FACTORS INFLUENCING ADOPTION OF INFORMATION AND COMMUNICATIONS TECHNOLOGY IN PUBLIC HOSPITALS IN NAIROBI COUNTY, KENYA

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A Research Project Submitted in Partial Fulfillment of the Requirement for the Award of Degree of Master of Arts in Project Planning and Management of the University of Nairobi

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DECLARATION

I hereby declare that this project is my original work and has not been presented for a degree at any other university.

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This research project has been submitted for examination with my approval as the candidate's University Supervisor.

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DEDICATION

To my parents Mrs. Evangeline Magambo and the Late Mr. Magambo Kiriamiti for their prayers and disciplined foundation they set that made me achieve what I have attained.

To my loving husband Johnson Kariuki Nyaggah and children Cynthia and Richard for their steadfast love, patience and support towards this project and entire highly demanding course they facilitated into a dream come true.

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ABBREVIATIONS AND ACRONYMS

CPOE: Computerized Providers Order Entry

CRS: Central Reservations Systems

EHR: Electronic Health Record

HIS: Health Information Systems

ICT: Information and Communication Technologies

MDGs: Millennium Development Goals

WHO: World Health Organization

SE: Small Enterprises

LAN: local area networks

VSAT: Very Small Aperture Terminal

EMIS: Egton Medical Information System

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ABSTRACT

Information and communications technology development are not of particular breakthrough technologies, but rather those of rapid and continuous improvement in price-performance of both computing and communications, the explosion of bandwidth capacity in fixed and mobile networks, and the emergence and development of the internet and internet-based applications. The purpose of the study was to establish the factors influencing adoption of ICT in public hospitals in Nairobi, Kenya, to determine the influence of training on the adoption of ICT in public hospitals in Nairobi County, to determine the influence of infrastructure on the adoption of ICT in public hospitals in Nairobi County, to determine the influence of availability of funds on the adoption of ICT in public hospitals in Nairobi County and to determine the influence of ICT staff attitude on the adoption of ICT in public hospitals in Nairobi County. The study was guided by innovation- diffusion theory, technology acceptance theory and contingency theory. The study employed a descriptive research design where it targeted 7 public hospitals. The sample consisted of ICT managers, record keepers, clerks, cashiers and laboratory technologists. The study sample size comprised of 100 staffs who were engaged in the study. The data collected was analysed using descriptive statistics (measures of central tendency and measures of variations) to achieve the objectives of the study. The quantitative data generated was analyzed using descriptive statistics with the help of Statistical Package for Social Sciences (SPSS) version 20. From the research findings, the study revealed that majority of the respondents as shown by 64.71% had served the institution for more than 9 years whereas 29.41% of the respondents had served the institution for a period of 6 to 8 years, 3.53% had served the institution for 3 to 5 years and only 2.35% of the respondents had served the institution for a period of less than 2 years. The study found that, the cost of ICT training materials is considered to be among the problems that negatively affects the implementation of ICT in most health facilities. The study further revealed that medical equipment management involves other essential activities which ensure that equipment is effectively planned and budgeted for, procured, and operated. The study found that installation of ICT infrastructure is a major drawback to the adoption of ICT. Developments in ICT technological infrastructure in hospitals have drastically influenced the competitive business environment in health sector as proved by the emergence and strengthening of the global economy, and the transformation of industrial economies to knowledge-and-information-based service economies. On the influence of ICT staff attitude on ICT adoption, the study found that ICT adoption has been perceived to challenge the traditional management hierarchy and change both the location and the nature of decision making in most public hospitals. The study recommends that the ministry of health to improve the current ICT status for health sector. The Sector should attain any tangible and observable ICT diffusion levels. The government should increase the ICT budget to address adoption challenges in public hospitals in Nairobi as the survey found that high cost of funding ICT programmes is immensely influencing ICT adoption.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Healthcare is a sector that is experiencing a significant number of internal, but also external pressures. Progress in medicine and also in information and communication technologies (ICT), are resulting in new methods and new opportunities to support or even enable new types of health care services. ICT development are not of particular breakthrough technologies, but rather those of rapid and continuous improvement in price-performance of both computing and communications, the explosion of bandwidth capacity in fixed and mobile networks, and the emergence and development of the internet and internet-based applications (Michel & Betty, 2003). Perhaps the most important development is the convergence and or compatibility of technologies, which is opening up new possibilities in a number of fields. E.g. bioinformatics which is a branch between biology, computer science, mathematics, and engineering that develops and improves upon methods for storing, retrieving, and analyzing biological data and develops software tools to generate useful biological knowledge.

ICT has helped to bridge the gap between the provider and seeker through telemedicine and remote consultations, enabled health knowledge management by institutions and agencies, and facilitated in the creation of networks between providers for exchange of information and experiences. In fact, globally, the e-Health or health telematics sector is fast emerging as the third industrial pillar of the health sector after the pharmaceutical

and the medical (imaging) devices industries (Macleod,2007). From a development perspective, ICTs are key instruments towards meeting the Millennium Development Goals (MDGs) related to health. In this respect, the increasing adoption of ICT in health care services of developing countries, by both public and private sectors, has been a welcome trend. All across the world, governments are pledging and pooling more and more of their resources towards developing ICT tools and systems with the ultimate aim of facilitating management, streamlining surveillance and improving health care through better delivery of preventive and curative services (Turban , 2004).

As outlined in the Kenya Vision 2030, provision of healthcare is key to achieving the millennium development goals. Information Technology has been identified as one of the pillars that will help Kenya achieve its millennium development goal. The ministry of health has identified ICT as one of its reform strategy to ensure they effectively support service delivery. The Kenya health system faces a challenge in understaffing of medical staff, lack of financing and late reporting and inadequate integration between departments. The healthcare system in Kenya is structured in a step-wise manner so that complicated cases are referred to a higher level (Mwilu, 2013). The public health system consists of the following levels of health facilities: national referral hospitals, regional general hospitals, county hospitals, health centers, and dispensaries.

Public hospitals are Government operated hospitals. Hospitals are open systems strongly influenced by the environment in which they operate (McKee & Healy 2002). They interact with the surrounding environment to secure the resources needed for survival,

adaptation and growth. Their policies and activities are constantly influenced by external factors related to the population they serve, patterns of prevailing diseases, public expectations, changes in the hospital system and healthcare system, and the broader socio-economic and political environment. Kenya's public health care sector has a network of over 4,700 health facilities countrywide, with the public facilities making 51%, consisting of the following levels; national referral hospitals, regional general hospitals, county hospitals, health centers and dispensaries (Kazi, 2012). National referral hospitals are at the apex of the pyramidal and the health care system, providing sophisticated diagnostic, therapeutic, and rehabilitative services. The national referral hospitals are Kenyatta National Hospital in Nairobi, Moi Referral and Teaching Hospital in Eldoret, National Spinal Injury Hospital and Mathare Mental Hospital. Regional hospitals act as referral hospitals to their county hospitals.

According to the National Hospital Insurance Fund (2013), there are 7 public hospitals in Nairobi .The 7 hospitals are categorized as A (Government hospitals). The hospitals include; Kamiti Hospital, Kenyatta National Hospital, Mama Lucy Kibaki Hospital, Mathare Mental Hospital, Mbagathi District Hospital, National Spinal Injury Hospital and Pumwani Hospital Management Board

1.2 Statement of the Problem

Developed countries have embraced the use of information communications technologies (ICT) within the hospitals and health clinics. A few examples of the use of ICT include computerization of medical records, electronic scheduling for appointments, and use of

the Internet for the purposes of communication and the use of magnetic cards. According to Baldwin (2006), ICT plays an important role in delivering healthcare today. Healthcare professional including doctors and nurses are occupied in what is seen as a radical action plan for improving the national healthcare services in most countries. Wilson and Anderson (2000), mentioned that while health information technology provides the greatest impact on administration functions, such as decreasing paperwork and workload of healthcare professionals, increasing administrative efficiencies and expanding access to affordable care, it also has shown effectiveness in preventing medical errors by enforcing clinical guidelines and protocols and reducing health care cost.

To overcome the challenges that the Kenya hospital system is facing, there is a need to improve information and communication exchange in the healthcare industry in order to accelerate knowledge diffusion and increase access to information. The adoption of information system has shown to improve businesses performance since ICT is known as a tool that improves business competitiveness (Niang, 2009). Hence this study has focused on investigating the factors that influence the adoption of information system in the healthcare industry.

Muhammad (2009), studied factors affecting the introduction of ICTs for 'healthcare decision-making' in hospitals of developing countries, the study found that on the information and communication technologies for decision-making is tabling new tools and techniques in the marketplace. There is a lack of studies that assessed the impacts of ICTs on decision making particularly in health sector of Pakistan.

Mugeni (2012), in their research on evaluating factors affecting broadband adoption in Kenya argued that relative advantage of broadband internet over its predecessor narrowband internet was very influential in explaining variations in broadband intention. Considering the items used to measure this construct, notably faster download speeds, higher reliability, better quality of service and better quality of experience, policy makers and regulators are called upon to foster an appropriate enabling environment. For example service and platform competition would spur improvement in download speeds, reliability, quality of service and quality of experience. Availability of a national broadband strategy would also serve as blueprint for broadband development and clearly set targets of download and upload speeds, among others.

Muga (2004)), studied an overview of the health system in Kenya. The study found that the overall thrust for future planning in the health sector should be to firmly address the downward spiral of deteriorating health status. The goal should be to reduce health inequalities and to reverse the downward trend in the impact and outcome indicators. These health inequalities exist between urban and rural overview of the health system in Kenya populations and between counties and regions (66 percent of the population of Western Region is below the poverty line, compared with 46 percent in Central Region).

Obino (2012) looked at the adoption of information and communication technology by small enterprises in Thika municipality, Kenya, The study concluded that ICT has not been well embraced by small enterprises in Kenya. All the variables under study have a statistically significant effect on ICT adoption. The Government of Kenya should develop

an appropriate programme to encourage ICT adoption by small enterprises, eliminate all taxes on ICT, establish a special fund to support ICT adoption; support training programmes to develop the capacity of small enterprises to embrace ICT; invest in appropriate communication infrastructure for SEs, and the SE Federation should institute deliberate efforts to encourage SEs to invest in basic ICT tools to help improve their business and make them more competitive. Such efforts could include establishment of a special fund to finance ICT adoption by SEs.

Nzisa (2012), did a study on investigation of factors affecting the adoption of information and communication technologies for communication of research output in research institutions in Kenya. The findings revealed researchers' priority research communication need was reinforcement of capacity for strategic research through recognizing and prioritizing research communication in budgetary planning. Thus, the findings call for investment in scientific and technological research and its communication, which includes improving tools and infrastructure, especially ICT-enabled ones like Internet connectivity and other e-resources. From the above local studies little has been done on factors influencing adoption of ICT in public hospitals in Nairobi, Kenya.

