THE DETERMINANTS OF ELECTRONIC HEALTH INFORMATION SYSTEMS (EHIS) ADOPTION AND USAGE FROM HEALTHCARE PROVIDERS’ STAFF PERSPECTIVE: CASE STUDY OF KENYA’S HEALTH SECTOR

BY

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This project has been submitted as Partial fulfillment of requirement for Master of Science in Information Systems of the University of Nairobi

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DEDICATION

I wish to dedicate this research project to my wife Rosaline, children Harry, Lewis and Mercy for their moral support and patience when I spent long hours collecting data, analyzing and compiling the report.
DECLARATION

I declare this project as presented in this report is my original work and has not been presented for an award of degree at this, or any other university

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Signature ……………………………………….. Date ………………………………………..

This project has been submitted as Partial fulfillment of requirements for Master of Science in Information Systems of the University of Nairobi with my approval as a supervisor.

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ABSTRACT

Quality healthcare is the extent to which health services provided to individuals and patient populations improve desired health outcomes. Information and Communication Technologies (ICTs) specifically Electronic Health information systems (EHIS) have made significant impact on healthcare industry in the globally. A well-functioning EHIS is an integrated effort to collect, process, report and use health information and knowledge to influence policy and decision-making, programme action, individual and public health outcomes, and research. Its adoption and use, has transformed the way healthcare services are delivered and has impacted significantly health care procedures, work practices, treatment outcomes and cost reduction. However EHIS’s full potential has not been realized, because there are many challenges affecting adoption of ICT solutions in developing countries. These failures of EHIS adoption can be linked to other factors such as social cultural, psychological and organizational besides technical factors (Mwai, 2011).

In this study, reviewed user acceptance literature and discussed application of prominent theories and models in studying ICT adoption and use behaviors, empirically compared them in adoption and use and formulated a framework that integrates elements across the theories and models suitable for adoption and use of EHIS in the health industry.

In the initial stages of data collection I used qualitative and open-ended research approaches to expand and enrich the conceptual framework. Four healthcare providers I clustered into three categories: Rural setup, urban setup and city setup that participated in this research. Using subjective sampling I selected informants who mainly end-users are using the system on a day to day basis. The analysis was conducted using SPSS where descriptive statistics were also generated including frequency. Inferential statistics were also generated including regression coefficient, and eventually and framework for adoption and use of EHIS from the staff perspective was generated. The findings of the study indicate the fact that five determinants: Perceived Usefulness, Perceived Ease of Use, Perceived Enjoyment, Security of Records and Awareness in combination with other determinants influence adoption and use of EHIS.
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DEFINITIONS OF TERMS

ICT  Information and Communications Technology
EHIS  Electronic Health Information Systems
IS  Information System
GoG  Government of Ghana
WHO  World Health Organization
IOM  Institute of Medicine
TAM  Technology Acceptance Model
UTAUT  Unified theory of Acceptance and Use of Technology
TRA  Theory of Planned Behavior
SPSS  Statistical Package for Social Scientists
CHAPTER ONE
INTRODUCTION

1.1. Introduction
This project report presents an explanation of the factors influencing EHIS adoption and use among staff in healthcare providers in health sector in Kenya. The introduction chapter starts by detailing the historical background of the research problem.

1.2. Background
ICT solution includes any product or service through which information can be digitally stored, retrieved or manipulated. Healthcare Information and Communication Technology (ICT) referred to as e-health is the use of information technology to improve the process of healthcare delivery. The World Health Organization defines eHealth as the cost-effective and secure use of information and communications technologies (ICT) in support of health and health-related fields. Ehealth then encompasses a range of services or systems that are at the edge of medicine/healthcare and information technology, including: Electronic health records, ePrescribing, Telemedicine, Consumer health informatics, Health knowledge management, mHealth, Medical research using Grids and Healthcare Information Systems.
The adoption and usage of Information and Communication Technology (ICT) is changing business processes, and the way people live and work. With the advent of internet and the World Wide Web in business has revolutionized the business processes in organizations. In recent years, harnessing Information and Communication Technology (ICT) has emerged as a new strategy towards achieving Quality Healthcare.
Quality Healthcare is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes, are consistent with current professional practitioner skill, and meet the expectations of healthcare users (IOM, 1990). The Institute of Medicine and others have suggested that the wide-scale adoption of the EHRs could be pivotal for improving patient safety and health care quality (Acta Inform Med. 2013). Most of the government healthcare providers have not integrated ICT adoption in their development program among other things would be due lack a suitable framework. And yet Healthcare providers play a crucial role in provision of quality healthcare for sustainable economic growth.

