ADOPTION FACTORS OF HOSPITAL MANAGEMENT INFORMATION SYSTEMS IN SELECTED HOSPITALS IN MERU COUNTY, KENYA

VUNYIWA PROSCOVIOUR

D53/0L/23055/2013

A RESEARCH PROJECT REPORT SUBMITTED TO THE SCHOOL OF BUSINESS IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE IN MASTER OF BUSINESS ADMINISTRATION (MANAGEMENT INFORMATION SYSTEMS OPTION) OF KENYATTA UNIVERSITY

JULY 2017

DECLARATION

This research project is my original work and has not been presented for a degree in any other University.

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Signature Date

Vunyiwa Proscoviour

D53/OL/23055/2013

I/We confirm that the work in this project was done by the candidate under my/our supervision

_____ _____

Signature Date

Dr. David Nzuki

Department of Management Science

School of Business

Kenyatta University

DEDICATION

This piece of work is dedicated to my Mum and Dad, Mr. and Mrs. Hezron Maina, My grandma Mrs. Elizabeth Vikatsi and my best friend Hezron for their bountiful and selfless support, constant encouragement and inspiration towards pursuing academic excellence; my Uncle and Aunt Mr. and Mrs. Jacob Baraza for their belief in me and endless support; last but not least to my boss Prof. Alice Mutungi, who greatly encouraged and supported me tirelessly during the production of this research project, not forgetting everyone who contributed in one way or another during my academic struggle.

ACKNOWLEDGEMENT

First of all, I wish to thank the Almighty God for the gift of life, wisdom and good health that he has continued to give me throughout my academic journey. The accomplishment of this project could only be achieved by the patience, council, guidance and collaboration of many people to whom I am indebted.

Much appreciation goes to my supervisor Dr. Nzuki for his insightful guidance, sustained support and generous help throughout the duration of this project. He accepted me as his student and spent much time and effort on teaching me to be an independent researcher with all the patience. Without his help, I will not be able to be a qualified researcher in academic area.

I am specifically delighted to mention the following; My parents who have been my rock through the times and who have patiently endured the challenging times and borne with all the times we have gone through together, with a constant cheer, I salute you; I would like to thank my grandma for her love and support. She has always been a source of encouragement for me. To my best friend Hezron, I am very grateful for your invaluable support.

To my lecturers at the University, I am grateful to all of you for your valuable advice towards this project and professional guidance. Without you, Kenyatta University School of Business would not have been the perfect place for my MBA (MIS) study.

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ABBREVIATIONS AND ACRONYMS

BPO	Business Process Outsourcing
CBO	Community Based Organisations
CPR	Computerised Patient Record
DOI	Diffusion of Innovations
EDI	Electronic Data Interchange
EHR	Electronic Health Record
EMR	Electronic Medical Record
ERP	Enterprise Resource Planning
HMIS	Hospital Management Information Systems
HIS	Health Information Systems
IOS	Inter-Organisational Information Systems
IS	Information Systems
IT	Information Technology
ICT	Information Communication Technology
MIS	Management Information Systems
MOH	Ministry of Health
NGO	Non-Governmental Organisation
PCIS	Patient Care Information System
SMEs	Small and Medium Enterprises
TAM	Technology Acceptance Model
TOE	Technological, Organisational and Environmental
WHO	World Health Organisation

OPERATIONAL DEFINITION OF TERMS

Compatibility: Ability of an information system to fit into the existing work processes

Complexity: This refers to the difficulties in understanding or using an information system.

Cost: Value that attached to adoption of an innovation

Competitors Pressure: Force from firms in the same industry that causes an organization to adopt an innovation.

Customers pressure: Customers pressure is defined as the level of perceived pressure from the patients or customers to adopt and information system.

Government Support: Assistance provided by the authority to encourage the adoption of IS innovations

Healthcare facilities: This refers to all hospitals that have both outpatient and inpatient services.

Hospital Management Information System: It is an integrated computer based system that supports healthcare service delivery

Human Resources: Manpower with relevant IT skills or expertise to use an innovation

Information Systems: Information systems refers to all computer based applications that healthcare providers use to deliver services to their clients.

Innovation: Process of implementing new ideas to create value.

Organisational readiness: Availability of the needed organizational resources in terms of physical assets and human knowledge for adoption of an innovation.

Partners Pressure: Power of a trading partner to influence adoption of an innovation

Private Hospital: This comprises of all hospitals that are not run by the government. This includes the faith based/mission hospitals.

Relative Advantage: These are the perceived benefits associated with adoption of an innovation/IS

Slack Resources: Degree to which uncommitted resources are available to an organization

Top management support: Top management cooperation or assistance provided towards adoption of a new information system.

Adoption of information system (IS): Adoption of information system is the decision to use a technology innovation.

Adoption of hospital management information systems: This is the use of computer hardware's and software applications to improve healthcare service delivery.

ABSTRACT

Despite the potential of Hospital Management Information systems (HMIS) to significatly reduce medical errors, streamline clinical processes, contain healthcare costs and ultimately improve the quality of healthcare, their adoption by hospitals in Kenya has been slow. The purpose of this study was to examine the influence of; technological factors, organizational factors and environmental factors on the adoption of HMIS in selected hospitals in Meru County. The study adopted survey research design. The target population was 447 system users from selected hospitals in Meru County. Stratified random sampling technique was used to select the respondents. Questionnaires were administered to a sample of 148 respondents from the selected hospitals out of which 120 were filled and returned. Data was analysed by use of descriptive and inferential statistical techniques with the aid of Statistical Package for Social Sciences. The results are presented in tables and charts. The findings of the study revealed that Technological and organizational factors do not have significant influence on the adoption of hospital management information systems in selected hospitals in Meru County. However, contrary to other technological factors, cost was found to be significant. In addition, Environmental factors were significant to the adoption of hospital management information systems. Therefore, the study recommends training of employees on information systems by healthcare facilities. The County Government of Meru in collaboration with healthcare facilities should foster private-private and public-private partnerships to facilitate cost sharing in the adoption of hospital management information systems. Further, the county in collaboration with national government should subsidize software and hardware to help small healthcare facilities adopt systems. The County Ministry of Education in collaboration with National Government should incorporate information systems training in all courses to facilitate systems adoption. The study also recommends that County Government formulates policies on ICT adoption in Meru County to provide guidance to healthcare institutions. Further, the county should deploy a network of health information management systems for use across the entire county health sector.

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Good health is not only important for individuals, but also for governments because it plays a central role in achieving sustainable economic development and growth as well as effective use of resources (Godal 2005). Unfortunately, we live in a world where two thirds of the population lives in so-called 'developing countries' under conditions grossly different from those in the richer industrialised countries (Tolme and Plessis, 1997) Ensuring that patients receive quality health care has become an important objective for county, district, and national health systems in developed and developing countries alike.

The application of Information and Communication Technology (ICT) in health care has been growing exponentially over the last decade and its growth is attributed potentially to its ability to improve effectiveness and efficiency in health care services worldwide (Thielst, 2007). Electronic Health Record (EHR) is one type of ICT application in this context which demands attention in its successful design, implementation and use. Healthcare providers can benefit substantially from routine use of electronic records in terms of improved quality, safety and efficiency as well as better opportunity to promote learning and research (Carayon *et al.* 2009; El-Kareh *et al.* 2009; Valenti 2007).

According to Archangel 2007, HMIS is a sub-system of a health information system which is used to manage clinical information of the hospital concerning financing, administration, operations and logistics such as accounting, record keeping, asset management, HR management and Stock Management.

Hospitals in developed countries continue to implement electronic medical records to lower costs and to improve quality of care. Each country in Europe has its own distinctive approach in the journey towards enabling technologies in healthcare. France is developing the concept of *digital hospitals* via telemedicine technologies (Currie & Finnegan, 2009). Germany is working on an Electronic Health Card (EHC) which will allow the physicians to check the administrative data of the patient and to write prescriptions on EHC which will also have voluntary medical functions like the emergency data record and later an electronic patient record that can be checked anywhere using appropriate card readers (Sunyaev *et al*., 2009). Denmark has a universal Electronic Health Record system and a national PHR

service available to any Danish citizen to allow them control who accesses their medical information and how it is accessed (Cruickshack *et al*., 2012). Launched in 2003, the country's government-run PHR portal is *Sundhed.dk*, a website where, a citizen can view treatments and diagnoses from his/her own hospital patient record, book appointments with his GP, renew prescription drugs, monitor own drug compliance, survey shortest waiting lists for operations and quality ratings of hospitals, register as organ donor, and get access to local disease management systems in out-patient clinics (Makori, Musoke & Gilbert, 2013). Hospital Information Systems (HIS) allow for seamless flow of administrative as well as clinical data between various hospital departments such as outpatients, accounts office, wards, pharmacy, laboratories, and theatres among others depending on the units within a hospital.

Developing countries have not been left behind in embracing information and communication technologies to deal with the problem of access, quality and costs of healthcare. Ojo *et al* (2007) additionally argues that adoption of ICT in health sector across developing countries will accelerate knowledge diffusion and increase access to health information. Hospital Information Systems (HIS) systems have enabled faster processing, storage and transfer of medical information between service providers in developing countries. An HIS prominently featuring in developing countries' eHealth landscape is the one shared by Southern African countries including Botswana, South Africa, Mozambique, Tanzania, Ethiopia and Malawi. In Ghana, adoption of Electronic Health Information Technology, (EHIT) has become an integral part of the national health care delivery.

Electronic medical record systems provide the basic infrastructure upon which other electronic health solutions can be laid. It is evidenced that electronic medical records are being adopted in the health sector in developing countries. For instance, the OpenMRS developed by the Regienstrief Institute and Partners in Health, provides a user-friendly interface for electronically storing medical data and has been very successful in Kenya. The Mosoroit Medical Record System (MMRS), which was implemented at a primary care rural health center in Kenya, provides patient registration and patient visit records management with capability to handle information of over 60,000 patients (Sood *et al.*, 2008). Electronic medical records that have succeeded in developing countries. For instance, in Lilongwe EMR is used for a wide range of clinical problems in a pediatric department of the Central Hospital in Malawi; Partners in Health (PIH)-EMR, Peru; HIV-EMR system, Haiti; Careware, Uganda; PEPFAR project, Tanzania; National EMR, project Zambia (Sood *et al.*, 2008).

In response to numerous research and media highlighting poor quality, increasing patient and stakeholders expectations, hospital managers are under immense pressure to provide quality healthcare. There is a general belief, supported by growing research literature, that there are effective methods to improve health care service quality for patients (Macharia and Maroa, 2014).

Kenya's Vision 2030 for health is to provide equitable and affordable healthcare at the highest affordable standard to all citizens, involving (among other things) the restructuring of healthcare delivery systems in order to shift the emphasis from curative to preventive and promotive healthcare. Improved access, equity, quality, capacity and institutional frameworks are the main focal areas that will be achieved through a devolution approach that will allocate funds and responsibilities for delivery of healthcare to hospitals, health centres, dispensaries and communities. Kenya realizes that patients with healthy lives are better able to maintain healthy minds, healthy lifestyles, and a balance between work and family. In a similar vein, healthcare service organizations also seek for optimal strategies and solutions to increase their medical services. Achieving this goal implies a need for the introduction of ICT capabilities in the hospitals, clinics and all other related healthcare institutions. HMIS constitute such a tool that can be used to positively address healthcare challenges.

Tornatzky and Fleischer (1990) believed that the adoption and assimilation of new technologies in a company were under the influence of Technological, Organizational and Environmental factors. This study therefore investigated how these factors have influenced the adoption of Hospital Management Information systems in selected hospitals in Meru County.

1.1.1 Adoption of HMIS in Meru County

Meru County is located along the Eastern part of Kenya. Meru County borders Isiolo County to the North and North East, Tharaka County to the South West, Nyeri County to the South West and Laikipia County to the West. According to the 2009 Kenya Population and Housing Census, the population was 1,356,301 people with a population density of 195.5 people per Km^2. It covers an area of 6,936.0Km^2.
Meru County has only nine (9) constituencies divided into 45 electoral wards. South Imenti has the highest with 6 and Buuri the lowest with 4. The rest Igembe South, IGembe Central, Igembe North, Tigania West, Tigania East, North Imenti and Central Imenti have 5 each. There are a total of 311 health facilities spread across the county. These are composed of 5 district hospitals, 6 sub-district

hospitals, 102 dispensaries, 23 health centres, 158 medical clinics, 5 nursing homes, 3 maternity homes and 9 private institutions. The ratio of doctors to patients stands at 1 doctor to 5,500 patients.

The goal of Meru County health department is universal access to affordable quality health services for all residents of Meru County. The County has a fairly functional health care system that brings together the public, faith-based and the private sector to provide health services to its residents and those from neighbouring counties. 58% of all healthcare services are provided by the public sector. Financing is mainly from the National Government of Kenya, Development Partners, Private Sector, Individuals and now the County Government. There is limited literature about HMIS in Meru county. However, in 1983, the Government of Kenya (GoK), decentralized the Ministry of Health's (MoH) decision-making process to the districts. This was in line with World Health Organization (WHO) resolution calling on all WHO member states to strengthen District Health Systems (DHS) (WHO,1989). For this decentralization to be effective, there was a need to establish information systems to support the DHS managers in their planning, implementation and evaluation functions. The GoK recognized that without an effective and appropriate information system, the MoH's capacity to cope with its planning and management needs would be severely compromised (Otieno, 2005).

The demand for quality healthcare in Kenya has been increasing, providers are looking for better ways to improve management and offer better services. As a result, the pen and paper system of running hospitals' affairs is being dropped in favor of technology, greatly facilitated by Futures Group. In the year 2014, Meru County embarked on an ambitious transformation programme to enhance its efficiency in healthcare service delivery. As part of the transformation strategy, Meru County has partnered with Futures Group through PEPFAR to improve the tracking and monitoring of patients in 300 government of Kenya facilities in Kenya. This is being done by deployment of IQ Care EMR in Meru County health facilities. IQ Care is an open source software that manages the CCC, MCH and TB Clinics. In this partnership, Futures Group provides software while the County Government, infrastructure. A number of private/missions hospitals in Meru County have adopted Hospital Management Information Systems at different levels. Some are at Level 1 where they have deployed one module in one department while others have deployed more than one module of HMIS. The adoption of HMIS by selected hospitals in Meru is therefore an important step towards the attainment of the policy objectives of the Ministry of Health articulated in Kenya Vision 2030 (KV 2030) and article 43 (1) of the

Constitution of Kenya which states in part that 'Every person has the right to the highest attainable standard of health, which includes the right to healthcare services".

Jayawardena (2014), posits that a good Hospital Management Information System (HMIS) is necessary to manage a health organization effectively and efficiently. HMIS is the key factor for an effective decision making process. Thus, even though the benefit of implementing the HMIS technology is well documented it can be established that is not an easy process to get it right. It is ultimately the end user that determines the degree of success by accepting and utilizing the technology optimally. According to Malik and Khan (2009) literature on the implementation of HMIS is scarce especially in regard to developing countries. While healthcare sectors in first world countries have already started reaping the benefits of utilizing HMIS technology, for Kenya, which is still in a relatively early stage of HMIS technology implementation process, there is still a long journey ahead. According to Bunge *et* al. 2009, Kenya HIS is still at stage I which relies on District Health information systems. It is basically paper-based system that is highly fragmented and burdensome to health workers tasked with data collection. While Kenya possesses several HIS initiatives, Kenya does not have a high-functioning health data collection or analysis scheme operating on a nationwide basis. Kenya HIS is the traditional health information systems, whose primary purpose is to facilitate health data collection and reporting (Ministry of Health, 2008).

The unfolding reality is one of a need to determine the underlying reason why HMIS technologies are currently not being effectively utilized in practice and identify the factors that influence adoption of HMIS in Kenya. Given the importance and ubiquitous nature of HMIS, the need remains to understand factors that would enable healthcare professionals to use HMIS. According to Tornatzky and Fleischer (1990), a company's decision to introduce a new technology is affected by technological, organizational and environmental factors. Understanding these factors provides greater management insight into finding effective strategies to allow hospitals to create better ways of serving customers. Motivated by these factors, the purpose of this study was to investigate the adoption factors of HMIS in Kenya. The study was carried out in selected hospitals in Meru County.

1.2 Statement of the Problem

Healthcare is undergoing a change both in the aspects of delivery and consumer acceptance of treatment options. Technology adoption relates to a hospital's decision to acquire a technology and make it available to physicians and hospital staff for supporting or enhancing their task performance. Hospital management information systems (HMISs) are increasingly being adopted by hospitals with the evolution of information technology (IT). The effective use of HIS reduces costs and improves patient care in the healthcare industry. Kenya is not left behind in this revolution. Several initiatives in the country are currently looking at improving health care reporting and outcomes using IT. However, the adoption has been a bit slow. According to Bunge *et al*. (2009), Kenya is at stage 1 in HIS adoption. Prior research has shown a significant lack of quality healthcare in hospitals. This manifests in several dimensions including increasing the risk of adverse outcomes, avoidable patient injury occurring in hospitals, lack of vital medicines, long waiting time particular for cases requiring surgery, and higher costs (Kundi *et al*. 2013). Poor health service quality not only leads to increased deaths and human suffering that could otherwise be avoided, but also wastes resources that could be used to treat more patients (Kohn *et al.*1999). The Government and the public are becoming more critical of the quality of hospital care (Coulter and Magee 2003). Despite these good intentions and the expected outcomes, many hospitals are still facing serious challenges in achieving the desired efficiency and effectiveness in service delivery even though there is a system in place. Prior research has posited that successful implementation of hospital management information systems (HMIS) in health care facilities appears to be a difficult task (Kundi *et al.* 2013).

According to Tornatzky and Fleischer (1990), most of the underlying challenges are linked to the combination of factors that influence the adoption of an information system, key of which are technological, organizational and environmental factors. These three elements present "both constraints and opportunities for technological innovation" (Tornatzky & Fleisher 1990) thus, influence the way an organization sees the need for, searches for, and adopts new technology. While these factors have been studied in developed countries in business related industry, none has been conducted in a developing country in healthcare industry. Kenya being a developing country, factors affecting HMIS adoption are different compared to developed countries. Adopting and using HMIS allows an organization to better manage its ICT projects and realize desired efficiency while ensuring the alignment of the projects with the long-term strategic objectives of the organization. Given that benefits of HMIS cannot be attained

without a successful adoption, there is a need to understand how the three factors influence HMIS adoption.

In this study, the three key factors for effective adoption of an information system, (technological factors, organizational factors and environmental factors) were investigated to establish how they have influenced the adoption of HMIS in selected hospitals in Meru County.