1.3 Purpose of the Study

The purpose of this study is to establish the factors influencing adoption of ICT in public hospitals in Nairobi County, Kenya

1.4 Research Objectives

The study was guided by the following specific objectives-:

1. To determine the influence of availability of funds on the adoption of ICT in public hospitals in Nairobi County
2. To determine the influence of training on the adoption of ICT in public hospitals in Nairobi County
3. To determine the influence of infrastructure on the adoption of ICT in public hospitals in Nairobi County
4. To determine the influence of ICT staff attitude on the adoption of ICT in public hospitals in Nairobi County

1.5 Research Questions

The study sought to answer the following research questions:-

1. How does availability of funds influence the adoption of ICT in public hospitals in Nairobi County?
2. How does training influence the adoption of ICT in public hospitals in Nairobi County?
3. How does infrastructure influence the adoption of ICT in public hospitals in Nairobi County?

4. How does ICT staff attitude influence the adoption of ICT in public hospitals in Nairobi County?

1.6 Significance of the Study

The information generated in this study can enable various stakeholders to come up with good plans and formulate policies that can favor adoption of information technology in health fields. It is expected that the vendors can use the information from this study to develop information systems with desirable characteristics that will increase their adoption in the hospitals. The findings of this study can help all the healthcare institutions in Kenya by providing the staff information and communication technology literacy, information systems characteristics, and how to improve the relationship between these factors on the adoption of information technology.

This study would benefit the government and especially the Ministry of health for making policy decisions whose overall objectives are to increase effectiveness and efficiency of hospitals in the country. Technological services can accelerate the rate of growth of the health industry sector and hence improved economy.

The research can also benefit students involved in ICT as a profession and those researchers willing to expound on areas that may require further investigations in this field. The study will contribute to the existing literature in the field of ICT. It should also act as a stimulus for further research to refine and extend the present study especially in Kenya.

1.7 Limitations of the Study

This study comprised of the current public hospitals in Nairobi, this makes the research limited in the sense that the findings cannot be generalized to other healthcare institutions that are owned by the private sectors.

1.8 Delimitations of the Study

This study targeted public hospitals within Nairobi that have implemented information and communications technology. This ensured that the research population will be identified faster, more easily and accurately.

1.9 Assumptions of the study

The study assumed that all respondents were honest, cooperative and provides reliable responses.

1.10 Definition of Significant Terms

Adoption	It is a process of taking up or starting to use or following
Factors	Elements contributing to a particular result or situation
Funds	Financial resources, usually in the form of money, or other values
ICT	Information and communications technology is an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and

	network hardware and software, satellite systems, as well as the various services and applications
Infrastructure	The basic physical and organizational structures and facilities needed for the operation of a society or enterprise
Public hospitals	Are a hospital which is owned by a government and receives government funding. In some countries, this type of hospital provides medical care free of charge, the cost of which is covered by government reimbursement.
Training	Is teaching, or developing in oneself or others, any skills and knowledge that relate to specific useful competencies.

1.11 Organizational of the study

Chapter one of the study contains introduction, giving a background of the study while putting the topic of study in perspective. It gives the statement of the problem and outlines the objectives, limitations, delimitations, and the assumptions of the study. Chapter two reviews the relevant literature on factors influencing adoption of ICT. It critically looks at the availability of funds, training and adoption, ICT Infrastructure and ICT staff attitude .It also outlines empirical review as well as the conceptual framework variables. Chapter three consists of research methodology which was used in the study. It covers the research design, target population, sample design, data collection, validity and reliability of data collection instruments, data analysis techniques, and ethical

considerations. Chapter four consists of data analysis, presentation and interpretations and discussions. Chapter five consists of summary of the findings, discussion, conclusion and recommendation based on the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter covers other researcher work on factors influencing adoption of ICT. The main sections covered in this chapter include; factors influencing adoption of ICT, theoretical framework, conceptual frame work, and summary of literature review and research gaps.

2.2 Factors Influencing Adoption of ICT in Public Hospital in Kenya

According to Oliver (2002), ICT helps companies and other institutions to increase productivity and create attractive products to be sold on the world market. It improves the quality and decreases lead-times and costs. ICT technology has also fuelled sustainable development by reducing the environmental impact of business activities. There are several factors influencing adoption of ICT in public hospital in Kenya which are;

2.2.1 Availability of Funds on Adoption of ICT

According to Oliver (2002), cost refers to an amount paid or to be paid for a purchase to acquire, produce, or maintain goods or services. Adoption according to this study refers to the application of ICT in hospitals. The cost of ICT training materials is considered to be among the problems that could negatively affect the implementation of ICT in most health facilities. The higher the cost of computers and their accessories, the fewer computers one can buy with the limited resources. According to Tusubira and Mulira (2009), the cost of computerized equipments is often prohibitive for most hospitals in

developing countries and for those who can afford them, routine maintenance and servicing, is yet another problem that is not easily manageable by the first generation computer users. Compared to traditional forms of hospital treatments, technology facilitated has proven to be quite expensive in all areas of consideration (Oliver, 2002).

In attempts to lower the costs, improve the quality and expand the access to health services many developing countries' governments put much hope in electronic health records (Nyella & Mndeme, 2010) and ICT based Health Information Systems (HIS). The migration to electronic medical records is necessitated by limitations in paper based records that include temporal, spatial, and monetary constraints associated with continued paper-based record accumulation and compression over time. Additionally, paper-based systems have limited functionality; many people cannot easily view the same record at the same time. Having electronic medical records can support medical professionals in their decision-making and also improve operating efficiency, thus improving medical care quality (Ayers, 2009). Other systems such as decision support systems have been shown to reduce medical errors in applications such as drug order entry (Bates, 2001). Research on eHealth in developing countries has shown that eHealth can be one solution to provide better access to healthcare facilities for patients and healthcare professionals, improve collaboration between different governmental bodies, and increase care quality. According to a survey carried out by the World Health Organization (WHO), eHealth tools, among them Electronic Health Record (EHR) systems, are seen as extremely useful for 70% of the non-OECD countries (World Health Organization, 2006).

2.2.2 Training and Adoption of ICT

Technological innovation has implications for employees of various institutions. Typically, health institutions are lacking in specialized IS knowledge and technical skills. Thong (1999), suggested that the higher IS capabilities the staff have, the higher their potential in the use of information systems, and thus the higher percentage of adopting IT. A small business that has IS knowledgeable employees will lower the knowledge barrier in understanding and using the IS. In order to facilitate the successful implementation of information system in organizations, and to avoid adoption failure, the health institutions should provide employees with computer education and training courses. IT acceptance among users of IT who form part of a firm employee's base will impose positive impacts on IT adoption, (Apulu & Latham, 2009).

The lack of knowledge on how to use technology and low computer literacy are factors that affect the adoption of ICT. There is a need for computer education. Owner-managers need to attend training programs that will enlighten them on the benefits associated with the use of ICT. In addition, there is the general issue of skills and training. The skill deficiencies appearing in institutions like hospitals include not only technical abilities but also management skills (Arendt, 2008). Generally, institutions do not develop training plans. In most institutions, there is reluctance among owner-managers to invest on training their employees because these owner-managers are afraid that following the completion of such training and having improved their qualifications, these employees will leave and find employment in large companies that offer better salaries (Arendt,

2008). Notwithstanding, owner-managers need to conduct training sessions for staff that will assist in creating awareness on the benefits of adopting technology in organizations (Thong,1999).

Arendt (2008), believed that innovation diffusion theory targets employees in small organizations. Small organizations usually lack professional IT knowledge and IT technical skills. He believed that small European organizations failed because they lacked knowledge of information systems. Because of the obstacle lack of skill and technical knowledge required in the development process, many organizations delay innovation adoption, and tend to wait until they have sufficient technical expertise. Thus, if employees in small organizations have more knowledge of information systems, then they will be more likely to adopt the information systems. Bates (2001), explained that staff must have some knowledge of IT innovation in order to use more innovative IT. Based on these discussions, the IS knowledge of staff and the information intensity in the hospitals can be seen as the IS capabilities of staff.

2.2.3 Influence of Infrastructure on the Adoption of ICT

Despite the immense benefits of ICTs as a means of delivering quality health care services, the potential of ICTs have not been fully harnessed by health professionals especially in developing countries. This is due to problems of infrastructure access (slow or unreliable Internet connectivity). A good ICT infrastructure, therefore, is a condition for enhancing the well-being of a country. Gates (1999) reported that intra- and Inter-organizational networks in some advanced countries function like a digital neural system

of the organization. Thus, he said, communication for health purposes has shifted from the largely manual or physical documentary method to digital communication. Such access to ICTs has helped disseminate information to the rest of the world. In the medical field, Gates reported, American doctors are able to collaborate as often and as quickly as they want with other medical doctors in other parts of the world through the use of ICTs. For example, while examining a patient, a medical doctor might be able to send an electronic x-ray of a patient to a leading expert in another country who could readily interpret and provide more details of the disease or condition, as well as send feedback to the medical doctor all within a few minutes. Rural health workforce strategy, in their research and application processes, can use the Internet to identify research issues, search literature databases, seek out information on surveys and clinical trials, and publish research results (Eysenbach & Wyatt, 2002).

Health workers play important roles in a nation's socioeconomic and political growth. ICTs are vital tools that help them to access and use relevant information in their jobs. ICT usage can be highly effective if health workers connect the opportunities it offers to meet their needs. Ibegwam (2004), observed that the Internet has become an important component of the electronic services in health institutions and has permeated all aspects of life, breaking down barriers to communication and information access worldwide. The Internet is a particularly valuable resource for information relating to health care. However, in spite of the potential contributions of ICTs to the activities of health workers, some constraints exist that prevent their widespread utilization. Some of the

more obvious constraints common to developing countries include the limits of physical access to ICTs, the high cost of providing access for nations trying to balance multiple financial priorities, and the exclusion from access of large segments of the population due to inadequate infrastructure (Chandrasekhar & Ghosh, 2001).

A study by Idowu (2003), in Nigerian reported that while ICT capabilities (personal computers, mobile phones, Internet) were available in Nigerian teaching hospitals, mobile phones were spreading fastest. Their findings also revealed that computers and mobile phones were in use in all the teaching hospitals but not much Internet connectivity was available, meaning that most of the medical experts used external (nonhospital) Internet services, such as cybercafés, for even rudimentary Internet access, such as e-mail. They further explained that while just 1.4% of the medical staff did not use the Internet in any fashion, the vast majority of those using the Internet did so only for e-mail. In addition, Adeyemi and Ayegboyin (2004), in a survey involving four general hospitals, 10 primary health-care centers, and six private hospitals in Nigeria, reported that none of the institutions had e-mail access or a Web site, only 5% of the workers possessed personal computers, only 7% of the health-care workers were computer literate, only 2% had any measurable computer skills, and just 65% had access to a mobile phone, but not necessarily their own. This was in spite of the fact that the state of Lagos has the largest concentration of Internet service providers, telecom operators, and cybercafés, intended to create a reasonable platform for ICT use.