Researchers in ICT have put in significant efforts to explain the factors influencing ICT adoption and usage in various sectors. There is an on-going debate on what factors really determine the adoption and usage of ICT in the health sector. However, the inherent characteristics of health sectors make it difficult to develop a generalized or unified ICT adoption and usage theory. Therefore, ICT adoption and usage models developed in other context may not be an exact fit in the health sector.

1.3. Scope
My study will be confined to adoption and use of Electronic Health Information Systems (EHIS) healthcare providers and will specifically focus in the Kenyan health sector. Health information systems refer to any system that captures, stores, manages or transmits information related to the health of individuals or the activities of organizations that work within the health sector. This definition incorporates things such as district level routine information systems, disease surveillance systems, and also includes laboratory information systems, hospital patient administration systems (PAS) and human resource management information systems (HRMIS). This research focuses on factors perceived to impinge on adoption and use of EHIS as e-health solutions in the Kenyan Health sector.

1.4. Problem statement and purpose of the project
Some estimates indicate that, since the 1980s, about 50 percent of all new capital investment in organizations has been in information technology (Westland and Clark 2000). The promise of more competitive, efficient and profitable organizations has so far not been realized due to implementation challenges. For technologies to improve productivity, they must be accepted and used by employees in specific organizations. Although EHI Systems are widely available in the market, appreciation of the technology, adoption and use it is varying remarkably among healthcare providers. This has had a negative impact in implementation, it is estimated that more than 50% of implementations fail to realize full potential (Logan J, 2012).

1.5. Specific Objectives
The aim of the study was to better understand how EHISs can be adopted and used more effectively to improve the health system in the Kenyan health sector.

The specific objectives of this study were:

i. To determining the current EHIS adoption and use status in health sector in Kenya

ii. To evaluate determinants for adoption of EHIS by healthcare providers in Kenya

iii. To develop a framework for EHIS adoption and use that can be used to guide in implementation in Kenya’s health sector and other developing countries?

1.6. Research questions
This study was guided by the following research questions:

i. What is the nature of adoption of EHIS in the health sector

ii. What are the determinants for adoption and usage of EHIS.

iii. Which framework which can used for effective adoption and use of EHIS by healthcare providers in Kenya’s health sector?

1.7. Research outcomes and their significance to key audiences
Healthcare system is the usual first line of response to medical events, whether of great or less severity. By integrating EHIS in providing services can lead to improving significantly efficiency in provision of healthcare services to all citizens. Formulation of a Framework for adoption and use of EHIS will play a role in the successful implementation of the integrated systems in the health sector.
The proposed framework will address the dynamics of adoption and use of EHIS in the health industry. It can be used to provide a basis on which to analyze and specify support and cooperation from development partners on EHIS projects. The framework will provide a useful tool for development partners, governments and healthcare providers needing to assess the likelihood of success for introduction of EHIS and helps them understand the drivers of adoption in order to proactively design interventions targeted at of users may be less inclined to adopt and use new solutions. Such a comprehensive, dynamic, and social framework offers a richer picture of the situation for analyzing and understanding EHIS implementation and adoption processes and their consequences. Further EHIS implementation in health sector will benefit from considering implementation and adoption as a part of a dynamic social system, and not as an individual decision to adopt or not adopt EHIS in isolation.

1.8. Hypotheses
Based on a review of literature as noted later in this proposal, it is hypothesized that for optimization of EHIS adoption and use of EHIS requires strategies and actions that address the determinants described in the framework.

