ICT, both at the organizational and individual levels and the processes of knowledge communication and sharing that result from this acceptance and use.

According to Jackson et al. (2007), studies that seek to understand experiences in a humanistic, interpretive approach fall under qualitative type of research. Qualitative research is able to elicit more detailed information about a phenomenon. Although the approach is limited in the extent to which it can be generalized, it was able to provide the investigation in this study. According to Patton (2002), transferable quality in research results can be used to understand what is happening at policy and practice level in organizational knowledge communication and sharing. Korpelainen (2011) also argues that future research in the area of ICT acceptance and use might benefit from studies that focus on the implementation, adoption processes and their consequences, adding that research should exploit more qualitative and interpretive methods to generate new and unexpected knowledge. The qualitative method was therefore chosen as the most

appropriate approach to gather detailed information on the role and contribution of ICT in knowledge sharing processes in the selected organizations.

3.2 Research sites

This study used familiar group of organizations operating in Kenya as research sites for gathering data on individual and organizational experiences and interactions with ICT. The organizations were a mix of governmental and non governmental agencies as well as corporations. The following are brief descriptions of the selected organizations.

Safaricom is a local service provider in mobile telephony and also operates a money transfer service called *Mpesa*. Communication Commission of Kenya is a government parastatal that oversees the regulation of information and communications in Kenya. Ministry of Information and Communication is a department of government that provides information to the government and to other relevant agencies, Ministry of Justice and Constitutional Affairs oversees the provision of legal services , Ministry of Planning and National Development/ Millennium Development Goals Secretariat oversees the work of producing the government's development plans, Ministry of Trade and Industry helps to develop industry strategies and oversees linkages between Kenya and other countries, Ministry of Industrialization conducts the mapping of local industrialization strategies and policies, Ministry of Water and Irrigation is in charge of water resources, Ministry of Gender, Culture and Social Services provides equity and empowerment programmes, Ministry of Youth Affairs oversees youth development projects and promotes talent and capacity among the youth, Ministry of Finance produces the country's budgets and finances government projects, departments and other operations , Office of the President

– Public service reform and development secretariat oversees performance contracting in the public service, Agriculture Development Co-operation /Italian Government supervises rural development projects, National Environment Management Authority supervises environmental policy implementation, Kenya Industrial Estates helps to set up structures for industrialization, Economic and Social Council conducts research on various economic activities, Capital Markets Authority is the regulator for the stock market activities, Federation of Kenya Employers is an agency linking employers and the government, Federation of Women Lawyers in Kenya is a legal advocacy organization for human rights, Kenya Private Sector Alliance is a private investor agency that links public and private investors, Media Council of Kenya is a self regulatory agency for media and journalism, and the Regional Centre on Small Arms is a licensing agency on small arms and controls the circulation of these arms.

The organizations were chosen purposively for their perceived mandate in contributing towards information and knowledge among their client and customers as indicated in their missions and also because their information and knowledge contribution requires them to intensify the adoption of ICT in their work for effective knowledge communication and sharing which plays a big role in their activities. For this study, the data sought existed through daily organizational processes and in the practical lived experiences of the respondents and informants working in these organizations. In this sense, the study was context bounded and the organizations that participated were treated as case studies. Yin (2003) says that case studies allow investigators to retain the holistic and meaningful characteristics of real-life events as was the case in the study.

3.3 Rationale for choice of target population

As the topic suggests, the population of the research included organizations that were perceived to be both knowledge and ICT intensive in their work processes based on the kind of services and products they offer as well as their mandate. The organizations were identified through a purposive selection by the researcher who felt that they had a significant contribution towards knowledge both at individual and organizational level and that their service provision required daily use of ICT. The total number of the organizations was 22 and this number was found to be sufficient to give diversity that the researcher needed in the investigation. Orlikowski and Baroudi (1991) argue that ICT system research can gain more when pluralities of research perspectives are employed. They further suggest that if researchers go into research situations with open questions instead of testing theories, they may have opportunities to identify new topics coming out of the data. The diversity in the choice of these organizations was aimed at enabling a more open approach as proposed by the two authors.

A diverse choice of organizations was seen to provide wider perspectives on what is happening in the field of ICT acceptance and use in knowledge communication and sharing processes in Kenyan organizations. It was assumed that these organizations are aware of what is happening in the field of ICT and knowledge sharing because their service mandate requires them to provide relevant information and knowledge to their clients and their work processes require daily use of ICT. The unit of analysis was at two levels: the individual ICT workers in terms of their acceptance and use of ICT, and each

of the organizations in terms of providing a good ICT infrastructure, simple ICT tools and ICT training of workers.

3.4 Selection of respondents and informants

Casual visits to selected organizations revealed that the number of ICT employees in most of the 22 organizations was on average 6-8 staff except in Safaricom where ICT intensification and knowledge sharing was quite wide at the individual, client and organizational level. The researcher however decided to retain a similar number of ICT workers in Safaricom as in the other organizations for purposes of uniformity. This provided a maximum number of individual respondents of 176. The final sample population was informed by the information provided by the selected organizations about their ICT infrastructure, ICT tools, training of ICT workers as well as the acceptance and use of ICT among workers and the need to communicate and share knowledge in the organizations' work processes. The picking of the final sample was by simple random whereby colour coding for each organization was employed on a piece of paper and a third party asked to randomly pick until the desired number was arrived at.

In addition, key informants were selected from each of the 22 organizations for the in-depth interviews. These organizations were divided into three categories determined by the researcher based on the selected population. The categories were: government departments and ministries; non-governmental organizations; and, service industry agencies and corporations. The study picked three key informants from each of the categories by means of simple random procedure. This yielded a total of 9 key

informants. The study used the information from the key informants to validate and confirm what the respondents said about the status of ICT and knowledge sharing in their organizations.

3.5 Variables of measurement

The study relied on the ICT Opportunity Index (ICT-OI) to identify what researchers look for when investigating the field of ICT adoption and use in organizations and institutions. The index was developed by the International Telecommunication Union (ITU) and allied organizations. It uses a predetermined analytical tool to track the digital divide by measuring the difference in ICT opportunity levels among economies. It relies on several indicators to measure ICT networks, education and skills, uptake and intensity of the use of ICT (ITU/UNCTAD, 2007). This study borrowed the aspects of the ICT-Opportunity Index that measure the technology infrastructure and tools, skills and training, acceptance and use, and then included an additional aspect of knowledge communication and sharing to gauge these elements.

The theoretical literature reviewed in this study indicates that some of the approaches used to measure ICT adoption in organizations and knowledge communication and sharing often includes measuring the acceptance and use of ICT besides measuring information processing structures. These approaches focus on the ICT infrastructures, tools and training of ICT workers as well as the human and organizational structures that support information and knowledge communication and sharing. The study picked the variables identified by both the ICT Opportunity Index and the various authors discussed

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in the literature review and theoretical framework for measurement. The variables from

the ICT opportunity index include the uptake (acceptance) and intensity of the use of

ICT, and education and skills (training of ICT workers). The final list of variables

identified by the researcher from the ICT-OI and the literature review include ICT

infrastructure, ICT tools, training in ICT, acceptance and use of ICT and knowledge

communication and sharing. The independent variables as used in this study are ICT

infrastructure, ICT tools, and training in ICT. The dependent variables are the acceptance

and use of ICT, and knowledge communication and sharing. The researcher synthesized

these variables and came up with a summarized illustration as indicated in **Figure 2** that

follows.

Figure 2: A summarized illustration of the measurable aspects of the synthesized variables

AVAILABILITY OF ICT INFRASTRUCTURE & TOOLS	ICT TRAINING ACCEPTANCE AND USE OF ICT	IMPACT ON KNOWLEDGE COMMUNICATION & SHARING
Connectivity Internet/website Data base tools Network tools Hardware & software tools Computers Printers Telephony Mass media Digital media Other technology	Areas and levels of ICT training Levels of acceptance and use Types of ICT used Areas of ICT use Frequency of ICT use	Improved knowledge communication and sharing processes Enhanced knowledge work performances Efficient and diverse knowledge flows and networks Faster and higher volumes of knowledge Faster and more accurate knowledge outputs Improved quality and variety of knowledge Easy access and frequent use of knowledge

Source: Researcher, 2012.

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Although **Figure 2** shows the variables as standing independently, in real practice they are interlinked and interconnected. The mode of measuring and reporting the findings on these variables is similarly interrelated.

3.6 Instruments of data collection

The instrument of data collection was in three sections. Section I provided details on ICT staff in terms of their individual levels of training and expertise, years of relevant experience and interaction with ICT. Section II provided information on the kinds of ICT infrastructure and tools that exist in the selected organizations. Section III provided details on the processes involved in knowledge conversion, and the communication and sharing of knowledge in the selected organizations. The information gathered was cross checked through in-depth interviews with key informants guided by a schedule of questions (see appendix II). These questions and topics were based on the relationships between sources and recipients of knowledge in the organizations, the form and location of knowledge, the learning predisposition of workers, sharing capabilities, and the organizational knowledge sharing environment.

3.7 Data collection techniques

3.7.1 Questionnaire survey

According to literature on ICT performance in organizations (Nelissen et al., 2008), an objectivist approach assumes that ICT characteristics act on the processes of knowledge sharing and that attention should be paid to ICT infrastructures and ICT tools. This study identified five key variables of measurement namely: ICT infrastructure and ICT tools,

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training of ICT workers, acceptance and use of ICT, information and knowledge processing habits, knowledge communication and sharing processes and the researcher decide that the questionnaire was the best tool to assess the status of the five indicators in the organizations. Face to face interviews and office drop off of the survey instrument was preferred as the most suitable technique for data collection because of convenience and time management.

3.7.2 In-Depth Interviews

It is noted in the literature review that the use of ICT in knowledge sharing is affected by both the human and organizational structures in place that may encourage or discourage effective knowledge communication and sharing. Based on this, the study adopted in-depth interviews as the most appropriate data collection technique because they facilitate extraction of detailed information on how human relationships are structured in the organizations. The in-depth interviews addressed the aspects of organizational and human structures such as work descriptions and relationships, responsibilities, supervision and reporting; work groups and networking, and power relationships. These aspects are further characterized by related factors such as motivations and incentives, competition, status differences, trust, team work, self and social identification, and commitment. Appendix II contains the interview points used to investigate these aspects.

3.8 Field Work and Data Analysis

This study undertook a nine month field research during which more than 100 copies of a questionnaire were distributed through drop off and appointments for face to face interviews made with the relevant officers in the selected organizations. In addition, within the same period, the study concurrently held in-depth interviews with nine key informants from the organizations listed earlier in this Chapter. The interviewing time for each individual ranged from 35 minutes to two hours to allow for flexibility for any unforeseen interferences. The interviews were audio taped for later transcription and thematic content analysis. The study had four trained research assistants. One assistant helped in the administrative matters and the scheduling of appointments. A second assistant took charge of the recording equipment. Two other research assistants helped to distribute the questionnaires and ensured that they were fully completed and returned.

Once the data was collected, the responses from the questionnaires were collated and the data edited before being fed into a computerized programme. Descriptive statistics were generated according to the study variables. Combinations such as ICT infrastructure and tools, ICT acceptance and use, training of ICT workers, information and knowledge processing habits, and, knowledge communication and sharing processes were used to generate the descriptive statistics. Data from the in-depth interviews were analyzed thematically based on the specific objectives of the study and used as a reflection on the descriptive responses.

3.9 Scope and Limitation

The study was limited to the selected organizations mentioned earlier in **Section 3.2** and the results are therefore applicable to those organizations. This means that they can only be used to demonstrate what happens in each single case. Nevertheless, the results can still be used to reflect on what is happening in other organizations. The study ensured that the data collected is informative in terms of policy and practice in order to be of use.

The study sought to understand a relatively new field that links ICT to knowledge communication and sharing. The literature in this field is diverse, coming from different fields of study and this led to difficulties in identifying a single position or approach from the literature. The study had to therefore combine data sources from different fields such as management science, information and technology studies, communication, and economics. Although the combination of literature from different fields to address a specific area of study is challenging and sometimes problematic due to the fact that theoretical approaches have varying and sometimes differing approaches, the combination also strengthened the study by providing a triangulation of data and theoretical sources that were informative and up to date. Closely related to this challenge is the fact that there are no common theoretical groundings in the field of ICT and knowledge sharing. This called for a combination of theories and concepts to explain the theoretical framework and how things are happening on the ground. In this regard, the study used a combination four theories, namely, the network society concept; inter organizational knowledge network theory; the organizational information processing theory; and the technology acceptance model to explain the phenomenon under

investigation. The combination of these four theories helped to enrich and clarify the different aspects of ICT and knowledge communication and sharing that were being investigated.

Another limitation that was anticipated was the reluctance by respondents and informants to provide the required information especially in cases of self reporting. To overcome this challenge, a letter was written to the Chief Executive Officers of the participating organizations requesting permission to collect the data from respective ICT departments and related sections. A second letter was written to the prospective respondents and informants explaining the importance of the study to their organization and the need for them to participate. The letter was to assure the respondents and informants of confidentiality in the information they gave and reassure them that the data was for academic purposes only. This approach motivated the respondents and informants to participate fully and to give the required information.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the research findings with the help of descriptive statistics accompanied by illustrations and detailed discussions to explain the significance of the findings in light of each of the objectives of the study. The discussions include narratives from the interviews with key informants. The findings as presented in this chapter are based on empirical data collected during the field work in respect of each of the research objectives with further explanations based on secondary data from the literature reviewed earlier in **Chapter 2**.

4.2 Findings on the kinds of information communication technology infrastructure and tools available in the selected organizations

4.2.1 ICT infrastructure

In order to build knowledge communication and sharing capabilities, organizations have to develop a comprehensive information communication technology infrastructure that facilitates various types of knowledge communication and sharing. The information communication technology infrastructure is crucial in integrating information and knowledge in organizational processes. Grant (1996) and Leonard (1995) identify several types of information communication technologies as comprising the needed infrastructure in organizations. These include business intelligence systems, collaboration systems,

distributed learning systems, knowledge discovery systems, knowledge mapping systems, opportunity generation systems, and security systems. These types of systems allow organizations to track their sources of internal and external knowledge so that individuals in need of a specific type of knowledge know where it resides and are able to retrieve the knowledge and share it easily. Although, all the selected organizations had one or the other of these ICT infrastructures, the type and state of their infrastructure was determined by the kind of business they operate. For example, *Safaricom* has elaborate business intelligence systems, collaborative systems, knowledge discovery and mapping systems as well as security systems. Communication Commission of Kenya has collaborative systems, knowledge discovery and mapping systems and security systems. Capital Markets Authority has business intelligence and security systems while other organizations have a combination of information and knowledge mapping systems.

The selected organizations have up to date and in some cases the latest technology infrastructure in the market. This was notable especially in the organizations that operate in the high end information and knowledge communication markets that require cutting edge technology for favourable competitiveness and keeping up with information and knowledge tracking. The ICT infrastructure in the selected organizations is also fairly reliable in terms of communicating and sharing knowledge processes and is regularly updated according to the organizations' information and knowledge needs. However, a number of government Ministries still rely on old ICT infrastructures that are rarely updated and are sometimes unreliable in terms of capacity and capability of processing and distributing information and knowledge. Some of the organizations most affected by

older infrastructure included the Ministry of Water and Irrigation, Ministry of Gender, Culture and Social Services and the Ministry of Youth Affairs. From the evidence on the availability of modern ICT infrastructure in the selected organizations, one can say that many of them, except with the exception of a few conform to the expectations of different scholars who identify a good ICT infrastructure as being important to effective knowledge communication and sharing (Grant, 1996; Leonard, 1995, and Riege, 2005).

One of the challenges identified by scholars in relation to the role of ICT in knowledge communication and sharing is that some organizations tend to take ICT for granted, viewing them as fixed and independent and therefore failing to invest in good ICT infrastructure (Orlikowski and Iacono, 2001). The two scholars argue that ICT should be conceptualized as dynamic and changing and thereby be supported with a good and reliable infrastructure in order for them to effectively facilitate knowledge communication and sharing processes. Organizations that had older ICT infrastructure also tended to treat the ICT as fixed tools for specified tasks and basic administrative work such as word processing and letter writing. The ICT infrastructure and tools available in these organizations cannot support more advanced information and knowledge processing tasks and this makes it harder for workers to be able to communicate and share knowledge meaningfully. This is an indication that some of the organizations that do not give ICT a key role in the organizational work performances are failing to meet the needed expectations in knowledge communication and sharing processes and therefore risk having ineffective knowledge communication and sharing.