The success on ICT adoption was run by a study conducted by Quayle (2002). It showed the factors that influenced ICT reported by small medium enterprise managers, included reduced administration costs, reduced stock, improved marketing and improved quality of information. Nevertheless, Bates (2001), proved that the adoption of ICTs substantially increased internal efficiency. Today's all organizations are utilizing ICT technologies to cut costs, improving efficiency and also to provide a better customer services. Additionally, governments around the world are adopting ICT to facilitate a business environment and to encourage open competition trust and security, and standardization (Ashrafi & Murtaza, 2008). Like other industrial sectors, strong substantiation suggests that it is not ICT in isolation that leads to benefits like increase quality of care, reduced errors and the same time the cost saving is significant, but must suitable with balancing investment in workplace, human capital and healthcare processes reformation. The application of ICT healthcare systems is without any exception that provides timely information is proven to save lives, improve the quality and efficiency of the health delivery system and contain the cost.

The respective ICT applications facilitate important services, such as drug interaction controls, laboratory quality controls and documentation of patient's radiology records. These systems are already quite widespread among hospitals in the world (McCullogh 2008). Further important technologies that are subsequently developed are electronic medical record (EMR) systems and computerized providers order entry (CPOE) systems. The development of electronic medical record has greatly expanded the automation of

clinical services. These systems integrate information from pharmacy, radiology and laboratory in a way that allows physicians to directly access this information and have a complete and integrated picture of a patient. The technology of computerized physician order entry is aiming at reducing communication errors and serving as a platform for treatment guideline automation; it enables the electronic entry of physicians' orders for examinations and treatment of patients, which are communicated over a computer network to the medical staff of the pharmacy, laboratory and radiology departments responsible for fulfilling these orders, and finally the results are communicated back to the physicians. It is only during the past decade that the latter technology has begun to diffuse widely. The combined use of these two technologies "should standardize care and reduce errors, thus enhancing both clinical quality and productivity (Lee, 2012). These two technologies have been investigated by a series of USA studies with respect to the determinants of their diffusion as well as their impact on clinical quality and productivity

2.2.4 ICT staff attitude and adoption of ICT

In the era of globalization and information age, healthcare industries are intensely promoting and adopting ICT to improve patient care. When more and more patients as health consumers seek and prioritize quality in their lives through enhanced healthcare treatments and services, it places great demands on the health care industry's information-handling abilities and infrastructure (Apulu & Latham, 2009).Reliable information and effective communication are crucial elements in public health practices.

The use of appropriate technologies can increase the quality and the reach of both information and communication.

Attitude is a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way you perceive, think, and feel in relation to those problems. Thus the impact of organizational culture is extensive and intense in organizations where it is manifested in concepts such as 'the way we do things around here or certain rites and rituals of the company, the company climate the common practices and norms and core values.' McCullogh (2008), suggests three levels of culture: artifacts, espoused values, and basic underlying assumptions. These organizational levels definitely overlap with the national background of an individual, which might create conflicts.

According to Thong (1999), the attitude of the developer of the ICT and the users who either adopt or reject the technology that is used in an organization affects the performance of organizations. IS attitude can be defined as the set of values and practices shared by the members of an organization involved in information activities; this includes people like IT professionals, managers, and end-users. IS attitude is thus a subset of an organizational culture, with unique values that are attached to the IT department. IS attitude might resist technologies which threaten to change their current status, power, and working habits, especially when they may violate some of the groups' shared values. IS culture may also be more or less compatible with certain forms of IT; when that is the

case, the result can be resistance to IT changes, failure in ICT adoption, and lack of implementation. In other words, the way people perceive the usefulness and ease of use of a given ICT will be impacted by the existing national attitude – in this case, that of the medical teams as well as the support staff – together with the common practices, artifacts, espoused values and underlying assumptions of the developer(s) in an organization.

2.3 Theoretical Framework

This section examines the various theories used to inform the study on the factors influencing adoption of ICT. The study is guided by the following theories; diffusion of innovation theory, technology acceptance theory and contingency theory

2.3.1 Innovation- Diffusion Theory

Diffusion of innovation theory was developed by Rogers in 1995. This theory suggests that there are three main sources influencing the adoption and diffusion of an innovation, namely perceptions of innovation characteristics, characteristics of the adopter, and contextual factors. The theory sees innovations as being communicated through certain channels over time and within a particular social system. Individuals are seen as possessing different degrees of willingness to adopt innovations, and thus it is generally observed that the portion of the population adopting an innovation is approximately normally distributed over time. Breaking this normal distribution into segments leads to the segregation of individuals into the following five categories of individual innovativeness (from earliest to latest adopters): innovators, early adopters, early

majority, late majority, laggards (Wejnert, 2001). The innovation process in organizations is much more complex. It generally involves a number of individuals, perhaps including both supporters and opponents of the new idea, each of whom plays a role in the innovation-decision.

The study by Rogers (1995) identifies five attributes upon which an innovation is judged. These are relative advantage, compatibility, complexity, triability and observability. Relative advantage refers to the degree to which an innovation is perceived as better than the practice it replaces. Relative advantage is often expressed in terms of economic, social or other benefits. Compatibility refers to the degree to which an innovation is perceived by potential adopters to be consistent with their existing values and practices. Compatibility with what is already in place makes the new practice seem less uncertain, more familiar and easier to adopt. Complexity refers to the degree to which an innovation is considered as a difficulty to understand and use. If potential adopters perceive an innovation as complex, its adoption rate is low. Triability refers to the extent to an innovation may be subjected to limited experimentation. Finally, observability refers to the degree to which the results of an innovation are visible to others.

This theory has been applied to study the adoption of various information communication technologies in healthcare. However, it does not provide information on how to assess innovation characteristics. Furthermore, this theory has been criticized for its lack of specificity, Gagnon, (2010). This theory posits that innovation spreads gradually over time and among people resulting in various adopter categories. Rogers attributes this

distribution of adoption to the role of information, which reduces uncertainty in the diffusion process.

2.3.2 Technology Acceptance Theory

Technology acceptance theory was introduced by Davis (1989), is an adaptation of the theory of reasoned action specifically tailored for modeling user acceptance of information systems. The goal of the theory is to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified. Ideally one would like a model that is helpful not only for prediction but also for explanation, so that researchers and practitioners can identify why a particular system may be unacceptable, and pursue appropriate corrective steps. A key purpose of the theory, therefore, is to provide a basis for tracing the impact of external factors on internal beliefs, attitudes, and intentions. Technology acceptance theory was formulated in an attempt to achieve these goals by identifying a small number of fundamental variables suggested by previous research dealing with the cognitive and affective determinants of computer acceptance.

The technology acceptance theory has also been used by researchers to explain why a particular system may or may not be acceptable to users. It hypothesizes that there are two beliefs, perceiving usefulness and perceiving ease of use, which are variables that primarily affect the user acceptance. The theory is relevant to the study because it suggests that the external variables indirectly affect individuals' attitude toward adoption

of information communication technology acceptance by influencing perceived usefulness and perceived ease of use. External variables might include individual user attributes, social factors or those related to their job tasks. A series of studies found that the theory is the best model in examining Physicians' acceptance of telemedicine technology because it is specialized in information technology, it is well-researched, it uses psychometric measurements, and it is a dominant model for investigating user technology acceptance (Mary, 2008).

2.3.3 Contingency Theory

Tornatzky and Fleischer (1990), developed a framework for organizational adoption based on contingency theory of organizations. This theory postulates that an effective organization should have a structure which is consistent with its environmental needs. The effectiveness of an organization is based upon its fitness towards both internal and external factors such as environment, organization size, and organization strategy and technological factors to make a decision. In this framework, three key determinants were identified (Donaldson, 2001). Therefore, decision makers should take in to account technology, organization, and environment factors that affect technology adoption.

A fundamental idea behind contingency theory is that organizational viability is dependent on a fit between the organization and its environment. An organization is considered an open system, which stresses the complexity and variability of the individual parts, individual participants and subgroups as well as the looseness of connections among them. In order for the organization to be viable, it must be able to

visualize and incorporate the contingencies of its environment into its premises (Donaldson, 2001). Moreover, to have success in a rapidly changing and dynamic environment, the organization must be flexible, internally dynamic and have the capability to renew and innovate.

The theory is applicable to the study since organizations operate in different markets, have different management styles and an individual composition of staff etc. Hence, to follow the idea behind contingency theory, each organization must monitor its own environment and realize that organizations have to deal with different situations in different ways. The technology, organization, and environment framework has been adapted in IT adoption studies in the past and it provides a useful analytical framework that can be used for studying the adoption and assimilation of different types of IT innovation (Oliveira & Martins, 2011).

2.4 Conceptual Frame Work

The conceptual framework is a diagrammatical presentation of variables in the study. The framework illustrates the interrelationship between dependent and independent variables. The independent variables for the study are factors influencing adoption of ICT. The independent variables include: cost of equipment, operational efficiency, human capital and competitive advantage while the dependent variable is the adoption of ICT.