1.3 Objectives of the Study

1.3.1 General Objective

The main objective of this study was to investigate the adoption factors of Hospital Management Information Systems in selected hospitals in Meru County.

1.3.2 Specific Objectives

The specific objectives were:-

i) To examine the influence of technological factors on the adoption of HMIS in selected hospitals in Meru County.
ii) To establish the influence of organisational factors on the adoption of HMIS in selected hospitals in Meru County.
iii) To investigate the influence of environmental factors on the adoption of HMIS in selected hospitals in Meru County.

1.4 Research Questions

In carrying out this study, the investigation were guided by the following research questions:-

i) What is the influence of technological factors on the adoption of HMIS in selected hospitals in Meru County?
ii) How does organisational factors influence the adoption of HMIS in selected hospitals in Meru County?
iii) What is the influence of environmental factors on the adoption of HMIS in selected hospitals in Meru County?

1.5 Hypothesis of the Study

This study was guided by the following hypotheses which were based on the objectives of the study.

H_1 Technological factors have significant influence on the adoption of HMIS in selected hospitals in Meru County

H_2 Organisational factors have significant influence on the adoption of HMIS in selected hospitals in Meru County

H_3 Environmental factors have significant influence on the adoption of HMIS in selected hospitals in Meru County.

1.6 Significance of the Study

The findings of this research will contribute to the existing literature on adoption of HMIS especially the influence of TOE factors on technology adoption. This study will benefit hospitals, healthcare practitioners and other health related institutions who may wish to implement HMIS in Kenya to cope with environmental uncertainty and achieve sustainable competitiveness. Government and devolved healthcare policy makers will benefit from the findings of this study in terms of policy formulation and development of implementation guidelines in the area of health systems. Researchers will benefit from this study by using as reference material. Further, limitations of this study can be used as a platform for future research. Hospital administrators and managers faced with HMIS adoption decision will benefit from this study by focusing on key adoption enablers and better manage adoption inhibitors in both private and public hospitals. Hospital staff will benefit from this study through workflow efficiencies and improved individual and organizational performance. Patients will benefit through less waiting time, improved services and patient information security. System developers will benefit from this study when developing systems thus putting strategies in place to counter the TOE factors.

It is expected that the findings of this study will improve hospital management information systems adoption process in selected hospitals in Meru County and healthcare industry in Kenya at large.

1.7 Scope of the Study

The study sought to establish the adoption factors of Hospital Management Information Systems in selected hospitals in Meru County. The hospitals included: St. Theresa's Mission Hospital-Kiirua, Maua Methodist Hospital, PCEA Chogoria Hospital, Nyambene Clinical Services & Nursing Home and

St. Anne Mission Hospital. In this study, Technological factors included: relative advantage, compatibility, complexity, and cost; Organisational factors included; management support, organizational readiness, human resources and amount of slack variables; Environmental factors included: competitor's pressure, customers pressure, partner's pressure and government support. In carrying out this study, the target population comprised of Doctors, Nurses, Pharmacists, Laboratory technologists, hospital administrators, accountants, Cashiers and administrative staff from each of the 5 selected hospitals in Meru County under study. The choice of the targeted respondents owed to their knowledgeable background on the research topic under study.

1.8 Limitations of the Study

Not much research has been done on HMIS adoption in Kenya, most related data is from developed countries however, data from other sources together with literature on adoption of innovation (technology) was used overcome this limitation. This study was carried out in selected hospitals in Meru County which limits the research as the findings cannot be generalized to public hospitals thus presenting a platform for future research. The purpose of this study was to investigate the adoption factors of HMIS in healthcare service delivery as such, the conceptual framework was based on the TOE framework, thus, the results of this study cannot be generalized beyond the findings. Some respondents were not willing to give the required information therefore a small sample of the willing population was used to give data. There were delays in getting the questionnaires back from the respondents however, the researcher gave a time frame within which the feedback was to be collected and made several reminders. Some of the respondents were unwilling to give some information citing confidentiality as the reason or fearing to disclose vital information however, the researcher explained that the information provided will be treated with utmost confidentiality by ensuring that no subject knows the identity of other subjects and therefore no name was required on the questionnaire.

1.9 Assumptions of the Study

In carrying out this study, it was assumed that the respondents completed the questionnaire objectively and accurately on the basis of their own perception, knowledge and experience of HMIS adoption. It was also assumed that the status of adoption of HMIS in selected hospitals is a representative of other hospitals in Meru County. This study was carried out on healthcare facilities which have different types

of HMIS on different platforms. It was assumed that the differences on the types of information systems did not affect the responses. It was also assumed that respondents were truthful in their responses to the questionnaire.

1.10 Organization of the Report

This project is structured with the following chapters: Chapter 1 gives the introduction on background of the study and adoption of HMIS in Meru County. It highlights statement of the problem, objectives, research questions, hypothesis, significance of the study, scope of the study, limitations and assumptions of the study. Chapter 2 presents literature review on adoption of information systems, which draws from theory and observations of recent practices on adoption of information system to identify the technological factors, environmental factors and organizational factors. Theoretical literature review, empirical literature review and conceptual framework are also presented in this chapter. Chapter 3 discusses the research methods that were used to collect, measure and analyse data. Chapter 4 presents research findings and discussions while Chapter 5 presents summary, conclusion and recommendations. References and appendices are also presented.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter presents the literature review on the factors influencing the adoption of information systems. It draws on theory and observations of recent practices on adoption of information systems or Information Technology. The theoretical literature review, empirical literature review and conceptual framework are also presented.

2.2 Theoretical Literature Review

Theory is an abstract statement formulated to predict, explain, or describe the relationships among concepts, constructs, or events (Robertson *et al.* 2010). It is important because it provides a framework for analysis, facilitates the efficient development of the field, and is needed to solve the real world problems.

2.2.1 Diffusion of Innovations Theory

Rogers' model of innovation adoption is a dominant model in this field that offers an established framework for measuring the adoption of various innovations and has been used successfully at both the consumer and organizational levels. Thus, Rogers' model was used as a basis for theorizing in this research, as it provides valuable information about the perceived innovation attributes that affect innovation adoption. According to Rogers (1995) the rate of adoption of innovations is influenced by five factors: relative advantage, compatibility, triability, observability and complexity. The first four factors are generally positively correlated with the rate of adoption while the last factor, complexity, is generally negatively correlated with the rate of adoption. Further, information systems research based on Diffusion of Innovation theory has revealed that technical compatibility, technical complexity and relative advantage are important antecedents to adoption of innovation leading to the model presented in figure 2.1 (Rogers, 1995). In this research, compatibility, complexity and advantages of HMIS were evaluated in determining hospital staff attitude towards HMIS adoption.

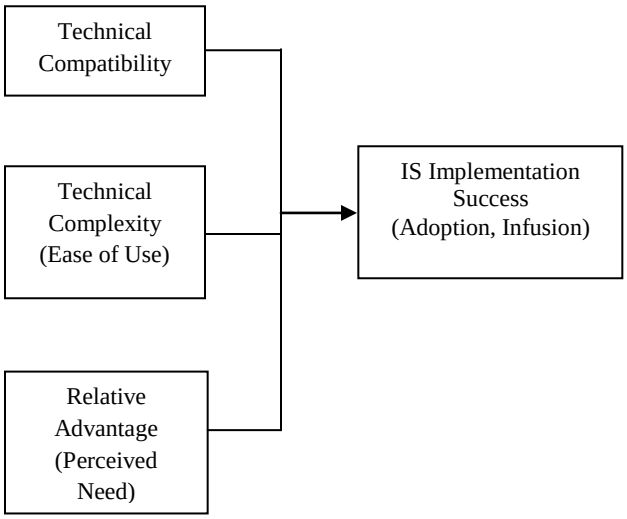

Figure 2.1: Diffusion of Innovations Theory
Source: Rogers, E.M. (1995)

Relative Advantage: Relative advantage has been defined by Rogers (2003) as "the degree to which an innovation is perceived as being better than the idea it supersedes". Relative advantage, thus, indicates how much the adopters of an innovation can perceive benefits associated with adopting the innovation, in comparison with their current ways of doing business. So, when organizations find that the IS will add better, more convenient and more effective ways of conducting business over currently existing business practices, they are expected to adopt the innovation faster. Rogers' seminal text indicates that relative advantage is expected to have a positive impact on innovation adoption. Several previous innovation adoption studies and, in particular, those which focus on the IS as the innovation studied, found a positive significant relationship between the relative advantage of the innovation and adoption/non-adoption of the innovation (Chong and Pervan, 2007; To and Ngai, 2006; Premkumar and Roberts, 1999; Hassan *et al.*, 2010; Mourad, 2010).

Compatibility: Rogers (2003) defines compatibility as "the degree to which an innovation is perceived as consistent with existing values, past experiences, and needs of potential adopters". Rogers' seminal text indicates that a positive relationship is expected to exist between compatibility and innovation adoption. Previous research on the effect of compatibility on innovation adoption did not show consistent results with regard to its effect on innovation adoption. Some researchers found a significant positive relationship (Saffu *et al.*, 2008; Black *et al.*, 2001; Lockett and Littler, 1997; Hassan *et al.*,

2010; Mourad, 2010), while others found no relationship (Sultan and Chan, 2000). This variability in results may be due to the particular nature of the innovation or the context of the study. In healthcare sector, any innovation that is perceived to be incompatible with the aim of providing improved patient service will ultimately lead to rejection of the innovation by healthcare professionals. Thus it is expected that the more compatible HMIS is perceived to be, the more likely are respondents to adopt it.

Complexity: Rogers (2003) defines complexity as "the degree to which an innovation is perceived as relatively difficult to understand and use". According to Rogers, the complexity of an innovation, as perceived by members in a social system, negatively affects its rate of adoption. Previous research on the effect of complexity on innovation adoption generally found a negative relationship exists (Hassan *et al.*, 2010; Mourad, 2010), with only a few of those showing a non-significant relationship (Premkumar and Roberts, 1999; Sultan and Chan, 2000). Thus it is expected that the more difficult HMIS is perceived to be, the less likely are respondents to adopt it.

2.2.2 Technology Acceptance Model

Besides the DOI, the Technology Acceptance Model (TAM) is relevant to this study. Technology acceptance model (Davis, 1989) is important for this study because it explains the factors that influence acceptance of new technology. It hypothesizes that there are two beliefs, perceived usefulness and perceived ease of use, which are variables that primarily affect the user acceptance. The TAM suggests that these external variables indirectly affect individuals' attitude toward 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. TAM has also been used by researchers to explain why a particular system may or may not be acceptable to users (Davis *et al.*, 1989). A series of studies found that TAM is the best model in examining adoption of HMIS in healthcare service delivery because it is specialized in information technology, it is well-researched and it is a dominant model for investigating user technology acceptance (Mary 2008).

Perceived usefulness is the degree to which a person believes that using a particular system will have some benefits whereas perceived ease of use is the degree to which a person believes that a particular system will be easy to use (Davis 1989). According to Davis (1989), perceived ease of use has direct

influence on perceived usefulness. Davis (1989) Technology Acceptance Model is presented as figure 2.2. In this research, Technology Acceptance Model was used to determine how Perceived Usefulness and Perceived Ease of Use influence HMIS adoption.

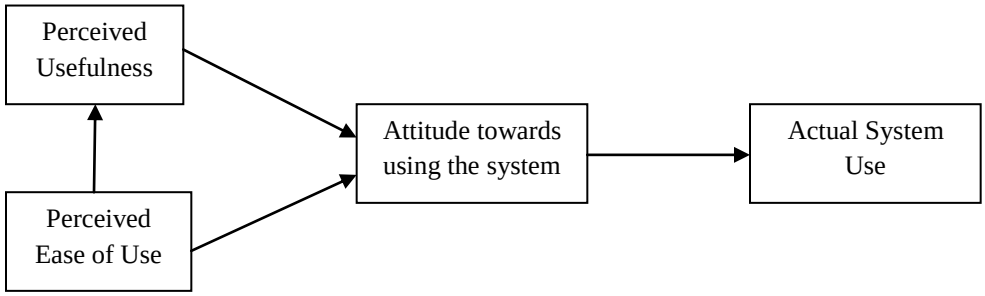

Figure 2.2: Technology Acceptance Model

Source: Davis, F.D. (1989), Perceived usefulness, Perceived ease of use and user acceptance of Information Technology, Technology Acceptance Model (TAM)

2.2.3 TOE Framework

TOE framework was developed by Tornatzky and Fleischer (1990) to examine firm-level adoption of various IS/IT products and services. It has emerged as a widespread theoretical perspective on IT adoption (Zhu et al., 2004). Inclusion of technological, organizational and environmental variables has made TOE advantageous over other adoption models in studying technology adoption, technology use and value creation from technology innovation (Hossain and Quaddus, 2011; Oliveira and Martins, 2010; Ramdani et al., 2009). Further, it is free from industry and firm-size restrictions (Wen and Chen, 2010). It identifies three aspects of an enterprise's context that influence the process by which it adopts and implements a technological innovation: technological context, organizational context, and environmental context (a) Technological context describes both the internal and external technologies relevant to the firm. (b) Organizational context refers to descriptive measures about the organization such as scope, size, and managerial structure. (c) Environmental context is the arena in which a firm conducts its business such as its industry, competitors, and dealings with the government (Tornatzky and Fleischer 1990). After carefully reviewing the academic literature on IS innovations published in major IS journals, relevant studies based on the TOE framework are summarized in Table 2.1.

Table 2.1 TOE Framework Based Studies

Author	Context	Significance	Technology	Organisation	Environment
Hang *et al.* 2008	EDI	Significant	Relative Advantage, complexity, strategic use of communication technology, trust in technology	Top Management support organizational slack	Potential power, trust in partner, competitive pressure, relationship commitment
		Insignificant	Compatibility, network externality	Organisational size	Dependency on partner, exercised power, pressure from the government
Ramdani *et al.* 2009	ERP	Significant	Relative advantage, triability	Top management support, organizational readiness, size	-
		Insignificant	Compatibility, complexity, observability	-	Industry sector, market scope, external IS support, competitive pressure
Kouki *et al.* 2009	ERP	Significant	-	Top management support, organizational culture, skilled and competent staff, training	Vendor support
		Insignificant	-	-	-

Lin and Lin 2008	e-business	Significant Insignificant	Expected benefits -	IS expertise and infrastructure Organizational compatibility	Trading partner pressure, competitive pressure -
Salwani *et al.* 2009	e-commerce	Significant	-	Technology competence	Pressure intensity
Carnaghan and Klassen 2007	e-business	Significant	-	Technology readiness, technology integration, firm size	Competition intensity
Hossin and Quaddus 2011	RFID	Significant Insignificant	- -	- Infrastructure	External pressure, external support, perceived competitive advantage Market pressure
Wang *et al.* 2010	RFID	Significant Insignificant	Complexity, compatibility Relative advantage	Firm size Top management support, technology competence	Competitive pressure, trading partner pressure, information intensity -
Ramdani *et al.* 2009	KM	Significant	Relative advantage, triability	Top management support,	-

		Insignificant	-	organizational readiness, size -	Industry sector, market scope, competitive pressure, external IS support
Scupola 2009	e-commerce	Significant Insignificant	Relative advantage, barriers and benefits -	Top management, knowledge and attitude, resource constraints -	Pressure from competitiors, customer pressure, access and quality of consulting Role of government
Pan and Jang 2008	ERP	Significant Insignificant	Technology readiness Infrastructure	Size, perceived barriers -	Production and operations improvement Enhancement of product and services, competitive pressure, regulatory policy

Source: Review on IT Adoption: Journal of Enterprise Information Management

Although specific factors identified within the three contexts may vary across different studies, the TOE framework has consistent empirical support. Drawing upon the empirical evidence combined with the literature review for studying the adoption of technology innovations, the TOE framework was an

appropriate theoretical foundation for studying adoption HMIS in selected hospitals in Meru County. Figure 2.3 presents the TOE framework.

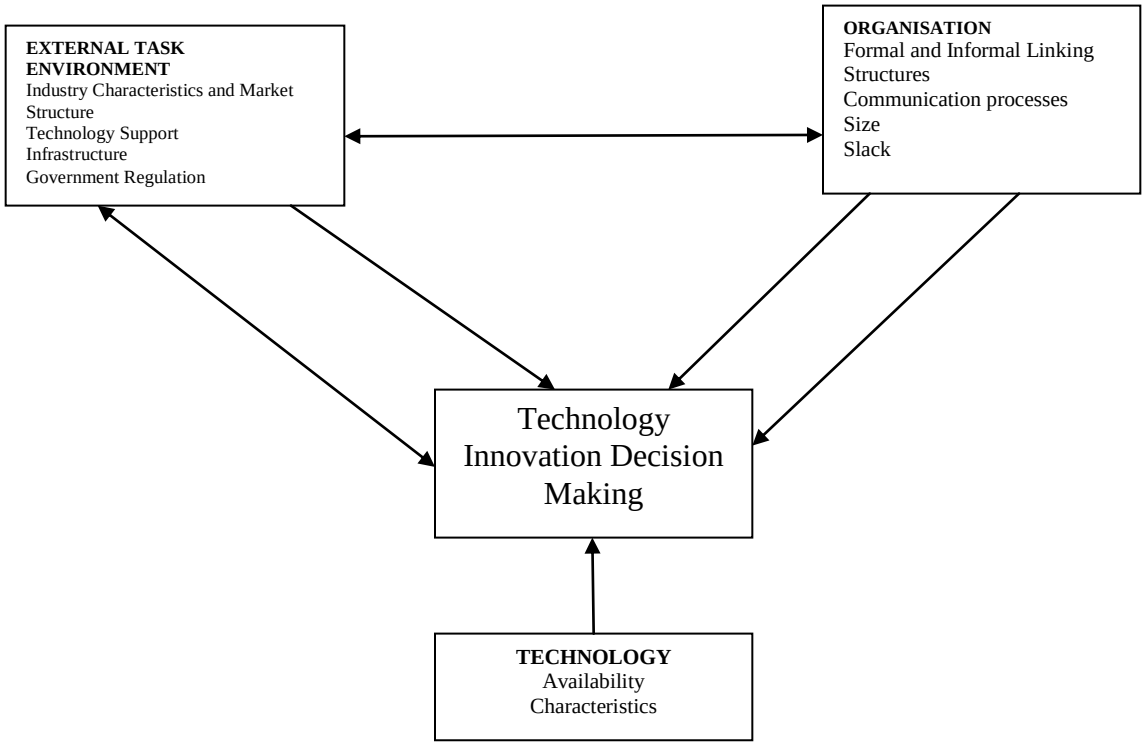

Figure 2.3: The TOE Framework (Tornatzky and Fleischer 1990)

Source: The Electronic Journal Information Systems Evaluation, 2011

2.3 Empirical Literature Review

The TOE framework posits that the adoption of innovations depends on technological, organizational and environmental factors. Fundamentally, the TOE model is an integrative schema incorporating characteristics of the technology, contingent organizational factors, and elements from the macro-environment.(Tornatzky and Fleicher 1990; Tornatzky and Klein 1982; Lai and Wang 2010). Several studies (Tan *et al.* 2007; Chwelos *et. al.* 2001; Hadaya 2006) that used the TOE framework to examine the impact of relevant organizational and environmental factors included such variables as management support, organizational readiness, government support, and pressures from partners, customers and competition. Within the broad framework of TOE, the current large practitioner literature on IS was used to identify HMIS-focused factors and determine that the following factors will be important in HMIS adoption: expected benefits from the innovation, compatibility of HMIS with existing processes, complexity, cost of tools and process integration needed to leverage HMIS, management support, organizational readiness, human resources, amount of slack resources, competitors pressure, customer's pressure, partners pressure and government support. Although some of these factors have been studied in other adoption contexts, all of these factors are considered important for HMIS adoption and have not been empirically examined in any prior HMIS academic studies. Previous research found almost all the aforementioned factors to be crucial in the adoption of IS and related technologies. This information provides ample reason for their inclusion in this research.