4.2.2 ICT tools

Different ICT systems and tools are used to support and enhance the organizational processes of knowledge creation, storage, sharing, and application (Alavi and Leidner, 2001). Some of the tasks performed with the help of ICT tools include finding a knowledge expert on directories, looking for recorded source of knowledge using online directories, searching knowledge databases, sharing knowledge and collaborating in virtual teams, accessing information on past projects, and learning about customer needs and behavior by analyzing transaction data. These kinds of tasks require a variety of ICT systems and tools. Organizations have different contexts and needs in knowledge communication and sharing, thereby requiring a wide selection of appropriate knowledge sharing tools which are also determined by the type of knowledge to be shared, the routine and frequency of the sharing process, and the knowledge receiver capabilities in handling the tools. The study established that the selected organizations had a variety of ICT tools that were being used for different purposes, either in knowledge communication and sharing processes or in administrative work. Some of the tools available in the organizations are basic while others are advanced and specialized. The study also established that where the infrastructure was high-tech, the ICT tools were also cutting edge tools while old infrastructures had low performing tools. The table below indicates the types of tools that are available in these organizations.

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Table 1: Types of ICT tools available in the selected organizations

Website technologies (servers, internet, intranet, email)
Computer devices (PCs, laptops, iPads)
Data base development and management technologies
Network systems
Telephony (mobile, wireless, landline, telecommunications)
Hardware and software development & maintenance technologies
Infrastructure development devices (cables, fiber terminators)
Printers
Scanners
Photocopiers
Fax machines
Television
Radio
Modems
Projectors
Flash disks
Compact Disks
Other digital devices (cameras, CCTVs)

4.2.3 Facilitation of ICT in the selected organizations

Scholars argue that simple and easy ICT tools are able to facilitate knowledge

communication and sharing better than complex tools (Hasanali, 2002). The study

established that even though some of the ICT tools available in these organizations were

simple and easy to use, their contribution to knowledge communication and sharing were

also limited and that it was the complex tools that were most frequently used to

communicate and share knowledge. The effect of this was that only the members of staff

that had ICT training were able to handle the tools for knowledge communication, thus

limiting the possibilities available in the knowledge communication and sharing

processes among other workers. Bell (1973) and Castells (2004) argue that training of

knowledge workers is critical to knowledge communication and sharing processes. This

means that organizations that have staffs who are not trained but who are handling

knowledge work among the selected organizations may not be recognizing the

importance of training their workers on ICT use and this is likely to compromise their

performance in the knowledge communication and sharing processes both at personal and organizational level.

Knowledge communication and sharing practices cannot be complete without a dedicated team of staff that process the various types of knowledge and ensure that the knowledge is available whenever needed. While some organizations rely on knowledge experts to facilitate the requirements of their knowledge demands, other organizations prefer to have departments and units that oversee the knowledge work. Most of the organizations that participated in the study had ICT departments that handle the production and dissemination of knowledge within and across the organizations. The existence of these departments in the some of the selected organizations is in line with the arguments of scholars who say that the adoption and intensification of information communication technology in organizations help to increase work productivity and output (Jian and Jeffres, 2006). The chart that follows indicates which of the selected organizations had ICT departments and which ones did not have an ICT department.

Figure 3: Percentage of organizations with ICT departments and those without
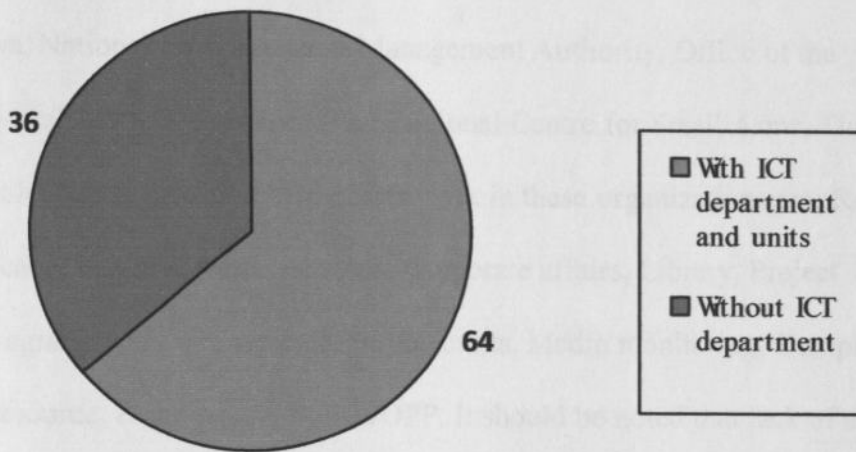
There are more organizations with ICT departments and units than those without ICT

departments as indicated in **Figure 3**. Organizations with ICT departments include

Safaricom, Communication Commission of Kenya, Agricultural Development

Corporation, Capital Markets Authority, Ministry of Finance, Ministry of Gender,

Culture and Social Services, Office of the President – Public service reform and

development secretariat/Performance contracting, National Economic and Social

Council, Ministry of Water, Ministry of Industrialization, Ministry of Trade, Ministry of

Planning/Millennium Development Goals Secretariat, Kenya Industrial Estates, Ministry

of Youth Affairs, Ministry of Justice and Constitutional Affairs and Ministry of

Information and Communication. In addition to the ICT departments, other departments

and units that handle ICT related knowledge work in these organizations are:

Administration, Planning, Marketing, Maintenance, Research, Policy and Advocacy.

The organizations that did not have an ICT department or unit include Federation of Kenya Employers, Federation of Women Lawyers, Kenya Private Sector Alliance, Media Council of Kenya, National Environmental Management Authority, Office of the President- Provincial Administration, and the Regional Centre for Small Arms. The units and sections that handle ICT related knowledge work in these organizations are: Research and policy advocacy, Finance, Administration, Corporate affairs, Library, Project management, Programmes, Communications, Accounts, Media monitoring, Complaints office, Human resource, Planning and Police/OPP. It should be noted that lack of an ICT department or unit in the selected organizations did not necessarily mean that there is no ICT use in that organization. Organizations that have no ICT departments are as actively involved in ICT driven knowledge sharing as are those with ICT departments. The high level of ICT departments in the organizations is an indication that the organizations recognize the importance of ICT in their communication and knowledge sharing activities. This intensive deployment of ICT in most of the selected organizations is also in conformity of Kenya's ICT policy which encourages application of ICT in all sectors of the society and their use for the improvement of the economy.

4.2.4 Comments from key informants on the contribution of ICT infrastructure and tools in knowledge communication and sharing

The study conducted interviews with key informants in the selected organizations on the contribution of ICT infrastructure and tools to knowledge communication and sharing. They had varied responses. According to the informants, a good ICT infrastructure and easy ICT tools make a big difference in the attitudes of workers towards using ICT for knowledge communication and sharing. Many workers consider ICT and knowledge to

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be complex areas of work and a lot of them shy away from job descriptions that require them to handle ICT for knowledge sharing purposes. Only those that are highly trained, especially in ICT, feel comfortable enough to undertake the tasks that involve knowledge sharing. The informants noted that in addition to the complexity of ICT and knowledge, there are no special colleges or seminars that train workers on how to handle information and knowledge creation processes, and workers seek employment with no idea of how to handle knowledge processes. One informant said, *"It is usually left to the individual worker to find their way around the jungle of data and information as they try to convert it to knowledge before sharing it. The effect this has on knowledge communication and sharing is that it becomes an individual and sometimes unguided effort that may produce any kind of result, even undesired results"* (**Informant No. 4, December 2010**).

Other informants were of the view that simple and easy to use ICT tools help to ease the burden of workers in their knowledge communication and sharing tasks as they are able to guide them in the various steps and phases of knowledge creation and sharing. Some of the informants said that their ICT systems were programmed in a way that enabled the workers to input raw data and get knowledge at the end of the process without having to involve too much thinking. However, this was the case only among organizations that were working in specialized areas such as information, communication and legal services. As noted by Christensen (2007), the informants said that the knowledge processes in their organizations are quite diverse, involving different steps and phases such as knowledge creation, storage, and transfer between individuals, groups and across the organizational boundaries, and that the performance of these processes depended on a

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number of human and technology related factors. They added that knowledge communication and sharing requires a lot of dedication from the individual and the performance of individual workers in knowledge sharing practices depends on their ability to adapt to the prevailing knowledge environment, their level of motivation and the opportunities provided by the organization. They were of the opinion that if there were direct motivations among workers for knowledge sharing efforts, perhaps the quality of knowledge sharing activities would be improved and the knowledge would reach more users within and outside their organizations unlike is the current situation where the knowledge communication and sharing is mostly restricted to intra and inter-organizational users. The informants added that the organizational settings in the area of knowledge communication and sharing can impact an individual's ability to create, retain and share knowledge, especially where the ICT infrastructure is poor and the organizational structures of creating and sharing knowledge are weak and unsupportive. Some of the informants from organizations that deal with information and knowledge services said that the prevailing conditions on knowledge sharing in many Kenyan organizations were so poor that they often felt frustrated when they employ workers from other organizations and then realize they have to train them afresh because they do not have skills in using technology for knowledge sharing purposes. This disappointment is a reflection that there are organizations that are not conforming to the arguments of Bell (1973) and Castells (2004) on the necessity to train workers who can cope with the new demands of ICT driven knowledge work.

The feelings of the informants were in line with the argument advanced by Riege (1995) who says that simple and easy tools help to facilitate knowledge communication and sharing because they enable the workers to navigate their way around the knowledge and tools without a lot of effort. The interviews with the informants established that although this was the case in most of the selected organizations, the simplicity of real time knowledge sharing tools also had other issues that affected knowledge sharing. The informants expressed the following views concerning the issue:

> *Many times, we have workers complaining that the tools are not working for them only because they are not quite sure that what they are doing. They also are not sure that what they are doing is not the right way and they have to keep rethinking their contribution to the process. Senior managers can watch what the workers are putting in the system and start commenting on the contributions that were still in infancy and this causes some workers to falter.*
>
> **Informant No. 1, December, 2010**

> *In our case, we are able to track what each worker is inputting into their ICT system and we can monitor and make changes or comment as they develop the knowledge.*
>
> **Informant No. 2, November, 2010**

> *We check on what our workers are doing in the various steps and phases of knowledge creation and sharing and we can advise on what needs to be improved before the final product. Among groups that do not have experience in working together these tools can make workers uneasy and unsure of themselves and their capability as they are afraid of what others might be thinking and saying when they see them constructing knowledge in real time.*
>
> **Informant No. 6, November, 2010**

> *Our tools allow us to see what others are typing in real time. This demands a very high level of confidence among our workers on what they are doing.*
>
> **Informant No. 9, November, 2010**

These responses from the informants are an indication that although simple and easy ICT tools help to facilitate knowledge communication and sharing, the level of confidence and trust in creating and sharing the knowledge is a different matter altogether. This issue is discussed in details elsewhere in the section on findings on knowledge communication and sharing processes in the organizations.

The findings on ICT infrastructure and tools in the selected organizations confirm hypothesis one that good ICT infrastructure and simple and easy ICT tools have a significant effect on knowledge communication and sharing in Kenyan organizations, although the findings also indicate that there are other factors that affect the knowledge sharing processes, including lack of confidence and group trust in the use of the tools.

4.3 Findings on ICT training and levels of acceptance and use of ICT among workers in the selected organizations

4.3.1 Training of Workers

The data from this section were analyzed at different levels and were informed by the number of organizations that completed the questionnaires, the number of questions responded to, and the number of respondents at each level of analysis. Riege (2005), Bell (1973, 2002) and Castells (2004) identify ICT training and technology know-how as

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being critical to knowledge work and knowledge sharing processes. Advances in information communication technology and their role in knowledge communication and sharing have created a demand for well trained and skilled knowledge workers in the modern world. The capabilities of these technologies keep changing, requiring workers to regularly update their skills and know-how in order to cope with ICT driven work. This means that workers who use ICT for knowledge communication and sharing processes must be formally trained and possess specialized skills in ICT. One of the key variables in the study was the training of workers. The chart below shows the number of workers with training in ICT and those with no ICT training in the selected organizations.

Figure 4: Percentage of workers with ICT training and those with no ICT training
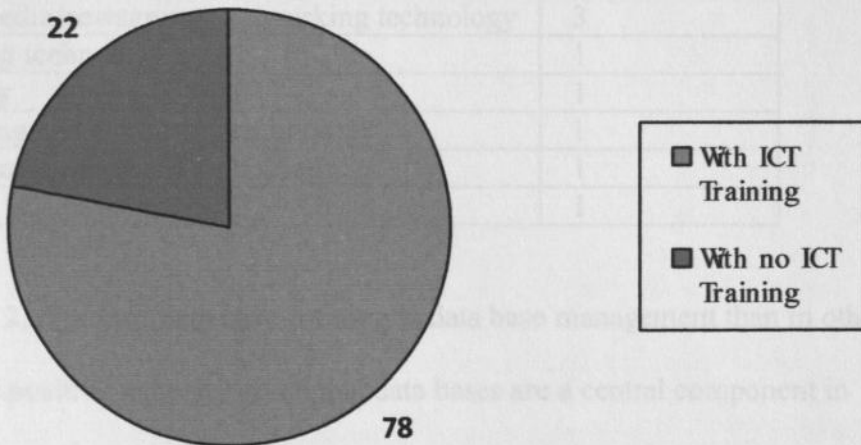
The ICT workers in the selected organizations are generally well trained in areas crucial to ICT use with a few also having additional professional training. As **Figure 4** indicates, there are more trained ICT workers than those with no training, an indication that the organizations appreciate the importance of formally training their knowledge workers in

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ICT use as argued by various scholars. Apart from having sufficient ICT training, it is also important for knowledge workers to have the training in specific areas that are critical to knowledge processes for them to make a positive contribution to knowledge communication and sharing. **Table 2** shows the specific areas that the workers in the selected organizations have been trained on.

Table 2: Areas of ICT training and the number of trained workers across the selected organizations

Area of training	No. of trained Workers
Data base management	40
Information and communication technologies (IT/ICT)	22
Computer science	20
Networking systems development and management	17
Web development and administration	13
Statistics and analytics	4
Public and social media/newsgroups networking technology	3
Financial accounting technology	1
Business technology	1
Integrated monitoring and evaluation technology	1
Performance contracting appraisal technology	1
Telephony	1

As shown in **Table 2**, more workers have training in data base management than in other ICT areas. This is a positive indicator given that data bases are a central component in knowledge processing and sharing. In a number of cases, there were individual workers who have training in more than one ICT area.

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Table 3: Education levels of workers across the selected organizations that have ICT departments and those without ICT departments

Education Level	Organizations with ICT departments	Organizations without ICT departments
University	30	10
Professional	14	2
College	16	5
Basic	2	13
Total	62	30

Organizations that have ICT departments appear to have more workers with a higher education level than those without ICT departments as indicated in **Table 3**. Although this study did not address the reason for this difference, anecdotal evidence from casual discussions with the respondents suggests that organizations that have dedicated ICT departments have a more intense application of ICT in their knowledge activities and require specialized skills in ICT, and are therefore more likely to hire workers with a higher education level. The table also shows that the number of ICT workers with basic education in organizations without ICT departments is rather high compared to the same workers in organizations with ICT departments. This could be a reflection of how each f the selected organizations view the role of ICT in their organizational goals. UNDP (2001) argues that some organizations tend to see ICT as a scenario rather than as being central to their development activities and thereby giving them little attention. Orlikowski and Iacono (2001) also note that some organizations take ICT for granted and see them as fixed and independent tools that are useful only in specified tasks. This seems to be the case in some of the selected organizations that do not have a well established ICT department and this attitude towards ICT in organizational work processes can have a

serious effect on the organizations' ability to create and communicate knowledge effectively because ICT are central to knowledge communication and sharing processes.

4.3.2 ICT acceptance and use in the selected organizations

Information Communication Technology acceptance and use by workers is one of the important concerns in knowledge based organizations. Individual's decision to accept or reject a technology is a conscious act that is predicted by a behavioral intention. According to the technology acceptance theory, an individual's beliefs influence their attitude, which in turn shapes their behavioral intention to engage in a particular behavior Venkatesh et al. (2003). These beliefs are in many situations of knowledge sharing influenced by what Fishbein and Ajzen (1975) say are the perceived behavioral controls whereby an individual sees themselves as lacking the control or resources necessary for carrying out the targeted behavior, despite having a positive attitude towards it. Factors that are said to influence workers in the acceptance or rejection of technology use are: performance expectancy, effort expectancy, social influence and facilitating conditions (Venkatesh et al., 2003). Performance expectancy refers to the degree to which an individual believes that using the system will help them to attain gains in job performance whereas effort expectancy is the degree of ease associated with use of the technology system. Ease of use is believed to have a significant influence on technology acceptance as well as perceptions of usefulness. This factor is also related to the skills and level of training of knowledge workers in ICT since effort oriented huddles decrease with sufficient and appropriate training, enabling workers to perform their duties with ease (Davis et al., 1989). Social influence is the degree to which an individual perceives that important people like supervisors believe he or she should use the new system. Social

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influence includes consideration of the person's perception of the opinion of others, his or her reference to the work group's subjective culture and specific interpersonal agreements with others, as well as the degree to which use of a tool is perceived to enhance one's image or status in one's social system (Venkatesh et al., 2003). Facilitating conditions is the degree to which an individual believes that an organizational and technology infrastructure exists to support use of the system.