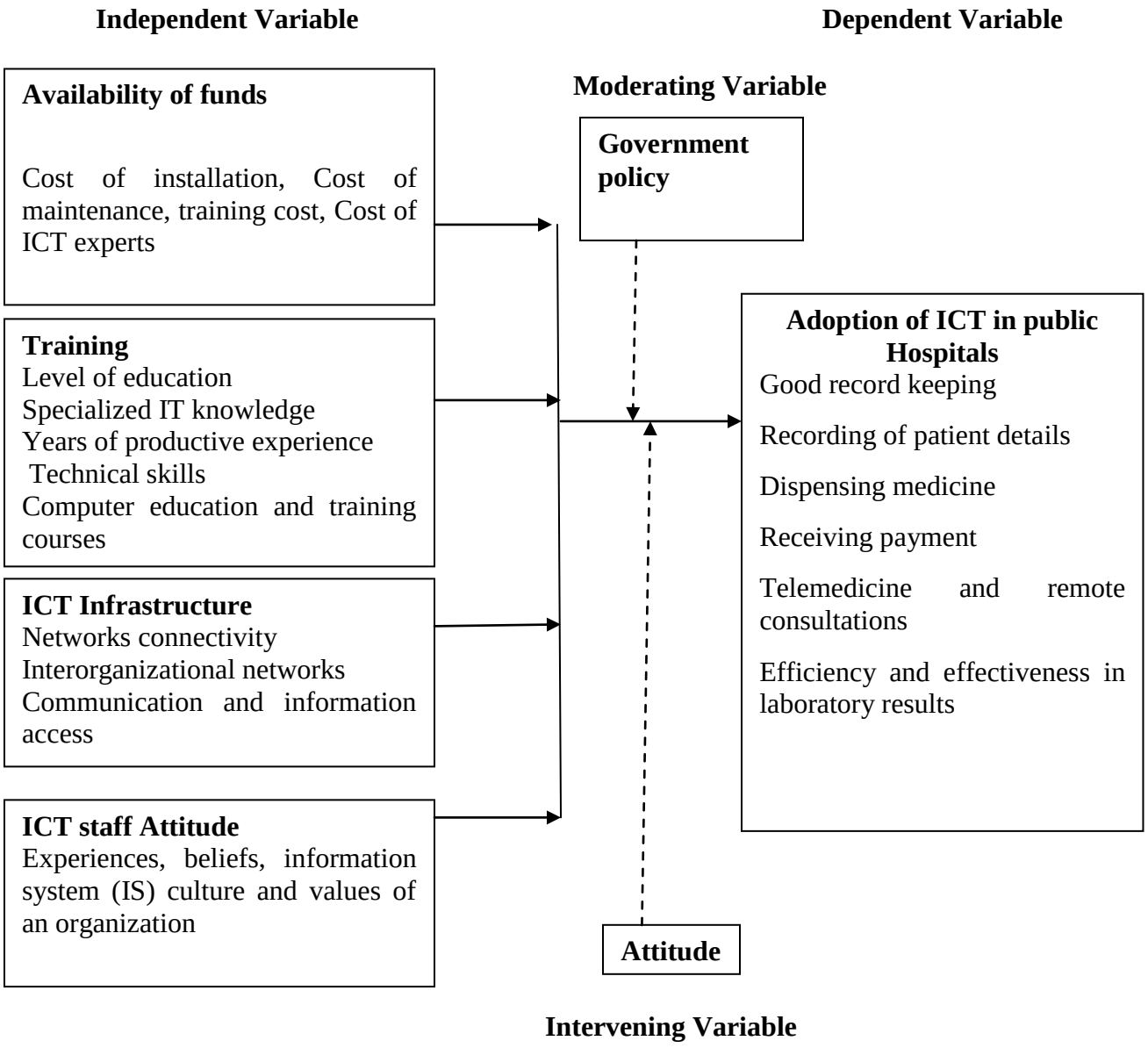

Figure 2. 1: Conceptual Framework

2.5 Research Gaps

Table 1: Knowledge Gaps

Variable	Author and Year	Findings	Knowledge gap
Availability of Funds	Tusubira and Mulira, (2009)	Found that the cost of computerized equipments is often prohibitive for most hospitals in developing countries and for those who can afford them, routine maintenance and servicing, is yet another problem that is not easily manageable by the first generation computer users.	There is need to adopt cheap hospital equipment whose routine maintenance and servicing is also cheap to improve the quality and expand the access to health services many developing countries
Training and adoption	Thong, (1999)	Suggested that the higher ICT capabilities the staff have, the higher their potential in the use of information systems, and thus the higher percentage of adopting ICT.	Hospitals should provide employees with computer education and training courses. IT acceptance among users of IT who form part of a firm employee's base will impose positive impacts on IT adoption
ICT Infrastructure	Quayle ,(2002)	Today almost all organizations are utilizing ICT technologies to cut costs, improving efficiency and also to provide better customer services. Additionally, governments around the world are adopting ICT to facilitate business environment and to encourage open	Hospitals should adopt ICT technologies to improve the quality and efficiency of the health delivery system and contain the cost.

		competition trust and security	
ICT staff attitude	Breznik, (2012)	IT and the Internet in create a competitive advantage and improve performance of different sectors.	The study seeks to come up with a clear view that there is a growing need to develop positive ICT staff attitude to improve performance which is the main reason for health managers to install information and communication technology

2.6 Knowledge Gap

From the literature review ICT personnel helps organizations react to changes as well as providing necessary connectivity and modularity that enable rapid organizational response to changes. ICT personnel contribute significantly to the extent of IT implementation. The lack of computer skills is regarded as the most common barriers to HIS adoption (Bates, 2001). The unfamiliarity with IT and computer operations amplified the degree of difficulties experienced by the end users in the initial transition stage. The consequent loss in work efficiency and frustration over the foreign technology directly attribute to the negative attitude end user adopted towards the new system, which have been proven to be detrimental to the assimilation of the new system and may result in system adoption failure.

Oliveira and Martins (2011), shows the human capitals of workers who are conversant with information communication technology are of particular importance in the

development of enterprise and especially in increasing its competitiveness. Enterprise personnel capacity and knowledge regarding the use of ICT, is an important issue both in large companies and health facilities, this significantly influencing the adoption of innovative technologies in the enterprise. Lack of trained personnel to provide value to the enterprise, and managerial capabilities are catalogued with great importance in the adoption of ICT. The lack of knowledge on how to use technology and low computer literacy are factors that affect the adoption of ICT. There is a need for computer education. Owner-managers need to attend training programs that will enlighten them on the benefits associated with the use of ICT. In addition, there is the general issue of skills and training. The skill deficiencies appearing in institutions like hospitals include not only technical abilities but also management skills

The introduction / adoption of ICT in routine data system in organizations widen the scope of analyses thus reducing bulkiness of data reported and enable data to reach its destination much faster to the users. Computerization of the routine data has been reported to facilitate detection of errors if the health information system is programmed to alert the operator on values that are unlikely. In addition, computerization allows transmission of disaggregated data to the national level. This makes data validation an easy exercise at each level. ICT impacts on organizational performance may enable a more effective implementation of tools and how organizations can take advantage of their application. However, even though there remains considerable interest in the relationship, the body of work that focuses on the contributions of technology on organizational

performance could be enlarged (Tusubira & Mulira, 2009). Like other industrial sectors, strong substantiation suggests that it is not ICT in isolation that leads to benefits like increase quality of care, reduced errors and the same time the cost saving is significant, but must suitable with balancing investment in workplace, human capital and healthcare processes reformation. The application of ICT healthcare systems is without any exception that provides timely information is proven to save lives, improve the quality and efficiency of the health delivery system and contain the cost.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter details the overall methodologies that were used in the study. This is organized into research design, population of the study, sampling procedures, data collection methods, research procedures, method of data analysis and ethical considerations.

3.2 Research Design

This study focused on factors influencing adoption of ICT in public hospitals in Kenya a case of public hospitals in Nairobi. The study employed a descriptive research design. According to Ngechu (2004) surveys is the collection of information from a group through interviews or the application of questionnaires to a representative sample of that group. According to Mugenda and Mugenda, (2003) descriptive survey enabled the researcher to describe the characteristics of the variables of interest due to its suitability in data collection to answer the research questions. It is therefore justified that descriptive design is most suited and justifiably adopted in this study. Surveys are useful in describing the characteristics of a large population. Additionally, high reliability is easy to obtain by presenting all subjects with a standardized stimulus which ensures that observer subjectivity is greatly eliminated.

3.3 Target Population

Population refers to the entire group of people, events or things of interest that the researcher wishes to investigate (Creswell, 2003). A study population can be defined as the entire collection of cases or units about which the researcher wishes to draw conclusions.

Target population in statistics is the specific population about which information is desired. According to Ngechu (2004), a population is a well-defined or set of people, services, elements, and events, group of things or households that are being investigated. This study focused on a population 15000 respondents which includes; ICT managers, ICT support staff record keepers, finance officers, cashiers pharmacists, procurement officers, radiologists and laboratory technologists of different levels in the public hospitals in Nairobi (KHF, 2015).

3.4 Sample Size and Sampling Procedures

This study used simple random sampling method which is a probability method. It further helped in the process of identifying the respondents for data collection. The sample size was established and the procedure for establishing is explained as follows.

3.4.1 Sample Size

The sample size therefore comprised of; ICT managers, ICT support staff, finance officers, record keepers, cashiers pharmacists, procurement officers, radiologists and

laboratory technologists. The following formula will be used to determine the sample size of the study (Mugenda & Mugenda, 2003).

$$n = \frac{N}{1 + N(e)^2}$$

Where,

n - Is the sample size for the study

N- Is the study population

e- Is the level of precision

N=15,000

e=10%

Therefore n will be = $\frac{15,000}{1+15,000(0.10)2}$

= 100

For the purpose of this study, a sample size of 100 was used. This was arrived at by using a total of 15000 members of staff.

Table 3.1: Sample Size

Public Hospitals In Nairobi	Number of workers	Sample size
Kamiti Hospital	**1,000**	**7**
Kenyatta National Hospital	**4,500**	**30**
Mama Lucy Kibaki Hospital	**1,500**	**10**
Mathare Mental Hospital	**2,100**	**14**
Mbagathi District Hospital	**3,500**	**23**
National Spinal Injury Hospital	**900**	**6**
Pumwani Hospital Management Board	**1,500**	**10**
Total	**15,000**	**100**

3.4.2 Sampling Procedure

In this study, ICT managers, ICT support staff, finance officers, procurement officers, pharmacists, radiology and laboratory technologists are deemed viable when carrying out the research (Evans and Lindsay, 2009). The sample size of about 100 respondents was equitably distributed and all respondents had equal chances of participating in the study. Purposive sampling technique was used for selection of various staff in the different hospitals that influence ICT adoption as they are considered competent in providing the required information. According to Denscombe (2008), purposive sampling starts with a purpose in mind and the sample is thus selected to include people of interest and exclude those who do not suit the purpose. The method was therefore suitable in selecting the managers who have been engaging in ICT adoption for a reasonable period of time.

Denscombe (2008) also posited that, purposeful sampling is useful when one wants to access a particular subset of people.

3.5 Research Instruments

This study used questionnaires as primary tool for data collection. The questionnaires contained both structured and unstructured questions. The questionnaires were preferred in this study because respondents are assumed to be literate and quite able to answer questions asked adequately. Kothari (2004), terms the questionnaire as the most appropriate instrument due to its ability to collect a large amount of information in a reasonably quick span of time. It guarantees confidentiality of the source of information through anonymity while ensuring standardization (Creswell, 2003).

3.5.1 Piloting of the Study

A pilot test was conducted in order to test the validity of the questionnaire and it was carried out with the help of research assistants. The main reasons for the pilot study was to identify any potential deficiencies, omissions and errors in the questionnaire and eliminate them before it is used to collect the actual data (Brotherton, 2008).

A pilot study was conducted where Mbagathi hospital will be used for pilot study where 2 ICT managers, 2 ICT support staff, 2 finance officers, 2 record keepers, 2 cashiers pharmacists, 2 procurement officers, 2 radiologists and 2 laboratory technologists were picked for the pilot study. Test re-test method was used to test for reliability of the instrument. The instruments were administered to the respondents and re-administered to

the same respondents after one week. This is in line with Shuttleworth (2009), who stated that the instrument should be administered at two different times and then the correlation between the two sets of scores computed. A correlation coefficient of above 0.7 was deemed to mean that the instrument is reliable thus the questionnaire was used for data collection.