1.9. Assumptions and limitations of the research
The study was limited in terms of its generalizability to the institutions which are using EHIS in service delivery. This institutions are a very heterogeneous, while the proposed study sample should be quite diverse, the fact remains that certain segments of the institutions will not be included depending how EHIS are utilized in the institutions.
CHAPTER TWO
LITERATURE REVIEW

2.1. Introduction
Although ICTs adoption studies constitute a significant area of research within the information systems domain, there continues to be a need for better understanding of the adoption and use of ICTs within the specific context, Healthcare is one of those disciplines. Little research was found in this area especially in adoption and use of EHIS from the perspective of healthcare providers' staff. So far the only literature found on the adoption and usage of ICT in the health sector is Framework for e-health adoption from management and staff perspective.

2.2.0. Definitions
For the purpose of this study it is important to make definitions associated with the study.

2.2.1. ICT and Healthcare service delivery
Information and Communications Technology (ICT), is often used as an extended synonym for information technology (IT), but is a more specific term that used to describe a range of technologies for gathering, storing, retrieving, processing, analyzing, and transmitting information. ICT in health encompasses a broad array of new technologies designed to manage and share health-related information.
ICT solutions offer myriad ways of making progress toward better health. For example, a ICT applications can support sound decision making by clinicians and patients, flag health threats to localities, enable citizens to receive laboratory results promptly and reliably, allow clinicians to monitor disease and coach patients with chronic conditions between appointments, transform individual data elements into pools of anonymous data for research and public health needs, and automate routine tasks so that chances of human error are greatly reduced. Recent healthcare trends clearly show significant investment by healthcare institutions into various types of applications to facilitate and support superior healthcare delivery.

2.2.2. Electronic Health information Systems
Electronic Health information Systems (EHIS) is the most basic type ICT in health sector, is a system that electronically collects, stores, exchange and organizes health information about patients. EHIS come in a variety of shapes and sizes; some collect and share patient information
only within a certain institution or within a certain provider group, while others are integrated into larger information networks.

Electronic Health information Systems (EHISs) have been available for decades, and yet hospitals, doctors, and other caregivers have been slow to adopt them. This is true even though 74% of U.S. physician EHIS adopters in 2011 said that using their systems enhanced overall patient care and 85% reported being somewhat or very satisfied with their systems (Jamoom, & Rechtsteiner, 2012).

2.2.3. Healthcare providers

Health care providers are institutions or individuals providing health care services. Individuals including health professionals and allied health professions can be self-employed or working as an employee in a hospital, clinic, or other health care institution, whether government operated, private for-profit, or private not-for-profit (e.g. non-governmental organization). They may also work outside of direct patient care such as in a government health department or other agency, medical laboratory, or health training institution. Examples of health workers are doctors, nurses, midwives, dietitians, paramedics, dentists, medical laboratory technologists, therapists, psychologists, pharmacists, chiropractors, optometrists, community health workers, traditional medicine practitioners, and others

2.3.0. ICT adoption

ICT adoption can be understood in three different stages: Pre-adoption, adoption, and post-adoption. At the pre-adoption stage, users may examine a new technology and consider adopting it. At the adoption stage, they form an intention to adopt the technology, and they eventually purchase and use it. At the post-adoption stage, people can either continue to use the technology or abandon it. If they abandon a technology, they may start to examine another technology at the same time in order to substitute their old technology (Youngseek & Kevin, 2010). On the other hand, Van der Veen (2004) provides a summary of the different dimensions used to conceptualize ICT adoption:

Business process activities ñ In this dimension, ICT adoption is measured according to the number of business process activities supported by e-business. Such business processes can be Customer-ordering process, customer complaints handling process, internal supporting process, etc;
**Application** In this dimension, the total number of computer applications used in the firm measure the extent of ICT adoption. Such computer applications may be Word, Excel, e-mail, website, internet, etc;

**Value creation** In this dimension, ICT adoption is measured according to the different relative advantages or benefits acquired because of adopting ICT. Some of the studies distinguish strategic value created from operational value created;

**Stage of development** - In this dimension, the ICT adoption process is a function of organisational change and ICT sophistication. The e-adoption ladder indicates that the lowest level is e-mailing application, followed by website presences, e-commerce, e-business and finally the transformed organisation (see also: Martin and Matlay, 2001).