In TOE and DIT models, the dependent variable can be adoption, acceptance, receptivity, business performance, business value, or a combination of other relevant variables (Davis and Vladica 2006). In this study, the dependent variable is adoption, which was operationalized with measures related to technological, organizational and environmental factors. Other prior studies (Chong and Pervan 2007) have used a similar conceptualization to facilitate the emergence of deeper insight.

2.3.1 Influence of Technological factors on adoption of Information systems

Technological aspect of the model subsumes the innovation attributes identified by Rogers (2010) that influence the likelihood of adoption. In this study, four attributes are specified within the technological factor: relative advantage, compatibility, complexity and cost.

Relative advantage is defined by Rogers (2003) as "the degree to which an innovation is perceived as being better than the idea it supersedes." Thus, if the benefits of the technological innovation are perceived as having advantages over existing practices and systems, the adoption of such an innovation will be positively encouraged. Prior research (Al-Qirim 2007; Huang *et al.* 2008) found this variable to be positively related to the adoption of information technologies (IT), including IEBT in SMEs. Perceived benefit is also found to be a key determinant in the implementation of new technologies (Sharma et al. 2007). Kuan and Chau (2001), Sharma *et al.* (2007), and Lin and Lin (2008) have all investigated the influence of perceived benefits in their study of EDI, e-business, and RFID adoption. The study of Chang *et al*. (2006) found that the benefits reaped from of information systems will lead to a positive adoption. Potential benefits such as improving the hospital's image, gaining strategic advantage over other organizations, improving their product or service quality, and enhancing the efficiency of internal operations will also be critical.

Compatibility is defined as "the degree to which an innovation is perceived as consistent with the existing values, past experience, and the needs of potential adopters." (Rogers 2003). It has been suggested that technological innovations diffuse more freely and easily where such applications appear to match the adopter's processes. Some IS researchers (Ramdani 2009) did not find support for a positive relationship between this factor and the adoption of IS in organizations. However, other researchers have confirmed the existence of such a relationship; for example Li *et al*.(2010) found compatibility to be a significant predictor of IS innovation adoption.

Rogers (2003) describes complexity as "the degree to which an innovation is perceived to be relatively difficult to understand and use." Consistent with the DIT theory, the acceptance of a new innovation is inhibited or discouraged if it is perceived by the adopter to be complex. While Hadaya, (2006) and Huang *et al*.(2008) found this variable to be an important predictor of IEBT acceptance in SMEs, some researchers, including Beatty *et al*.(2001) and Kendall *et al*.(2001) did not confirm such a relationship. Mirchandani and Motwani (2001). Daniel and Grimshaw,(2002), Grandon and Pearson (2004) have all inferred that easy to use business applications tend to be more readily adopted than complex ones. That is, technologies perceived to be less complex tend to garner greater support and acceptance among adopters than more complex systems. The higher the complexity of a new technology the higher the possibility of facing failures in the implementation and adoption of such technology hence the decision

to go for such technology is risky (Premkumar and Roberts 1999). As this complexity factor is found to be negatively influencing the SMEs' adoption decision on ICT, it is considered to be an important factor of ICT adoption (Ramdani *et al*. 2013).

According to Jeon *et al.* (2006), the adoption cost, apart from the adoption decision itself, affects the extent of IS adoption. Irani *et al.* (2010) stated that manufacturing costs of the RFID system and customisation costs are some of the key reasons hindering the adoption of RFID.

2.3.2 Influence of Organisational factors on adoption of Information systems

The organizational factors consist of factors that rely on the organization's internal environment. Organisational factors include four attributes: management support, organizational readiness, human resources and slack variables.

Management support refers to the "active engagement of top management with IS implementation." Top management support is one of the best predictors of IT adoption. In their review of 99 studies conducted between 1992 to 2003, Jeyaraj *et al.* (2006) found that top management support consistently influences an organisation's decision to adopt new technologies. Ngai *et al.* (2010) stated that the support of management is critical to the success of the implementation of mobile SCM technology such as RFID. Within the organizational context, management support is an important factor. Management support was considered to be important in risk-free development environments. Several studies have confirmed the importance of management support in the adoption of the innovation (Glynn *et al.*, 2005; Hauge *et al.*, 2010). Additionally, Scupola (2009) found that top management support is a significant factor which influences e-commerce adoption in Australia and Denmark. Past research indicates that management support generally boded well for the acceptance of technological innovations in SMEs (Al-Qirim 2007; Huang *et al.* 2008). This is because top managers act as change agents in the adoption process of technological innovations. When top managers understand the relevance and importance of computer technologies for their organisations, they tend to play a significant role in influencing other organisational members to accept the same technologies (Ifinedo, 2011). Conversely, where management support is low or unavailable, technology acceptance and adoption tend to be placed on the back-burner in terms of organizational priorities and eventually fail to produce favorable outcomes.

Jeon *et al.* (2006) used two sub-factors to examine CEOs characteristics that might influence e-business adoption, (a) CEOs knowledge of IT and (b) CEOs attitudes toward innovation. They concluded that CEO characteristics do, indeed, have an influence on the adoption of e-business. Therefore when top managers in hospitals understand the importance of HMIS, they tend to play a crucial role in influencing other organizational members to accept it.

Top Management's Support which is highly prioritized factor in the organizations' ICT adoption (Jeyaraj *et al*. 2006) refers to whether or not the executives or the people in the top management of hospitals understand the nature and functions of HMIS and therefore support the adoption of the same by means of communication as well as reinforcement of the ideas (Ramdani *et al*. 2013) affecting the adoption of new information systems (Chang *et al*., 2006). This factor has been found to be critical in creating a conducive atmosphere for the adoption of new technologies and allocation of adequate resources for the adoption of new technologies (Lin and Lee 2005; Wang *et al*., 2010) since the implementation and adoption of HMIS is usually a bigger project and a huge undertaking for hospitals. The implementation of HMIS involves integration of resources and re-engineering of the business processes, hence the support from top management, mostly the decision makers in the case of hospitals, is very crucial.

Organizational readiness is defined by Iacovou *et al.*(1995) "as the availability of the needed organizational resources for adoption." Additionally, Chang (2010) defines organizational context (organizational readiness) as the "enterprise's availability of financial and human resources"). Organizational readiness of businesses is critically important for HMIS adoption and it encompasses not only physical assets, but also human knowledge of IS. Previous studies have discussed this factor using financial resources, organizational IT sophistication, and expertise. (Al-Qirim 2007, Ramdani *et al* 2009). In this study, financial resources will be excluded for simplicity purposes; instead organizational readiness will be described in terms of availability of IT knowledge and expertise in the adopting organization.

Khemthong and Roberts (2006), who conducted a study in the hospitality industry, found the importance of organizational readiness for the adoption of internet and web-based marketing activities. The ICT experience factor evaluates whether an organization's adoption of ICT is deprived by the limited

experience the organization has in the technology. Previous studies (e.g.: Kuan and Cahu 2001) found that ICT experience affects organizations' adoption of new technologies.

Technological competence is a firm's ability to evaluate, assimilate, and apply new knowledge (Vicente and Lopez, 2009). The endowment of human resources with technical and managerial skills in IT is one of the key factors influencing this competence (Kuang & Xu, 2008). A firm's technical knowledge and skills with respect to IT innovations provide it with the ability to build IT applications by using available technologies and use them to facilitate information gathering, transactions, and fulfilment/customer service efforts. Therefore, firms with personnel with relevant IT knowledge and skills may have relevant skills for technological competence and thus may exhibit a greater propensity to use e-commerce applications (Kuang & Xu, 2008).

The technological level of an organisation is a crucial element that affects the adoption and implementation of an IS/IT innovation. According to Kwon and Zmud (1987) and Zhu *et al.* (2003) the technological level is highly affected by IT infrastructure and employee technical skills. According to Zhu *et al.* (2006) technology infrastructure establishes the ground on which e-business can be built. Companies with enhanced IT infrastructure are in better position to make use of e-business technologies.

Slack, defined as the degree to which uncommitted resources are available to an organization (Rogers, 1995), is a part of DOI as well as a part of TOE framework. As IS exercise higher levels of voluntariness of use (Popovič et al., 2012) and are, as such, more sensitive for availability of resources, slack could be an important factor of IS adoption. According Hameed *et al*. (2012) IS department size means existing IT function and dedicate IT personal within the organization. The size of IT function is tightly connected with the time and labor needed in adopting new technology (Hwang *et al.*, 2004). Firms that do not possess the IT/IS expertise may be even unaware of new technologies or may just not want to risk the adoption of these innovations (Premkumar & Roberts, 1999).

2.3.3 Influence of Environmental factors on adoption of Information systems

These factors are external to an organization and they present constraints and opportunities for technological innovations. Both internal and external factors can influence an organization's decision to adopt and continuously use a particular technological innovation. According to Porter (1979), the

external environment of an organisation includes its competitors (existing and potential), its customers (existing and potential), and its buyers (existing and potential). Based on Porter (1979) and Chang (2010), the present study used four dimensions in order to capture the "environmental context" construct: competitor's pressure, customer's pressure, partners pressure and government support. Pressure from competitors, customers, and key suppliers represents an important external driver.

Competitive pressure does impact the adoption of IS innovations and has been reported to be one of the better predictors of IS innovations in business (large and SMEs).(Chong and Pervan 2007, Huang *et al.* 2008; Jeyaraj *et al.* 2006). Previous studies have suggested that an increase in market pressure makes it more likely for a firm to increase its use of technological innovations to enhance its responsiveness to market changes and its delivery of customer service (Zhu *et al.*, 2006). Competition also pressures organisations that have not adopted or initiated plans to adopt HMIS. If all the competitors are adopting HMIS, the organisation that chooses not to follow suit might be left lagging behind its competitors. However, there are also firms that do not believe in certain technology hypes and decide to sit back instead. In their study of e-business assimilation, Zhu *et al.* (2006) found that competition affects the initial stages of e-business positively. This is consistent with what was mentioned earlier, whereby organisations adopt technologies more aggressively when they are faced with competitive pressure. However, their findings showed that competition may also distract an organisation from learning how to use a technology. The organisation might end up chasing the latest technologies without having time to infuse them into the organisation. Jeon *et al.* (2006) argued that a high competitive environment urges companies to adopt methods and procedures to become more efficient and profitable. Moreover, according to Pavlou and El Sawy (2010), the use of new technologies is more important in competitive environments, in which products rapidly change and in which competitors act in an unpredictable manner. Despite that, it seems that environmental uncertainty has not been extensively investigated in the research of e-business adoption (Larsen, 2003). According to Coltman *et al.* (2007), companies that adopt e-business as a result of environmental pressure significantly improve their performance.

Moreover, in markets with strong competition, companies rely on information from the external environment in order to enhance their technological infrastructures, while technological innovations are being regarded as prerequisites of success (Zhu *et al.*, 2006). The environmental dimension represents the current operating environment of the firm. This will no doubt impact the organization as it adopts

new information systems (Chang *et al*. 2006; Hsiao *et al*. 2009).This competitive pressure will force them to adopt new information systems quickly to provide the products or services better and gain strategic advantages. Previous studies also confirm the fact that business competition significantly influences organizations to adopt new technologies (Hsiao *et al*. 2009). Jeon et al. (2006) also fail to identify significantly reactive behaviors in response to competitors' decisions to adopt e-business or not. In turn, Hsu *et al.* (2006) find that competitive pressure has a negative effect on the intensity and diversity of use of e-business: Firms facing higher levels of competition make less and less varied use of e-business. Zhu *et al.* (2006) find that strong competitive pressure leads firms to adopt e-business systems quickly. This makes it difficult for them to assimilate the systems gradually or adequately, with negative repercussions for the implementation. Vilaseca *et al.* (2007) obtained a similar result among 2,038 Spanish firms. They found that the competitive environment has a positive effect on the decision to adopt e-commerce, but not on its effective implementation. An explanation for these results could lie in the fact that firms that face excessive competitive pressure will not have enough resources left to adopt innovations.

Intense competition can cause a business to look at new ways of doing business, including utilizing technological innovations for survival. Regarding customers' pressure, Carmichael *et al*.(2000*)* suggest that the key driver for SMEs to innovate is customer feedback and demand. Also, Kula *et al.*(2003) implied that most SMEs innovate only when they come under pressure from their clients.

Khemthong and Roberts (2006) highlighted the importance of customer power to the adoption of internet and web-based marketing activities. Their results showed a positive relationship between customer power and Web adoption, with the former being one of the push factors for hotels to use internet-based marketing activities. Moreover, various empirical studies (Chong *et al.*, 2009; Del Aguila and Padilla, 2008) have found that suppliers and customers can influence the adoption of e-business technologies.

With respect to business partners' pressure, Hadaya (2006) showed that the deployment of IEBT and related technologies improves commercial transactions and relationships between businesses and their partners. According to Chang (2010), trading partner capabilities is a significant determinant of on-demand e-business adoption. On-demand e-business is modulated and standardized on the needs of each

company. Therefore, a complete supply chain is motivated to use the same e-business architecture in order to act as an integrated unit. Chau and Jim,(2002) and Mehrtens *et al.*(2001) found that business partner influence is a significant predictor of the acceptance of IS innovations. However, others did not confirm this relationship.(Chau and Hui 2001, Windrum and de Berranger 2004).

Government support in this study refers to the assistance provided by the authority to encourage the spread of IS innovations in businesses. According to Jeon *et al.* (2006), an important environmental determinant that motivates companies to adopt e-business is the financial support and the motivations provided by the government. Parker and Castleman (2009) consider that especially in small economies, such as the Greek economy, government plays the most crucial role in the ebusiness adoption decision. On the same vein, Papazafeiropoulou and Pouloudi (2000) argue that government support is a key factor for e-business adoption. Governments should not only make use of the internet themselves, but also actively encourage companies to do so (Simon, 2004). A government could provide support via subsidies, procurement, or by acting as a trusted third party (Papazafeiropoulou and Pouloudi, 2000). According to the Economist Intelligence Unit (2009), government policy and vision is one of the main factors for formulating the e-readiness ranking of every country. Spremic and Hlupic (2007) argued that government rules and strategies have a significant effect on e-business development. Government policies will encourage companies to adopt e-business at a high rate, therefore increasing e-business development on the whole country. Studies examining the relevance of government support for technology adoption have produced mixed results. The study by Gibbs and Kraemer (2004) that included businesses from both developed and developing countries noted that "Government promotion (support) through incentives and procurement requirements was also marginally significant, although it had less of an effect." Yet, others (Thatcher *et al* 2006) reported that government commitment is vitally important in the IS adoption process of SMEs. Khemthong and Roberts (2006) highlighted the importance government support to the adoption of internet and web-based marketing activities. The literature suggests that government support is related to IT adoption.

Organizations also adopt process innovations to comply with legal and government requirements. For example, organizations may be forced to adopt HMIS in response to changing regulatory requirements such as Kenya's Vision 2030, The Constitution of Kenya 2010 and Kenya Health Policy 2012-2030. HMIS can help the organization better manage and document their investment decisions for audit

requirements related to these regulations. A summary of empirical studies of firms' adoption of ICT and technology adoption studies.is presented in table 2.2 and table 2.3 respectively.

Table 2.2:Empirical studies of firms' adoption of e-commerce or other information and communication technology (ICT) taking integrative approach, and dimensions considered

Theoretical Framework	**Author(s) and year**	**Object of analysis**	**Scope of analysis**	**Dimensions Considered**
Innovation literature	To and Ngai (2006)	E-Commerce adoption	Firms	Competitive pressure Channel Conflict Relative advantage Technical resource competence
TOE framework	Zhue et al. (2006)	E-business adoption	Firms	Environmental context Organisational context Technological Context
Technology diffusion literature	Chong (2007)	E-Commerce adoption	SME's	External Environment factors Internal Environment factors
Contingency Theory, TOE framework	Lee and Kim (2007)	E-commerce adoption	Firms	IS related factors Organisational factors Characteristics of technology innovation
Interactionism	Tan et al. (2007)	E-commerce adoption	Firms	Perceived external e-readiness Perceived organizational e-readiness
ICT adoption literature	Rodriguez-Ardura *et al.* (2008)	E-commerce adoption	Spain	Factors of competitive environment Factors of firm's value proposition

Source: The Information Society, 2010

Table 2.3 Summary of existing technology adoption studies

Study	Technology studied	Adoption factors
Zhu *et al. (2006)*	E-business	Technology: technology readiness, technology integration Organisation: firm size, global scope,managerial obstacles Environment: competition intensity, regulatory
Wang *et al.* (2010)	RFID	Technology: relative advantage, complexity, compatibility Organisation: management support, firm size, technology competence Environment: competitive pressure, trading partner pressure, information intensity
Sharma *et al.* (2007)	RFID	Technology: perceived benefits, perceived cost Organisation: management support, IS infrastructure and capabilities, financial readiness Environment: perceived standard convergence, perceived privacy
Chang (2007)	Electronic signature	Technology: security protection, system complexity Organisation: user involvement, resources, organisation size, internal need Environment: vendor support, government policy
Lin and Lin (2008)	E-business	Technology: compatibility, expected benefits Organisation: IS infrastructure, IS expertise Environment: competitive pressure, trading partner

		readiness
Raymond and Uwizeyemungu (2007)	Enterprise resource planning	Technology: assimilation of computer integrated manufacturing systems Organisation: size and structure, type of production, operational capacity, innovation capacity, financial capacity Environment: commercial dependence, networking intensity

Source: International Journal of Production Research, 2013

2.4 Summary of Literature and Research Gaps

The literature review analysis revealed the following gaps in the relevant literature:

The contemporary literature is mainly on adoption of an innovation or information systems or information technology in business related industry. There is none that has been conducted in healthcare industry. Additionally, most of the existing studies on acceptance and use of technology were done in developed countries with better facilities than developing countries. Kenya being a developing country, factors affecting adoption of HMIS are different as compared to developed countries. Therefore, the model described in this paper will bridge these gaps by studying the adoption of HMIS in Kenya.