The study established that facilitating conditions followed by effort expectancy were the most influential factors in the individual decision to accept and use ICT or to reject the ICT. Many of the workers felt that if their organizations did not provide a conducive environment for ICT use that included proper training and simple ICT tools then it was difficult for them to realistically engage in knowledge sharing practices.

Among the selected organizations, performance expectancy was viewed as being dependent on the facilitation and effort of the organization because if the individual worker did not have a good facilitation, they believed it was because their organization did not value the use of ICT in work processes and they did not therefore think the ICT tools would make any difference in their work. Facilitating conditions represent the organizational and technological infrastructure and support. Where acceptance and use relates only to the use of the software but does not consider the difficulties of implementing the software, the facilitation was considered to be difficult and thereby not supporting the knowledge communication and sharing processes and was therefore not sufficient to influence the intention to accept and use and technology.

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Many of the workers felt that technological support through a good infrastructure and simple tools, and training on hardware and software was an important factor in determining their acceptance and use of the technology generally and specifically in knowledge communication and sharing processes. Social influence was the least influential factor in the acceptance and use of ICT among the workers. This was because many workers did not see their seniors as good role models in the knowledge sharing processes but rather as authority figures that determined whether one retained a job or not. This factor was only necessary when the performance of a particular task using a specified ICT tool was mandatory.

The respondents noted that knowledge sharing structures in the organizations were too hierarchical, gravitating only around certain classes of employees instead of moving freely across the organization. For them, ICT acceptance and use in knowledge communication and sharing could only be effective where and when the ICT structures were automated for direct individual input rather than relying on human interactions that did not favour the practice. The figures and table that follow illustrate the various aspects of ICT acceptance and use in the organizations. For the purposes of this study, the acceptance of an ICT tool had a positive relationship with the use of that tool, whereby the most accepted tools were also the most frequently used tools. The acceptance level was based on perceptions of effort expectancy or ease of use combined with facilitation. These feelings are in line with the arguments of the technology acceptance theorists (Vankatesh et al.) and it means that the challenges the factors identified by these authors as affecting human relationships in knowledge sharing are the same factors that exist in

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the selected organizations and these organizations ought to find ways of addressing these

factors in order to make the work of communicating and sharing knowledge more

efficient.

Table 4: Rating of acceptance and daily use of ICT across the selected organizations

Type of ICT	Acceptance and use
Website technologies	Very high
Computers	High
Data base development and management systems	High
Telephony (mobile, wireless, landline, telecommunications)	Medium
Hardware and software development and maintenance tools	Medium
Networking systems	Medium
Printers	Medium
Other digital devices (cameras, CCTVs)	Medium
Scanners	Low
Photocopying machines	Low
Fax machines	Low
Infrastructural development devices	Low
Cables and fiber terminators	Low
Television	Very low
Modems	Very low
Projectors	Very low
Flash disks	Very low
Compact disks	Very low
Radio	Very low

Bedard et al. (2003) observe that the training of workers on ICT tends to enhance their

acceptance and use of the technology as it impacts on their perceptions of their tasks and

technology self-efficacy, which in turn impacts on perceptions of usefulness and ease of

use. Venkatesh et al. (2003) found that facilitation was significant in predicting actual

usage of technology. When we look at the areas of training of workers in the selected

organizations on **Table 2**, we see that those areas that have the highest numbers of trained

workers are also the areas that have received the highest level of acceptance and use in

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knowledge sharing processes as shown on **Figure 5**. There is also a good facilitation of

ICT tools in the selected organizations as seen on **Table 1.** The frequency of use of the

ICT tools as seen on **Figure 6** also follows a similar pattern as that of ICT acceptance.

This confirms hypothesis two of the study which states that ICT training and the

acceptance and use of ICT contribute positively towards the communication and sharing

of knowledge in the selected organizations. It is also a demonstration that organizations

that pay attention to the training of workers have a better chance to improve on their

knowledge communication and sharing activities as observed by scholars like Bell

(1973), Castells (2004) and Riege (2005).

Figure 5: Percentage of ICT tools usage across the selected organizations
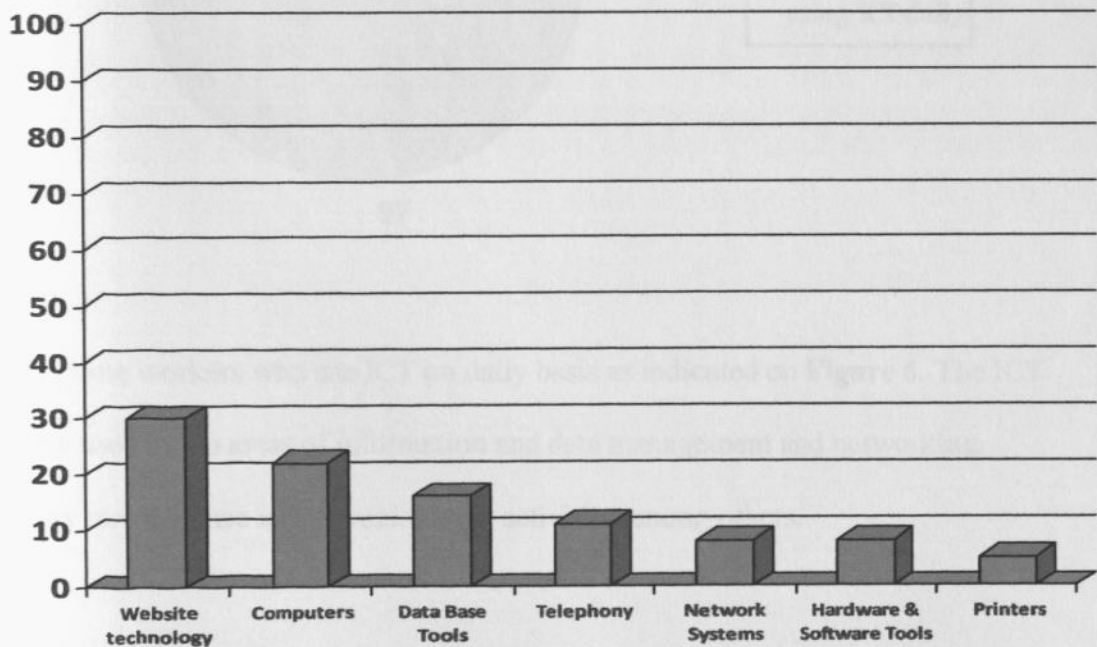
The percentages on **Figure 5** indicate that the difference in usage of various ICT is

average rather than extreme although some of the ICT seem to be in use much less than

others. Technologies that do not require daily interaction recorded a lower frequency of use. The higher use of website technology is closely related to the higher frequency of knowledge communication and sharing activities among the selected organizations through website links such as intranet, internet, email, blogs and list serve.

Figure 6: Percentage of daily use of ICT tools among the knowledge workers in the selected organizations
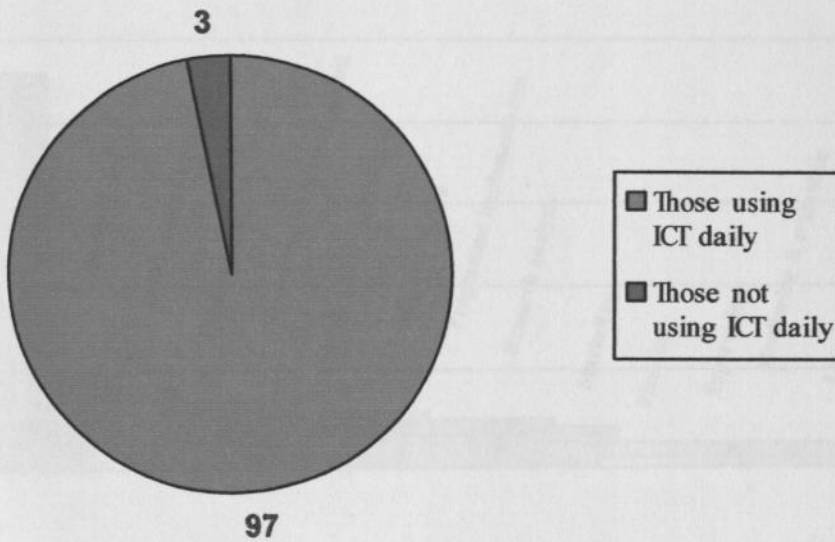
There are more workers who use ICT on daily basis as indicated on **Figure 6**. The ICT are mainly used in the areas of information and data management and networking, technology maintenance and administrative activities among others.

Figure 7: Percentage of comparative uses of ICT across the selected organizations
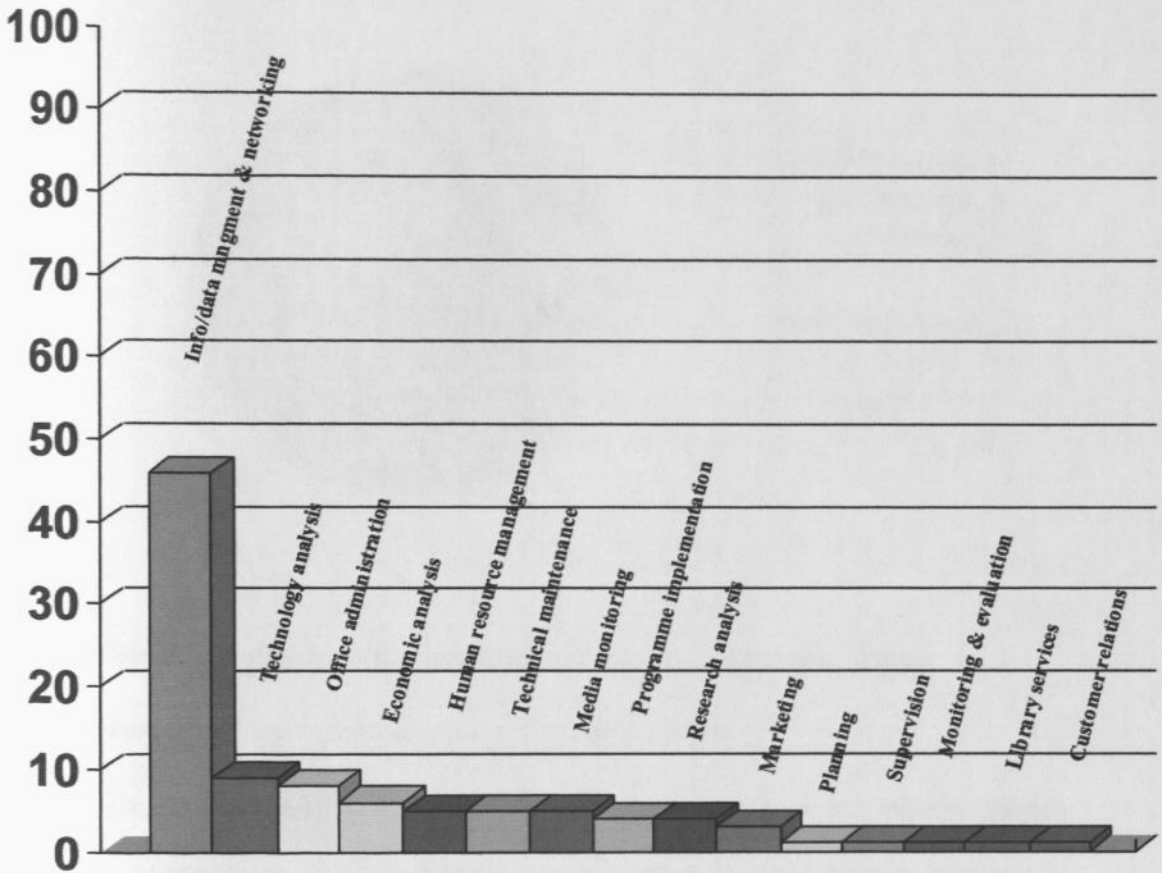
The use of ICT in information and data management and networking is quite high compared to other uses as seen on **Figure 7**. This is an indication that ICT use in the selected organizations is more concentrated on areas that relate to knowledge processes than in general administrative areas.

Figure 8: Percentage of workers who feel that the ICT are simple and easy to use in the selected organizations

Legend:
- ICT tools are simple and easy to use
- ICT tools are not simple and easy to use
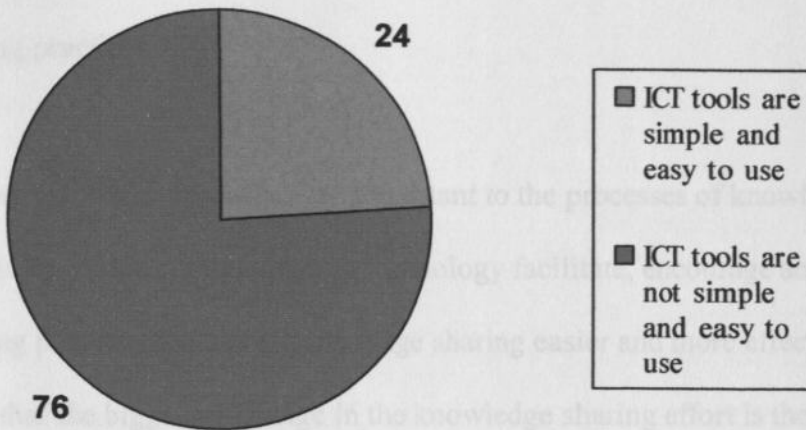
4.4 Findings on the processes used in converting knowledge

4.4.1 Processes of converting raw data into knowledge

Some of the scholars reviewed in this study argue that individual and organizational

choices in information and knowledge processing behaviour is determined by the

knowledge processing systems, type of knowledge needed and the technology that is

available for knowledge processing (Riege, 2005; Alavi and Leidner, 2001). These

processes are also dependent on the prevailing perspectives on knowledge in the

organization. Some organizations view knowledge either as an object to be stored or as a

process of applying expertise, or as a condition of access to information. Kankanhalli et

al (2005) identify two main models used by organizations in their knowledge creation

and sharing processes. These are the repository model and the network model. The

repository model focuses on storage of knowledge allowing knowledge reuse through

access to the codified expertise. This process is supported by electronic knowledge

repositories. The network model emphasizes linkage among people for the purpose of knowledge exchange and is supported by knowledge directories and networks of people, electronic forums and discussion boards that allow people to interact with each other in knowledge sharing practices.

These scholars say that both approaches are important to the processes of knowledge sharing and that information communication technology facilitate, encourage and support knowledge sharing process by making knowledge sharing easier and more effective. Hsu et al. (2007) say that the biggest challenge in the knowledge sharing effort is the willingness of people to share knowledge with others in their groups and across groups. Thus, the key elements in knowledge sharing are not only the technology hardware and software, but also the ability and willingness of team members to actively participate in the knowledge sharing process. This applies to both the repository and network models of knowledge sharing.

In work situations, people differ in their communications skills and abilities to express their thoughts and knowledge freely, which is critical in the effort towards the sharing of implicit knowledge which resides in the individuals. But people possess valuable knowledge to an organization and this means that the efforts to make knowledge sharing easier should be devoted to establishing the processes for knowledge creation, conversion and sharing supported by information communication technology. Organizations that participated in this study have various steps and processes of acquiring information and

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raw data, and converting it into usable knowledge. These processes are discussed in the illustrations that follow.