### 2.4.0. EHIS adoption and use in Kenya’s health sector

Health Care sector in Kenya has witnessed significant growth during the last few years, both in quality and capacity. Healthcare is an information intensive industry and healthcare professionals rely on access to correct and comprehensive information, when and where they need it, to inform the daily decisions in real time. A large numbers of initiatives have been made by both public and private sectors in providing faster, affordable and reliable healthcare services by embracing EHIS for delivering health services. Kenya launched the country’s first National e-Health Strategy aimed at ensuring health information is provided to the right persons at the right place and time to support quality and efficient healthcare GOK (2010).

E-Health is acting not only as an agent for reforming healthcare systems, but also as an enabling tool to share resources without having to duplicate efforts Ogao et.al (2005). According to WHO report, there are an increasing number of local examples showing that faster and better information can improve health-care delivery and public health information WHO (2011).

Governments and Health Management organizations are placing greater emphasis, and greater resources, on ICT solutions as an improvement tool. Healthcare ICT solutions are centered on the following operational segments: Payers, Management/Administration, and Clinicians.

At the Payer level informational requirements consist of trend data population health, disease prevalence and high-level financial management.
The Kenya government developed e-Health strategy, Kenya National e-health Strategy 2011-2017 anchored on the achievement of Vision 2030, whose overall goal in health is to have an equitable and affordable healthcare at the highest achievable standard to her citizens. The e-Health Strategy will make use of the already available national ICT infrastructure; Conducive policy and legal environment and local expertise to harness ICT for improved healthcare service delivery in addition to other ongoing efforts.

In February 2011, a broad range of stakeholders representing government, private sector and academia gathered in Naivasha to prioritize the strategic areas of intervention and device an implementation framework for the Strategy. The stakeholders prioritized the Electronic Health information Systems. Some of these systems have been implemented by various institutions at different levels and extent but its benefits remain elusive.

Taurai and Chikotie (2010) carried out a study covering Healthcare provider’s management and patients and indentified Critical factors that are instrumental in adoption of e-health in healthcare service delivery within the developing country from the Healthcare provider’s management perspective: Knowledge, Organizational, Regulatory and policy and Economic. From Patients perspective the following factors were also indentified: Poor use awareness, Infrastructure, Education and Content Division.

![Diagram of adoption and use of EHIS in Healthcare](image)

**Figure 2.1. Framework for e-health adoption African Context**

Other studies suggest that social and technical factors can also affect implementation of EHIS. In either case, the question remains: how should adoption of EHIS is facilitated. To achieve the
full potential of ICT in the health sector it is important to consider implementation aspect from all perspectives. Therefore, it is important to examine the perceptions of the healthcare providers’ staff toward EHIS adoption and usage as described by the DOI theory (Rogers, 2003; Thong, 1999). Therefore other models will be analyzed to identify determinants for adoption and use EHIS in health facilities from the staff perspective.

2.5.0. Identifying determinants of EHIS adoption and use

Research in acceptance of new technology in the contemporary information systems (IS) has resulted frameworks, theories and models employed in studying ICT adoption and continued use behaviors (e.g., Hu et al. 1999). These frameworks, theories and models focus on people’s intention to engage in a certain behavior (i.e., adopt and use ICT) as a major theoretical foundation. These frameworks, theories and models include: e-health adoption framework, Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), Technology Acceptance Model 2 (TAM2), Unified theory of acceptance and use of technology (UTAUT), Innovation Diffusion Theory (IDT), Social Cognitive Theory, Information System (IS) Continuance Model and Expectation Confirmation Theory. These theories and models with different sets of acceptance determinants will form a basis for identifying determinants EHIS adoption and use by healthcare providers in the Kenya’s health sector.

2.5.1. Theory of Reasoned Action (TRA)

Theory of Reasoned Action explains an individual’s behavior based on his or her behavioral intention, which is influenced by his/her attitude toward the behavior and perception of the subjective norms regarding the behavior. Both attitude and subjective norm were found to be important determinants of peoples’ intentions to adopt and use ICTs (Brown, Massey, Montoya-Weiss, & Burkman, 2002; Karahanna, Straub, & Chervany, 1999). Attitude was found to have a significant influence on the intention to adopt and continue to use ICT (Anol Bhattacherjee & Premkumar, 2004) Regarding the subjective norm, previous studies found that subjective norm influences not only the behavioral intention (Hu, Lin, & Chen, 2005; Venkatesh & Davis, 2000),
but also other constructs including satisfaction (Hsu & Chiu, 2004), image (Chan & Lu, 2004), and perceived usefulness (Venkatesh & Davis, 2000).