When fully developed, tested and validated, the model will both explain the current situation in terms of HMIS adoption in a developing country context, as well as provide significant contribution to the scientific understanding of acceptance and use of technology in healthcare setting by extending the TOE model. The outcomes of this study will also provide practical suggestions to system developers and implementers on interventions that can lead to more successful HMIS adoption and inform policy makers on strategies to proactively design and target interventions to increase the success of new health ICTs. TOE framework seems to be the most popular approach, since most studies have used it as a basis for their analysis.

The present study is designed so as to cover the limitations (research gaps) of the literature described above. Its main goal is to build a coherent conceptual framework including the most significant

antecedents of HMIS adoption and test that framework by gathering quantitative data and using regression analysis statistical techniques.

In synopsis, the present study contributes in the following areas:
It focuses on a developing country, an approach that has found limited empirical investigation in the international literature. Secondly, It examines the antecedents of HMIS adoption in Kenya. The literature review that was conducted failed to recognise similar studies. Moreover, it enhances the literature with an empirical research that has adopted the most popular methodological approach (TOE framework), offering room for comparisons and future replication studies. Additionally, it offers an operationalisation of several constructs based on previous studies, also offering a basis for future research.

2.5 Conceptual Framework

The conceptual framework follows the TOE (Technology- Organization- Environment) framework (Tornatzky and Fleiscer, 1990). The TOE framework which identifies the technological, organizational and environmental factors in the adoption of technology has been used to come up with the Conceptual Framework presented in Figure 2.4. According to this approach, a company's decision to implement a technological improvement is affected by technological, organizational and environmental factors. The TOE methodology was used because its validity is supported by the literature (Lin and Lin, 2008; Oliveira and Martins, 2010; Srivastava and Teo, 2010; Wang *et al.*, 2010; Zhu *et al.*, 2003, 2004) and the factors under study fall into the three categories it proposes. More significantly, the use of the TOE framework as the reference theory is based on its attributes and its better fit with the context and the objectives of this study.

The framework shows the relationship between the dependent and the independent variables. The conceptual framework of this study incorporates the twelve independent variables and one dependent variable. The independent variables are classified into three categories: Technological, Organisational and Environmental.

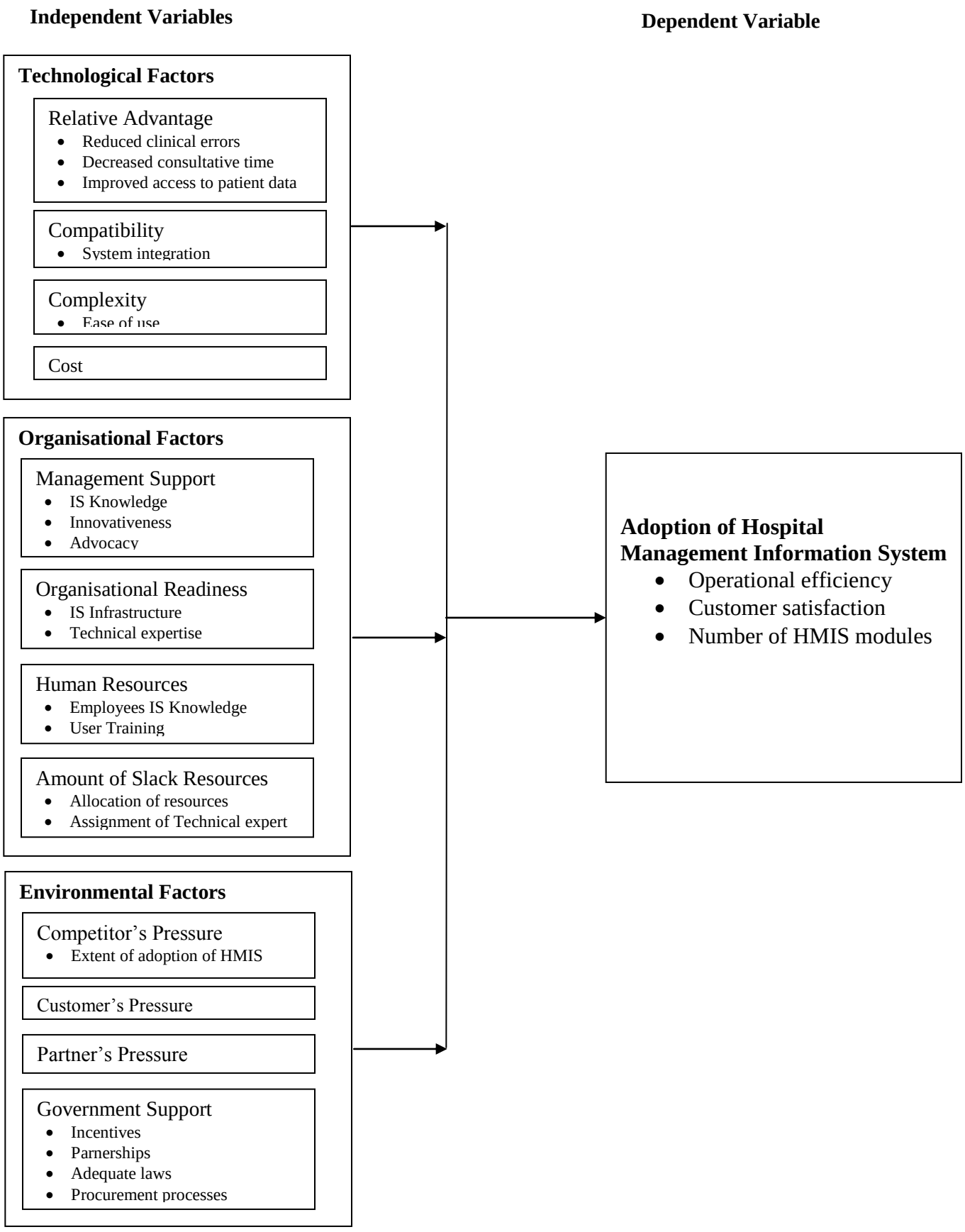

Figure 2.4: Conceptual Framework
Source: Researcher, 2016

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter explains the research design and the methods that were used in collecting and analyzing data. The target population and sample design is also explained in this chapter.

3.2 Research Design

Research design is the roadmap that deals with the procedures in which data will be collected, analysed and interpreted in order to achieve research objectives.

The study adopted the survey research design, which according to (Creswell, 2009) provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample population, which is essential for achievement of this study. According to Mugenda and Mugenda (2003) survey is a form of analysis where studies are done on institutions and from the study, data generalizations and inferences are drawn. The researcher preferred this method because the main objective of the research was to investigate the adoption factors of HMIS in selected hospitals in Meru County. Respondents were required to provide data or information through closed ended structured questionnaire using five-point Likert scale.

3.3 Target Population

Mugenda and Mugenda (2003) defines population as an entire group of individuals, events or objects having a common observable characteristic i.e. aggregate of all that conforms to a given specification. According to (Muthafena 2007), population refers to the potential subjects who possess the attributes in which the researcher is interested. Target population refers to all members of a real or hypothetical set of people, events or objects to which an investigator wishes to generalize the results of a research study (Mugenda and Mugenda 2003). Researchers usually draw conclusions about large groups by taking a segment of the population selected to represent the population (Cooper & Schindler, 2003). Meru County has 183 health facilities with an estimated population of 1.3 million people. However, for purposes of this study, SemaDoc Hospital Cash Benefit Facilities for the year 2015 report was used. According to the report, Meru County has 28 hospitals; 14 government and 14 private hospitals and nursing homes as presented in Appendix III. The target population for this study consisted of five selected hospitals in Meru County. These hospitals were selected since the researcher considered them

to be able to provide the required information on technological, organizational and environmental factors that influence adoption of HMIS in Meru County. These hospitals included: St. Theresa's Mission Hospital – Kiirua, Maua Methodist Hospital, PCEA Chogoria Hospital, Nyambene Clinical Services & Nursing Home and St. Anne Mission Hospital. In this study, a target population of 447 employees consisting of 27 doctors, 238 nurses, 28 Phamarcists, 33 Laboratory Technologists, 17 Hospital Administrators/Hospital Managers, 9 ICT managers, 11 accountants, 42 cashiers and 42 Administrative staff was used.

3.4 Sampling Design

Sampling is the process of selection of appropriate number of subjects from a defined population (Chalmers, 2002). Sample design refers to the method the researcher will use to select respondents from the target population for the study. This study used stratified random sampling technique since the population of interest was not homogeneous and could be subdivided into groups or strata to obtain a representative sample. Stratified sample helped the researcher to obtain sufficient sample points to support a separate analysis of the subgroups involved (Mary & Mugenda, 2003).

3.4.1 Sampling Technique

According to Welman and Kruger (2001), in the simplest case of random sampling, each member of the population has the same chance of being included in the sample. This method was preferred because the respondents were grouped into categories which were followed by random sampling. A sample is a subject of the target population which the researcher intends to generalize the findings (Mugenda & Mugenda, 2003). The sample represented staff working in various departments in selected hospitals in Meru County. Respondents from selected hospitals were drawn from various staff categories, each category represented a stratum. They included: Doctors, Nurses, Pharmacists, Laboratory Technologists, Hospital Administrators/Managers, ICT Managers, Accountants, Cashiers and Administrative staff. The sample size generally depends on a number of factors e.g. number of variables in the study, type of research design, and method of data collection and the size of accessible population (Borg, 2001). According to Mugenda & Mugenda (1999) at least 30% of objects are required per category of the target population. Therefore 30% of the target population in each category was selected to form a sample size. However, for purposes of this study, if 30% of the target population is less than five, the researcher will use 100%. Table 3.1 presents the sampling frame.

Table 3.1

Sampling Frame

Population Category	**Target Population**	**Percentage**	**Sample**
Doctors	27	30%	8
Nurses	238	30%	71
Laboratory Technologists	28	30%	8
Pharmacists	33	30%	10
Hospital Administrators/Hospital Managers	17	30%	5
ICT Manager	9	100%	9
Accountants	11	100%	11
Cashiers	42	30%	13
Administrative Staff	42	30%	13
Total	**447**		**148**

Source: Organisational Records, 2016

3.5 Data Collection Instruments

Data collection instruments refer to tools the researcher will use for data collection.

The research study relied on both primary and secondary data sources. Primary data was obtained using structured questionnaires. In addition to primary data, secondary data from journals and e-books was also used to provide comparative perspectives to the study.

Questionnares were preferred because they were easy to administer to key informants. The questionnaires were self-administered to the 5 selected hospitals in Meru County in order to achieve the highest return rate and ensure the quality of data obtained from the researcher to respondents. By directly administering the questions to the respondents, the researcher was able clarify on grey areas. Most of the respondents requested to be given some time to cornplete the questionnaires and therefore the researcher dropped the questionnaires and collected them later. Questionnaires are also considered convenient, less costly and covers many respondents at the same time (Kothari, 2004). The researcher further believed that the objectives of this study will be achieved effectively by use of this method. The questionnaire was based on a 5-point likert scale where respondents were asked to indicate the extent to

which they agree with each of the variables in regard to HMIS adoption. The questionnaire consisted of four sections. The first section captured the general information on the respondents. The second to fourth section captured information on influence of TOE factors on HMIS adoption. While secondary data was obtained from internet, magazines, journals newspapers, books and reports.

3.6 Data Collection Procedure

Data collection procedures refer to a process in which the tools of data collection are identified. The researcher obtained a letter of introduction from Graduate School of Kenyatta University (Appendix iv). The introduction letter was then used to apply for a research permit from the National Council of Science and Technology (Appendix v) and letter of Research Authorization (Appendix vi). Clearance was sought from Meru County Commissioner (Appendix vii), Director County Ministry of Education (Appendix viii) and Director County Ministry of Health (Appendix ix) as advised by the National Council for Science and Technology. The researcher then communicated to participating hospitals in writing, her intention to carry out a study (Appendix x). Permission to carry out research in respective hospitals was also obtained either verbally or in written (Appendix xi). The purpose of the study was explained by the researcher to all participants. All information obtained was treated with confidentiality. Participation in the study was voluntary. The researcher self-administered the questionnaires to the respondents in order to increase the response rate. The respondents were then given a period of one week to answer the questions after which the questionnaires were picked from the respondents for coding and analysis.

The study employed self-administration approach of data collection and monitored the process to ensure that respondents who were not part of the sampled group do not fill the questionnaires. In many cases, the questionnaires were filled while the researcher waited, thereby providing clarification where necessary whereas in cases where the questionnaires were to be left behind, the researcher made subsequent visits and calls when necessary to remind the respondents to fill in the questionnaires thereby increasing the response rate.

3.6.1 Pretesting

The questionnaires were pretested at Meru Teaching and Referral Hospital. A sample of 10 staff participated in the pretesting of the questionnaire.

Questionnaires were administered to a group of ten employees with a representation from each category. After first administration of the questionnaire to the sample of 10 employees, the same questionnaire was re-administered to the respondents after one week but they were not from the sampled group. Pretesting was done before the actual study to ensure that the items tested what they were intended to (validity) and that they consistently measured the variables under study. Any important corrections, clarifications, suggestions and omissions highlighted during the pre-testing exercise were then adopted and used to improve the study instrument.

3.6.2 Reliability

The reliability of a research instrument is the extent to which the research instrument yields the same result on repeated trials. Citing Straub *et al.* (2004), Dwivedi *et al.* (2010) explained on the need for conducting reliability testing so as to confirm internal consistency. It is very important to know whether the same set of item will elicit the same responses if the same questions are recast and re-administered to the same respondents. Variables derived from test instruments are declared to be reliable only when they provide stable and reliable responses over a repeated administration of the test to the same person under similar conditions (Gill and Johnson, 2010). In the current study, individual item reliability was measured using Cronbach's alpha. Yet, as Krippendorff and Bock (2007) pointed out that it was statistically implausible to get either an alpha value of a 1 or a 0 but it could be any point between the two. Thus, if the estimated Cronbach's alpha was above 0.7, then the instrument would be deemed to have a high internal consistency, and thus high reliability (Dwivedi, Choudrie, & Brinkman, 2006; Sanchez-Franco & Rondan Cataluna, 2010; Cokluk, 2011; Bulbul, 2012).

In evaluating reliability of findings through the study instrument used, a pilot study was carried out on 10 respondents. Using Cronbach's alpha, internal consistency was evaluated. This was aimed at establishing how sets of variables are related in the group. As argued by Nunnally (1994), a construct composite reliability coefficient of above 0.7 is considered adequate for reliability of a research tool in carrying out a study.

3.6.3 Validity

Validity refers to the accuracy of the measurement process. According to Mugenda and Mugenda (2003) validity is the accuracy and meaningfulness of inferences based on research results. Borg *et al.*, 1989

defines validity as the degree to which a test measures what it purports to measure. All assessment of validity is subjective opinions based on the judgment of the researcher (Wiersma 1995). Creswell (2009) suggests that, to use an existing instrument, describe the established validity and reliability of scores obtained from past use of the instrument. It comprises of the degree to which results obtained from the data analysis represent the subject of the study. The researcher used content validity which is a non-statistical type of validity that involves "the systematic examination of the test content to determine whether it covers a representative sample of the behaviour of the domain to be measured" (Cooper & Schindler, 2003). This was done by organizing questions in line with the specific objectives of the study. Pilot testing was used in examining the face validity, content validity and ethical appropriateness of the questionnaire. Through pilot testing, the responses of the subjects were checked against the objectives. The results of the reliability test were used to assess content validity.

Mugenda and Mugenda (1999) contend that the usual procedure in assessing the content validity of a measure is to use a professional or expert in a particular field. To establish the validity of the questionnaire the researcher prepared the document in consultation with the supervisor and also sought opinions of experts in the field. This facilitated the necessary revision and modification of the research instrument thereby enhancing validity.

3.7 Data Analysis Techniques

Data collected from the questionnaires were summarized, coded, tabulated and checked for any errors and omissions. The collected data was summarised processed and analysed statistically using descriptive and inferential statistics. Frequency tables, percentages and means were used to present the findings. The responses from the open-ended questions were listed to obtain proportions appropriately, the responses were then reported by descriptive narrative as qualitative analysis. Quantitative data was analysed using descriptive statistics such as averages, percentages, means and standard deviations. Descriptive statistics was used to analyse demographic characteristics of respondents. This included mean, frequencies and percentages. Descriptive statistics was preferred because it is easy to use in manipulating and presenting the data. The results were presented in tables of frequency distributions, percentages, pie charts, bar graphs and figures.

Inferential data was analysed using Logit regression model to examine the relationships between the independent variables and the dependent variable. Binary logistic regression technique was used to predict the presence or absence of adoption of HMIS in selected hospitals in Meru County based on values of all the three influential factors as predictor variables. Statistical Package for Social Sciences (SPSS) version 20.0 was used as an aid in analysing the results.

Regression analysis was applied in all the cases where correlation was found to exist between the independent and dependent variables.

3.8 Ethical Considerations

Ethical practices that were put into consideration during the research study included confidentiality of responses, anonymity of respondents, honesty in reporting findings from the proposed study and integrity in handling data and information collected from the research study. The respondents were assured both in writing and verbally that the information obtained from them would be treated with utmost confidentiality. In addition, the researcher used random identities to ensure privacy of participating institutions. Presentation of findings has been done without disclosure of respondents' identities thus ensuring privacy of the respondents.

Respondents were also informed that their participation in the study was voluntary and therefore were at liberty to decide whether to take part in the survey or not. Further, the researcher did not compel the respondents to give any information or change their feedback thus exercising respect for respondent's decisions on the information provided. The researcher also indicated that the information provided in the questionnaire was for academic purposes only and expressed her intention to share or give feed back to respondents on research findings.

CHAPTER FOUR
RESEARCH FINDINGS

4.1 Introduction

This chapter presents research findings and discussions. In general, the study aimed at investigating the adoption factors of Hospital Management Information Systems in selected Hospitals in Meru County. The areas covered in this chapter include sample characteristics, descriptive statistics, variables of the study and inferential statistics. The data is presented in tables and figures.