Figure 9: Percentage of the selected organizations that keep different data bases
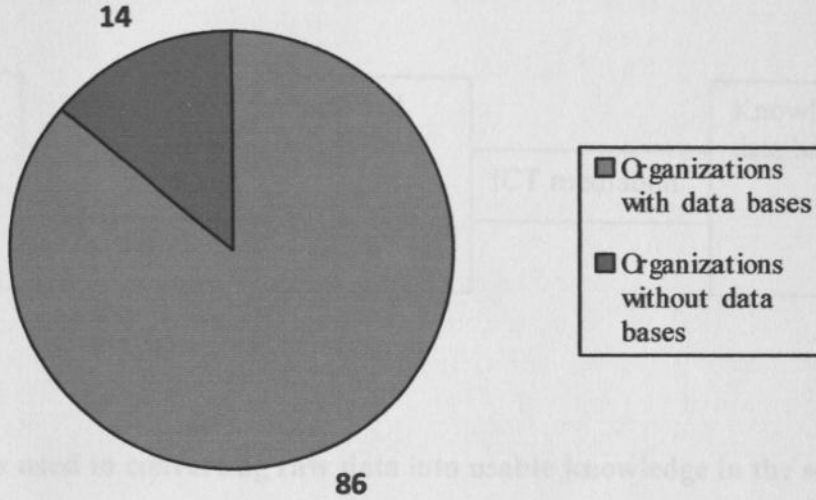
Figure 10: Percentage of the types of data bases kept by the selected organizations
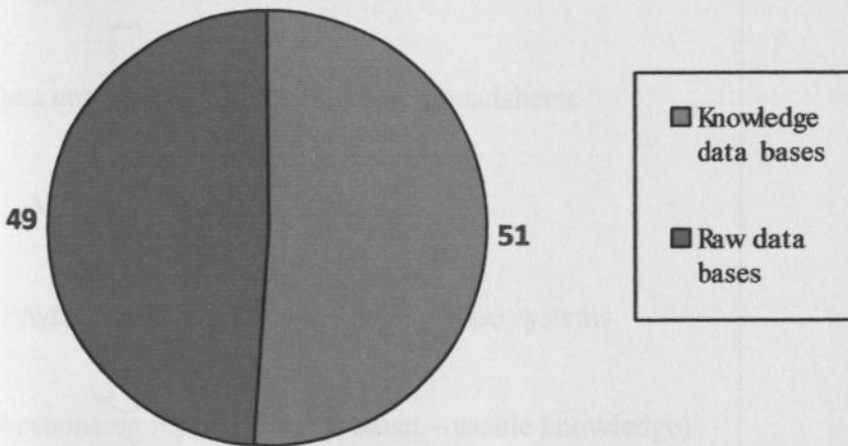
The amount of raw data bases kept by the organizations appears to be almost equal to that of knowledge data bases as shown in **Figure 10**. However, organizations that require

usable knowledge would convert the raw data bases into knowledge through various ICT

aided steps as shown on the **Figure 11**.

Figure 11: A chart of the steps used in converting raw data into usable knowledge in
the selected organizations (an illustration from the findings)

Raw data from various sources	→ ICT mediation →	Classified data bases	→ ICT mediation →	Knowledge data bases
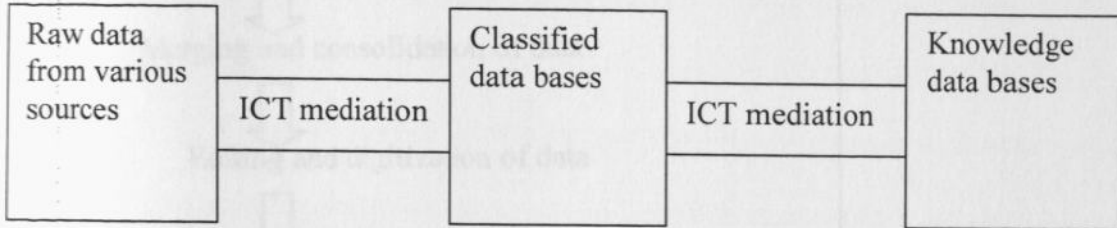
4.4.2 Procedures used in converting raw data into usable knowledge in the selected organizations

Figure 12 A: A flow chart of data conversion procedures used in the selected
organizations

Raw data from the field

⬇

Data entry using Microsoft Excel spreadsheets

⬇

Analysis of data

⬇

Production of sales reports using xBase systems

⬇

Accounting reports (final product – usable knowledge)
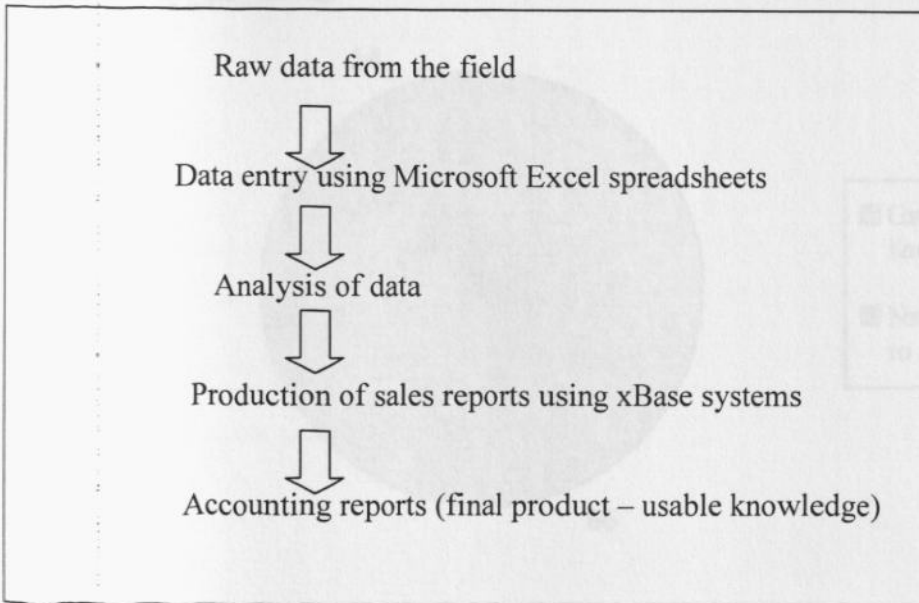
Figure 12 B: A flow chart of data conversion procedures used in the selected organizations

Sourcing of raw data

⇩

Sorting of data

⇩

Merging and consolidation of data

⇩

Editing and digitization of data

⇩

Printing and circulation

⇩

Storage in servers for knowledge sharing
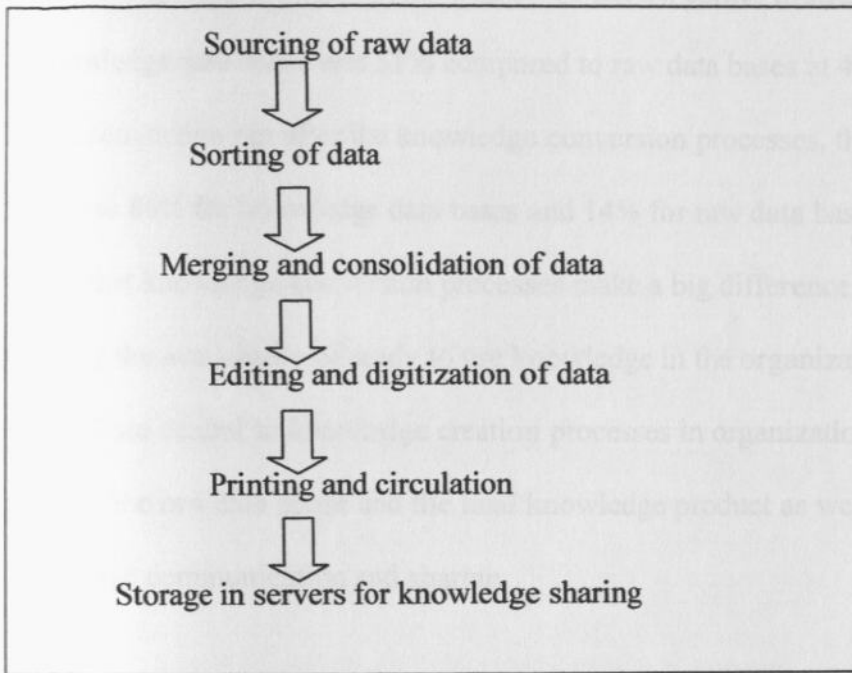
Figure 13: Percentage of raw data that is converted into usable knowledge in the selected organizations
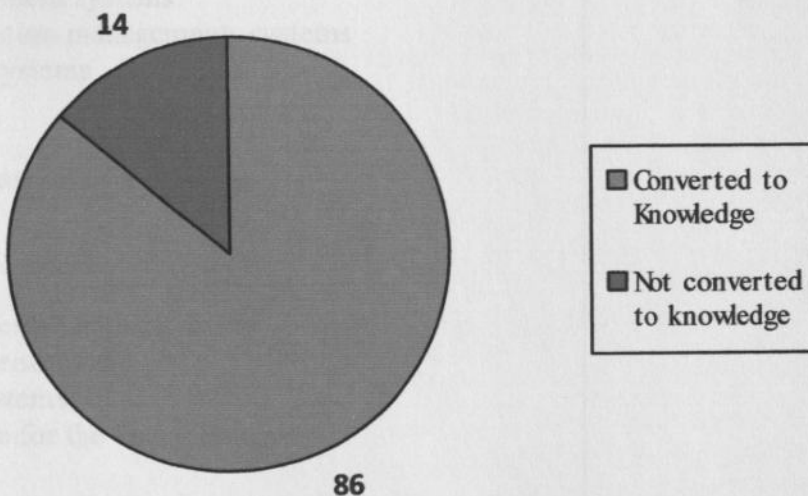
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■ Converted to Knowledge

■ Not converted to knowledge

Figure 13 indicates that the scenario of data bases kept by the organizations changes after

the knowledge conversion process. **Figure 10** shown earlier indicates that the percentage

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Figure 13 indicates that the scenario of data bases kept by the organizations changes after the knowledge conversion process. **Figure 10** shown earlier indicates that the percentage of knowledge data bases was 51% compared to raw data bases at 49%, almost equal before conversion but after the knowledge conversion processes, these figures drastically change to 86% for knowledge data bases and 14% for raw data bases (**Figure 13**). This means that knowledge conversion processes make a big difference and are critical in ensuring the availability of ready to use knowledge in the organizations. It also shows that ICT are central to knowledge creation processes in organizations as they mediate between the raw data phase and the final knowledge product as well as in the processes of knowledge communication and sharing.

Table 5: Types of ICT used in converting raw data into usable knowledge

Computers
Data base management systems
Advanced information managements systems
Server operating systems
Network systems
Sera software
Advanced excel database programmes
Microsoft Access
Microsoft Excel
Spreadsheets
Data back-up systems and hard drives
Microsoft Word processors
Microsoft data systems
Statistical Package for the Social Sciences
Scanners

In addition to converting raw data bases into usable knowledge, the organizations also receive ready to use knowledge from different sources.
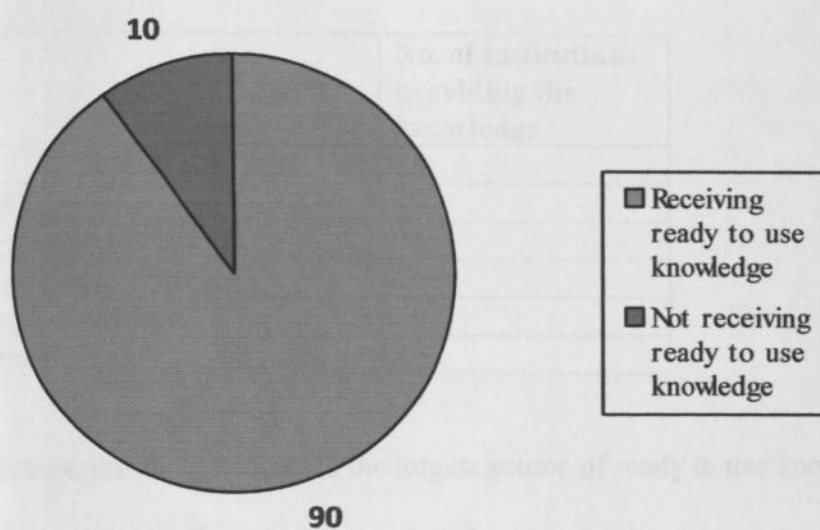
Table 6: Types of ready to use knowledge products received by the selected organizations

Reports
Website contents
Booklets and publications
Economic reviews
Journals
Circulars
Memos
Emails
Letters
Speeches
Notice board postings
Mass media content

Table 7: Sector sources of the ready to use knowledge that is received by the selected organizations

Sector source	No. of institutions providing the knowledge
Private sector	19
Government of Kenya	17
Non-governmental organizations	15
International and regional bodies	11
Banks and financial agencies	9
Research centres	3

As **Table 7** indicates, the private sector is the largest source of ready to use knowledge followed by the government. The non-governmental sector also has a large number of institutions providing the ready to use knowledge.

The various processes used by the selected organizations to convert raw data into usable knowledge conform to the arguments of scholars like Lin (2007d) and Hansen et al. (1999) who say that organizations have different approaches to processing, storing and sharing knowledge. As shown on **Figures 12 A** and **12 B**, the procedures of converting raw data into knowledge are different in each scenario as they are determined by the knowledge needs and the state of accessible data that can be converted into knowledge.

4.4.3 Classification of raw data and knowledge

The organizations have various ways of classifying their data bases in both raw format and knowledge format but most of them have similar types of classifications. The commonly used categories of classifications across the selected organizations are: top secret, secret, highly confidential, confidential data, private data, public data, general

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information, stakeholders data, internal use only, departmental information, financial data, monitoring and evaluation data, training data, procurement data, internship data, management reports, client performance reports, monthly reports, IT specific reports, general ledger, institutional information and internal accounting processes data.

4.5 Findings on knowledge communication and sharing processes in the selected organizations

Knowledge is considered a critical resource in organizational performance. Knowledge is created by individuals and resides in the individual but when it is shared, it becomes a collective resource and is availed for use by all who need it. Effective ICT infrastructure and tools enable the capture, organization, reuse and transfer of experience-based knowledge that resides within the organization, making that knowledge available to everyone in the whole organization (Lin, 2007d). Hansen et al. (1999) identify two types of knowledge sharing strategies in organizations: codification and personalization strategies. The codification strategy emphasizes on the externalization of knowledge on external medium such as databases and documents to make the knowledge accessible in the absence of the knower. This strategy is good for the explicit type of knowledge. The personalization strategy links knowledge seekers to knowledge owners. This strategy is good for tacit knowledge which is difficult to extract from the knower. The two strategies of knowledge have different values for the organization. Information communication technologies are intensively used to process and facilitate the dissemination and sharing of the explicit knowledge in these strategies.

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Tacit knowledge provides long lasting competitive advantages to the organization because it is unique to the knower and cannot be easily imitated by competitors. It is the knowledge that makes individual workers unique to the organization because of the personal knowledge that they possess. Individuals are the main source of organizational knowledge and knowledge sharing at the individual level is uniquely important to the organizations. Ipe (2003) says that in performing their day to day activities, individuals create, find, accumulate and share knowledge. Lin (2007d) adds that knowledge recipients engage in the knowledge sharing process to acquire new knowledge or upgrade their existing knowledge and become more capable and do their tasks more quickly and efficiently.

According to Kharabsheh (2007), knowledge sharing can be seen as a process of employee learning because it creates common understanding and belief among workers in the organization which in turn increases the success of the organizational goals and its performance. Knowledge sharing helps employees to reduce mistakes, save time from reinventing the same process and speed up learning process. The process of knowledge communication and sharing increases the accumulation of organizational knowledge and develops the capability of its workers to perform better. Since knowledge usually exists in the minds of individuals, the process of communicating and sharing knowledge often starts at the individual level and expands to the group level and the organizational level. This process involves various steps where knowledge is converted from raw data to usable knowledge before being shared. Sometimes these processes and steps may be simple while in other cases they are complex.

As argued in literature, individual participation in knowledge sharing is determined by their acceptance and use of ICT which is influenced by the training they have received in ICT and the availability of simple ICT tools. As findings of this study indicate, the infrastructure and tools as well as ICT training in the selected organizations appear to be favourable to the workers and thereby influencing their decision to share knowledge. The findings show that many of the organizations have well established ICT infrastructure and simple ICT and that the workers are also well trained in various aspects of ICT use. These favourable factors, combined with the level of acceptance and use of ICT play a significant role in facilitating the various forms of knowledge communication and sharing processes in the selected organizations.

Figures 15, 16 and **17** that follow illustrate a high participation in knowledge sharing processes in the selected organizations and also indicate the various ways in which knowledge is utilized in these organizations. The organizations studied are diverse in their activities and have different approaches towards knowledge sharing and the analysis in this section was based on individual ICT workers' responses in order to get a better comparative assessment of each individual's participation in knowledge sharing across the selected organizations.