2.5.2. Theory of Planned Behavior
Similar to TRA, Theory of Planned Behavior is a well-established social psychology theory that also states that specific salient beliefs influence behavioral intentions and subsequent behavior (Ajzen, 1991). Compared to TRA, TPB added another construct, Perceived Behavioral Control (PBC), which can be defined as “one’s perceptions of his/her ability to act out a given behavior easily” (Ajzen, 1991). Similar to using TRA, these studies also found significant relationships between attitude, subjective norm, perceived behavioral control and behavioral intention. Studies found that PBC directly influences the technology adoption intention (Chau & Hu, 2001; Wu & Chen, 2005) and continuance usage intention (Hsu, Yen, Chiu, & Chang, 2006; Liao, et al., 2007).

2.5.3. Technology Acceptance Model (TAM)
TAM stems from the TRA and TPB and aims at predicting the attitude of potential users towards a new technology by focusing on individual perceptions (Davis, 1989). In TAM, Davis identified two theoretical constructs including Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) that affect the intention to use a system. In post adoption studies, PU has been found to influence satisfaction (Moez Limayem, Hirt, & Cheung, 2007) and attitude toward the technology. PEOU has been found to influence both PU and adoption intention (Davis, 1989). In post-adoption studies, PEOU was found to influence satisfaction, continuance intention and actual continuance usage (R. Agarwal, 2000; Lippert, 2007).

Davis (1989) also found that there is a relationship between users’ beliefs about a technology’s usefulness and the attitude and the intention to use the technology. However, perceived usefulness exhibits stronger and more consistent relationship with usage than did other variables reported in the literature. In addition, an individual may adopt a technology if he or she perceives it as convenient, useful and socially desirable even though they do not enjoy using the technology (Saga & Zmud, 1994). Thus, there might be a possibility of a direct relationship between beliefs and intentions.


2.5.4. Technology Acceptance Model 2

Extended Technology Acceptance Model (TAM2) is an extension of TAM, which provides a detailed explanation of the key forces underlying judgments of perceived usefulness (Venkatesh & Davis, 2000). TAM2 incorporated additional theoretical constructs including social influence processes (subjective norm, voluntaries, image, and experience) and cognitive instrumental processes (job relevance, output quality, and result demonstrability), which original TAM lacked (Venkatesh & Davis, 2000). In TAM2, the social influences such as image and subjective norm were studied in order to overcome the limitations of the original TAM. TAM2 actually incorporated social influences into an individual’s perceptions of usefulness (Venkatesh & Davis, 2000). Compared to subjective norm, image can be defined as the way that people want to be seen. Image was found to have a significant influence on perceived usefulness (Venkatesh & Davis, 2000) and attitude (Karahanna, et al., 1999).

2.5.5. Unified theory of acceptance and use of technology (UTAUT)

UTAUT provides a refined view of how the determinants of intention and behavior evolve over time. It assumes that there are three direct determinants of intention to use (performance expectancy, effort expectancy, and social influence) and two direct determinants of usage behavior (Venkatesh, et al., 2003).

These relationships are moderated by gender, age, experience, and voluntariness of use (Venkatesh, et al., 2003). Empirical testing of UTAUT shows that performance expectancy, effort expectancy, and social influence have significant relationships with the intention to use technologies (Venkatesh, et al., 2003). Later studies found that social influence affect perceived usefulness and perceived ease of use (Hong & Tam, 2006).

2.5.6. Innovation Diffusion Theory

The main goal of IDT is to understand the adoption of innovation in terms of four elements of diffusion including innovation, time, communication channels, and social systems. IDT also states that an individual’s technology adoption behavior is determined by his or her perceptions regarding the relative advantage, compatibility, complexity, trialability, and observability of the innovation, as well as social norms (Rogers, 2003). The five main constructs of IDT were
employed and found to have significant relationships with other factors in ICT adoption and use research. Compatibility was found to influence PU (A Bhattacherjee & Hikmet, 2007), PEOU (Hernandez, et. al 2010), attitude (Ritu Agarwal et. al, 2003), and intention (Saeed et. al, 2008).