4.2 Sample Characteristics

4.2.1 Response Rate

A total of 148 structured questionnaires were distributed in all the 5 selected hospitals in Meru County. Out of the 148 questionnaires that were administered, 120 were filled and returned, however, 28 questionnaires were not returned. Therefore the response rate was 81% which was adequate for statistical analysis of the findings. According to Mugenda and Mugenda (2003), 50% response rate is adequate, 60% and above good, while 70% rated very good, This collaborates with Bailey's (2000) assertion that a response rate of 50% is adequate, while a response rate greater than 70% is very good. This implies that based on this assertion, the response rate in this case of 81% is very good and therefore adequate for the purpose of this study.

The high response rate can be attributed to the data collection procedures, where the researcher pre-notified the potential participants (targeted hospitals) of the intended survey. A questionnaire was self-administered and respondents were given time to fill. Follow up calls and physical visits were made to clarify on any queries as well as prompt the respondents to fill the questionnaires which were picked for analysis.

4.2.2 Reliability Analysis

Reliability test was conducted to determine the consistency of the measures of the research instrument. and all factors had Cronbach alphas of 0.7 and above. The number items of each variables and the Cronbach Alpha are shown in Table 4.1. According to Sekaran (2009), the nearer the figure of reliability coefficient to 1.00, the better the appliance generally whereas reliability over 0.80 is good and

those less than 0.60 is measured to be poor. The study found that overall cronbach's alpha was 0.825 while variables had; Technological (0.825), Organisational (0.702) and environmental (0.878). Sushil and Verma (2010) has indicated 0.7 to be an acceptable reliability coefficient.

Table 4.1

Reliability of study findings (Cronbach's Alpha)

Variables	No. of Items	Chronbach Alpha
Technological Factors	12	0.863
Organisational Factors	10	0.702
Environmental Factors	11	0.878
Overall Reliability	42	0.825

Source: Research Data, 2016

As evidenced from the study results, the scales measuring the objectives had a very high reliability. This was indicative that the research tool was sufficiently reliable to carry out the study without further amendment.

4.3 Descriptive Statistics

4.3.1 Demographic information

The study sought to establish the demographic data of the respondents. This is the information on characteristics of the respondents. It includes gender, job title, level of education, work experience, duration of hospital existence, number of beds, location of hospital and number of employees.

4.3.2 Gender of the respondents

Data was sought on whether respondents were males or females. The purpose was to establish the gender distribution of the respondents. Data collected showed that majority, 63% were female while males were 37%. This shows that the sample had more women than men who took part in the study as depicted in figure 4.1. This pattern reflects the general trend in healthcare settings where most of the workers are female. The findings concur with those of (Muathe, 2010) while studying factors influencing ICT adoption among health workers in SMEs in Nairobi, Kenya where he observed that most of the health workers were females compared to males. The pattern is similar to what was

observed by Kordic (2013) while studying influence of social economic and demographic environment of health care providers in Croatia. However, there is no significant relationship between gender of health workers and adoption of HMIS. The results enabled the researcher to obtain information from both genders, although female were slightly more than male, they were appropriate to provide reliable information.

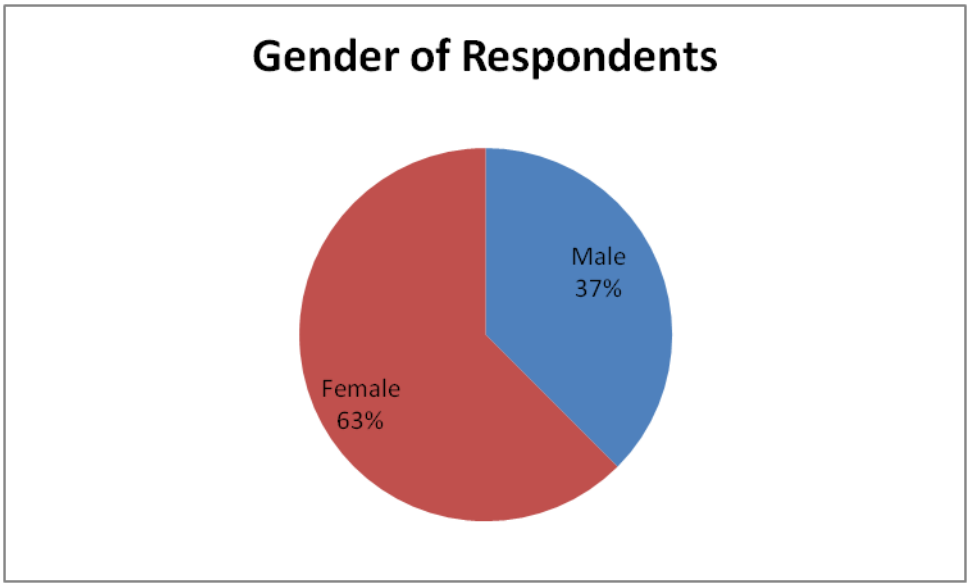

Figure 4.1 Gender of Respondents
Source: Survey Data, 2016

4.3.3 Job Title

Distribution of the sampled respondents by profession was also sought. Majority (42.5%) were Nurses followed by Accountants (12.5%), Doctors and Clinical officers had an equal proportion (10%), Laboratory Technologists (9.2%), ICT officers (6.7%), followed by Cashiers, Pharmacists and administrative staff with (5.8%) each while Hospital Administrators were the least (1.7%). Data revealed that most of the departments that use the HMIS system in selected hospitals were represented in this study. The sample was picked proportionately depending on the population. The higher the population, the higher the sample resulting in the high number of nurses. Nurses were the highest with 42%. This could also be attributed to the fact that most of the services offered in these hospitals are mainly nursing services. This observation is in support of the findings recorded by Garrosa *et al.* (2008) while studying relationships between socio-demographic variables of health providers in Spain where nurses were majority (59%). This implies that majority of employees in organizations under investigation were nurses as indicated in figure 4.2.

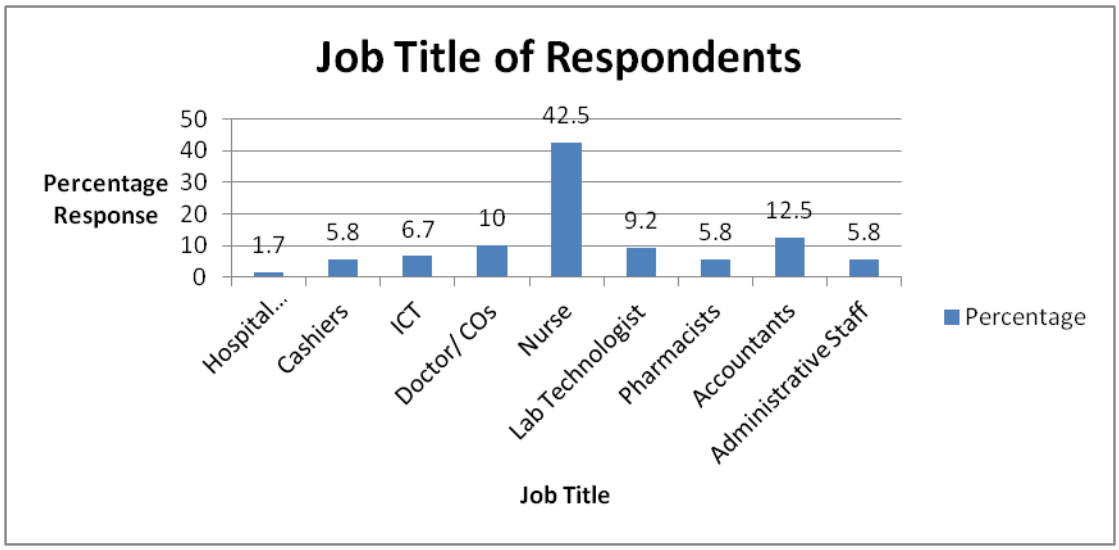

Figure 4.2 Job title of respondents

Source: Survey Data, 2016

4.3.4 Level of Education

The question sought to establish the respondents' highest academic qualification. The answers were as varied as the number of respondents. The results in figure 4.3 indicate that majority of the respondents (63.3%) were Certificate/Diploma Holders, 22.5% had a Bachelor's degree, 11.7% had Post Graduate degree/Diploma, 1.7% were PhD holders while Higher Diploma holders were the least with 0.8%. These results show that the respondents were well educated since majority of the respondents had diploma qualifications and above which is in line with what Venkatesh *et al.* 2008) found out. This is significant since it assured the researcher that the responses are based on informed and educated perspective.

This confirms the previous research by (MacGregor, 2004) indicating the significant influence of educational level towards technology adoption. Middle to top management within healthcare institutions plays an important role as decision maker. Hospitals tend to have highly centralized structure, where these people make most of decisions in the institution. They make nearly all decisions from strategic to daily operations (Bruque & Moyano, 2007, Nguyen, 2009). Generally, people with higher education background have more insights, information and knowledge. They have more access to information. Thus, education background of middle to top management in hospitals plays an important role in the decision making process of adopting ICT.

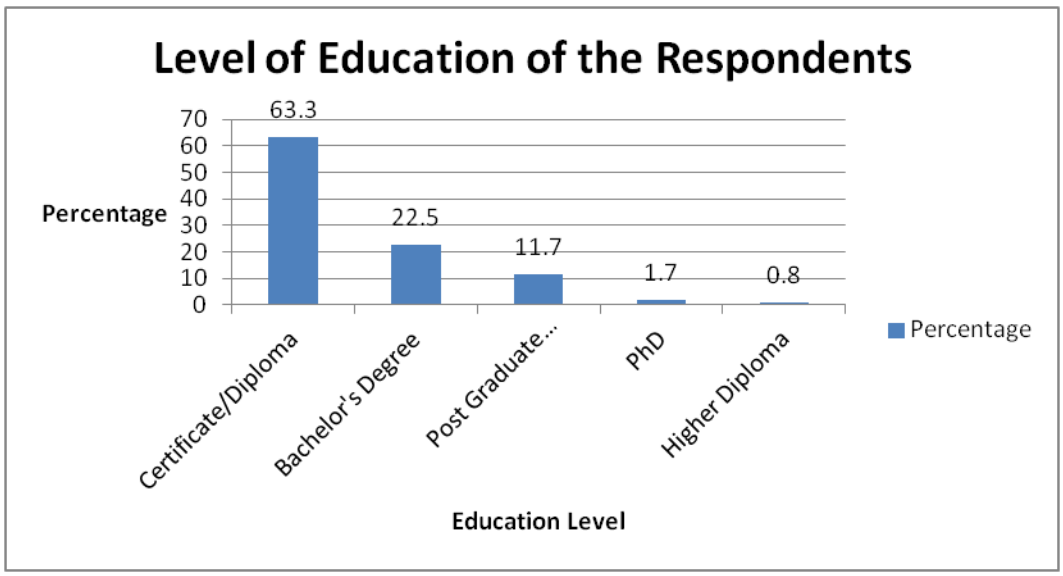

Figure 4.3 Level of Education

Source: Survey data, 2016

4.3.5 Work Experience

Prior literature has linked experience to the adoption of technological innovations (Venkatesh, Thong and Xu, 2012). In general, physicians tend to be very confident and autonomous within their profession, an attribute that derives from their highly demanding education, their specialised knowledge and skills (Chau and Hu, 2002a). As a result, they tend to be dubious and sometimes reluctant to accept the proliferation of technology or to adopt innovative methods in contrast to their traditional working routines (Menachemi and Brooks 2006, Anderson and Aydin, 1997). This becomes more intense as physicians become more experienced. This resistance to change in their working practice and the tendency to avoid new ways of working can have a negative impact on both their attitude towards an innovative service and their intention to adopt a new technology (Harrison *et al*, 2002). The question intended to establish work experience of the respondents in their respective institutions. The results indicated that majority of the respondents (43.3%), had between 0 - 1 year of work experience. 20.8% had 10 years and above of work experience, 18.3% had 1-3 years, 11.7% had 4 - 6 years while 5.8% had 7 - 9 years of work experience as presented in figure 4.4. This shows that most of the respondents had little or no much experience at their institutions. This could be attributed to the high number of young medical professionals currently being employed in healthcare institutions in Kenya. Most health workers complete their specialized studies at an early age and get employed while most retire or leave

service after 50 years. Research has also shown that younger physicians will adopt technologies more quickly than their established colleagues (Ford, McAlearney, Phillips, Menachemi and Rudolph, 2008). According to Alkhateeb, Khanfar and Loudon (2010), as physicians' years in practice increase, they become less eager to adopt new technologies. This was important for this study because it showed that the respondents are fairly experienced in their respective professions in institutions under study to know their systems and how they operate. This gave the researcher an assurance of the quality of data received from the respondents. Further, the period of service showed that the respondents had used HMIS and therefore were in a better position to answer questions regarding the same.

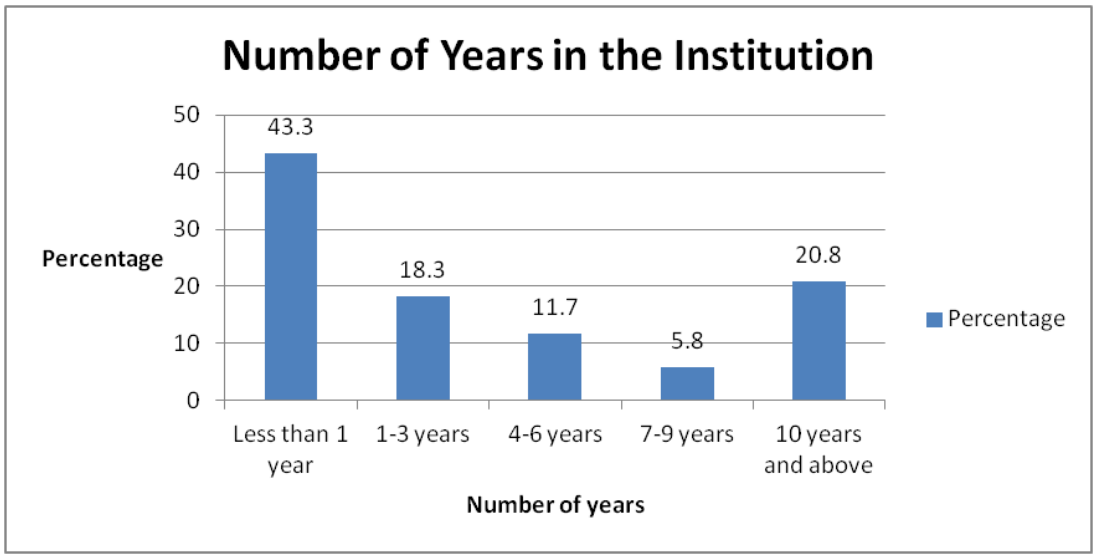

Figure 4.4 Number of years in the Institution

Source: Survey data, 2016

4.3.6 Existence of Hospital

The study sought to find out the duration for which the hospital had been in operation. Arguments can be raised on both sides regarding the rate of adoption and the age of the hospital. On the one side it is argued that as the hospital ages its rate of adoption increases. This would mean making the name familiar with the local population as well as building on the trust that the hospital has already created. This would attract more and more patients to the hospital. Increase in the demand for services should, as basic economics says, lead to increased supply which would necessitate increased adoption of better and appropriate technology. Other argument is based on the view that rather than the old hospitals, it is the

newly established ones which would go for an increased adoption of latest equipments. This is because, being a new establishment means, being new to competition. Thus for attracting clients as well as physicians from a market which is already having other established players, it necessitates that the hospital have to go for the adoption of the latest equipment (Rajan 2004). This was important for this study as it showed that the hospital has been in existence for a given period of time long enough to know the importance of adopting a system. The study showed that majority of the respondents (95%) indicated the period of existence of their hospitals as more than 20 years while 0.8% were the least having their institution in existence for 6-10 years. Thus age of the hospital is not an important variable determining the adoption HMIS. This is illustrated in figure 4.5.

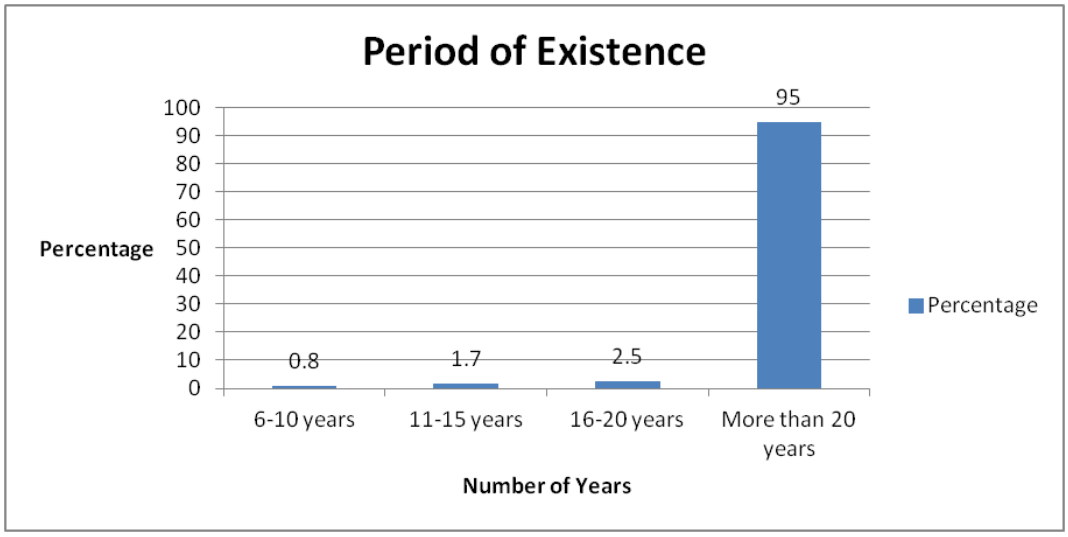

Figure 4.5 Existence of Hospital

Source: Survey data, 2016

4.3.7 Beds Capacity

The study sought to find out the number of beds per hospital. This was necessary as it indicated the size of hospital which explained their need for a system to increase efficiency. Further, it ensured that the researcher was not biased as all sizes of hospitals were represented. Hospital size is the strongest predictor of adoption, and the health IT-size relationship is positive and significant for all applications. Large hospitals have 79 percent higher levels of overall adoption and 6-15 times greater odds of adopting ADM and ROBOT than small hospitals (Furukawa *et al.*, 2016). From the findings, majority

of the respondents (70%) indicated 150 and above number of hospital beds while 8.3% were the least with less than 50 hospital beds. The study therefore revealed both small and large hospitals have adopted information system thus hospital size was not significant. Figure 4.6 presents the number of hospital beds and their percentages.