Figure 15: Percentage of individuals participating in knowledge communication and sharing in the selected organizations

Legend:
- Those sharing directly
- Those not sharing directly

Values: 16, 84
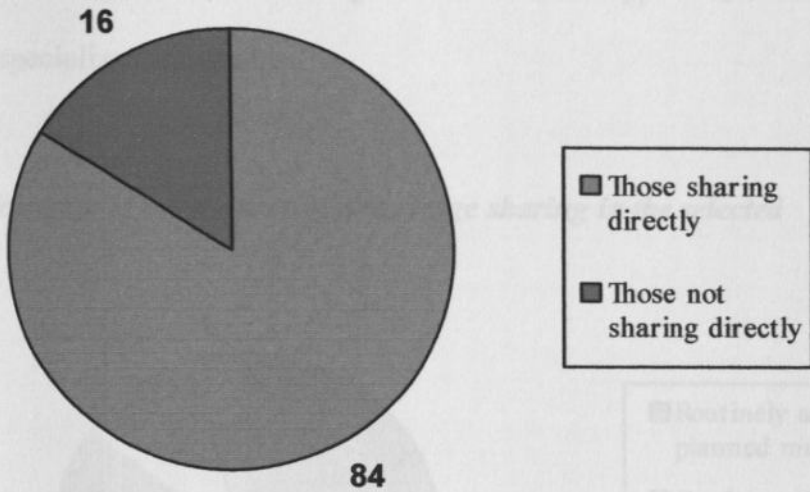
Figure 16: Percentage of the specifications of the knowledge shared in the selected organizations

Legend:
- General information
- Specialized knowledge
- Not specified

Values: 2, 44, 54
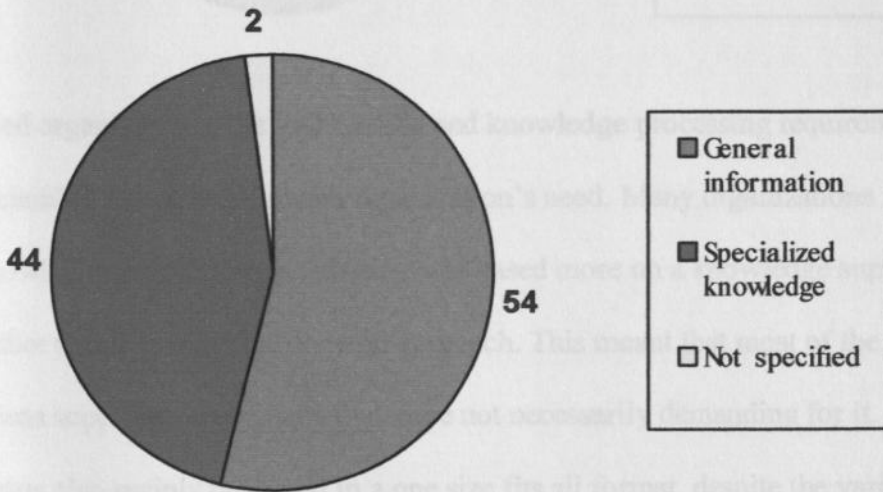
Most of the knowledge received is specified as general information although a large amount of it is also specified as specialized knowledge. Only a small percentage is not specified at all. It should be noted that the knowledge that is shared in this case is meant to inform the organizational activities and enhance organizational performance and is

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therefore deliberately created for special application. In most of the situations among the selected organizations, individuals desiring to access a certain type of knowledge would be looking for specialized knowledge.

Figure17: Percentage of the manner of knowledge sharing in the selected organizations
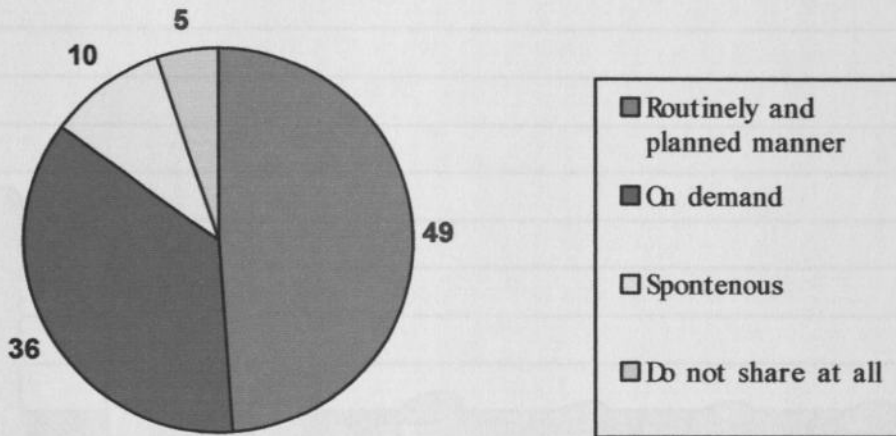
In the selected organizations, the information and knowledge processing requirements varied considerably depending on each organization's need. Many organizations reported that their knowledge processing and sharing was based more on a knowledge supply approach rather than a knowledge demand approach. This meant that most of the knowledge was supplied to recipients that were not necessarily demanding for it. The knowledge was also mainly produced in a one size fits all format, despite the varied characteristics and needs of the recipients. Only a few of the organizations reported supplying knowledge on demand, and only to a few of their recipients. However, these findings are a positive indication that the selected organizations were positively engaging in knowledge communication and sharing processes that add value to their individual and organizations' work performance and are therefore conforming to the arguments of Ipe

(2003) and Lin (2007d) who say that knowledge communication and sharing adds value to the individual and the organization.

Figure 18: Percentage of the frequency of sharing the knowledge in the selected organizations
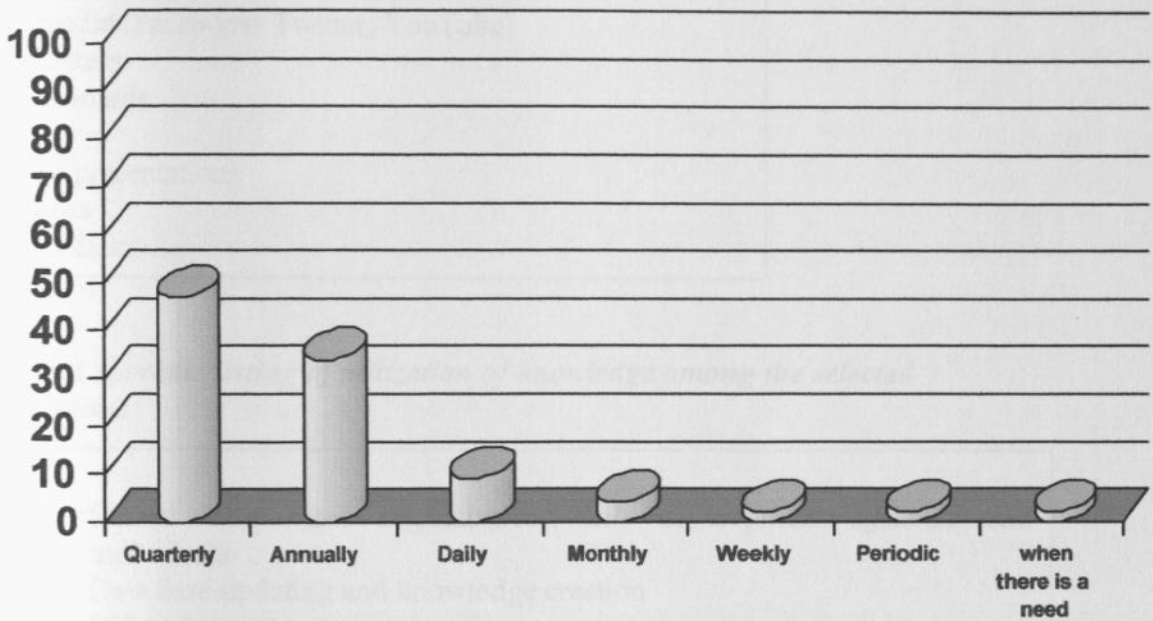
Figure 18 above indicates that quarterly and annual sharing of knowledge have higher frequencies in the selected organizations than daily and weekly sharing. This is an indication that the flow of the knowledge in the organizations may not be as frequent as expected. Perhaps the reason for this scenario is the fact that the processes of converting raw data and information into knowledge before sharing it takes a lot of time and a long time will have gone before the knowledge is ready for sharing.

Table 8: The technological channels of sharing knowledge in the selected organizations

Internet and web links
Email
Intranet
Telephones and telecommunications
Mass media
Electronic data centres
Social media (Facebook, Twitter, YouTube)
E-newsletters
E-notice boards
Faxes
Projector presentations
Flash disks
Compact disks

Table 9: A sporadic listing of utilization of knowledge among the selected organizations

1. Shared with other organizations, key development agencies and individuals
2. Data base updating and knowledge creation
3. Enhancing organizational performance
4. Administration of organizational activities
5. Programme and project implementation
6. Project design and tracking development parameters
7. Development of proposals
8. Improving food security through agribusiness projects
9. Implementation of grassroots women empowerment programmes.
10. Informing the reform process and Kenya Vision 2030
11. Primary education support
12. Poverty reduction, loaning and job creation
13. Business incubation and training
14. Improving on the organizational goals
15. Policy formulation, planning and development of strategies and budgeting
16. Improving on the achievement of organizational development framework
17. Fund raising activities
18. Sharing with the general public and their networks
19. Seeking internal and external solutions
20. Lobbying and advocacy

The list on **Table 9** does not follow any order of priority and is not exhaustive. Many of

the uses indicated do not also cut across all the selected organizations but are rather

specific to each of the organization depending on the mandate of the organization.

Figure 19: Percentage of the selected organizations using knowledge for organizational performance
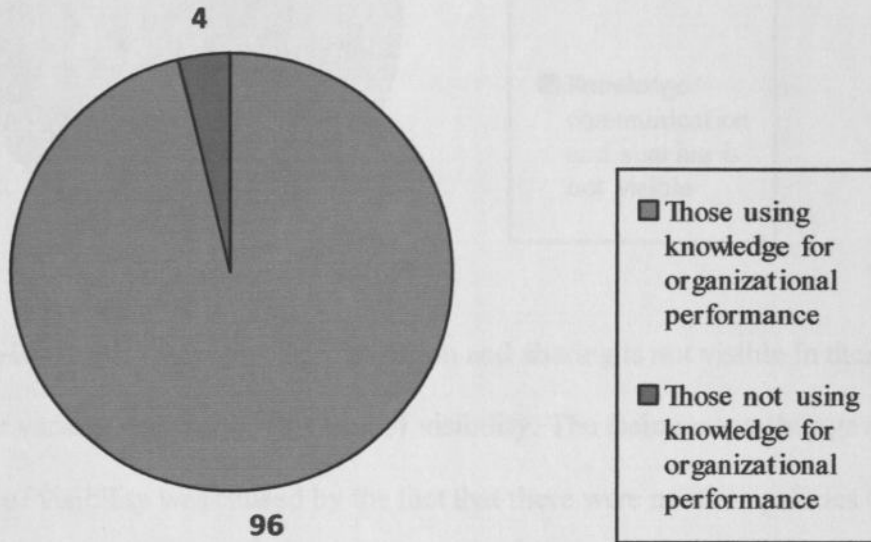
Figure 20: Percentage of areas of performance targeted by the knowledge in the selected organizations
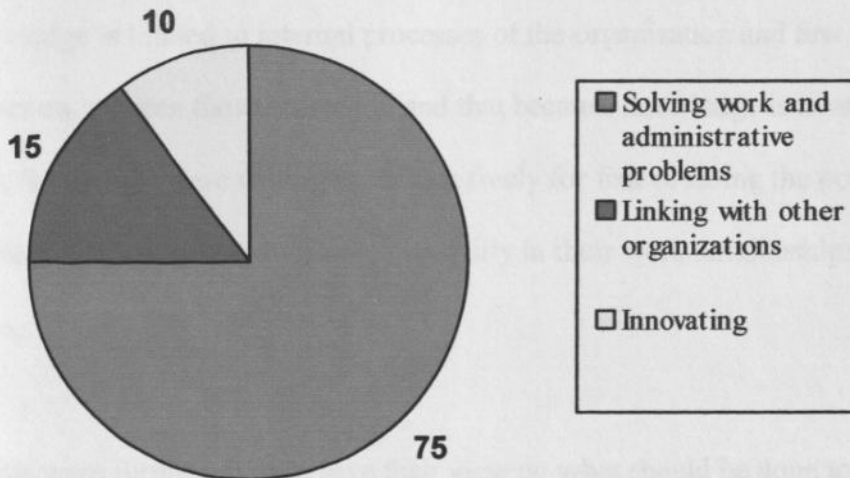
Figure 21: Percentage of workers who feel that knowledge communication and sharing is visible in the selected organizations
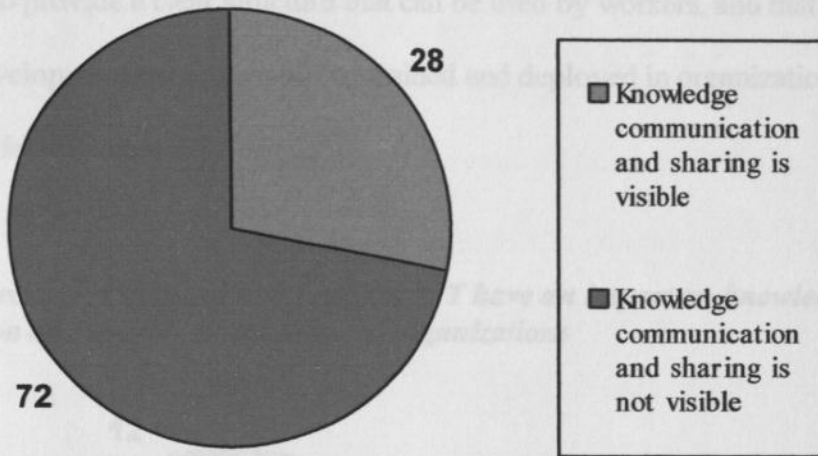
Those who responded that knowledge communication and sharing is not visible in their organizations gave various reasons for this lack of visibility. The main reason they gave were that the lack of visibility was caused by the fact that there were no clear policies on how to share knowledge and therefore many of them did not know what to do in order to create the visibility. Another reason was that there were few knowledge experts to guide and oversee the processes of knowledge communication and sharing. Other reasons given were that knowledge is limited to internal processes of the organization and few people know what goes on between those sharing it, and that because knowledge is treated as a personal asset, few people were willing to share it freely for fear of losing the power and authority it bestows on them as individuals, especially in their work relationships with fellow workers.

The respondents were further asked to give their view on what should be done to create visibility in knowledge communication and sharing activities. They responded that

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knowledge access points should be availed to users both inside and outside of the organization. They added that policies on knowledge communication and sharing should be developed to provide a clear structure that can be used by workers, and that more knowledge development experts should be trained and deployed in organizations to assist in knowledge development.

Figure 22: Percentage of those who feel that ICT have an impact on knowledge communication and sharing in the selected organizations
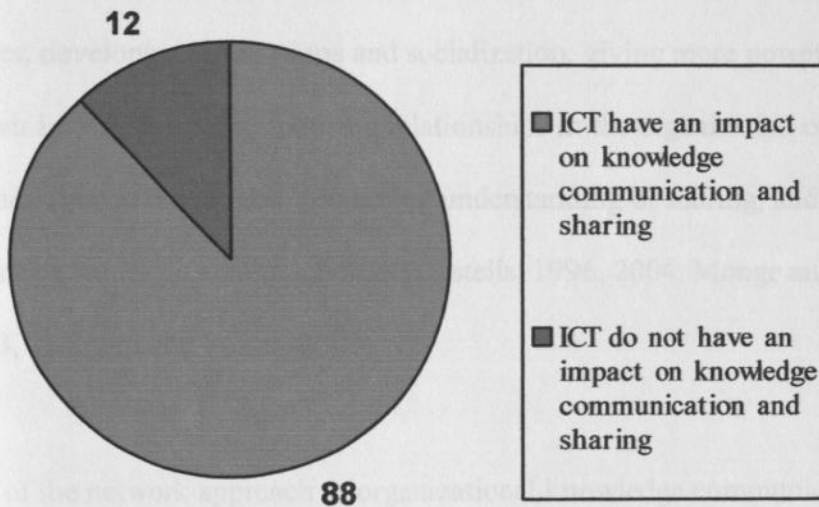
As **Figure 22** indicates, most of the respondents were of the opinion that ICT have an effect on the knowledge communication and sharing. The respondents were further asked to identify which ICT have had the most impact and which ones have had the least impact on knowledge communication and sharing. They cited web technologies, including internet, intranet, emails, list serve, blogs and links as having the most impact in knowledge communication and sharing. Mobile telephones and other telecommunication systems were also said to have an impact. Radio and television have an impact on knowledge communication and sharing although they are rarely used in the selected

organizations. The ICT with least impact include landline telephones, cameras, CCTVs, photocopiers and fax machines.

4.6 Findings on networks of knowledge communication and sharing in the selected organizations

Research on inter organizational knowledge network and the network society argue that in order for knowledge communication and sharing to have visibility, organizations should encourage collaboration and knowledge sharing activities by creating awareness of work processes, developing connections and socialization, giving more power to employees in their knowledge work, focusing relationships in the organization on partnerships rather than on hierarchies, promoting understanding of sharing, and encouraging positive values on sharing choices (Castells, 1996, 2004; Monge and Contractor, 2003, Borgatti and Foster, 2003).