2.5.7. Social Cognitive Theory
Social Cognitive Theory (SCT) explains how people acquire and maintain certain behavioral patterns based on the learning from others (Bandura, 1977). SCT posits that portions of an individual's knowledge acquisition can be directly related to observing others within the context of social interactions, experiences, and outside media influences. SCT suggests that behavior is affected by both outcome expectations and self-efficacy, while outcome expectations and self-efficacy are in turn influenced by prior behavior. Self-Efficacy was found to positively influence various adoption determinants including PEOU (Venkatesh & Davis, 1996), PU (Ritu Agarwal & Karahanna, 2000), and perceived enjoyment (Roca & Gagné, 2008).

2.6.0. Summary of ICT Adoption Theories and Models
A total of seven models have been considered and defined their theorized determinants of intention and/or usage. The models hypothesize between two and seven determinants of acceptance.

After examining each of the seven theories and models above, I found several similarities between the constructs used to explain users' technology adoption and use. Table 1 below shows how the constructs in TRA, TPB, TAM, TAM2, UTAUT, IDT, and SCT are related to each other.

<table>
<thead>
<tr>
<th>UTAUT</th>
<th>TRA</th>
<th>TPB</th>
<th>TAM</th>
<th>TAM2</th>
<th>IDT</th>
<th>SCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Expectancy</td>
<td>Beliefs Attitude</td>
<td>Beliefs Attitude</td>
<td>Perceived Usefulness</td>
<td>Perceived Usefulness</td>
<td>Relative Advantage</td>
<td>Outcome Expectations</td>
</tr>
<tr>
<td>Effort Expectancy</td>
<td>Perceived Behavioral Control</td>
<td>Perceived Easy of Use</td>
<td>Perceived Easy of Use</td>
<td>Complexity</td>
<td>Self-Efficacy</td>
<td></td>
</tr>
<tr>
<td>Social Influence</td>
<td>Subjective Norm</td>
<td>Subjective Norm</td>
<td>Subjective Norm, Image</td>
<td>Result Demonstrability</td>
<td>Compatibility</td>
<td>Observability Trialability</td>
</tr>
<tr>
<td>Facilitating Conditions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2.1. Summary of previous Theories and Models in ICT Adoption
2.7.0. Post Adoption Theories
Recent post-adoption studies have applied new theoretical frameworks such as Expectation Confirmation Theory (ECT) (Hsu, et al., 2006) and IS Continuance model in order to address the changes in perceptions on technologies after people use them. These theories also reflect on people's cognitive reasoning, in regards to their post-adoption decision making processes. Cognitive processes are processes that involve knowledge and how people use their knowledge. They include matters such as attention, memory, producing and understanding language, solving problems and making decisions. All these are very important for human behavior.
In addition to these cognitive process based theories and models, habit has also been explored as a factor in automatic process of technology use. In this section, we review major post-adoption-focused theories and models including ECT, IS Continuance model, and habit.

2.7.1. Expectation Confirmation Theory
ECT addresses the phenomenon of increasing user experiences with ICTs over a time period, which is an important consideration in studying the continued or discontinued use of technology. The ECT theorizes that consumer's post-purchase satisfaction is jointly determined by pre-purchase expectation, perceived performance (of technology), and expectancy confirmation. ECT explains the cause of satisfaction by focusing on both the antecedents of satisfaction and the satisfaction formation process (Susarla, Barua, & Whinston, 2003). In the studies that used the ECT as a major theoretical framework in studying the post-adoption behavior of ICTs, confirmed statistically that there is significant relationships with various adoption and use constructs including perceived usefulness, perceived ease of use, perceived enjoyment (Thong, et al., 2006), perceived behavioral control (Hsu, et al., 2006), and satisfaction (Bhattacherjee & Premkumar, 2004).