3.5.2 Validity of Instruments

Joppe (2000) provides the following explanation of what validity is in quantitative research where validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. Researchers generally determine validity by asking a series of questions, and often look for the answers in the research of others.

Wainer and Braun (1998), describe the validity in quantitative research as "construct validity". The construct is the initial concept, notion, question or hypothesis that determines which data is to be gathered and how it is to be gathered. They also assert that quantitative researchers actively cause or affect the interplay between construct and data in order to validate their investigation, usually by the application of a test or other process. In this sense, the involvement of the researchers in the research process would greatly reduce the validity of a test. Data quality was incorporated in the entire study process especially at the data collection point to include completeness of questionnaires, legibility of records and validity of responses. At the data processing point, quality control included data cleaning, validation and confidentiality. There are three types of

validity which was addressed and stated; Face validity with pre-testing of survey instruments is a good way was used to increase the likelihood of face validity. Content validity the use of expert opinions, literature searches, and pre-test open-ended questions helped to establish content validity.

To establish the validity of the instruments in this research, the instrument was presented to the research supervisor and defended in the faculty forums where the research proposal was presented. There after the questionnaire was administered with approval of the supervisor.

3.5.3 Reliability of Research Instruments

Mugenda and Mugenda (2008), reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trial. In order to improve the reliability of the instrument, an assessment of the consistency of the responses on the pilot questionnaires will be made to make a judgement on their reliability.

According to Kothari (2004), an instrument is reliable when it measures a variable accurately and consistently and produces the same results under the same conditions over time. The idea behind reliability is that any significant result must be more than a one-off finding and be inherently repeatable. For reliability, the researcher will use internal consistency measure known as Cronbach's Alpha (α) which indicates the extent to which a set of measurement items could be treated as measuring a single latent variable Reliability provides a measure of the internal consistency and homogeneity of the items comprising the scale

3.6 Data Collection Procedures

Permission to collect data from ICT manager who engage in ICT adoption in public hospitals Nairobi was sought from the seven hospitals, after the approval from the university to carry out the research. The researcher attached a transmittal letter in each questionnaire. The researcher visited each hospital at different times and sought for permission to collect data as pertains the different ways discussed above.

3.7 Data analysis Techniques

The data collected was analysed using descriptive statistics (measures of central tendency and measures of variations) to achieve the objectives of the study. The process of data analysis involved several stages: the completed questionnaires were edited for completeness and consistency, checked for errors and omissions. The research yielded both qualitative and quantitative data.

The qualitative data collected was analyzed through content analysis where a thematic framework was developed. The quantitative data generated was analyzed using descriptive statistics with the help of Statistical Package for Social Sciences (SPSS) version 20. The findings were presented using tables, frequencies and percentages. Correlation analysis was employed for analysis. It's a measure of the degree of association between two or more variables that have been obtained from the same group of subjects (Mugenda & Mugenda, 2008) Used when a researcher wants to predict and

describe the association between two or more variables in terms of magnitude and direction.

3.8 Ethical Considerations

Ethical considerations represent a moral stance that involves conducting research to achieve not just high professional standards of technical procedures, but also respect and protection for the people actively consenting to be studied (Creswell, 2003). Professional ethical standards should be noted during all phases of the research process.

Throughout this study the researcher strived to adhere to ethical research considerations and professional guidelines. This involved avoiding acts of misconduct in research, such as data fabrication, falsification and plagiarism. Permission to conduct the study was obtained from the relevant authorities before commencement of data collection. During data collection the researcher explained the aim and significance of the study to the respondents, and consent for participating in the interviews and focus group discussions was sought from them. The researcher ensured that the information collected was treated with due confidentiality and was used purely for research work.

3.9 Operationalization Table of Variables

This section analyses the operational definition of variables the factors influencing adoption of ICT in public hospitals in Kenya. The operation of the variables is as shown below

Table 3. 2 : Operationalization Table of Variables

Objectives	Variables	Indicators	measurement	Measurement scale	Type of Analysis	Tool of Analysis
To determine the influence of availability of funds on the adoption of ICT in public hospitals in Nairobi	availability of funds	Cost of installation	money used in installation	Ordinal	Descriptive	Mean
		Cost of maintenance	Money used in installation	Ordinal	Descriptive	Mean
		Cost of ICT experts	Money used in hiring ICT experts	Ordinal	Descriptive	Mean
To determine the influence of training on the adoption of ICT in public hospitals in Nairobi	Training	IT specialists	Number of IT specialists	Interval	Descriptive	Mean
		Technical skills	Number of staff with technical skills	Interval	Descriptive	Mean
		Computer education and training	Number of Computer training programs	Interval	Descriptive	Mean percentage
To determine the influence of infrastructure on the adoption of ICT in public hospitals in Nairobi	ICT Infrastructure	Networks connectivity	Degree of connectivity	Nominal	Descriptive	percentage Mean
		Interorganizational networks	Level of organization networks	Interval	Descriptive	Mean percentage
		Communication and information	Level of organization communication systems	Interval	Descriptive	Mean
To determine the influence of ICT staff attitude on the adoption of ICT in public hospitals in Nairobi	ICT staff attitude	Staff experience on ICT	Degree of Staff experience on ICT	Nominal	Descriptive	Mean percentage
		Staff beliefs on ICT	Degree of Staff beliefs on ICT	Nominal	Descriptive	Mean percentage
		Staff culture on ICT	Degree of Staff culture on ICT	Nominal	Descriptive	Mean percentage

CHAPTER FOUR: DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents data analysis of the findings obtained from the field. It presents the background information of the respondents, findings of the analysis based on the objectives of the study. Descriptive statistics have been used to discuss the findings of the study.

4.1.1 Questionnaire

The study targeted a sample size of 100 respondents from which 85 filled in and returned the questionnaires making a response rate of 85%. This response rate was satisfactory to make conclusions for the study as it acted as a representative. According to Mugenda and Mugenda (1999), a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent. Based on the assertion, the response rate was excellent as indicated by Table 4.3

Table 4.3: Response Rate

	Questionnaires Administered	**Questionnaires filled & Returned**	**%**
Respondents	100	85	85

4.2 Demographic Information

The study sought to establish the demographic information of the respondents in terms of gender distribution, level of education and period of service as in Table 4.4.

4.2.1 Gender distribution

Table 4. 4 : Gender Distribution

Gender	Frequency	Percentage
Male	65	76.47
Female	20	23.53
Total	**85**	**100**

The study sought to establish the gender distribution of the respondents, from the research findings the study revealed that majority of the respondents as shown by 76.47% were males whereas 23.53% of the respondents were females. This this implies that respondents were fairly distributed in terms of their gender.

4.2.2 Level of Education

The study sought to establish to what level the respondents were educated. It was establish as shown by Table 4.5

Table 4. 5 : Level of Education

Level of Education	Frequency	Percentage
College Diploma	10	11.76
Undergraduate	35	41.18
Master	40	47.06
Total	**85**	**100**

On respondents' level of education attained, the study revealed that most of the respondents as shown by 47.06 % had attained master's degree or whereas 41.18 % of the respondents had attained undergraduate degrees and 11.76% of the respondents had attained college diplomas. This implies that respondents were well educated and therefore they were in position to respond to the research questions with ease.

4.2.3 Period of Service

The study sought to establish the period which the respondents had served for in the institutions as indicated in Table 4.6

Table 4. 6 : Period of Service

Period of Service	Frequency	Percentage
Below 2 years	2	2.35
3 to 5 years	3	3.53
6 to 8 years	25	29.41
9 years and above	55	64.71
Total	**85**	**100**

From the research findings, the study revealed that majority of the respondents as shown by 64.71% had served the institution for more than 9 years whereas 29.41% of the respondents had served the institution for a period of 6 to 8 years, 3.53% had served the institution for 3 to 5 years and only 2.35% of the respondents had served the institution for a period of less than 2 years. This implies that majority of the respondents had served the institution for a considerable period of time and thus they were in a position to give credible information rating to this research

4.3 Factors Influencing Adoption of ICT

The study sought to establish how various factors influencing adoption of ICT in public hospitals which are; availability of funds, training and adoption, ICT infrastructure and ICT staff attitude

4.3.1 Availability of funds

Table 4. 7 : Availability of funds on adoption of ICT

Statements	Strongly	Disagree	Moderately	Agree	Strongly	Mean	Std deviation
The cost of ICT training materials is considered to be among the problems that negatively affects the implementation of ICT in most health facilities	0	0	5	50	30	4.29	0.24
Routine maintenance and servicing, is major problem that is not easily manageable by the first generation computer users.	0	1	4	48	32	4.31	0.24
The migration to electronic medical records is necessitated by limitations of monetary constraints associated with continued paper-based record accumulation and compression over time.	0	1	1	48	35	4.38	0.25
Paper-based systems in hospitals have limited functionality; many people cannot easily view the same record at the same time.	0	1	1	50	33	4.35	0.25
Electronic medical records, support medical professionals in their decision-making leading to improved medical care quality	0	3	2	35	45	4.44	0.23
eHealth can be one solution to provide better access to healthcare facilities for patients	0	5	5	38	37	4.26	0.21
Average mean						**4.34**	

The study sought to establish the extent to which respondents agreed with the above statements relating to cost of equipments and training from the research findings, majority of the respondents strongly agreed that; Electronic medical records, support

medical professionals in their decision-making leading to improved medical care quality as shown by a mean of 4.44, The migration to electronic medical records is necessitated by limitations of monetary constraints associated with continued paper-based record accumulation and compression over time as shown by a mean of 4.38,Paper-based systems in hospitals have limited functionality; many people cannot easily view the same record at the same time.as shown by a mean of 4.35,Routine maintenance and servicing, is major problem that is not easily manageable by the first generation computer users as shown by a mean of 4.31,The cost of ICT training materials is considered to be among the problems that negatively affects the implementation of ICT in most health facilities as shown by a mean of 4.29 and e-Health can be one solution to provide better access to healthcare facilities for patients as shown by a mean of 4.26. The study further revealed that medical equipment management involves other essential activities which ensure that equipment is effectively planned and budgeted for, procured, and operated. Human factors engineering is used to influence medical device procurement decisions in hospitals. The process ensures that the safest, most efficient and effective devices are purchased. The study findings are in line with Oliver (2002) that compared to traditional forms of hospital treatments technology facilitated has proven to be quite expensive in all areas of consideration

4.3.2 Training and Adoption

Table 4. 8 : Training and Adoption

Statements	Strongly Disagree	Disagree	Moderately Agree	Agree	Strongly Agree	Mean	Std deviation
Members of the institutions are lacking in specialized IS knowledge and technical skills.	0	4	2	34	45	4.41	0.23
The higher IS capabilities the staff have, the higher their potential in the use of information systems	0	5	2	28	50	4.45	0.24
In order to facilitate the successful implementation of information system in hospitals, the government should provide employees with computer education and training courses.	0	0	10	45	30	4.24	0.22
The lack of knowledge on how to use technology affects the adoption of ICT in hospital.	0	5	4	44	32	4.21	0.22
Many public hospital are lacking technical abilities on the adoption of ICT	0	4	3	33	45	4.40	0.22
Public hospital are lacking management skills on the adoption of ICT	0	1	4	50	30	4.28	0.24
If employees in health institutions have more knowledge of information systems, then they will be more likely to adopt the information systems.	0	5	5	32	43	4.33	0.21
Average mean						**4.34**	

The study sought to establish the extent to which respondents agreed with the above statements relating to training and adoption from the research findings, majority of the respondents strongly agreed that; the higher IS capabilities the staff have, the higher their potential in the use of information systems as shown by a mean of 4.45, Members of the institutions are lacking in specialized IS knowledge and technical skills as shown by a mean of 4.41, many public hospital are lacking technical abilities on the adoption of ICT as shown by a mean of 4.40, if employees in health institutions have more knowledge of information systems, then they will be more likely to adopt the information systems.as shown by a mean of 4.33, public hospital are lacking management skills on the adoption of ICT as shown by a mean of 4.28, in order to facilitate the successful implementation of information system in hospitals, the government should provide employees with computer education and training courses as shown by a mean of 4.24 and that the lack of knowledge on how to use technology affects the adoption of ICT in hospital as shown by a mean of 4.21.