The proponents of the network approach to organizational knowledge communication and sharing say that technological networks have become a major factor in the world's economies as they enable development worldwide and improve communication and the exchange of knowledge and information to strengthen and create new social and economic networks. Some scholars argue that in the age of globalization, the boundaries of traditional organizations have broken down, and organizations are now gaining competitive advantage by embedding themselves in different types of inter-organizational networks and utilizing the knowledge resources in the network instead of developing them in-house (Castells, 1996; Monge and Contractor, 2003).

Strategic knowledge sharing networks are composed of inter-organizational ties that are enduring and are of strategic significance to the organizations involved. According to the above scholars, a key characteristic of networks is the repeated and enduring knowledge exchange relationships between the actors in the network. Network members occupy different positions along the network's value chain and members are well organized to achieve certain knowledge related goals. Knowledge communication and sharing in the network is the process through which one network member is affected by the experience and knowledge behaviour of another (Argote and Ingram, 2000). Knowledge communication and sharing in the network is manifested through changes in the knowledge and performance of the recipient organization, meaning that each organizational member participates in the network in order to access the benefits of the knowledge residing in another organization.

Argote et al. (2003) and Hansen (2002) argue that organizations are able to transfer knowledge effectively from one organization to another and this transfer mostly happens between organizations that are more productive than organizations that are less capable of knowledge transfer. New knowledge, especially knowledge from outside the organization, can be an important stimulus for change and organizational improvement, hence the need for organizations to join in the knowledge sharing network. In the selected organizations, there was evidence of active knowledge sharing networks that had three dimensions of the knowledge flow. The illustrations that follow indicate the types of knowledge flows and the directions of these flows and how the selected organizations are

benefiting from the activities of networked knowledge communication and sharing internally and across organizations.

Figure 23: Networks of knowledge communication and sharing in the selected organizations (an illustration from the findings)

Unidirectional   **Multiple directions**   **Networked directions**

Key

●   Knowledge sharing nodes of the organizations

●   Knowledge spill over to non organizational users

—   Technology streams
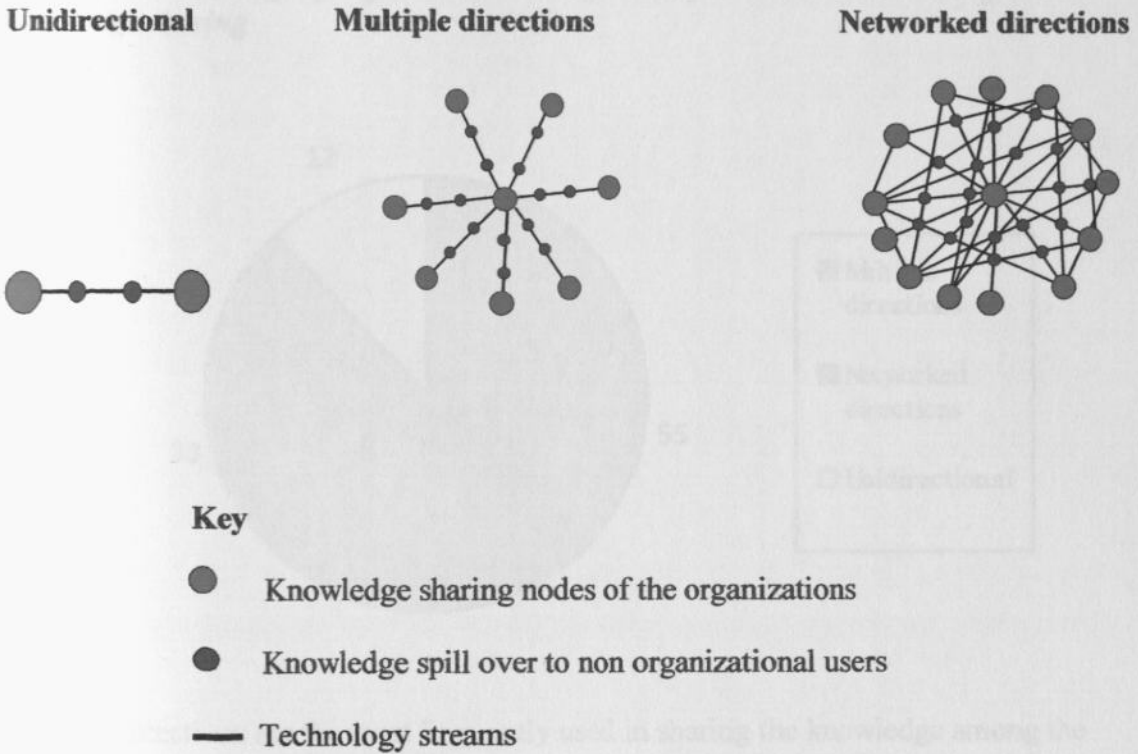
Source: Researcher, 2011

There were three discernible directions of knowledge sharing in the organizations, namely, unidirectional, multiple directions and networked directions. In the unidirectional sharing of knowledge, an organization acts as a single entity in sending knowledge to another organization. In the multiple directions, an organization can still be recognizable as an entity but acts as a key player in the technological connections between various organizations sharing the knowledge. In the networked directions, the organization is no

longer identifiable as a single entity because of the multiplicity of the networks. Instead, it becomes a node within the interconnectivity of a large mass of technological connections as explained by Castells (1996).

Figure 24: Percentage of organizations using each of the three directions of the knowledge sharing
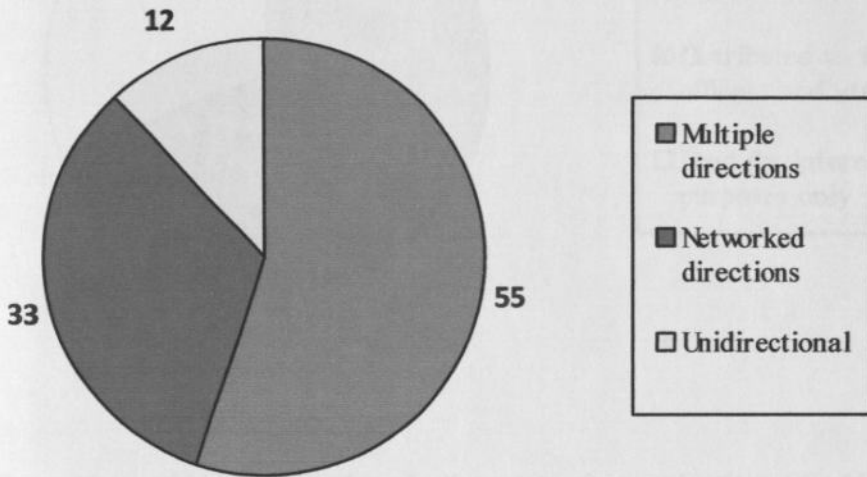
Multiple directions are the most frequently used in sharing the knowledge among the organizations followed by networked directions using different ICT as indicated above. The unidirectional exchange approach from one organization to another organization is the least used. The findings indicate that whereas some organizations may gradually grow from unidirectional connectivity to networked connectivity, other organizations go straight into a networked connectivity right from inception, for example, *Safaricom*, skipping the unidirectional and multiple direction connectivity. However, only three organizations among the 22 organizations studied have achieved this level of connectivity

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and perhaps this may explain why the visibility of knowledge communication and sharing

is rather low in the selected organizations.

Figure 25: Percentage of knowledge distribution in the network in the selected organizations
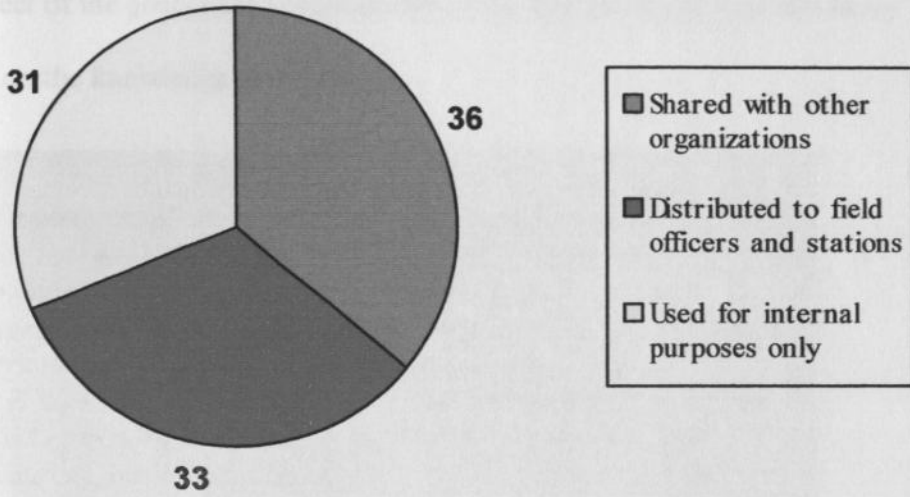
Figure 26: Percentage of how the workers in the selected organizations would feel if they were not participating in the knowledge network
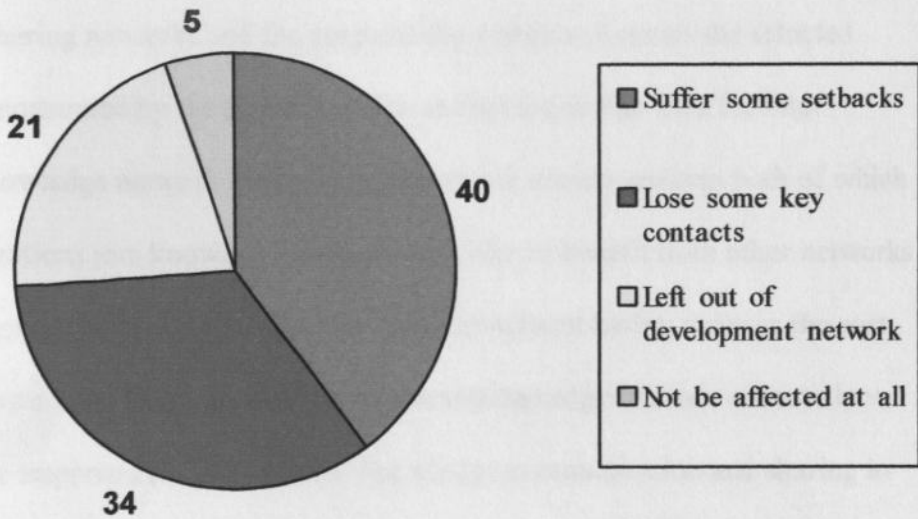
As indicated in **Figure 26**, a larger number of organizations feel that they would suffer

some setbacks in their organizational goals and objectives if they are not linked to other

organizations in the knowledge sharing network. Only a few of them feel they would not

be affected if they were not linked to other organizations. This means that the links serve

an important aspect of the goals of the organizations. One key informant had this to say

about remaining on the knowledge networks,

> *When you want to innovate, you have to stay connected to young
> minds that are today the leaders in the information and
> knowledge industry. These young minds can be found in
> universities or in other organizations and even in their homes and
> we try to reach out to them and attach ourselves to their
> knowledge creation and sharing systems. We ensure that we are
> actively pursuing and building partnerships with other like
> minded organizations. We also try to innovate together with our
> customers because they are the people who are in the real world
> trying to solve real problems and they often come up with very
> good and original innovations*
>
> **Informant No. 1, December, 2010**

The knowledge sharing networks and the connectivity within and across the selected

organizations demonstrated by the findings in this section are in line with the inter

organizational knowledge network theory and the network society concept both of which

argue that organizations join knowledge networks in order to benefit from other networks

that have similar or useful knowledge that they can use without having to incur the cost

of creating their own knowledge in house. Thus the selected organizations seem to have

acknowledged the importance of networks in knowledge communication and sharing in

their organizational activities.

However, although the descriptive statistics in this study indicate that there exists positive knowledge communication and sharing practices in the selected organizations interviews with some of the informants identified other knowledge, social and human factors that were hindrances to the knowledge communication and sharing. The section that follows discusses these factors.

4.7 Findings on the social and human factors contributing to ICT use in knowledge communication and sharing in the selected organizations

Although the social and human factors that affect knowledge communication and sharing were not the main focus of this study, it emerged from the literature review and the findings that these factors were intrinsically intertwined with the information communication technology acceptance and use in knowledge sharing processes. This is more so because knowledge creation and sharing requires a supportive organizational structure that is conducive to the social and human interactions in work processes and which guides the workers on what is expected of them in their knowledge sharing activities. It is therefore necessary to include some of the responses received on the social and human factors in the findings as they relate to knowledge communication and sharing. Whereas the ICT infrastructure and ICT tools available in the selected organizations were good and supportive to knowledge sharing, some key informants said that there were no policies to guide the workers on how to create and share knowledge within and across the organization. Knowledge was shared only where the work processes required that it be shared and there was no voluntary action towards knowledge

sharing. The study asked some of the informants to comment on the challenges related to knowledge communication and sharing in their organizations and they had the following comments,

> *Although our workers are well trained on various ICT areas, there are no clear policies on communicating and sharing knowledge. The workers have no formal training on how to deal with knowledge data bases and processes and we have to try and orient them in this area. Many times, each is left to their own decision on how to handle such data. There are no well established processes for knowledge collection and storage which would make the interaction between workers and the knowledge communication and sharing more effective.*
>
> **Informant No. 8, December 2010**

> *There are no standardized technological formats for monitoring data bases, especially knowledge data bases. This makes it harder for organizations like ours which provides agricultural services to access and distribute information and knowledge faster.*
>
> **Informant No. 4, December 2010**

Trust, safety and transparency were identified as the most common human related hindrances to knowledge communication and sharing. In many of the organizations, lack of trust was related to safety especially in organizations that had a strict top down structure where reporting was one direction. Workers need to be in a position to predict

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reactions and behavior of other workers and their superiors in situations of knowledge

sharing and to be sure that nobody will misappropriate or victimize them for any mistakes

made in the course of knowledge sharing. An informant had this to say about the safety in

knowledge sharing,

> *There ought to exist a feeling of safety, to feel safe when*
> *accessing and distributing knowledge across groups and*
> *individuals, and to feel confident that the knowledge is sound and*
> *relevant. If workers feel that their knowledge is considered to be*
> *below par by their peers and superiors, they will feel shy to share*
> *it and feel unfit to receive knowledge from others. Many workers*
> *need to be able to say that the knowledge I shared was*
> *appreciated by my co-workers and superiors.*
>
> **Informant No. 5, December 2010**

Another informant added that the feeling of safety and trust is important for new

openings in knowledge sharing practices especially those that involve real time inputting.

He said,

> *We often deal with knowledge sharing via some ICT medium and*
> *we grapple with contexts that are non-verbal and which sometimes*
> *are lacking in our previous experiences. Sometimes there is a*
> *feeling that if you share specialized information, your bosses will*
> *think that you are giving out business secrets while other workers*
> *might misunderstand it or use it wrongly. I am an ICT expert in*
> *policy analysis and if I share some knowledge on policy analysis*
> *and someone else who is not a policy analyst uses the knowledge,*
> *they may misuse it depending on their context and level of*
> *understanding.*
>
> **Informant No. 2, November, 2010**

Collaborative networks of knowledge communication and sharing use ICT tools that help reduce the time and effort needed for content creation and compiling knowledge. Information communication technologies make it easier to express and transfer knowledge across groups and organizations. In the collaborative content and knowledge creation different, workers can assume different roles and fulfill different parts of the tasks required. This makes it possible to create and share knowledge faster and be able to respond to knowledge needs in good time. One informant had a positive comment on the collaborative networks of knowledge communication and sharing in their organization and said,

> *I believe that the concept of knowledge networking has changed many people and organizations because now you can network with larger groups of experts through various ICT and you do not have to rely on only one expert. One of the reasons why ICT exist is to support the ways of creating and sharing knowledge for improved work performance and this makes a big difference in the way people access and use knowledge.*
>
> **Informant No. 3, December 2010**

But other informants argued that although being connected to the networks of knowledge sharing was a positive contribution to their organizational performance and added value to their work through sharing innovations with other organizations, being over networked presents new challenges to their organizations. An informant said that if too many people have to collaborate in the network through direct and real time input, they are unlikely to be effective as the process gets difficult to moderate, to supervise and to manage. He said,

> *In groups of a few people, a collaborative network is more effective because in a short time you will see results but in a network of tens or hundreds of people from different organizations working on the same project, it takes a long time to follow the knowledge sharing phases before you find what you really need.*

Informant No. 6, November 2010

The diversity of work principles, experiences and organizational cultures requires that some workers have to make some changes to accommodate others in order to fit in the network. The knowledge demands were different in the selected organizations. While some of the organizations are seeking advanced knowledge, others are seeking basic knowledge, meaning that some of the organizations benefit more than others in the network. This is why some scholars have argued that knowledge communication and sharing through networks is more effective between organizations that are more productive than organizations that are less capable of knowledge transfer (Argote et al., 2003 and Hansen, 2002). One informant expressed the challenge of finding information in a highly networked knowledge setting and said,

> *While working on one of the government projects I was searching for some information and knowledge on a particular topic on agriculture. I was looking in various databases of scientific studies in our organization and other organizations that we are linked to and I could not locate any documents for the keyword I searched with. Scientific experts do not use the same vocabulary other regular workers use and probably they do not use the same words as farmers. The common knowledge seeker has to learn which words are used by experts in order to identify a certain kind of information and be able to survive in the network.*

Informant No. 8, December 2010

4.8 Findings on the effects of ICT on knowledge communication and sharing in the selected organizations

Information Communication Technologies have been applied by organizations to enhance work performance for many years. They facilitate speedy access to ideas and experiences, and prompt exchange of information and knowledge. The Kenya Bureau of Statistics and the Communication Commission of Kenya observe that in the world today, access, usage and ownership of ICT are fundamental in linking communities and facilitating businesses and empowering communities socially and economically. The ICT have made the communication and exchange of knowledge more reliable, faster and affordable and it is now possible to transmit data more effectively and at minimal costs. The communication and sharing of knowledge helps organizations to improve quality, create new products, diversify the mode of their service delivery, increase internal efficiency and improve customer relationships. Organizations that value knowledge as a strategic resource establish knowledge communication and sharing systems that facilitate the performance of activities related to knowledge creation, retention, sharing and application. It is believed that the time and money invested on knowledge sharing activities are repaid by the overall organizational effectiveness and success.