2.7.2. Information System (IS) Continuance
In the IS field, user satisfaction can be defined as the affective attitude towards a particular computer application by an end user who interacts with the application directly (Doll, Hendrickson, & Deng, 1998). Smith and Bolton (2002) also argued that satisfaction represents a construct that is partly cognitive and partly emotional. Studies on satisfaction, found that satisfaction influences attitude toward an ICT (Anol Bhattacherjee & Premkumar, 2004) and the intention to continue using the ICT (Anol Bhattacherjee, 2001a; Moez Limayem, et al., 2007).
2.8.0. Summary of ICT Post Adoption Theories

After examining each of the theories above, I found several similarities between the constructs used to explain users’ ICT technologies adoption and use. First, studies confirmed that there are significant relationships with various adoption and use constructs including perceived usefulness, perceived ease of use, perceived enjoyment and satisfaction. Also satisfaction influences attitude toward an ICT and the intention to continue using ICT. Frequently performed behaviors tend to become habitual and thus automatic over time, habit is an important consideration in studying the continued or discontinued use of technology.

2.9.0. Other determinants

In the context of ICT adoption and use, habit can be defined as the extent to which people tend to perform behaviors (use ICT) automatically because of learning (Moez Limayem, et al., 2007). During the initial adoption of technology, individuals are most likely involved in active cognitive processing in determining their intentions to adopt the technology. However, with any repetitive behavior occurring after the adoption of technology, reflective cognitive processing attenuates over time leading to non-reflective, routinized behavior (Ouellette & Wood, 1998). Previous post-adoption studies have ignored that frequently performed behaviors tend to become habitual and thus automatic over time (Moez Limayem, et al., 2007). Therefore, the post-adoption of technology research needs to consider not only the continuance intention but also habit.

Security is a sensitive issue in healthcare, protecting customer information and system is a tall order for healthcare providers. It has been found to be an important determinant of technology acceptance and use. Understanding of trends in the available technologies and expected benefits is enhanced by awareness and continued education in ICT. Governments could assist in creating awareness and reducing the psychological barriers to ICT acquisition by showcasing SME success stories, best practices, and benefits gained through ICT adoption. Both satisfaction and prior behavior were found to have significant impact on IS continuance (Limayem & Cheung, 2008).
2.10.0. Theoretical Synthesis

The synthesis of previous theories and models indicated that people's technology adoption and use intention can be explained by three main constructs including perceived behavioral control, behavioral attitude and subjective norms. However for continued or discontinued use of technology the main construct is satisfaction and habit as another factor influencing the continued use of technology. Other factors such as security, benefits and awareness are also key determinants.

The table below shows how the constructs in TRA, TPB, TAM, TAM2, UTAUT, IDT, and SCT are related to each other together with the synthesis of previous theories and models indicated that people's technology adoption and use intention.

<table>
<thead>
<tr>
<th>UTAUT</th>
<th>TRA</th>
<th>TPB</th>
<th>TAM</th>
<th>TAM2</th>
<th>IDT</th>
<th>SCT</th>
<th>ECT</th>
<th>SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Expectancy</td>
<td>Beliefs</td>
<td>Attitude</td>
<td>Beliefs</td>
<td>Attitude</td>
<td>Perceived Usefulness</td>
<td>Perceived Usefulness</td>
<td>Relative Advantage</td>
<td>Outcome Expectations</td>
</tr>
<tr>
<td>Effort Expectancy</td>
<td>Perceived Behavioral Control</td>
<td>Perceived Easy of Use</td>
<td>Perceived Easy of Use</td>
<td>Complexity</td>
<td>Self-Efficacy</td>
<td>Perceived Easy of Use</td>
<td>Perceived Easy of Use</td>
<td></td>
</tr>
<tr>
<td>Social Influence</td>
<td>Subjective Norm</td>
<td>Subjective Norm</td>
<td>Subjective Norm</td>
<td>Result Demonstrability</td>
<td>Compatibility Observability Trialability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitating Conditions</td>
<td></td>
<td></td>
<td></td>
<td>Expectancy confirmation</td>
<td>Expectancy confirmation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Perceived Performance</td>
<td>Perceived Performance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Perceived Enjoyment</td>
<td>Perceived Enjoyment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Habit</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2.2. Summary of previous Theories and Models in ICT Adoption and Continued Use

From the theoretical synthesis I concluded that most of the variance in the rate of adoption of innovations can be explained by five innovation attributes namely: Perceived Usefulness, Perceived Ease of Use, Expectancy confirmation and Perceived performance. In recent studies, more innovation attributes are discussed especially in the health sector context. This includes Perceived Enjoyment, Security, Benefits, Awareness and Habit.