The study further revealed that training and adoption of electronic medical records in public hospitals can support medical professionals in their decision-making and also improve operating efficiency, thus improving medical care quality .Other systems such as decision support systems have been seen to reduce medical errors in applications such as drug order entry. EHealth in public hospitals has shown that it can be one solution to provide better access to healthcare facilities for patients and healthcare professionals, improve collaboration between different governmental bodies, and increase care quality.

The study findings are in line with Apulu and Latham (2009), hospitals in developed countries continue to implement electronic medical records to lower costs and to improve quality of care. With the adoption of electronic medical records, patient information will be electronically captured in any care delivery setting.

4.3.3 ICT Infrastructure

Table 4. 9 : ICT Infrastructure

Statements	Strongly	Disagree	Moderately Agree	Agree	Strongly Agree	Mean	Std deviation
Despite the immense benefits of ICTs as a means of delivering quality health care services, the potential of ICTs have not been fully harnessed by health professionals	0	0	0	40	45	4.53	0.25
Communication for health purposes has shifted from the largely manual or physical documentary method to digital communication	0	5	10	20	50	4.35	0.22
Internet has become an important component of the electronic services in health institutions	0	0	10	55	20	4.12	0.25
In spite of the potential contributions of ICTs to the activities of health workers, some constraints exist that prevent their widespread utilization	0	9	4	30	42	4.24	0.20
Physical access to ICT is a major constraint to public hospitals	0	3	0	38	44	4.45	0.24
Cost of installation of ICT infrastructure is a major drawback to the adoption of ICT.	0	5	15	22	43	4.21	0.19
That computers phones were in use in all the teaching hospitals but not much Internet connectivity was available, meaning that most of the medical experts used external	0	10	0	40	35	4.18	0.21
Average mean						**4.29**	

The research sought to establish the level at which respondents agreed on the above statements relating to ICT infrastructure**,** from the research findings majority of the respondents agreed that; despite the immense benefits of ICTs as a means of delivering quality health care services, the potential of ICTs have not been fully harnessed by health professionals as shown by a mean of 4.53, physical access to ICT is a major constraint to public hospitals as shown by a mean of 4.45,communication for health purposes has shifted from the largely manual or physical documentary method to digital communication as shown by a mean of 4.35,in spite of the potential contributions of ICTs to the activities of health workers, some constraints exist that prevent their widespread utilization as shown by a mean of 4.24, cost of installation of ICT infrastructure is a major drawback to the adoption of ICT as shown by a mean of 4.21, that computers phones were in use in all the teaching hospitals but not much Internet connectivity was available, meaning that most of the medical experts used external as shown by a mean of 4.18 and that internet has become an important component of the electronic services in health institutions as shown by a mean of 4.12.

The study further revealed that developments in ICT technological infrastructure in hospitals have drastically influenced the competitive business environment in health sector as proved by the emergence and strengthening of the global economy, and the transformation of industrial economies to knowledge-and-information-based service economies The study findings are in line with Eysenbach and Wyatt (2002), that ICT infrastructure is a major issue that stands as an impediment to access of information, most people are not able to access digital information due to lack of the necessary infrastructure .This has left a bigger part of the population unable to access the digital

information hence discouraging the adoption of ICT thus widening digital divide between developed and developing economies as well as between haves and have not, setting classes and levels of learning institutions rather than sink poverty levels and narrow economic gaps.

4.3.4 ICT Staff Attitude

Table 4. 10 : ICT Staff Attitude

Statements	**Strongly**	**Disagree**	**Moderately Agree**	**Agree**	**Strongly Agree**	**Mean**	**Std deviation**
The impact of staff attitude is extensive in health institutions where it is manifested in concepts such as the way things are done	0	0	8	32	45	4.44	0.22
The attitude of the developer of the ICT that is used in an organization affects the performance of organizations	0	5	10	30	40	4.29	0.19
The attitudes of the user of ICT in the hospitals affect the performance of the organization(s).	0	10	5	55	20	4.18	0.24
ICT adoption attitude is shared by the employees of a health institution involved in information activities.	0	0	14	29	42	4.33	0.20
ICT adoption attitude resist technologies which threaten to change the working habits, especially when they employees violate some of the groups' shared values.	0	4	8	38	35	4.22	0.20
The way people perceive the usefulness of a given ICT will be impacted by the existing national attitude	0	5	15	22	43	4.21	0.19
IS culture is more or less compatible with certain forms of IT; when that is the case, the result can be resistance to IT changes	0	5	5	40	35	4.24	0.21
Average mean						**4.27**	

The research sought to establish the level at which respondents agreed on the above statements relating to ICT staff attitude , from the research findings majority of the respondents agreed that; the impact of staff attitude is extensive in health institutions where it is manifested in concepts such as the way things are done as shown by a mean of 4.44, ICT adoption attitude is shared by the employees of a health institution involved in information activities as shown by a mean of 4.33,the attitude of the developer of the ICT that is used in an organization affects the performance of organizations as shown by a mean of 4.29,IS culture is more or less compatible with certain forms of IT; when that is the case, the result can be resistance to IT changes as shown by a mean of 4.24,ICT adoption attitude resist technologies which threaten to change the working habits, especially when they employees violate some of the groups' shared values as shown by a mean of 4.22,the way people perceive the usefulness of a given ICT will be impacted by the existing national attitude as shown by a mean of 4.21 and the attitudes of the user of ICT in the hospitals affect the performance of the organization(s) as shown by a mean of 4.18.

The study further revealed that the way people perceive the usefulness and ease of use of a given ICT is impacted by the existing national culture where the medical teams in many hospitals as well as the support staff together with the common practices, artifacts, espoused values and underlying assumptions of the developer(s) in an organization affect ICT adoption. The study findings concur with Apulu and Latham (2009), that in the developed nations, doctors use computers to send live video, sound and high-resolution

images between two distant locations as well as examining patients in clinics that may be thousands of miles away. These technologies are being rolled over to developing countries due to their immense abilities in reducing healthcare costs but most staffs do not adopt these changes.

4.4 Adoption of ICT

Table 4. 11 : Adoption of ICT

Statements	Strongly	Disagree	Moderately Agree	Agree	Strongly Agree	Mean	Std deviation
The risk of our customers drifting to other competitor hospitals has influenced adoption of ICT in health institutions	0	0	8	32	45	4.51	0.22
Adoption of ICT to improve the quality of laboratory services.	0	5	10	30	40	4.29	0.19
Adoption of ICT has helped to bridge the gap between the provider and seeker through telemedicine and remote consultations,	0	0	5	40	40	4.41	0.23
Adoption of ICT has increased knowledge in management of the institutions in the creation of networks.	0	5	5	30	45	4.35	0.21
Adoption of ICT has improved efficiency in dispensing drugs pharmacy.	0	4	8	38	35	4.22	0.20
The intensity of competition in the market has influenced adoption of ICT in health institutions	0	5	8	29	43	4.34	0.20
Adoption of ICT has improved the financial services in terms of speed.	0	5	0	30	50	4.47	0.24
Adoption of ICT has improved the financial services in terms of accuracy.	0	0	6	40	39	4.39	0.23
Average mean						**4.37**	

The research sought to establish the level at which respondents agreed on the above statements relating to adoption of ICT**,** from the research findings majority of the respondents agreed that; the risk of our customers drifting to other competitor hospitals has influenced adoption of ICT in health institutions as shown by a mean of 4.51, adoption of ICT has improved the financial services in terms of speed as shown by a mean of 4.47,adoption of ICT has helped to bridge the gap between the provider and seeker through telemedicine and remote consultations, as shown by a mean of 4.41,adoption of ICT has improved the financial services in terms of accuracy as shown by a mean of 4.39,adoption of ICT has increased knowledge in management of the institutions in the creation of networks as shown by a mean of 4.35,the intensity of competition in the market has influenced adoption of ICT in health institutions as shown by a mean of 4.34, adoption of ICT to improve the quality of laboratory services as shown by a mean of 4.29 and adoption of ICT has improved efficiency in dispensing drugs pharmacy as shown by a mean of 4.22.

The study further revealed that, ICT skills are required to foster positive attitudes about electronic medical records which translate to greater adoption of electronic medical records. The study findings are in line with Baldwin (2006), that when hospital executives are familiar with the characteristics of innovation, the hospital reduces the uncertainty concerning the use of information systems and increase the willingness of adoption of ICT.

4.5 Discussion of the Findings

This section discusses the key findings as considered under each objective.

4.5.1 Availability of funds on adoption of ICT

On effects of cost of equipments and training, the study established that the cost of ICT training materials is considered to be among the problems that negatively affects the implementation of ICT in most health facilities. Enormous amount of funds are require to acquire equipment and on training. The study further revealed that medical equipment management involves other essential activities which ensure that equipment is effectively planned and budgeted for, procured, and operated. Human factors engineering is used to influence medical device procurement decisions in hospitals. The process ensures that the safest, most efficient and effective devices are purchased.

The study further revealed that ,ICT equipments investment costs are generally much higher in Kenya where almost all ICT equipment must be imported where (often subject to high rates of taxation and non-tariff barriers), and where telecommunications usage charges are generally much higher (especially for international and Internet connectivity). Regulatory factors such as license fees often also add to the cost of ICT investment. The study findings are in line with Oliver, (2002) that compared to traditional forms of hospital treatments, technology facilitated has proven to be quite expensive in all areas of consideration.