The focus of this study was on the role and contribution of information communication technology in knowledge communication and sharing in selected organizations in Kenya, with a critical look at the kinds of ICT infrastructure and ICT tools that exist in the selected organizations and the prevailing state of ICT training, acceptance and use of ICT in the organizations. The study sought to establish how ICT infrastructure and ICT tools; training, acceptance and use of ICT were contributing to knowledge communication and

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sharing in organizations in Kenya. According to the findings, the study established that most organizations have ICT departments and units that support the ICT infrastructure and ICT tools. In terms of ICT training, acceptance and use, the findings indicate that the level of training of ICT workers was high and that there was a wide acceptance and use of ICT in these organizations based on the different areas of ICT application and the frequency of ICT use in the organizations. Based on this evidence, the study was able to verify that all of the knowledge communication and sharing processes relied heavily on ICT mediation from the time of information collection to processing, storing and sharing. From this evidence, the study then sought to establish what effect the ICT had on knowledge communication and sharing processes. The descriptive statistics and informant responses that follow give an insight into the various effects that ICT are having on knowledge communication sharing in the selected organizations.

Figure 27: Percentage of specific areas in which ICT have had the most visible impact

Legend:
- Improved knowledge creation, communication and sharing — 38
- Enhanced work performance — 32
- Maintained efficient knowledge flows and networks — 30
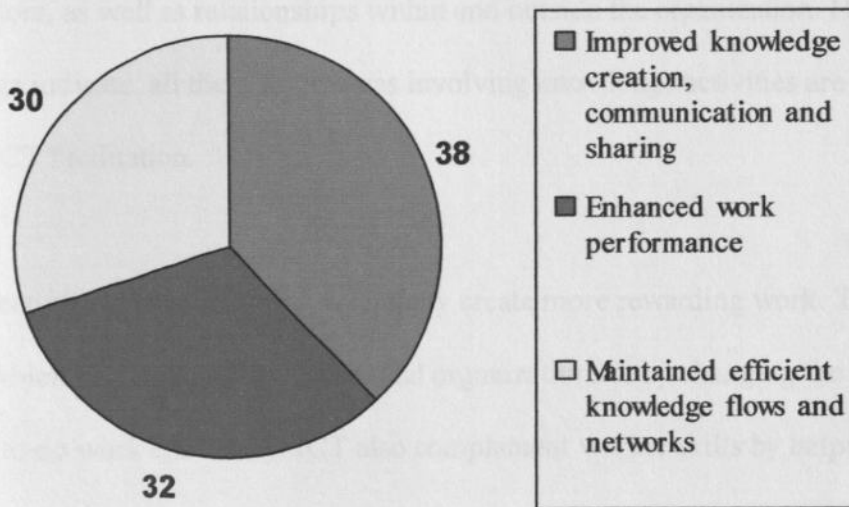
Table 10: General areas of knowledge communication and sharing in which ICT have had an impact

ICT mediated area of knowledge	Impact
Data sourcing	Faster and higher volumes of knowledge
Knowledge entry and analysis	Faster and more accurate knowledge
Knowledge products	Improved quality and variety of knowledge
Knowledge application by experts	Easy access and frequent use of knowledge
Knowledge storage	Large and secure quantities of knowledge
Knowledge networks	Diverse knowledge sharing networks

The findings from the study show that ICT had a slightly bigger effect on knowledge creation, communication and sharing compared to enhancing work performance and maintaining links and networks. This is perhaps because work performance and maintaining links are influenced by other factors beyond the use of ICT such as social and human factors, as well as relationships within and outside the organization. However, as other findings indicate, all these three areas involving knowledge activities are heavily dependent on ICT facilitation.

ICT enable effective organizations and potentially create more rewarding work. The major way in which ICT impact on workers and organizations is by changing the mix of skills required to do work efficiently. ICT also complement worker skills by helping the workers draw on the system and add to the information embedded in the system. ICT enable the increase of productivity in organizations. When asked to comment on the

impact of ICT on knowledge communication and sharing activities in their organizations, the key informants who were interviewed had different perspectives on the impact. Some felt that the ICT have a negative impact on their ability to communicate and share knowledge while others said that the ICT have certainly made a big change to their organizational knowledge communication and sharing. The following were the opinions expressed by the informants,

> *ICT are used to monitor knowledge work activities and micro manage the workers, reducing their power and control of work. Because of this, the workers feel that their jobs are insecure and their skills are scrutinized too closely and can be judged to be of less value even before the worker has had time to prove themselves.*

Informant No. 2, November 2010

> *The technology steps involved in converting information to knowledge before being distributed are sometimes very demanding and sometimes do not allow for individual thinking. We are supposed to input into the ICT systems knowledge that we understand but this is not always the case. Some technologies are complicated and we take long before we familiarize ourselves with the way they operate, making our work difficult at times.*

Informant No. 5, December, 2010

> *Many workers want to share knowledge but they have difficulties knowing how to do it. They do not trust what they know and their bosses do not want to show them how to do it. You find that those who know how to do it are too busy with their work and they wonder how you got your job if you do not know what do.*

Informant No. 7, November 2010

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Despite the varied responses from the informants, it should be noted that the negative effects of ICT are mostly on issues to do with human resource and relationships rather than knowledge itself since many technologies are programmed to communicate and share information and knowledge with minimal human input.

Table 11: Activities that have been impacted on by ICT in the selected organizations

Activity	Type of impact
Creation of new products	Improved distribution of information and knowledge on products Faster processing of market research data Diversification of product lines
Service delivery	Timely service delivery Quality of service improved significantly Improved delivery mechanisms Improved employee links Facilitated expansion to remote areas
Internal efficiency	Faster intra-organizational communication Quicker response to queries Immediate feedback and action enabled
Customer service	Increased customer and client base Improved customer satisfaction Created interactive links with customers

The informants who felt that ICT have had a positive impact in their knowledge communication and sharing said that ICT helps them to think and see things differently from the way they would if they were working outside of ICT. An informant said,

> *Since we adopted the new money transfer technology our client and capital base has more than tripled and we are seeing a faster growth in this service than in the calling service. The technology we use for the money transfer has created a product that has a bigger impact on the lives of the ordinary people and we are happy that ICT today are doing what traditional methods of trade could not do. The efficiency created by ICT makes our products and services cheaper, increasing demand and raising customer base.*

Informant No. 1, December 2010

Other informants had the following comments on the effects of ICT in their organizations' knowledge communication and sharing,

> *In our case, ICT are used to facilitate high involvement of knowledge work practices which involve self managed teams that help employees to get involved in management decisions by contributing their knowledge online whereas they would have been shy to talk if they were involved through formal meetings. This reduces hierarchical hindrances. The ICT add value to our workers because they are able to can access information and knowledge for decision making online.*
>
> **Informant No. 2, November 2010**

> *ICT have enabled us to consolidate client data bases and this helps us to access the information on our clients faster. The clients are also able to get information on our services through various ICT that we are linked to. This has significantly improved our service delivery and it is now far better than it was when we had to retrieve hard copy files and write mail to our clients. We think ICT have certainly made a difference in the way we conduct our business.*
>
> **Informant No. 3, December, 2010**

> *Without ICT, we cannot be in a position to distribute the information and knowledge that we have to provide to the various players in the information and communication sector. Our knowledge communication and sharing is fully dependent on ICT facilitation, including the various steps involved in the collection, consolidation, cleaning and storing of the information and knowledge. The potential of ICT has persuaded us to move from the traditional modes of knowledge distribution to a paperless way of sharing knowledge. In the long run, we think it is cheaper and faster to use ICT in our core activities.*
>
> **Informant No. 2, November, 2010**

4.9 A synthesis of the theoretical framework used in the study and findings

The theories that informed this study included the network society concept, inter organizational knowledge networks theory, the organizational information processing theory, and technology acceptance model. These theoretical approaches provided a wide range of factors and issues that affect and relate to knowledge communication and sharing in organizations. The study identified the prominent factors highlighted in the theoretical approaches that contribute to the use of ICT in organizations for knowledge communication and sharing purposes. Some of the key factors identified include the human relationships in organizations, knowledge sharing capabilities, the organizational environment, ICT infrastructure and tools, ICT training, acceptance and use of ICT.

Deriving from this wide variety of factors that affect knowledge communication and sharing as discussed in the theoretical approaches, the study sought to combine the different results on the various factors to come up with a clear picture of what was happening in the selected organizations in relation to knowledge communication and sharing. The study used the three thematic areas of ICT infrastructure and tools, ICT training, and acceptance and use of ICT to establish how knowledge communication and sharing activities were being affected. The findings indicate that all these factors are interrelated in terms of affecting the knowledge communication and sharing in the selected organizations. For example, the state of ICT infrastructure affected the availability of ICT tools as well as their simplicity and ease of use. The level of ICT training among workers determined their level of confidence in ICT acceptance and use.

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The acceptance and use of ICT influenced the decisions made by workers to share or not to share their knowledge depending on ICT use attitudes. These findings demonstrate that knowledge communication and sharing is affected by factors that are interconnected, all of which are closely linked to ICT adoption in organizations. It is therefore possible to say that ICT are the driving components of knowledge communication and sharing and that without a facilitating ICT environment, knowledge communication and sharing would be seriously affected in the selected organizations. From the findings, one can say that ICT have a positive effect on knowledge communication and sharing in the selected organizations and that their use in the organizations is central to knowledge communication and sharing practices.

The study had two hypotheses; 1) good ICT infrastructure and easy to use ICT tools have a significant effect on knowledge communication and sharing in Kenyan organizations, and 2) ICT training and the acceptance and use of ICT contribute positively towards the communication and sharing of knowledge in Kenyan organizations. Both hypotheses were proved positive by the results of the study that demonstrated that there exists good ICT infrastructures and simple ICT tools that contributed significantly to knowledge communication and sharing processes, and that the level of training of ICT workers was high while the acceptance and use of ICT in the organizations was wide thereby contributing positively to knowledge communication and sharing. The study however established that the few hindrances to knowledge communication and sharing in the selected organizations were human and knowledge related factors rather than ICT factors as expressed by the various key informants.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The general objective of the study was to evaluate the role and contribution of information communication technology in knowledge communication and sharing in selected organizations in Kenya. The specific objectives were 1) to establish the kind of information communication technology infrastructural tools available in selected Kenyan organizations; 2) to establish the level of training, acceptance and use of information communication technology in the selected organizations; and, 3) to assess how the information communication technology infrastructural tools combine with the training, acceptance and use of information communication technology to affect knowledge communication and sharing in the selected Kenyan organizations.

In relation to the general objective, the study established that ICT were playing a very central role in the processes involved in converting raw data into usable knowledge and that the ICT were also contributing significantly to the knowledge communication and sharing activities as well as in the networks of knowledge communication and sharing in the selected organizations. Findings that relate to objective one show that the selected organizations had well established ICT departments with good ICT infrastructures and a variety of ICT tools. In objective two, the study established that majority of the workers were highly trained in various areas of ICT and that there was sufficient acceptance and use of ICT in all the selected organizations. In relation to objective three, the study was

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able to establish that ICT infrastructure and simple ICT tools work in combination with training, acceptance and use of ICT to positively affect knowledge communication and sharing in the selected organizations. The study also established that most of the workers were not confident in their knowledge sharing because they did not have the relevant training in knowledge creation and sharing and also because their superiors were not good role models in the knowledge communication and sharing activities.

The study observes that most of the organizations have fairly good ICT infrastructure and a variety of ICT tools. However, a number of the organizations operate on outdated ICT infrastructures that have old and inefficient ICT tools. There is also a wide acceptance and use of ICT in work processes, even though some of the use is very basic. Information and knowledge processing is a regular work output in most of the selected organizations. Although a number of the selected organizations have an elaborate knowledge communication and sharing structure, a few of them do not have a clear stand on knowledge communication and sharing. The findings indicate that the organizations are highly networked through various ICT in their knowledge communication and sharing.

The human and organizational structures that support knowledge communication and sharing in these organizations are the formal and traditional top down structures, except in the case of *Safaricom* which has both the top down and an open flexible structure that targets its clients. Organizational environments affect the impact of ICT on knowledge communication and sharing by providing positive work conditions that encourage workers to be confident in their knowledge communication and sharing practices. If there

is commitment on the part of the organization to facilitate the right work conditions, ICT can have a greater effect on knowledge communication and sharing. The findings demonstrate that organizations need to acknowledge the importance of ICT and proper training of workers as necessary conditions to effective knowledge communication and sharing. Organizational investment on information communication technology infrastructure and knowledge sharing systems is also an important factor affecting knowledge sharing capabilities of workers.

The study established that whereas there is a positive environment of knowledge communication and sharing that is facilitated through various ICT tools among the selected organizations, there are no clear policies on knowledge sharing and workers only produce and share knowledge when it is required. The absence of a clear policy means that it is difficult to asses the knowledge sharing capabilities of workers and the quality of the knowledge they share. There is need for the organizations to establish mechanisms of identifying knowledge needs and structuring the knowledge communication and sharing processes such that they respond appropriately to these needs.

The findings of this study were generally consistent with previous literature on the issue of ICT being tools for knowledge development and in playing a critical role in raising the consciousness about the existing links within the organization (Büchel, 2001). The study was able to establish that ICT were actively involved in the various steps and stages of converting information into usable knowledge and also in the distribution of ready to use knowledge through various networks. The findings on the important role the ICT

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infrastructure, ICT tools and training were playing in the use of ICT for knowledge communication and sharing were also consistent with the arguments advanced by Riege (2005) that organizations ought to recognize the importance of ICT infrastructure, tools and training for them to reap the full benefits of ICT use in knowledge sharing.

Other areas of findings that were consistent with literature included the acceptance and use of ICT for knowledge communication and sharing based on the ease of the ICT tool (Hasanali, 2002 and Venkates et al., 2003), the importance of training among knowledge workers, and also the existence of active knowledge sharing networks (Castells, 2004; Bell, 1973, and Bell et al. 2002). This consistency is a validation of the results that were obtained in the identified areas and a demonstration that these results can be useful in other areas of research. The findings of the study also confirmed the topic of the study that ICT have a contribution in knowledge communication and sharing in the selected organizations in Kenya and that their contribution was a positive one. ICT infrastructure, ICT tools, and ICT training emerged as the most decisive factors in the acceptance and use of the information communication technology for knowledge communication and sharing activities in these organizations.

Some of the findings indicate that the visibility of knowledge communication and sharing in the organizations was very low. The visibility of individuals and organizations in knowledge sharing activities can enhance the image and reputation of the person or organization sharing the knowledge and give them an advantage over their competitors. This can encourage other people and organizations to follow suit, thus making more

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knowledge available to many people. It can also motivate people to use ICT systems to contribute their knowledge and thereby build and a reputable body of knowledge. This is an area that the organizations need to address because knowledge communication and sharing is only useful when its visibility is felt among those who need the knowledge in their daily life. Although the selected organizations do not appear to be applying ICT for knowledge communication and sharing in the same way, one can say from the findings that they all are responding in one way of another to the aspirations of Kenya's ICT policy and to the objectives of Kenya Vision 2030, both of which aim to improve the livelihoods of Kenyans through availing ICT services and providing a good economic, social and political environment for all Kenyans.