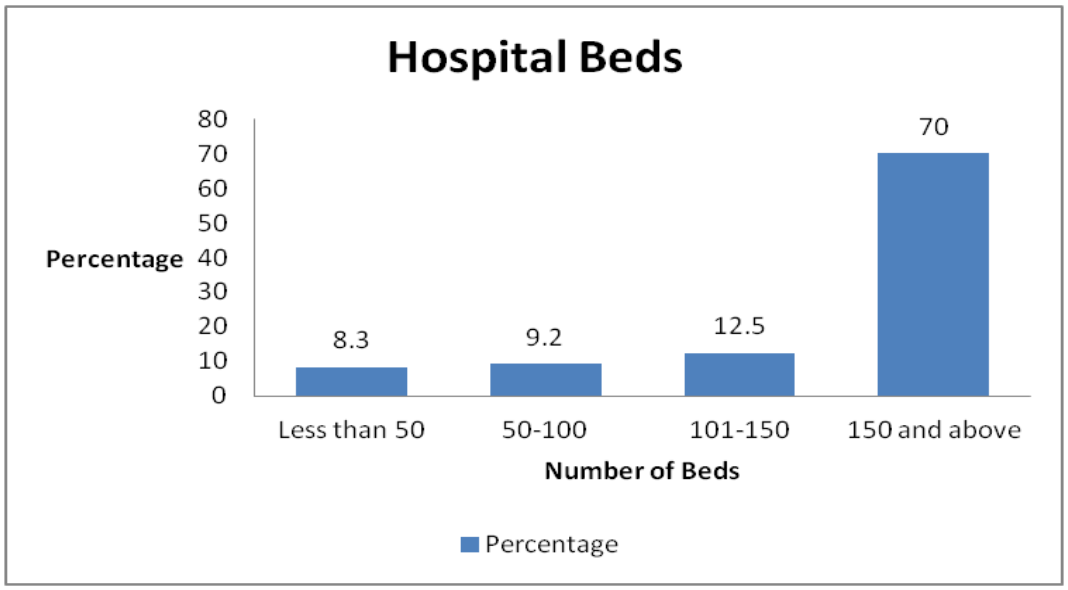

Figure 4.6 Beds Capacity

Source: Survey data, 2016

4.3.8 Hospital Locality

By location the study implies as to whether the hospital is functioning in an urban area or rural area.

The study sought information about where the respondent's institution is located. The study tried to check as to whether there existed any relation between the level of urbanization and the adoption of technology. Relative to private not-for-profit hospital geographic location might be associated with either higher or lower health IT adoption. (Furukawa *et al.*, 2016). The findings of the study indicated that 54.2% of the hospitals were in urban areas while 45.8% were in rural areas. This was necessary as hospitals in both locations were covered thus eliminating biasness.The study further revealed that HMIS had been adopted in both urban and rural areas. Figure 4.7 presents information on location of the hospital.

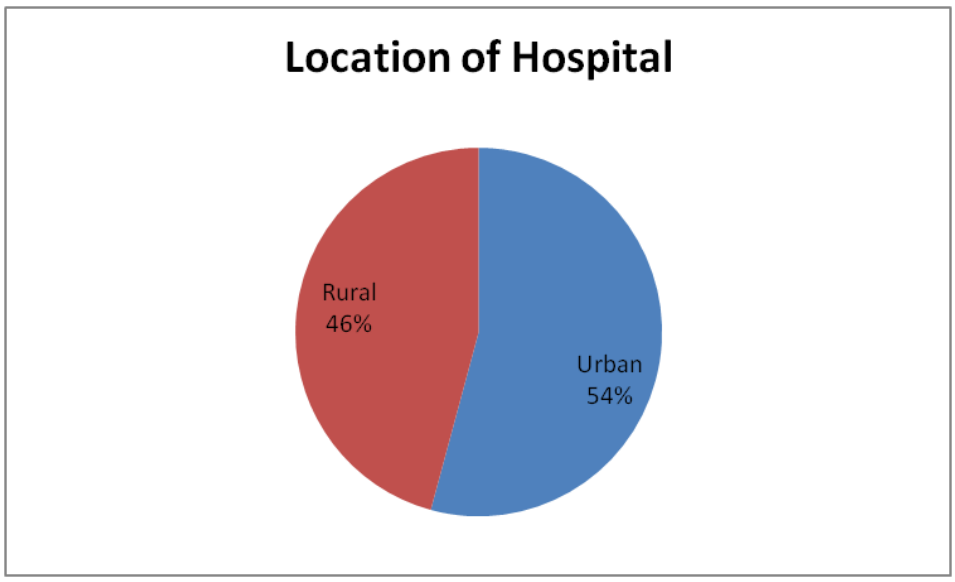

Figure 4.7 Hospital Locality

Source: Survey data, 2016

4.3.9 Number of Employees

Number of employees was important in establishing the size of the hospital. Results in table 4.2 shows that majority, (79.2%) of the respondents indicated that they worked in hospitals with 200 and above employees while minority (8.3%) were from hospitals of 50 and below employees. This implies that most of the hospitals under study were large hospitals. According to Yu 2012, larger hospitals achieve easily economies of scale and mainly information and resources needed across the organization. Several studies show a positive relationship between ICT adoption and organization size (Zhu *et al., 2003;* Pan & Jang 2008) since they have more finances compared to smaller institutions. However, in this study, both large and small hospitals had adopted the system.

Table 4.2

Number of Employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	50 and below	10	8.3	8.3	8.3
	51-100	10	8.3	8.3	16.7
	101-150	1	.8	.8	17.5
	151-200	4	3.3	3.3	20.8
	Above 200	95	79.2	79.2	100.0
	Total	120	100.0	100.0	

Source: Survey data, 2016

4.4 Variables of the Study

4.4.1 The influence of Technological Factors on the adoption of HMIS

Respondents were asked to agree or disagree with a number of statements regarding influence of technological factors on the adoption of HMIS in their institutions. A five-point Likert scale, where 1 (strongly agree) to 5 (strongly disagree) as (Venkatesh *et al.*, 2003) recommends was used and data analyzed using descriptive statistics (mean and standard deviation). Standard deviation was used to indicate variability of responses. In the scale, those variables which had a mean close to 4.0 represented 'disagree', those which had a mean close to 3.0 represented 'neutral' while those which had a mean close to 2.0 represented 'agree'. The statements aimed at assessing the respondents' perception on HMIS adoption especially with regard to relative advantage, compatibility, complexity and cost. The results indicate that most respondents disagreed that relative advantage (mean 4.67, 4.43 and 4.37, 4.21), compatibility (mean 4.12, 3.91, 4.12) and complexity (3.98) does not influence adoption of HMIS. These findings collaborate with a study on ERP by Ramdani *et al.* (2009) who did not find support for a positive relationship between compatibility and complexity factors on the adoption of information systems in organisations. The findings are also consistent with a study by Beatty *et al.* (2001) and Kendall *et al.* (2001) which did not confirm complexity as an important predicator in the adoption of IS. Further, a study on RFID by Wang *et al.* (2010) indicated that relative advantage was insignificant to the adoption of RFID. With regard to cost, most respondents (mean 3.87) agreed that cost was significant

to the adoption of HMIS with a standard deviation of 1.209. The findings are consistent with a study carried out by Jeon *et al.* (2006) who found out that the adoption cost, apart from the adoption decision itself, affects the extent of IS adoption. Further, a study by Irani *et al* .(2010) reported that manufacturing costs of a system and customization costs were significant in the adoption of RFID. The mean and standard deviation of variables under the technological factors are presented in Table 4.3.

Table 4.3

Influence of Technological Factors on the adoption of HMIS

	N	Mean	Std.Deviation
HMIS is beneficial to healthcare service delivery	120	4.67	.690
HMIS improves quality of healthcare services	120	4.43	.683
HMIS improves speed of service delivery to patients	120	4.37	.970
HMIS improves employees efficiency	120	4.21	.839
HMIS is compatible with our current work	120	4.12	.918
Knowledge on benefits of IT uses influences HMIS adoption	120	4.28	.879
Compatibility with nurses work	120	3.91	.961
Compatibility with laboratory operations	120	4.12	.881
Perceived consistency of HMIS with existing values and needs of potential users influence HMIS adoption	120	4.02	.926
HMIS is easy and convenient to use	120	3.98	.983
User friendliness of HMIS	120	3.94	.901
Cost of HMIS installation influences its adoption	120	3.87	1.209
Overall		**4.16**	

Source: Survey data, 2016

It was ironical to note that majority of respondents as indicated by the overall mean (4.16) on a 5-point Likert scale "disagreed" that technological factors (relative advantage, compatibility and complexity) influence the adoption of HMIS. One of the reasons most organizations embark on IS adoption are perceived advantages over existing practices and systems, consistency with existing values and needs of adopters and ease of use (Rogers 2003). Thus these results are contrary to those of Al-Qirim (2007),

Huang *et al.* (2007), Chang *et al.* (2006), Li *et al.* (2010), Hadaya, (2006) and Huang *et al* (2008) who found these variables significant to the adoption of IS. However, most respondents agreed that cost of adopting HMIS is high. These include installation costs, training costs, maintenance costs and cost of infrastructure. The feeling is that taxation on ICT is high and that prices of some ICT tools and equipment has been inflated making them unaffordable.

4.4.2 The influence of Organizational Factors on the adoption of HMIS

The study sought to investigate the influence of organizational factors on the adoption of HMIS. Specifically, the study focused on Top management IS knowledge, innovativeness, advocacy, IS infrastructure, technical expertise, employees IS knowledge, user training, allocation of resources and assignment of technical expert. The information was analysed using mean and standard deviation as presented in table 4.4.

Table 4.4

Influence of Organisational Factors on the adoption of HMIS

	N	Mean	Std. Deviation
Top management knowledge of ICT influences adoptioin of HMIS	120	4.29	.893
Top management supports the adoption of HMIS	120	4.24	.830
Top management's knowledge on emerging healthcare information systems influences HMIS adoption	120	4.26	.750
Poor ICT infrastructure influences HMIS adoption	120	3.88	1.192
Lack of user training influences HMIS adoption	120	3.88	1.254
Employees do not support the implementation of HMIS	120	2.29	1.253

Users are not fully involved in the adoption of HMIS	120	2.95	1.340
Employees knowledge of IS influences HMIS adoption	120	3.95	1.091
Computer literacy among stakeholders influence HMIS adoption	120	4.09	1.021
Lack of infrastructure influences HMIS adoption	120	3.78	1.298
Overall Mean		3.761	0.646

Source: Survey data, 2016

The results show that management support had a mean of (4.29, 4.24 and 4.26) on a 5-point Likert scale indicating that most respondents disagreed that management support influences the adoption of HMIS. These findings correspond with those of a study carried out by Wang *et al.* (2010) on RFID who found out that top management support and technology competence is insignificant to the adoption of IS. Further, the findings of this study contradicts those of Jeyaraj *et al.* (2006), Glynn *et al.* (2005), Hauge *et al.* (2010) who found that top management support consistently influences organisation's decision to adopt new technologies.

Organisational readiness was found to be significant to the adoption of HMIS with a standard deviation of 1.2 which implies that most respondents agreed that this variable influences the adoption of HMIS. The findings concur with those of Khemthong and Roberts (2006) who found organizational readiness significant to the adoption of IS. Further, these findings concurs with a study carried out by Kuang and Xu (2008) who found technological competence significant to the adoption of IS. A study carried out by Lin and Lin (2008) on e-business found IS expertise and infrastructure significant to the adoption of IS

The study infers that availability of IS infrastructure (mean 3.88) and technical expertise influence the adoption of HMIS in Meru County as depicted by a comparison of the findings of the study and existing literature. This reveals that hospitals who provide infrastructure and technical expertise to their employees are likely to encourage them to be innovative and thus lead to the adoption of IS.

Employees IS knowledge (mean 3.95) and user training (mean 3.88) were also significant in the adoption of HMIS. The findings of the study indicated a standard deviation of 1.00 which implies that majority of respondents agreed that these factors influence the adoption of HMIS. The findings are in line with those of Kuang and Xu (2008) who found these factors significant to the adoption of IS. The study further concurs with the findings of Kwon and Zmud (1987) and Zhu *et al.* (2003) who observed that technological level is highly affected by IT infrastructure and employee technical skills.

Amount of slack resources were also significant in the adoption of HMIS according to the findings in table 4.11. Having a standard deviation of 1.2 indicates that respondents agreed that this factor influences the adoption of HMIS. This is in line with the findings of a study carried out by Hang *et al.* (2008) on EDI where organizational slack was significant to its adoption. Hameed *et al.* (2012) observed that IS department size means existing IT function and dedicated IT personnel within the organization. The findings concurs with observations made by Premkumar and Roberts, 1999 that firms which do not possess the IT/IS expertise may be even unaware of new technologies or may just not want to risk the adoption of innovations.

4.4.3 The influence of Environmental Factors on the adoption of HMIS

The researcher collected data from the respondents regarding the influence of Environmental factors on the adoption of HMIS. The study focused on competitors pressure, customers pressure, partner's pressure and government support. Data was analysed using mean and standard deviation as shown in table 4.5

Table 4.5

Influence of Environmental Factors on the adoption of HMIS

	N	Mean	Std. Deviation
Pressure from competitors influences adoption of HMIS	120	3.56	1.371
Use of information systems by neighbouring hospitals influences our decision to adopt HMIS	120	3.34	1.393
Customers preference/demand on computerised systems influences adoption of HMIS	120	3.38	1.330

Risk of our customers drifting to our competitors influenced our adoption of HMIS	120	3.15	1.307
Suppliers pressure on the use of computerised systems influenced out technology adoption	120	3.11	1.413
Use of computer systems by suppliers influenced our adoption of information systems	120	3.21	1.384
Intense competition in the market influenced our decision to adopt information systems	120	3.45	1.413
Pressure from our business partners on the use of information systems influenced our decision to adopt information systems	120	3.17	1.326
Emerging government policies and acts influenced our decision to adopt information systems	120	3.27	1.328
Government support for technology adoption influenced our decision to adopt information systems	120	3.47	1.289
Government commitment influenced our decision to adopt HMIS	120	3.09	1.366
Overall Mean		3.291	0.16

Source: Survey data, 2016

According to the findings , respondents agreed that competitor's pressure (M-3.56), customer's pressure (M- 3.38, M-3.15) , partner's pressure (M-3.17) and government support (M-3.47, M-3.09) influences the adoption of HMIS. Table 4.12 presents the findings. Overall mean (3.291) indicate that majority of respondents agreed that environmental factors influences the adoption of HMIS.

These findings are in agreement with (Huang *et al.* 2008) who found out that competitor's pressure influences IS adoption. However, this study contradicts their findings on government support which is insignificant. The findings are also in line with what (Lin and Lin 2008) reported on e-business where trading partner and competitor's pressure are significant. Further a study carried out by Wang *et al.* (2010) on RFID indicated that competitor's and trading partner's pressure were significant. A study by Scupola (2009) indicated that competitor's pressure, customer's pressure and government support were significant in the adoption of IS. Studies by Chong and Pervan 2007, Huang *et al* 2008, Jeyaraj *et al.* 2006 revealed that competitive pressure impact on adoption of IS innovations.

The findings of this study and previous literature confers that competition can pressure organizations in Meru County that have not adopted or initiated plans to adopt HMIS to do so as such improve their performance. This was argued by Jeon *et al* (2006) that high competitive environment urges companies to adopt methods and procedures to become more efficient and profitable. Results of Khemthong and Roberts (2006) studies showed a positive relationship between customer pressure and web adoption. This study is also in line with studies carried out by Hadaya (2006), Chang (2010), Chau and Jim (2002) and Mehrtens *et al.* (2001) who found partners pressure a significant predictor of IS adoption. However, the findings of this study contradicts those of Chau and Hui (2001), Windrum and de Berranger 2004 who did not confirm this relationship.

On government support, the study corresponds with the findings of Jeon *et al.* (2006), Parker and Castleman (2009) where government support is significant in the adoption of IS. A study by Thartcher *et al. (*2006) and Khemthong and Roberts (2006) highlighted the importance of government support in the adoption of IS.

4.5 Level of Adoption of HMIS

Respondents were asked to indicate the number of modules of HMIS in use in their organizations. This was important as the study was carried out in both adopted and non-adopted organizations. Table 4.6 presents the findings.

Table 4.6

Number of HMIS modules

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 – 1	39	32.5	32.5	32.5
	2 and above	81	67.5	67.5	100.0
	Total	120	100.0	100.0	

Source: Survey data, 2016

According to the findings, majority (67.5%) respondents indicated that their hospitals had 2 and above modules while 32.5% indicated 0-1 modules in their respective organizations. This implies that most of the organizations under study had adopted HMIS.

4.6 Inferential Statistics

To establish the relationship between the independent variables and the dependent variable, the inferential analysis was done. In analyzing inferential data collected from the study, regression analysis was conducted to determine whether Technological, Organisational and Environmental factors influence the adoption of HMIS in selected hospitals in Meru County.

4.6.1 Assumptions of Logistic Regression

It is important to first note that Logistic regression does not make many of the key assumptions of linear regression and general linear models that are based on ordinary least squares algorithms – particularly regarding linearity, normality, homoscedasticity, and measurement level (Garson, 2009; Tabachnick and Fidell, 2012).

Firstly, logistic regression does not assume a linear relationship between the dependent and independent variables. Logistic regression can handle all sorts of relationships, because it applies a non-linear log transformation to the predicted odds ratio. Secondly, the independent variables do not need to be multivariate normal – although multivariate normality yields a more stable solution. Also the error terms (the residuals) do not need to be multivariate normally distributed. Thirdly, homoscedasticity is not needed. Logistic regression does not need variances to be heteroscedastic for each level of the independent variables. The study however looked at the following assumptions of the study:

i) Binary dependent variable

Respondents were asked to indicate the number of modules of HMIS in use in their organizations. This way the study was able to classify the respondents into organizations that either adopted or did not adopt HMIS. Therefore, since the logistic binary regression assumes a maximum probability of 1, a factor level of 1 of the dependent variable represented the desired outcome (adoption of HMIS).

ii) Correct Fitting

To ensure that the model was correctly fitted, the model used a stepwise method to estimate the logistic regression in SPSS during generating of the binary logistic regression output. A step-wise approach ensures neither over-fitting nor under-fitting occurs (Garson, 2009; Tabachnick and Fidell, 2012).

iii) Removal of outliers

According to Garson (2009), the data should be free from outliers. This was assessed through converting the independent variables to standardized values (z scores) by using the formulae

$$z = \frac{original\ value - mean}{standard\ error/\sqrt{n}}$$

Given that the study was conducted at 5% significance level, the criteria was to remove values which were below -1.96 or greater than 1.96.

iv) Interco-relation (Multicollinearity)

According to Tabachnick and Fidell (2012), there should be a low intercorrelations (multicollinearity) among the independent variables. This was assessed by looking at the correlation coefficient among the independent variables. Tabachnick and Fidell (2012) suggest that correlation coefficients of less than 0.90 among the independent variables should be enough to suggest that the assumption is met. This study found that there was insignificant correlation between the independent variables of the study (that is, Technological, Organisational and Environmental Factor).