4.5.2 Training and Adoption

The study revealed that staffs various hospitals are lacking in specialized IT knowledge and technical skills in most public hospitals in Nairobi. If employees in health institutions have more knowledge of information systems, then they will be more likely to adopt the information systems. The study further revealed that training and adoption of electronic medical records in public hospitals can support medical professionals in their decision-making and also improve operating efficiency, thus improving medical care quality .Other systems such as decision support systems have been seen to reduce medical errors in applications such as drug order entry. EHealth in public hospitals has shown that it can be one solution to provide better access to healthcare facilities for patients and healthcare professionals, improve collaboration between different governmental bodies, and increase care quality.

The study further revealed that, in order to facilitate the successful implementation of ICT system in hospitals, the government should provide employees with computer education and training courses. Potential and competency of the ICTs for improving hospitals services cannot be realized unless staffs are well trained and retrained in the pedagogical use of technology in the hospital premises. Doctors and hospital staffs in Nairobi should be trained on basic IT skills such as; file management, word processing, spreadsheet, email and internet use since they will play a key role in developing requisite human health which is paramount in ensuring attainment if vision 2030 and knowledge economy.

The study findings are in line with Apulu and Latham (2009), hospitals in developed countries continue to implement electronic medical records to lower costs and to improve quality of care. With the adoption of electronic medical records, patient information will be electronically captured in any care delivery setting.

4.5.3 ICT Infrastructure

On the influence of ICT Infrastructure in adoption of ICT, the study revealed that installation of ICT infrastructure is a major drawback to the adoption of ICT. Computers phones are in use in all the teaching hospitals but not much Internet connectivity was available, meaning that most of the medical experts used external. The study further revealed that developments in ICT technological infrastructure in hospitals have drastically influenced the competitive business environment in health sector as proved by the emergence and strengthening of the global economy, and the transformation of industrial economies to knowledge-and-information-based service economies. The study findings are in line with Eysenbach and Wyatt (2002), that ICT infrastructure is a major issue that stands as an impediment to access of information, most people are not able to access digital information due to lack of the necessary infrastructure.

The study further revealed that Lack of adequate ICT infrastructure has hampered provision of efficient and affordable ICT services in public hospitals in Nairobi. There is therefore need to put more emphasis on provision of support infrastructure, such as, connectivity, supporting software development and assembly of ICT equipment and accessories and Provision of incentives for the provision of ICT infrastructure in major

hospitals. The study findings are in line with Eysenbach and Wyatt (2002), that technological infrastructure is a major issue that stands as an impediment to access of information, most hospital staffs are not able to access digital information due to lack of the necessary infrastructure. This has left a bigger part of the population unable to access the digital information hence discouraging the adoption of ICT. Health institution needs to enhance and upgrade current technical architectures to accommodate digital materials especially with the rapid changes in technology.

4.5.4 ICT Staff Attitude

On the influence of ICT staff attitude on ICT adoption, the study established that ICT adoption has been perceived to challenge the traditional management hierarchy and change both the location and the nature of decision making in most public hospitals. The effectiveness and success of ICT systems seems to depend not only on the technology itself, but also on the ways in which the users are introduced to the concept because some staffs tend to be resistant to change. The support of hospital staffs in introduction of new innovations is highly dependent on the type of innovation as well as the employees' perception to the inventions to be introduced.

The study further revealed that the way people perceive the usefulness and ease of use of a given ICT is impacted by the existing national culture where the medical teams in many hospitals as well as the support staff together with the common practices, artifacts, espoused values and underlying assumptions of the developer(s) in an organization affect ICT adoption. The study findings concur with Apulu and Latham (2009), that in the

developed nations, doctors use computers to send live video, sound and high-resolution images between two distant locations as well as examining patients in clinics that may be thousands of miles away. These technologies are being rolled over to developing countries due to their immense abilities in reducing healthcare costs but most staffs do not adopt these changes.

CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

From the analysis and data collected, the following discussions, conclusion and recommendations were made. The responses were based on the objectives of the study. The sought to determine the factors influencing adoption of ICT in public hospitals in Nairobi County, Kenya, to determine the influence of availability of funds on the adoption of ICT in public hospitals in Nairobi County, to determine the influence of training on the adoption of ICT in public hospitals in Nairobi County, to determine the influence of infrastructure on the adoption of ICT in public hospitals in Nairobi County and to determine the influence of ICT staff attitude on the adoption of ICT in public hospitals in Nairobi County.

5.2 Summary of the Findings

This section presents the key findings as considered under each objective in the study.

5.2.1 Availability of Funds on Adoption of ICT

From the findings the study established that funds the cost of ICT training materials is considered to be among the problems that negatively affects the implementation of ICT in most health facilities. The study further revealed that medical equipment management involves other essential activities which ensure that equipment is effectively planned and

budgeted for, procured, and operated. Human factors engineering is used to influence medical device procurement decisions in hospitals. The process ensures that the safest, most efficient and effective devices are purchased. ICT equipments investment costs are generally much higher in Kenya where almost all ICT equipment must be imported where (often subject to high rates of taxation and non-tariff barriers), and where telecommunications usage charges are generally much higher (especially for international and Internet connectivity). Regulatory factors such as license fees often also add to the cost of ICT investment.

5.2.2 Training and Adoption

The study found that staffs of various hospitals are lacking in specialized IT knowledge and technical skills in most public hospitals in Nairobi. If employees in health institutions have more knowledge of information systems, then they will be more likely to adopt the information systems. The study further revealed that training and adoption of electronic medical records in public hospitals can support medical professionals in their decision-making and also improve operating efficiency, thus improving medical care quality. In order to facilitate the successful implementation of ICT system in hospitals, the government should provide employees with computer education and training courses.

5.2.3 ICT Infrastructure

On the influence of ICT Infrastructure in adoption of ICT, the study found that installation of ICT infrastructure is a major drawback to the adoption of ICT.

Developments in ICT technological infrastructure in hospitals have drastically influenced the competitive business environment in health sector as proved by the emergence and strengthening of the global economy, and the transformation of industrial economies to knowledge-and-information-based service economies. The study further found that lack of adequate ICT infrastructure has hampered provision of efficient and affordable ICT services in public hospitals in Nairobi. There is therefore need to put more emphasis on provision of support infrastructure, such as, connectivity, supporting software development and assembly of ICT equipment and accessories and Provision of incentives for the provision of ICT infrastructure in major hospitals.

5.2.4 ICT Staff Attitude

On the influence of ICT staff attitude on ICT adoption, the study found that ICT adoption has been perceived to challenge the traditional management hierarchy and change both the location and the nature of decision making in most public hospitals. The effectiveness and success of ICT systems seems to depend not only on the technology itself, but also on the ways in which the users are introduced to the concept because some staffs tend to be resistant to change. The support of hospital staffs in introduction of new innovations is highly dependent on the type of innovation as well as the employees' perception to the inventions to be introduced.

5.3 Conclusions

From the analysis and summary, the study established that fund to be used in ICT training materials is considered to be among the problems that negatively affects the implementation of ICT in most public hospitals in Nairobi County. ICT equipments investment costs are generally much higher for public hospitals in Nairobi where almost all ICT equipment must be imported where (often subject to high rates of taxation and non-tariff barriers), and where telecommunications usage charges are generally much higher (especially for international and Internet connectivity).

On the influence of training on the adoption of ICT in public hospitals in Nairobi County, the study concludes that staffs of various hospitals are lacking specialized IS knowledge and technical skills in most public hospitals in Nairobi. The study further concluded that training and adoption of electronic medical records in public hospitals in Nairobi can support medical professionals in their decision-making and also improve operating efficiency, thus improving medical care quality.

On the influence of ICT Infrastructure in adoption of ICT, the study concludes that installation of ICT infrastructure is a major drawback to the adoption of ICT in public hospitals in Nairobi. Developments in ICT technological infrastructure in hospitals have drastically influenced the competitive business environment in health sector as proved by the emergence and strengthening of the global economy, and the transformation of industrial economies to knowledge-and-information-based service economies.

The study concludes that ICT adoption has been perceived to challenge the traditional management hierarchy and change both the location and the nature of decision making in public hospitals in Nairobi. The effectiveness and success of ICT systems seems to depend not only on the technology itself, but also on the ways in which the users are introduced to the concept because some staffs tend to be resistant to change.

5.4 Recommendations

This study recommends to the ministry of health to improve the current ICT status for health sector. The Sector should attain any tangible and observable ICT diffusion levels. Accordingly different institutions within levels may be at different stages of adoption hence the policy frame work should be whole inclusive to address needs of different adoption stages.

The study recommends that the government should increase the ICT budget to address adoption challenges in public hospitals in Nairobi as the survey found that high cost of funding ICT programmes is immensely influencing ICT adoption. Adequate ICT budget should be provided to empower the operations of ministry of information and communication as well as the ministry of health with a focus of bringing down the cost of ICT adoption.

The study recommends adoption of internet connectivity in the health institution to empower resource sharing among the hospitals. Establishment of standard local area networks (LANs), wireless systems such as VSAT technologies and operationalization of EMIS should be prioritized. The government should reconsider its policy target of

ensuring all public hospitals have affordable internet access. This should be done through use of strong and effective servers that are able to transfer data at high speed or use of the recently launched internet through the use of fibre optic connection for improving the connectivity efficiency, learning.

Based on the findings, this research recommends that public hospitals management should train their employees on the information systems prior to the ICT adoption. This will ensure that the staff will easily understand the functionality of information systems and will also serve to reduce resistance to information systems.

5.5 Suggestions for Further Studies

This study focused on factors influencing adoption of ICT in public hospitals in Nairobi County, this research recommends that future research should look into factors that may influence adoption of information systems in public hospitals in Kenya.

This study also recommends that multiple case studies or quantitative surveys to involve more hospitals in Kenya in the study to further improve the generalizability of the findings can also be conducted. Through contrasting the responses received from large number of hospitals, the ICT adoption situation can be explored more fully and new insights into the information systems adoption practices can be acquired.

REFERENCES

Apulu, L. & Latham, G. (2009). ICT Adoption: Challenges for Nigerian SMEs. TMC Academic Journal, 2009, 4(2):64-80.

Arendt, L. (2008). Barriers to ICT adoption in SMEs: How to bridge the digital divide? *Journal of Systems and Information Technology,* 10 (2), 93-108.

Ashrafi, S., & Murtaza, E. (2013). The Effect of Soft ICT Capital on Innovation Performance of Greek Firms, Journal of Enterprise Information Management, 26(6), 679-701.

Ayers, J. D. (2009). Adoption of electronic medical records: the role of network effects. Journal of Product & Brand Management, 18 (2), 127-135.