The study had anticipated some resistance in the provision of information in the selected organizations, this was not the case. Many of the respondents and informants were eager to share their ideas on the state of ICT use in their organizations, although they did not seem to feel very comfortable with the concept of knowledge sharing because it is still viewed as an internal and sometimes secretive matter. However, since most knowledge sharing situations in the selected organizations involve individual decisions, it was possible to extract the required information easily once the respondents and informants were sure that they were expressing their personal experiences as opposed to making a policy statement.

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This study has significance on four levels: academic, practice, policy and personal. On the academic level, it contributes to the large body of knowledge on ICT performance in organizations, with an emphasis on ICT infrastructure, ICT tools, ICT training, and acceptance and use of ICT in organizations. The study establishes the status of these factors in the selected organizations with some statistical descriptions and interview comments and discusses on how they affect knowledge communication and sharing. The study becomes part of the ongoing discourse on the role of ICT in organizational performance, especially in the area of knowledge communication and sharing in the world in general, and in Kenya in particular. Academicians and researchers will be able to use the findings of this study as a reference in future research.

At policy level, the results will benefit both the organizations that participated in the study and other organizations using ICT, and the government of Kenya, which is particularly interested in supporting ICT application in the various sectors of government. The results will inform policy formulation on the state of art, focusing on areas of need for improvement and change as indicated in the items discussed in the recommendations. At the practitioner level, the study provides up to date statistical data as presented in **Chapter 4** which can be used to inform current practices on the role of ICT in knowledge communication and sharing in Kenya with a view to adopting best practices to improve for better results.

At a personal level, I will have added knowledge to the existing scholarly work on ICT infrastructure, tools, acceptance and use, and knowledge communication and sharing in Kenyan organizations and made a personal contribution to the body of knowledge in this field of study.

5.3 Recommendations

The findings identify several areas that can be improved in the use of ICT for knowledge communication and sharing. The following are some of the important areas that the selected organizations and other interested organizations can address in the knowledge communication and sharing efforts:

5.3.1 Knowledge needs and policy

The selected organizations may need to come up with clear policies on knowledge creation and sharing based on specific knowledge needs in the various organizational activities. Lack of awareness of the existence of knowledge in the selected organizations was also evident among a few of the staff members and this can be addressed by training more knowledge workers on the processes and products of knowledge.

5.3.2 Availability and visibility of knowledge

Availability and visibility of knowledge communication and sharing activities ought to be enhanced in the organizations. Knowledge can be availed both inside and outside the selected organizations through focal points and dedicated knowledge networks where those who need it can access it easily. Knowledge sharing visibility is very low in the

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selected organizations. The visibility can be improved through portals that are specifically for knowledge development and distribution either within the organizations or outside the organizations in partnership with other organizations.

5.3.3 Training of knowledge experts

Most of the employees working in the area of ICT enabled knowledge communication and sharing in the selected organizations are well trained in different ICT areas but they have no prior training in knowledge development and sharing. The organizations can combine ICT training with knowledge development training in order to maximize the benefits of using ICT for knowledge communication and sharing activities.

5.4 Future research

5.4.1 Knowledge conversion and sharing processes

The processes used by workers to convert information and produce knowledge are quite diverse. Future research can focus on specific and detailed processes and patterns of knowledge creation, storage and use in organizations.

5.4.2 Acceptance and use of ICT

Acceptance and use of ICT for knowledge communication and sharing is influenced by other factors outside of ICT such as social and human factors. Future research can focus on these other factors to establish the extent to which they contribute to the acceptance and use of ICT and their contribution to effectiveness in knowledge sharing activities.

5.4.3 Networks of knowledge communication and sharing

The findings indicate that the organizations use three types of networks to share knowledge, unidirectional, multiple directions, and networked directions. Future research can investigate further on the extent to which these networks contribute to organizational knowledge and how they are facilitated within and across organizations.

5.4.4 The challenge of ICT projects

Although the performance of the *Pasha* centers was not the main focus of this study, it is important for future research to investigate why such projects do not seem to take off or to have the impact expected by their beneficiaries and what lessons can be learnt from similar projects that have been a success elsewhere.

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CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The general objective of the study was to evaluate the role and contribution of information communication technology in knowledge communication and sharing in selected organizations in Kenya. The specific objectives were 1) to establish the kind of information communication technology infrastructural tools available in selected Kenyan organizations; 2) to establish the level of training, acceptance and use of information communication technology in the selected organizations; and, 3) to assess how the information communication technology infrastructural tools combine with the training, acceptance and use of information communication technology to affect knowledge communication and sharing in the selected Kenyan organizations.

In relation to the general objective, the study established that ICT were playing a very central role in the processes involved in converting raw data into usable knowledge and that the ICT were also contributing significantly to the knowledge communication and sharing activities as well as in the networks of knowledge communication and sharing in the selected organizations. Findings that relate to objective one show that the selected organizations had well established ICT departments with good ICT infrastructures and a variety of ICT tools. In objective two, the study established that majority of the workers were highly trained in various areas of ICT and that there was sufficient acceptance and use of ICT in all the selected organizations. In relation to objective three, the study was

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able to establish that ICT infrastructure and simple ICT tools work in combination with training, acceptance and use of ICT to positively affect knowledge communication and sharing in the selected organizations. The study also established that most of the workers were not confident in their knowledge sharing because they did not have the relevant training in knowledge creation and sharing and also because their superiors were not good role models in the knowledge communication and sharing activities.

The study observes that most of the organizations have fairly good ICT infrastructure and a variety of ICT tools. However, a number of the organizations operate on outdated ICT infrastructures that have old and inefficient ICT tools. There is also a wide acceptance and use of ICT in work processes, even though some of the use is very basic. Information and knowledge processing is a regular work output in most of the selected organizations. Although a number of the selected organizations have an elaborate knowledge communication and sharing structure, a few of them do not have a clear stand on knowledge communication and sharing. The findings indicate that the organizations are highly networked through various ICT in their knowledge communication and sharing.

The human and organizational structures that support knowledge communication and sharing in these organizations are the formal and traditional top down structures, except in the case of *Safaricom* which has both the top down and an open flexible structure that targets its clients. Organizational environments affect the impact of ICT on knowledge communication and sharing by providing positive work conditions that encourage workers to be confident in their knowledge communication and sharing practices. If there

is commitment on the part of the organization to facilitate the right work conditions, ICT can have a greater effect on knowledge communication and sharing. The findings demonstrate that organizations need to acknowledge the importance of ICT and proper training of workers as necessary conditions to effective knowledge communication and sharing. Organizational investment on information communication technology infrastructure and knowledge sharing systems is also an important factor affecting knowledge sharing capabilities of workers.

The study established that whereas there is a positive environment of knowledge communication and sharing that is facilitated through various ICT tools among the selected organizations, there are no clear policies on knowledge sharing and workers only produce and share knowledge when it is required. The absence of a clear policy means that it is difficult to asses the knowledge sharing capabilities of workers and the quality of the knowledge they share. There is need for the organizations to establish mechanisms of identifying knowledge needs and structuring the knowledge communication and sharing processes such that they respond appropriately to these needs.

The findings of this study were generally consistent with previous literature on the issue of ICT being tools for knowledge development and in playing a critical role in raising the consciousness about the existing links within the organization (Büchel, 2001). The study was able to establish that ICT were actively involved in the various steps and stages of converting information into usable knowledge and also in the distribution of ready to use knowledge through various networks. The findings on the important role the ICT

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infrastructure, ICT tools and training were playing in the use of ICT for knowledge communication and sharing were also consistent with the arguments advanced by Riege (2005) that organizations ought to recognize the importance of ICT infrastructure, tools and training for them to reap the full benefits of ICT use in knowledge sharing.

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Some of the findings indicate that the visibility of knowledge communication and sharing in the organizations was very low. The visibility of individuals and organizations in knowledge sharing activities can enhance the image and reputation of the person or organization sharing the knowledge and give them an advantage over their competitors. This can encourage other people and organizations to follow suit, thus making more

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5.2 Significance of the findings

This study has significance on four levels: academic, practice, policy and personal. On the academic level, it contributes to the large body of knowledge on ICT performance in organizations, with an emphasis on ICT infrastructure, ICT tools, ICT training, and acceptance and use of ICT in organizations. The study establishes the status of these factors in the selected organizations with some statistical descriptions and interview comments and discusses on how they affect knowledge communication and sharing. The study becomes part of the ongoing discourse on the role of ICT in organizational performance, especially in the area of knowledge communication and sharing in the world in general, and in Kenya in particular. Academicians and researchers will be able to use the findings of this study as a reference in future research.

At policy level, the results will benefit both the organizations that participated in the study and other organizations using ICT, and the government of Kenya, which is particularly interested in supporting ICT application in the various sectors of government. The results will inform policy formulation on the state of art, focusing on areas of need for improvement and change as indicated in the items discussed in the recommendations. At the practitioner level, the study provides up to date statistical data as presented in **Chapter 4** which can be used to inform current practices on the role of ICT in knowledge communication and sharing in Kenya with a view to adopting best practices to improve for better results.

At a personal level, I will have added knowledge to the existing scholarly work on ICT infrastructure, tools, acceptance and use, and knowledge communication and sharing in Kenyan organizations and made a personal contribution to the body of knowledge in this field of study.

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5.4 Future research

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APPENDIX 1: QUESTIONNAIRE

THE IMPACT OF INFORMATION COMMUNICATION TECHNOLOGIES (ICT) ON KNOWLEDGE COMMUNICATION AND SHARING IN ORGANIZATIONS: CASE STUDIES IN KENYA

IMPORTANT NOTE

This questionnaire must be answered by a staff member who frequently uses Information Communication Technologies in their regular work. All questions must be answered in order to give a true reflection of the organization's position on ICT and knowledge sharing.

NAME OF ORGANIZATION_____

SECTION I

INDIVIDUAL INFORMATION AND ICT TRAINING

1. What is your gender   Male ☐   Female ☐

2. Your name: _____ Phone contact: _____

3. What is your job title/designation? _____

4. How long have you worked in the current organization?
   1 – 24 months ☐   25 months – five years ☐   Six – nine years ☐   Above ten years ☐

5. Under which department/unit/section do you work? (please specify): _____

6. How many people work in this department/unit/section? _____

7. a) Do you have specialized training in Information Communication Technologies and related areas?
   Yes ☐   No ☐

b) If Yes, please name the area(s) of your training
_____
_____
_____

8. What is the level of your training in ICT?
   Basic ☐

   College ☐

   University ☐

   Professional ☐

9. Which institution gave you the training? Please give name: _____

1

SECTION II

ICT INFRASTRUCTURE AND TOOLS

10. Would you say that your organization has a good ICT infrastructure and ICT tools?
Yes ☐   No ☐

b) If Yes, please name the kinds of ICT infrastructure that your organization has.

_____
_____
_____

c) Which ICT tools are available in your organization?

_____
_____
_____

11 a) Des your every day work involve the use of any of the above Information Communication Technologies?
Yes ☐   No ☐

b) If Yes, please list the types of ICT that you use daily.

c) In which areas are the ICT used?

_____
_____
_____

12. Would you say that the ICT tools you use are simple and easy?
Yes   No

13. a) Is your use of these ICT tools based on your previous training in ICT?
Yes ☐   No ☐

b) If No, explain what other factors influence your use of these tools.

_____
_____
_____

c) How often do you use the ICT tools?

_____

d) What is your rating of use of these ICT tools?
Very high ☐

High ☐

Medium ☐

Low ☐

e) In which areas of work do you use the ICT most?

_____
_____
_____

KNOWLEDGE CONVERSION, COMMUNICATION AND SHARING

14. a) Is the information received or generated by your organization retained in data base form?

Yes ☐   No ☐

b) If Yes, in what format is this information retained? Tick all that apply.

Raw format ☐

Refined and converted to knowledge (for development use) ☐

c) Are you aware of the existence of knowledge data bases in your organization?

Yes ☐   No ☐

16. a) Briefly explain the procedures used to convert the general information to knowledge

_____
_____
_____
_____
_____
_____
_____

b) What is the percentage of raw data that is converted to knowledge?

_____

c) What ICT are used in the procedures of converting and knowledge?

_____
_____
_____

17. If the knowledge is classified, please list types of classifications used.

_____
_____
_____

19. a) Does your organization sometimes receive ready to use knowledge?

Yes ☐   No ☐

b) If Yes, please give the types of knowledge that you receive.

_____

c) Give the various sources of this ready to use knowledge.

_____
_____

19. How is the knowledge used? Tick all that apply.

For internal organizational purposes only ☐

Distributed to organization field stations and officers ☐ ☐

Shared with other organizations ☐ ☐

20. How is the knowledge kept by your organization specified?
    As specialized knowledge ☐
    As general information ☐
    Not specified at all ☐

21. How often do you share this knowledge with other organizations?
    Daily ☐
    Weekly ☐
    Monthly ☐
    Quarterly ☐
    Annually ☐

22. What ICT channels are used to communicate this knowledge?
_____
_____
_____

23. What types of technological networks link your knowledge sharing activities with other organizations?
_____
_____
_____

24 a) In what manner does your organization share the knowledge with other organizations?
    Spontaneously ☐

    Routinely and planned ☐

    On demand ☐

    Does not share at all ☐

b) How would you describe this sharing of the knowledge? Tick all that apply.
    One direction from your organization to other organizations ☐
    Multi directional (between the various partner organizations) ☐
    Networked directions (through different ICT) ☐

c) Which ICT channels are used for this sharing? List all that apply.
_____
_____
_____

25. If your organization was not linked in any way to other organizations, would you feel that;
    It would be left out completely from the development network ☐

    It would lose some key contacts in the development network ☐

It would suffer some setbacks in its development goals ☐

It would not be affected at all ☐

26. In what ways does your organization utilize knowledge?
_____
_____
_____

27. a) Would you say that knowledge communication and sharing is visible in organizations in Kenya?
    Yes ☐   No ☐

b) If No, what are the reasons for lack of visibility?
_____
_____
_____
_____

28. In your view, what can be done to improve the visibility of knowledge communication and sharing?
_____
_____
_____

29. a) Do you think that ICT have had any impact at all on knowledge communication and sharing in your organization?
    Yes ☐   No ☐

b) If Yes, what do you think is the level of impact of ICT on knowledge communication and sharing in your organization?

    High   ☐

    Medium ☐

    Low   ☐

30. Which ICT do you think have had the most impact and which one ones have had the least impact?
a) ICT with most impact _____
b) ICT with least impact _____

31. What kinds of impact have these ICT had on knowledge communication and sharing?
_____
_____
_____
_____

32. Any other comments on ICT and knowledge sharing
_____
_____
_____

APPENDIX II: SCHEDULE FOR IN-DEPTH INTERVIEWS

- Tell us about the state of ICT infrastructure and ICT tools and how they are used in knowledge communication and sharing purposes in your organization.

- Would you say that your workers have easily accepted the use of ICT in knowledge sharing activities in your organization?

- How do you view the relationships between those who give knowledge and those who receive knowledge within and outside your organization?

- How do these relations affect knowledge communication and sharing processes?

- In your view, would you say that knowledge is produced, stored and shared in an accessible way in and across your organization?

- Do you think many people who use knowledge understand it and are able to apply it with ease in their work?

- Would you say that your workers are willing and able to learn quickly how to use ICT for knowledge communication and sharing purposes?

- What is the capacity and capability of your workers in knowledge communication and sharing?

- Do you think that your organization provides a safe environment for knowledge communication and sharing?

- Are there any organizational structures that facilitate knowledge communication and sharing in your organization?

- Please give us any other comments that you feel are important in making knowledge communication and sharing in your organization effective.

APPENDIX III: LIST OF SELECTED ORGANIZATIONS USED IN THE STUDY

1. Agriculture Development Co-operation /Italian Government
2. Capital Markets Authority
3. Communication Commission of Kenya
4. Economic and Social Council
5. Federation of Kenya Employers
6. Federation of Women Lawyers in Kenya
7. Kenya Industrial Estates
8. Kenya Private Sector Alliance
9. Media Council of Kenya
10. Ministry of Finance
11. Ministry of Gender, Culture and Social Services
12. Ministry of Industrialization
13. Ministry of Information and Communications
14. Ministry of Justice and Constitutional Affairs
15. Ministry of Planning and National Development/ Millennium Development Goals Secretariat
16. Ministry of Trade and Industry
17. Ministry of Water and Irrigation
18. Ministry of Youth Affairs
19. National Environment Management Authority
20. Office of the President – Public service reform and development secretariat (performance contracting)
21. Regional Centre on Small Arms
22. Safaricom