4.6.2 Strength of the Model (Technological, Organisational and Environmental Factors) in explaining the dependent variable (Adoption of HMIS)

To test the strength of the logistic regression model which included Technological, Organizational and Environmental Factors as the independent variables and Adoption of HMIS as the dependent variables, the study used Nagelkerke R Square which is a pseudo Pearson's coefficient of correlation. The results are presented in Table 4.7

Table 4.7

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	149.687[a]	.014	.019

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

In this case, Nagelkerke R Square = 0.019

= 1.9% of the variations in Y (adoption of HMIS).

The model used yielded a Nagelkerke R^2 value of 0.019 meaning that 1.9% of the dependent variable (HMIS adoption) can be explained by the independent variables; Technological, Organisational and Environmental factors. There is 98.1% of the variations in Y which are not explained by the model. This implies that besides the TOE factors, there are other factors which influence the adoption of HMIS in selected hospitals in Meru County which have not been explained by the model. This presents a platform for further research. Moreover, this study was a descriptive survey and the concepts used to explore the relationship between the TOE factors and HMIS adoption in selected hospitals in Meru County were anchored in a theoretical framework by other researchers (Tornatzky and Fleicher 1990; Tornatzky and Klein 1982; Lai and Wang 2010). The operationalization of concepts was carefully adapted to the nature of the technology under study and the settings in which it was implemented.

With regard to technological factors, this finding supports Ramdani *et al.* (2009), since they did not find a relationship between compatibility and complexity and the adoption of information systems. Different from this, however, Al-Qirim (2007), Huang *et al.,* (2007) found a significant association between the three variables and HMIS adoption. Relative advantage, compatibility and complexity were insignificant. Relative advantage has been consistently identified as the significant factor that motivate organization to adopt new IT innovation (Prekumar & Roberts 1999). In this study, relative advantage was indicated to be one of the least factors in driving HMIS adoption. This is consistent with a study by Wang *et al.* (2010) where relative advantage was insignificant to the adoption of RFID.

Complexity was also indicated as one of the least factors in influencing HMIS adoption. This contradicts the previous studies on IT adoption in Malaysia where complexity was found to significantly influence IT adoption (Tan, *et al.* 2009).

Among the organizational factors, management support was insignificant to the adoption of HMIS in selected hospitals in Meru County. The results revealed that there is significant relationship between organizational readiness and HMIS adoption. Similar findings were recorded by Khemthong and Roberts (2006). The findings concurs with a study carried by Kuang and Xu (2008) who found technological competence significant to the adoption of IS. Research by(Wang *et al.,* 2010) confirms

that top management support is insignificant during the early stage of technology development. Contrary to the findings by Jeyaraj *et al.,* (2006), however, management support was not found to be significant in the adoption of HMIS.

With regard to environmental factors, the effect of external environment is important throughout the ICT adoption decision making process (Makau, 2010). This was confirmed by the study findings which revealed that competitor's pressure, customers pressure, partners pressure and government support were effective in influencing HMIS adoption in selected hospitals in Meru County. The findings are in line with those of Lin and Lin (2008) who reported that trading partner and competitor's pressure were significant to IS adoption. A study by Scupola (2009) indicated that competitor's pressure, customer's pressure and government support were significant to IS adoption. With regard to government support, the study corresponds with the findings of Parker and Castleman (2009) where government support is significant to the adoption of IS.

4.6.3 Goodness of Fit (Hosmer & Lemeshow Test)

This test measures the goodness of fit of the model.

Null Hypothesis (H_o) : The model is fit

Alternate (H_1): The model is not fit

The results from Hosmer and Lemeshow test are presented in Table 4.8

Table 4.8

Hosmer and Lemeshow Test

Chi-square	Df	Sig.
6.301	8	.614

Based on p-value of 0.614>0.05, the researcher chose 5% as the significance level.

Since the p-value of 0.614>0.05, the study fails to reject the null hypothesis and concludes that the model is fit. If the Hosmer Lemeshow goodness of fit test statistic is greater than 0.05 as desired for well-fitting models, we fail to reject the null hypothesis that there is no difference between observed and model-predicted values, implying that the model's estimates fit the data at an acceptable level. That is, well-fitting models show non-significance on the Hosmer-Lemeshow goodness of fit test. The Hosmer

Lemeshow statistic assumes sampling adequacy, with a rule of thumb being enough cases so that 95% of cells have an expected frequency >5. In this study, the Hosmer Lemeshow statistic has a significance of .614 which means that it is not statistically significant and therefore the model is quite a good fit . Despite the fact that it predicts only 1.9% of Y (adopting HMIS). The study still found the model (3 independent factors combined) to be fit according to Hosmer and Lemeshow Test.

4.6.4 Hypothesis Test of the Study

To test the hypothesis of the study:

i) H_o : Technological factors do not influence adoption of HMIS at 5% significance level.

ii) H_o: Organisational factors do not influence adoption of HMIS at 5% significance level.

iii) H_o: Environmental factors do not influence adoption of HMIS at 5% significance level.

Results from Logistic regression

Table: 4.9

Estimated parameters of variables influencing HMIS adoption

Variable	ß	S.E.	Wald statistic	df	Sig. (p values)	Exp(ß)	95% C.I.for EXP(ß)	
							Lower	Upper
Technological Factors	-.096	.362	. 071	1	.790	.908	.447	1.845
Organizational Factors	.083	.385	.046	1	.830	1.086	.510	2.312
Environmental Factors	.248	.234	1.126	1	.289	1.281	.811	2.026
Constant	.014	1.729	.000	1	.993	1.014		

Source: (Survey Data, 2016)

To test the three hypotheses of the study, Wald test from the Logistic regression results was to make inference for the population of the study. The criteria for rejection was: if p value > 0.05, null hypothesis will not be rejected.

The findings of the study in Table 4.9, indicate that Technological factors had a p - value of 0.790>0.05 hence the study failed to reject the null hypothesis thus Technological factors does not significantly influence adoption of HMIS in selected hospitals in Meru County. It can also be observed that Organisational factors had a p-value of 0.830>0.05 hence the study failed to reject the null hypothesis thus organizational factors does not significantly influence the adoption of HMIS in selected hospitals in

Meru County. In addition, it can be observed that Environmental factors had a p-value of 0.289>0.05 hence the study failed to reject the null hypothesis thus environmental factors does not significantly influence adoption of HMIS in selected hospitals in Meru County.

From Table 4.9, it can also be seen that technological factors, organisational factors and environmental factors had beta (ß) values of -0.096, 0.083 and 0.248 respectively.

Hence the logistic regression equation is:

$$\text{In } (^{p}/_{1-p}) = 0.014 - 0.096X_1 + 0.083X_2 + 0.248X_3$$

Where

P	-	Probability of adopting HMIS
X_1	-	Technological factors
X_2	-	Organisational factors
X_3	-	Environmental factors

Interpretation of the logistic fn using ß [in odds]

i) A marginal (unit) change in Technological factors leads to a decrease in the natural log of odds of adopting HMIS by 0.0096 while holding other factors constant.
ii) A marginal (unit) change in Organisational factors leads to an increase in the natural log of odds of adopting HMIS by 0.083 while holding other factors constant.
iii) A marginal (unit) change in Environmental factors leads to an increase in the natural log of odds of adopting HMIS by 0.289 while holding other factors constant.

Alternatively:

Interpretation of logistic function using odds

i) A marginal change in Technological factors leads to a change in odds of adopting HMIS by a factor of 0.908 holding other factors constant.
ii) A marginal change in Organisational factors leads to a change in odds of adopting HMIS by a factor of 1.086 holding other factors constant.
iii) A marginal change in Environmental factors leads to a change in odds of adopting HMIS by a factor of 1.281 holding other factors constant.

The p-values indicate the statistical significance of the relationship. A p-value of less than 0.05 is recommended as it signifies a high degree of confidence. With all the independent variables having p > 0.05, this indicates that there is no significant relationship among all the three variables with the adoption HMIS in selected hospitals in Meru County. Holding other factors constant, a unit increase in Technological factors would result to 0.0096 decrease in the adoption of HMIS in selected hospitals in Meru County. Additionally, a unit increase in Organizational factors would result to 0.083 increase in the adoption of HMIS in selected hospitals in Meru County. Lastly, a unit increase in Environmental factors would result to 0.289 increase in the adoption of HMIS in selected hospitals in Meru County.

The study also found that a majority of the respondents strongly agreed that the cost of adopting and accessing ICT is high. This finding supports that of Seyal and Rahim (2006) who found a direct and significant relationship between cost and adoption of technology.

4.7 Discussion of Findings

The findings are discussed under the following headings.

4.7.1 Technological factors

Unexpectedly, the study established that Technological factors do not have significant influence on the adoption of HMIS in selected hospitals in Meru County. This finding implies that compatibility, complexity and relative advantage were not detrimental to the adoption of HMIS in selected hospitals in Meru County. This finding also supports Ramdani *et al.* (2009), since they did not find a relationship between compatibility and complexity and the adoption of information systems. Different from this, however, Al-Qirim (2007), Huang *et al.* (2007) found a significant association between the three variables and HMIS adoption.

Relative advantage, compatibility and complexity were insignificant. Relative advantage has been consistently identified as the significant factor that motivate organization to adopt new IT innovation (Prekumar & Roberts 1999). In this study, relative advantage was indicated to be one of the least factors in driving HMIS adoption. This is consistent with a study by Wang *et al.* (2010) where relative advantage was insignificant to the adoption of RFID.

Complexity was also indicated as one of the least factors in influencing HMIS adoption. This contradicts the previous studies on IT adoption in Malaysia where complexity was found to significantly influence IT adoption (Tan, *et al.* 2009).

Further, the study also indicates compatibility as less important factor influencing HMIS adoption. Compatibility focused on whether HMIS was aligned to the needs of the selected hospitals. Most respondents were of the view that while a wide range of facilities was needed, compatibility with existing ICT systems was necessary for utilization of HMIS.

Cost was found to be one of the important factors influencing the adoption of HMIS in selected hospitals in Meru County. This is probably because this form of ICT is relatively new and very expensive to install. This could also be explained by the fact that its maintenance is high and health workers need specialized training to use it. This is inline with what WHO noted that high cost of equipment, software and lack of funds is a major issue in the adoption of EHR. Despite several benefits of EHR, the initial costs and maintenance costs of the systems are so significant and due to lack of funding, EHR systems have not been adopted (WHO, 2006). In addition, these results agree well with studies conducted by UNESCO (2010) while investigating use of satellite systems in health care settings in Africa which established that over 90% of the sampled facilities had not adopted the use of satellite systems. Further, the risk and cost implications entailed to the technology have not been exposed completely. Hospitals are still hesitant to adopt HMIS due to this uncertainty and confidentiality of hospital information. Based on the participants comments, it can be said that the more costly the service, the less people prefer to use it. So the findings about the cost were parallel with the literature according to Jeon *et al.,* (2006) who found out that the adoption cost affects the extent of IS adoption.

4.7.2 Organisational Factors

Management support was insignificant to the adoption of HMIS in selected hospitals in Meru County. As brought out in the study findings, adoption of HMIS in selected hospitals in Meru County has been influenced by organizational readiness, availability of IS infrastructure and technical expertise, employees IS knowledge, user training and amount of slack variables.

The results revealed that there is significant relationship between organizational readiness and HMIS adoption. Similar findings were recorded by Khemthong and Roberts (2006). The findings concurs with a study carried by Kuang and Xu (2008) who found technological competence significant to the adoption of IS. With the availability of infrastructure, there is still need for the system users to be equipped with the relevant skills to operate and make use of the system. This calls for both the initial and routine refresher courses to provide the users with the necessary knowledge to use the system as well as technical assistance. This makes training and technical assistance significant in the adoption of HMIS as supported by several other researches in developing countries. Abraham *et al.* (2011) argue that optimal use of IT towards the improvement of health care requires IT knowledge in the medical sector. The relationship between ICT skills and adoption of eHealth is also discussed by Juma *et al* (2012) who points out that lack of ICT skills in the health sector in Kenya explains the low adoption of eHealth. Additionally, Sife *et al.* (2007) adds that for the adoption of ICTs to be effective and sustainable, administrators themselves must have a broad understanding of the technical, administrative and financial dimensions of ICTs in institutions.

Contrary to the findings by Jeyaraj *et al.,* (2006), however, management support was not found to be significant in the adoption of HMIS. It is surprising to have top management to be less important in influencing the HMIS adoption. This finding does not confirm the previous studies on IT adoption (Al-Qirim, 2005, Wang, *et al.*, 2010, To &Ngai, 2006). However, the data shows that most hopitals have low perception towards top management support. This may be due to the fact that HMIS in Kenya is still in its infancy stage (stage 1), uncertainties entail the adoption. Thus, most of top management of hospitals tend to 'wait and see' how well this technology develop and give necessary benefits to their organisations. Research by(Wang *et al.,* 2010) confirms that top management support is insignificant during the early stage of technology development. Ongwang points out that it is important to involve users within the software development process. User specifications and input are therefore important to the acceptance of the system (Ongwang, 2006).

4.7.3 Environmental Factors

The effect of external environment is important throughout the ICT adoption decision making process (Makau, 2010). This was confirmed by the study findings which revealed that competitor's pressure, customers pressure, partners pressure and government support were effective in influencing HMIS

adoption in selected hospitals in Meru County. The findings are in line with those of Lin and Lin (2008) who reported that trading partner and competitor's pressure were significant to IS adoption. Further, a study by Scupola (2009) indicated that competitor's pressure, customer's pressure and government support were significant to IS adoption. With regard to government support, the study corresponds with the findings of Parker and Castleman (2009) where government support is significant to the adoption of IS.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The study investigated the adoption factors of HMIS in selected hospitals in Meru County. Five hospitals were targeted for the study. This chapter presents the summary, conclusions and recommendations based on the objectives of the study. Suggestions for further studies are also presented.

5.2 Summary of Findings

The study investigated the adoption factors of HMIS in selected hospitals in Meru County. A total of 148 structured questionnaires were distributed in the 5 selected hospitals in Meru County. A response rate of 81% was obtained from the study with 37% male and majority (63%) female. With regard to job title, nurses were the majority (42.5%) while hospital administrator were the least with 1.7%. Findings of the study showed that most of the respondents (63.3%) were certificate/diploma followed by those with a Bachelor's degree while those who had a higher diploma were the least (0.8%). 43.3% of respondents had worked in the institution for less than one year, 95% of the hospitals had existed for more than 20 years, 54% of the hospitals were urban. With regard to level of HMIS adoption, majority (67.5%) of the hospitals had adopted the system to the level of 2 and above modules.

The strength of the model in explaining the dependent variable (adoption of HMIS) was found to be fit according to Hosmer & Lemeshow Test. The study revealed that 1.9% of dependent variable can be explained by the independent variables. This implies that there are other factors which influence the adoption of HMIS in selected hospital in Meru County which were not explained by the model thus presenting a platform for further research.

The findings of the study revealed that Technological factors had a p - value of 0.790>0.05 hence does not significantly influence adoption of HMIS in selected hospitals in Meru County. It was also observed that Organisational factors had a p-value of 0.830>0.05 thus not significant to the adoption of HMIS in selected hospitals in Meru County. Environmental factors had a p-value of 0.289>0.05 hence the study

revealed that environmental factors does not significantly influence adoption of HMIS in selected hospitals in Meru County.

Logistic function indicated Organisational and Environmental factors were positively correlated with the adoption of HMIS. However, technological factors had a negative relationship to the adoption of HMIS. From the findings of this study, it can be stated that Environmental factors was the predictor variable that contribute the highest to the adoption of HMIS in selected hospitals in Meru County. Thus, every unit increase by environmental factors will increase 0.289 adoption of HMIS provided other variables remain constant. The second highest predictor was organizational factors (ß-0.083) thus, a unit increase in Organizational factors would result to 0.083 increase in the adoption of HMIS in selected hospitals in Meru County.

With regard to technological factors, the study revealed that majority of respondents disagreed that technological factors (relative advantage, compatibility and complexity) influence the adoption of HMIS. However, cost was found significant in the adoption of HMIS. Organisational factors results from the study indicated organizational readiness, IS infrastructure, technical expertise, IS knowledge, user training and slack resources as significant while management support as insignificant factors to the adoption of HMIS. The study found environmental factors (competitors pressure, customers pressure, partner's pressure and government support) significant to the adoption of HMIS.

The findings of the study revealed that all the p-values of the three factors (Technological, Organisational and Environmental) >0.05 significance level as such they were insignificant in the adoption of HMIS in Meru County.

5.3 Conclusion of the Study

Developing countries are starting to embrace information and communication technologies as a means to deal with health service delivery problems of access, quality and costs. HMIS provide the basic infrastructure upon which other electronic health solutions can be laid. There exists evidence to show that HMIS is gaining ground in the health sector in Kenya. Results of the study indicated that most of the respondents (67.5%) had adopted HMIS.

However, there is statistically significance relationship between cost and adoption of HMIS in selected hospitals in Meru County. Majority of respondents agreed that installation cost of HMIS is high. Therefore cost negatively influences the adoption of HMIS. The p-values indicate the statistical significance of the relationship. A p-value of less than 0.05 is recommended as it signifies a high degree of confidence. However, with all the independent variables having $p>0.05$, this indicates that there is an insignificant relationship among all the three variables and the adoption of HMIS in selected hospitals in Meru County. From the results, while holding other factors constant, a unit increase in Technological factors leads to a decrease in the adoption of HMIS by 0.0096, a unit increase in Organisational factors leads to an increase in the adoption of HMIS by 0.083 while a unit increase in Environmental factors leads to an increase in the adoption of HMIS by 0.289. This therefore implies that the two independent variables (Organisational and Environmental) are important factors in the adoption of HMIS in selected hospitals in Meru County. The findings also point to lack of awareness and uncertainity about the benefits of HMIS adoption in hospitals, concerns about lack of managerial support and skills; set-up costs and pricing issues as the most significant factors to the adoption of HMIS. Hospitals have limited resources (financial, time, personnel). This "resource poverty" has an effect on the adoption of HMIS, as they cannot afford to experiment with technologies and make expensive mistakes.

5.4 Recommendations of the Study

Based on the findings, this research recommends that healthcare facilities train their employees on the information systems prior to their 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.

The County Government of Meru in collaboration with hospitals should foster private-private partnerships to facilitate cost sharing in the adoption of HMIS. For instance teaching hospitals to train staff from other private/faith-based institutions on ICT skills.