Baldwin, D. (2006). Information communication technology (ICT): integrating digital tools into your project. Information collection and Exchange Publication, 2003,

Bates, D.W. (2001). Reducing the frequency of errors in medicine using information technology, Journal of the American Medical Informatics Association, 8:299–308

Bilgihan, A. (2011). Information technology applications and competitive advantage in hotel companies, *Journal of Hospitality and Tourism Technology,* 2 (2), 139-153

Chandrasekhar, C. P., & Ghosh, J. (2001). Information and communication technologies and health in low-income countries: The potential and the constraints. Bulletin of the World Health Organization, 79, 850–855

Creswell, J. W. (2003). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* Thousand Oaks: Sage Publications, Inc

Davis, F.D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly, Vol. 13, No 3, pp.318-339

Denscombe, M. (2008). Communities of Practice: A Research paradigm for the Mixed Methods Approach. *Journal of Mixed Methods Research* 2(3) 270-283.

Donaldson, M. (2001). Phases of the Adoption of Innovation in Organizations: Effects of Environment Organization and Top Managers. British Journal of Management, 17 (3), 215-236

Eysenbach, G., & Wyatt, J. (2002). Using the internet for surveys and health research, *Journal of Medical Internet Research* 4(2), e13, retrieved May 18, 2007, from www.pubmedcentral.nih.gov/articlerender.fcgi?pmid=12554560

Gagnon, A. M. (2010). A systematic review of interventions to improve health professionals' management of obesity, International journal of obesity, 23, 1213-1222

Gates, W. H. (1999). *Business at the speed of thought.* New York: Warner Books.

Ibegwam, A. (2004). Internet communication: E-mail and medical research. In E. C. Madu & M. B. Dirisu (Eds.), Information science and technology for library schools in Africa (pp. 14–32). Ibadan, Nigeria: EviColeman Publications.

Kazi, S.K. (2012). Supply Chain Management Practices and Performance at Kenya Medical Supplies Agency.

Kenya Healthcare Federation (KHF), 2015

Kothari, C. R., (2004). *Research methodology: methods and techniques*, (2nd ed.). New Delhi: New Age International (P) Limited

Lee, J. (2012). The Impact of Health Information Technology on Hospital Productivity, NBER Working Papers No. 18025, Cambridge, Mass

Mary, R.C. (2008). "An Integrative Model of Organizational Trust," Academy of Management Review, Vol.20, No.3, pp. 709- 734

McCullough, J.E. (2008). The Effect of Health Information Technology on Quality in US Hospitals, Health Affairs, 29, 647-654.

McKee, M., & Healy, J. (2002). "Hospitals in changing Europe", (European Observatory on Health Care System series)

McLeod, L. D. (2007). User participation in contemporary IS development: An IS management perspective, Australasian Journal of Information Systems, Volume 15 (1)

Michel, A. & Betty, V. (2003). Ownership Interaction, A Key Ingredient of Information Technology Performance Sprouts: working papers on information Environments, Systems and organizations Volume 2 (1).

Muga, J.K. (2004). Overview of the health system in Kenya

Mugenda, O. M., & Mugenda, A.G. (2008). Research Methods: Quantitative and Qualitative approaches, Nairobi: African center of technology studies.

Muhammad, H. (2009). Factors affecting the introduction of ICTs for 'Healthcare Decision-Making' in Hospitals of Developing Countries, International Journal of Business and Social Science Vol. 3 No. 13; July 2012

Mwilu, J.M. (2013). Supply Chain Management Practices and Performance among Public Research Institutions in Kenya.

Ngechu. M. (2004). *Understanding the research process and methods*, An introduction to research methods, Acts Press, Nairobi

Niang, S.M. (2009). E-readiness of SMEs in the ICT sector in Botswana with respect to information access, The Electronic Library, 24(3), 402- 417

Nyella, E. & Mndeme, M. (2010). Power Tensions in Health Information System Integration in Developing Countries: The Need for Distributed Control. Electronic Journal of Information Systems in Developing Countries, 43(4), 1-19.

Nzisa, P.G. (2012). Investigation of Factors Affecting the Adoption of Information and Communication Technologies for Communication of Research Output in Research Institutions in Kenya

Obino, K.L. (2012). Adoption of information and communication technology by small enterprises in Thika municipality, Kenya,

Oliveira, T., & Martins, M. F. (2011). Literature Review of Information Technology Adoption Models at Firm Level, *the Electronic Journal Information Systems Evaluation,* 14(1), 110-121

Oliver, O. G. (2005). Factors influencing diffusion of electronic medical records: a case study in three healthcare institutions in Japan, Health Information Management, 34

Rogers, E.M. (1995). *The Diffusion of Innovations*, New York: Free Press, 5th Edition.

Tornatzky, L. G., & Fleischer, M. (1990).The Processes of technological innovation," Lexington Books

Tsai, H., & Wong, K. K. F. (2009). Tourism and Hotel Competitiveness Research, *Journal of Travel & Tourism Marketing*, 26 (5-6), 522-546. doi: 10.1080/10548400903163079

Turban, E.W. (2004). Information technology for management: Transforming organizations in the digital economy, 4th Edition. John Wiley & sons, Inc

Tusubira, A. L., & Mulira, G. (2009). Adoption of Electronic Medical Records in Family Practice: The Providers' Perspective. Fam Med, 41(7), 508- 512

Wejnert, B. (2001). Integrating models of diffusion of innovations: A conceptual framework, *Annual review of sociology*, 297-326

Wilson, E. & Anderson, E. (2000).Telephone psychotherapy and telephone care management for primary care patients starting antidepressant treatment Jama, 2004, pp. 935-942

APPENDIX I

LETTER OF TRANSMITTAL

Harriet Kanyua Nyaggah

P.O. Box 22646 - 00100

NAIROBI

October 12, 2015

To whom it may Concern

Dear Respondent,

RE: FILLING OF QUESTIONNAIRE

My name is Harriet Kanyua Nyaggah and I am currently pursuing a Master's Degree in Project Planning and Management at University of Nairobi. I have obtained permission from the University Management to carry out research as part of the requirements for the award of the degree. As part of my study, it requires me to administer a questionnaire designed to generate some insights and equally offer support to my research proposal on the study topic, "Factors Influencing Adoption of ICT in Public Hospital in Kenya: A Case of Public Hospitals in Nairobi.

Participation in the study is voluntary. Whatever information provided will be treated with confidentiality and will not be used for any other purpose other than the objectives of this study.

Your assistance in providing the required information will be highly appreciated. Thank you.

Yours faithfully,

Harriet Kanyua Nyaggah

Cell Phone: 0722605247

APPENDIX II

QUESTIONNAIRE

Instructions:

Kindly answer the following questions fully by either ticking the appropriate response in one of the boxes provided. Do not write your names anywhere in this questionnaire. Please be as honest as possible.

Section: A: Demographic Information

1. Gender

   Male ( ) female ( )

2. Please indicate the highest level of education attained? (Tick as applicable)

   College Diploma [ ]

   Undergraduate [ ]

   Master [ ]

   Others (specify)

   ……...

3. Indicate your period of service in this institution

   Below 2 years ( ) 3 to 5 years ( )

   6 to 8 years ( ) 9 years and above ( )

Section: B. Factors Influencing Adoption of ICT

4. Indicate your level of agreement with the following statements relating to Factors Influencing Adoption of ICT Key Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

Cost of Equipments and Training	**1**	**2**	**3**	**4**	**5**
The cost of ICT training materials is considered to be among the problems that negatively affects the implementation of ICT in most health facilities					
Routine maintenance and servicing, is major problem that is not easily manageable by the first generation computer users.					
The migration to electronic medical records is necessitated by limitations of monetary constraints associated with continued paper-based record accumulation and compression over time.					
Paper-based systems in hospitals have limited functionality; many people cannot easily view the same record at the same time.					
Electronic medical records, support medical professionals in their decision-making leading to improved medical care					

quality					
eHealth can be one solution to provide better access to healthcare facilities for patients					

5. To what extent do you agree with the following statements on training and adoption? Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

Training and Adoption	**1**	**2**	**3**	**4**	**5**
Members of the institutions are lacking in specialized IS knowledge and technical skills.					
The higher IS capabilities the staff have, the higher their potential in the use of information systems					
In order to facilitate the successful implementation of information system in hospitals, the government should provide employees with computer education and training courses.					
The lack of knowledge on how to use technology affects the adoption of ICT in hospital.					
Many public hospital are lacking technical abilities on the					

adoption of ICT					
Public hospital are lacking management skills on the adoption of ICT					
If employees in health institutions have more knowledge of information systems, then they will be more likely to adopt the information systems.					

6. To what extent do you agree with the following statements on ICT Infrastructure? Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

ICT Infrastructure	**1**	**2**	**3**	**4**	**5**
Despite the immense benefits of ICTs as a means of delivering quality health care services, the potential of ICTs have not been fully harnessed by health professionals					
Communication for health purposes has shifted from the largely manual or physical documentary method to digital communication					
Internet has become an important component of the electronic services in health institutions.					

In spite of the potential contributions of ICTs to the activities of health workers, some constraints exist that prevent their widespread utilization					
Physical access to ICT is a major constraint to public hospitals.					
Cost of installation of ICT infrastructure is a major drawback to the adoption of ICT.					
That computers phones were in use in all the teaching hospitals but not much Internet connectivity was available, meaning that most of the medical experts used external					

7. To what extent do you agree with the following statements on ICT staff attitude? Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

ICT staff attitude	**1**	**2**	**3**	**4**	**5**
The impact of staff attitude is extensive in health institutions where it is manifested in concepts such as the way things are done					
The attitude of the developer of the ICT that is used in an					

organization affects the performance of organizations					
The attitudes of the user of ICT in the hospitals affect the performance of the organization(s).					
ICT adoption attitude is shared by the employees of a health institution involved in information activities.					
ICT adoption attitude resist technologies which threaten to change the working habits, especially when they employees violate some of the groups' shared values.					
The way people perceive the usefulness of a given ICT will be impacted by the existing national attitude					
IS culture is more or less compatible with certain forms of IT; when that is the case, the result can be resistance to IT changes					

Section: C. Adoption of ICT

8. To what extent do you agree with the following statements on Adoption of ICT? Use a scale of 1-5, where (1= strongly disagree, 2= disagree, 3= moderately agree, 4= Agree and 5= strongly Agree)

Adoption of ICT	**1**	**2**	**3**	**4**	**5**
The risk of our customers drifting to other competitor					

hospitals has influenced adoption of ICT in health institutions					
Adoption of ICT to improve the quality of laboratory services.					
Adoption of ICT has helped to bridge the gap between the provider and seeker through telemedicine and remote consultations,					
Adoption of ICT has increased knowledge in management of the institutions in the creation of networks.					
Adoption of ICT has improved efficiency in dispensing drugs pharmacy.					
The intensity of competition in the market has influenced adoption of ICT in health institutions					
Adoption of ICT has improved the financial services in terms of speed.					
Adoption of ICT has improved the financial services in terms of accuracy.					