With the current dispensation of devolved government structure, the County Government of Meru should allocate more funds to finance the ICT projects that aim to improve the wellbeing of the citizens to ensure the projects are sustainable. Further, the county government in collaboration with national government should subsidize software and hardware to assist small healthcare facilities who may not

have adequate finances for adopting information systems; this will go down well in improving the quality of healthcare service delivery to all citizens.

This research also recommends that the national government in collaboration with Meru county government ministry of education incorporates information systems training in all courses as it is an important factor that facilitates adoption of information technology.

This study also recommends that the Meru County government formulates policies on ICT adoption in healthcare to provide guidance to healthcare institutions.

The county government of Meru together with Ministry of Health should foster partnerships in health though public-private partnerships in health sector to avoid duplication and dissipation of efforts, lack of holistic planning and inefficient implementation of health programmes. This will lead to efficient use of the pooled donor funds in ICT infrastructure development. Hospitals through Meru County government and County Ministry of Health should partner with private sector and civil society in deployment and utilization of ICTs in health sector.

The national government should facilitate the deployment and implementation of ICT-based programmes that efficiently and effectively utilize scarce human resources in healthcare delivery system to reduce costs. Further, government should also invest in ICT-based healthcare systems to ensure that all Kenyans have access to adequate, appropriate and timely healthcare services

It is also recommended that the county government of Meru develops and deploys a network of health information management systems for use across the entire health sector to support efficient management of the entire health sector in Meru County. The network of information systems will manage all types of information needed and collected in all sections of the health sector.

The County Government of Meru in collaboration with national government should develop procedures for procurement and standardization of ICT equipment and software to ensure effective and efficient deployment of resources in health sector.

In the face of limited resources, there is need for County Government of Meru to put in place minimum standards to ensure systems compatibility and cost efficiency. In addition, government should provide political leadership to accelerate the adoption of electronic health systems.

Lastly, research in HMIS in Kenya appears to be fragmented and so far few studies have been conducted to indicate its progression. Studies involving several hospitals are also limited. Therefore, factors in this paper need to be looked into as regards smaller health units and other counties to investigate other factors influencing HMIS adoption.

5.5 Suggestions for Further Research

A study on influence of technological and organisational factors on the adoption of HMIS in healthcare service delivery is recommended for hospitals in other counties.

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APPENDICES

APPENDIX I

LETTER TO RESPONDENTS

Proscoviour Vunyiwa
P.O. Box 267
60200, Meru

TO WHOM IT MAY CONCERN

Dear Sir/Madam

Re: Request to conduct Research

I am a post graduate student at Kenyatta University pursuing a Master of Business Administration (Management Information Systems option) Degree. I am undertaking a research on adoption factors of Hospital Management Information Systems in selected hospitals in Meru County, as a requirement towards completion of this degree. In this regard, your organization has been identified as one of the key respondents in this study. Kindly complete this questionnaire by responding to all the sections therein. Your participation in this study will be highly appreciated.

Please note that any information provided with respect to this study shall be treated with strict confidentiality and will be used for academic purpose only.

Yours faithfully

Proscoviour Vunyiwa
D53/OL/23055/2013

APPENDIX II

QUESTIONNAIRE

This questionnaire is designed to collect data and help gain a clear understanding on adoption factors of Hospital Management Information Systems in selected hospitals in Meru County. You are considered as one of the resourceful persons and as such you are kindly requested to respond to the questions/statements frankly and honestly. Your response will be treated with utmost confidentiality. Therefore, you do not have to write your name on the questionnaire nor disclose your answers to other respondents. This research is intended for academic purposes.Thank you for accepting to participate in this study.

SECTION A: DEMOGRAPHIC INFORMATION

Please tick the box representing the most appropriate responses in respect to the following:

1. Gender Male ☐ Female ☐
2. What is you job title?
   Hospital Administrator ☐ Head of Nurses ☐ Head of ICT ☐
   Doctor ☐ Nurse ☐ Lab Technologist ☐
   Other……
3. Your highest level of education?
   Certificate/Diploma ☐ Bachelor's Degree ☐ Post Graduate Degree/Diploma ☐
   PhD ☐ Others ……..

4. How long have you worked with this institution?
   Less than 1 year ☐ 1 - 3 years ☐ 4 - 6 years ☐ 7 - 9 years ☐ 10 years and above ☐

5. How long has the hospital been in operation?
   Less than one year ☐ 1 - 5 years ☐ 6 - 10 years ☐ 11 - 15 years ☐
   16 - 20 years ☐ More than 20 years ☐

6. How many beds does the hospital have?
   50 - 100 ☐ 100 - 150 ☐ 150 and above ☐

7. Location of the hospital

   Urban ☐ Rural ☐

8. How many employees does the hospital have?

   50 and below ☐ 51 - 100 ☐ 101 -150☐ 151 – 200☐ Above 200☐

SECTION B: INFLUENCE OF TECHNOLOGICAL FACTORS

Please indicate the extent to which you agree with each of the following statements in regard to HMIS adoption. They should be rated in the scale of 1-5 where 1 represents strongly agree, 2 represents agree, 3 represents Neither Agree or Disagree, 4 represents Disagree and 5 represents Strongly Disagree.

	Statement	**5**	**4**	**3**	**2**	**1**
9.	HMIS is beneficial to healthcare service delivery					
10.	HMIS improves quality of healthcare services					
11.	HMIS improves speed of service delivery to patients					
12.	HMIS improves employees efficiency					
13.	HMIS is compatible with our current work					
14.	Knowledge on benefits of IT use influences HMIS adoption					
15.	Compatibility with nurses work					
16.	Compatibility with laboratory operations					
17.	Perceived consistency of HMIS with existing values and needs of potential users influence HMIS adoption					
18.	HMIS is easy and convenient to use					
19.	User friendliness of HMIS					
20.	Cost of HMIS installation influences its adoption					

SECTION C: INFLUENCE OF ORGANISATIONAL FACTORS

Please indicate the extent to which you agree with each of the following statements in regard to HMIS adoption. They should be rated in the scale of 1-5 where 1 represents strongly agree, 2 represents agree, 3 represents Neither Agree or Disagree, 4 represents Disagree and 5 represents Strongly Disagree.

	Statement	**5**	**4**	**3**	**2**	**1**
21.	Top management knowledge of ICT influences adoption of HMIS					
22.	Top management supports the adoption of HMIS					
23.	Top management's knowledge on emerging healthcare information systems influences HMIS adoption					
24.	Poor ICT Infrastructure influences HMIS adoption					
25.	Lack of user training influences HMIS adoption					
26.	Employees do not support the implementation of HMIS					
27.	Users are not fully involved in the adoption of HMIS					
28.	Employees knowledge of IS influence HMIS adoption					
29.	Computer literacy among stakeholders influence HMIS adoption					
30	Lack of infrastructure influences HMIS adoption					

SECTION D: INFLUENCE OF ENVIRONMENTAL FACTORS

Please indicate the extent to which you agree with each of the following statements in regard to HMIS adoption. They should be rated in the scale of 1-5 where 1 represents strongly agree, 2 represents agree, 3 represents Neither Agree or Disagree, 4 represents Disagree and 5 represents Strongly Disagree.

	Statement	5	4	3	2	1
31.	Pressure from competitors influences adoption of HMIS					
32.	Use of information systems by neighbouring hospitals influences our decision to adopt HMIS					
33.	Customers preference/demand on computerised systems influences adoption of HMIS					
34.	Risk of our customers drifting to our competitors influenced our adoption of HMIS					
35.	Suppliers pressure on the use of computerized systems influenced our technology adoption.					
36.	Use of computer systems by suppliers influenced our adoption of information systems.					
37.	Intense competition in the market influenced our decision to adopt information systems					
38.	Pressure from our business partners on the use of information systems influenced our decision to adopt information systems.					
39.	Emerging government policies and acts influenced our decision to adopt information systems.					
40.	Government support for technology adoption influenced our decision to adopt information systems.					
41.	Government commitment influenced our decision to adopt HMIS					

Section F *(In answering the following question, Tick where appropriate)*

42. How many modules of HMIS does your institution have?

0 - 1 ☐ 2 and above ☐

Thank you for your participation and cooperation in filling this questionnaire.

APPENDIX III

Sema Doc Hospital Cash Benefit Facilities July 2015 Extract

LIST OF HOSPITALS IN MERU COUNTY

MERU COUNTY (GOVERNMENT HOSPITALS)

1.	Chuka District Hospital	Meru South
2.	Giaki Sub District Hospital	Imenti North
3.	Githongo Distrtict Hospital	Meru Central
4.	Kibirichia Sub District Hospital	Meru Central
5.	Kanyakine Sub District Hospital	Imenti South
6.	Kinoro Sub District Hospital	Imenti South
7.	Magutuni Sub District Hospital	Maara
8.	Mbeu Sub District Hospital	Tigania West
9.	Mikinduri Sub District Hosital	Tigania East
10.	Mikumbune Sub District Hospital	Imenti South
11.	Muthara Sub District Hospital	Igembe East
12.	Mutuati Sub District Hospital	Igembe North
13.	Nyambene District Hospital	Igembe South
14.	Timau Sub District Hospital	Buuri, Meru

MERU COUNTY (Private Hospitals & Nursing Homes)

15.	Consolata Cottage Hospital	Chuka Town
16.	Consolata Hospital, Nkubu	Along Meru- Chuka Rd.
17.	Cottolengo Mission Hospital	Gaitu, Chaaria Market
18.	LAARE NURSING & MATERNITY HOME	Laare, MERU
19.	Maua Methodist Hospital	Maua Town
20.	Milimani Maternity & Nursing Home	Milimani Area, New Meru Town
21.	Nyambene Clinical Services & Nursing Home	Along Maua-Meru Road.
22.	PCEA Chogoria Hospital	Chogoria Town, Off Meru-Chuka Highway
23.	St. Anne Mission Hospital	Igonji-Meru Rd
24.	ST. ANNE MATERNITY -COTTAGE	MERU
25.	ST. ORSOLA HOSPITAL, MATERI	Chuka, Meru
26.	St. Theresa's Mission Hospital Hospital, Kiirua	Kiirui Market, Off Isiolo-Meru Road
27.	Tigania Hospital	Off Meru-Maua Road
28.	Woodlands Hospital	Gitimbine Area, Along Meru-Nkubu Road

APPENDIX IV
LETTER OF INTRODUCTION

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: D53/OL/23055/2013

DATE: 25th August 2016

Director General,
National Commission for Science, Technology
& Innovation
P.O. Box 36023-00100,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR VUNYIWA PROSCOVIOUR– REG. NO. D53/OL/23055/2013

I write to introduce Mr. Vunyiwa Proscoviour who is a Postgraduate Student of this University. He is registered for M.B.A degree programme in the **Department of Management Science.**

Mr. Vunyiwa intends to conduct research for an M.B.A Proposal entitled, **"Adoption Factors of Hospital Management Information Systems in Selected Hospitals in Meru County,Kenya".**

Any assistance given will be highly appreciated.

Yours faithfully,

MRS. LUCY N. MBAABU
FOR: DEAN, GRADUATE SCHOOL

AN/nn

APPENDIX V
RESEARCH PERMIT

THIS IS TO CERTIFY THAT:
MISS. PROSCOVIOUR VUNYIWA MAINA
of KENYATTA UNIVERSITY, 267-60200 MERU,has been permitted to conduct research in *Meru County*
on the topic: *ADOPTION FACTORS OF HOSPITAL MANAGEMENT INFORMATION SYSTEMS IN SELECTED HOSPITALS IN MERU COUNTY, KENYA*
for the period ending:
14th October,2017

Permit No : NACOSTI/P/16/74686/13692
Date Of Issue : 14th October,2016
Fee Recieved :ksh 1000

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation

APPENDIX VI
LETTER OF RESEARCH AUTHORIZATION

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349, 3310571, 2219420
Fax: +254-20-318245, 318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying Please quote

9th Floor, Utalii House
Uhuru Highway
P. O. Box 30623-00100
NAIROBI-KENYA

Ref: No. NACOSTI/P/16/74686/13692

Date: 14th October, 2016

Proscoviour Vunyiwa Maina
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Adoption factors of hospital management information systems in selected hospitals in Meru County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Meru County** for the period ending **14th October, 2017.**

You are advised to report to **the County Commissioner, the County Director of Education and the County Director of Health Services, Meru County** before embarking on the research project.

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

BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Meru County.

The County Director of Education
Meru County.

APPENDIX VII
LETTER OF RESEARCH AUTHORIZATION

THE PRESIDENCY
MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT

Telegrams:
Telephone:
Email: ccmeru@yahoo.com
Fax:

COUNTY COMMISSIONER
MERU COUNTY
P.O. BOX 703-60200
MERU.

When replying please quote
Ref: ED.12/3 VOL.II/8

And Date 18th November, 2016

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION – PROSCOVIOUR VUNYIWA MAINA

This is to inform you that **Proscoviour Vunyiwa Maina** of Kenyatta University has reported to this office as directed by the Commission for Science, Technology and Innovation and will be carrying out Research on "**Adoption factors of hospital management information systems in selected hospitals in Meru County, Kenya".**

Since authority has been granted by the said Commission, and the above named student has reported to this office, she can embark on her research project for a period ending 14th October, 2017.

Kindly accord her any necessary assistance she may require.

C. Keah
For: County Commissioner
MERU

APPENDIX VIII
LETTER OF RESEARCH AUTHORIZATION

Republic of Kenya
MINISTRY OF EDUCATION
State Department of Basic Education

Email: cdemerucounty@gmail.com

When Replying please quote

COUNTY DIRECTOR OF EDUCATION OFFICE,
Meru County
P.O. Box 61,
MERU

MRU/C//EDU/11/1/208

18th November, 2016

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION - PROSCOVIOUR VUNYIWA MAINA

Reference is to the letter ref. NACOSTI/P/16/7486/13692 dated 14th October, 2016.

Authority is hereby granted to Proscoviour Vunyiwa Maina of Kenyatta University to carry out research on" **Adoption factors of hospital management information systems in Meru Hospital Level 5 in Meru County',** for the period ending14th October , 2017.

The authorities concerned are requested to accord you the necessary assistance.

FOR: COUNTY DIRECTOR OF EDUCATION
MERU COUNTY
P. O. Box 61 - 60200
Tel: 064 - 32372 MERU

Alex .Ndereba
For ; County Director of Education
MERU

APPENDIX IX
LETTER OF RESEARCH AUTHORIZATION

COUNTY GOVERNMENT OF MERU
DEPARTMENT OF HEALTH

Telegrams: "MEDICAL" Meru
Telephone: Meru 064-32370/1
Fax: 31242
Email: *hospitalmeru@yahoo.com*
When replying should be to:
Director of Medical Services
Ref: MRU/MED/GEN/R.14

County Director of Medical Services
P. O. BOX 8 – 60200
MERU

DATE: 18th November 2016

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION- PROSCOVIOUR VUNYIWA MAINA

Reference is made to the letter NACOSTI/P/16/7486/13692 dated 14th October 2016.

Authority is hereby granted to Proscoviour Vunyiwa Maina of Kenyatta University to carry out research on **"Adoption factors of Hospital Management Information Systems** in Meru County for the period ending 14th October 2017.

You are required to hand over one (1) hand copy and soft copy of your research findings to this office at the end of your research period.

The authorities concerned are requested to accord you the necessary assistance.

Dr Elias Nyaga
County Director of Medical Services
County Government of Meru

DIRECTOR HE... TH SERVICES
MERU CO... ...VERNMENT
18 NOV 2016
P. O. Box 120 -60200
MERU

APPENDIX X
SAMPLE LETTER TO HOSPITALS

10th October, 2016

Hospital Administrator
St. Anne Mission Hospital
P.O. Box 24
Igoji 60402

Dear Sr. Jacqueline

Re: Request for Permission to Carry out an Academic Study at your Institution

The above subject matter and our conversation refer.

I am a student at Kenyatta University undertaking a Masters course, MBA (Management Information Systems). I am in my final year of study in which research in one's area of specialization is a requirement for the award of the degree. My research topic is on '*Adoption factors of Hospital Management Information Systems (HMIS) in selected hospitals in Meru County, Kenya.*' Your institution, having adopted the system has been identified as one of the key participants in this study.

Sometime in May, 2016 when I came to the hospital, I expressed my intention of coming back with a questionnaire, to administer to some of your staff who are dealing with the said system, once the proposal is approved by the University. I am pleased to inform you that the proposal was approved and I was given permission to proceed to the field and collect data. The officers who will be involved in filling the questionnaire are: Doctors, Nurses, Pharmacists, Laboratory Technologists, Hospital Administrators/Managers, ICT Managers, Accountants, Cashiers and Administrative Staff. It is in this regard that I am requesting for permission to come to your institution, any day convenient to you this week, to administer the questionnaire to the above mentioned staff.

It is expected that the findings of this study will improve hospital information systems management process in selected hospitals in Meru County and healthcare industry in Kenya at large.

Please note that any information provided with respect to this study shall be treated with strict confidentiality and will be used for academic purpose only. Attached please find a copy of the proposal, a questionnaire and approval letter from Kenyatta University for more details. Should you require any further information, please do not hesitate to contact me on: 0720 535754.

I look forward to your favourable response.

Yours faithfully

Proscoviour Vunyiwa

APPENDIX XI
LETTER OF RESEARCH AUTHORIZATION

THE METHODIST CHURCH IN KENYA
MAUA METHODIST HOSPITAL

Telephone: 064 - 21003 /21107/ 21108.
Switch board: 0738-983192 / 0716-337302.
Mobile: 0724-697053
Fax: 064 - 21121
Email: info@mckmauahospital.org.

P.O BOX 63,
MAUA – 60600.
IGEMBE SOUTH.

10th October, 2016.

Vunyiwa Proscoviour.

RE: APPROVAL FOR CONDUCTING RESEARCH STUDY AT MAUA METHODIST HOSPITAL AS PER SUBMITTED RESEARCH PROPOSAL.

Christian greetings to you.

The Maua Methodist Hospital Research Ethics Committee has reviewed your research proposal and considered your request to conduct a research study at the hospital.

I am glad to inform you that permission to conduct the study is granted, and that this approval is valid for the next six months from the date of this letter upon which an individual should request for renewal.

You must undertake to indemnify the Maua Methodist Hospital against any claim that may arise from the research.

This approval is subject to submission of an abstract report to Maua Methodist Hospital upon completion of the study.

The committee hopes that the results from the study will increase the body of knowledge to improve quality in delivery of healthcare.

Thank you.

Yours sincerely,

For Dr. Tony Mwenyemali,
Chairman – MMH Research Ethics Committee.

METHODIST CHURCH IN KENYA
P. O. Box 63, MAUA
TEL: 21003 / 0733 - 634449
MAUA METHODIST HOSPITAL