2.11.0. Hypothesis and Conceptual framework
In this part I present and discuss the hypotheses and formulate the conceptual framework of this study and I will present an integrated conceptual framework that addresses the key determinants related to EHIS adoption among healthcare providers in the health sector.

### 2.11.1. Hypotheses

From the synthesis of previous theories and frameworks, Perceived Usefulness, Perceived Ease of Use, and performance Expectancy, Perceived Enjoyment, Security of Records, Benefits, Awareness and Habit determine adoption and use of ICT in other sectors. These determinants also influence EHIS adoption and use from the healthcare provider's staff perspective.

- **H1.** Perceived Usefulness does not determine Adoption and Use of EHIS
- **H2.** Perceived ease of use does not determine Adoption and Use of EHIS
- **H3.** Facilitating conditions does not determine Adoption and Use of EHIS
- **H4.** Perceived Enjoyment does not determine Adoption and Use of EHIS
- **H5.** Expectancy confirmation does not determine Adoption and Use of EHIS
- **H6.** Security of records does not determine Adoption and Use of EHIS
- **H7.** Personal Benefit does not determine Adoption and Use of EHIS
- **H8.** Awareness does not determine Adoption and Use of EHIS
- **H9.** Habit does not determine Adoption and Use of EHIS

### 2.11.2. Conceptual framework

Therefore, the rate of adoption and usage of EHIS in the health sector is determined by: Perceived Usefulness, Perceived Ease of Use, and performance Expectancy, Perceived Enjoyment, Security of Records, Benefits, Awareness and Habit. The innovation characteristics model is summarised in Figure 2-1 below.
The research design is the outline or plan that is used to generate answers to the research questions.
It is the blueprint for the collection, measurement and analysis of data. The method to be used in

CHAPTER TWO
METHODOLOGY

3.0. Introduction
The research design is the outline or plan that is used to generate answers to the research questions. It is the blueprint for the collection, measurement and analysis of data. This chapter details the research methodology used in the study, among other things explained include methodological choices made, and the steps followed to collect and analyze the data and test the hypotheses done.

3.1. Research design
The main aim of the study was to identify determinants, formulate and test the framework developed on adoption and usage of EHIS in the Kenya’s Health sector. Two research designs were used: surveys and case studies. Saunders, Lewis, and Thornhill (2007), state that case studies are used to answer the questions who, what, where and how. The method helps to establish the traits of healthcare providers staff which may inhibit or foster the adoption and usage of EHIS. A case study was used in collecting data for the study and a survey was used in the selected cases. The survey method entails using a standardized questionnaire to collect the desired information from the respondents (Malhotra, 2007).

The research used both quantitative and qualitative approaches. Qualitative approach helps bring out the feelings of the respondents while quantitative research involves the measurement of quantifiable values. It helps in generating statistics.

3.2. Target Population and Sample Selection
In most cases, a sampling design starts by identifying the target population.

3.2.1. Target Population
The study targeted staff of healthcare providers from rural area, urban area and city: healthcare providers representing rural were Kapsabet county referral hospital and Mosoriot Rural training Health centre; healthcare providers representing urban were Familycare hospital and Medheal hospital in Eldoret and; healthcare providers representing city were Jamaa Hospital and Getrude Children Hospital in Nairobi.

Contact list obtained from the website indicated as at February 2014 there were 9476 as indicated in Table 3-1. Kenya Healthcare providers according to the website http/www.ehealth.or. ke.
<table>
<thead>
<tr>
<th>Serial</th>
<th>CATEGORY</th>
<th>FREQUENCY</th>
<th>PERCENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dental Clinic</td>
<td>30</td>
<td>0.3</td>
</tr>
<tr>
<td>2</td>
<td>Dispensary</td>
<td>4308</td>
<td>45.3</td>
</tr>
<tr>
<td>3</td>
<td>District Health Office</td>
<td>4</td>
<td>0.001</td>
</tr>
<tr>
<td>4</td>
<td>District Hospital</td>
<td>136</td>
<td>1.4</td>
</tr>
<tr>
<td>5</td>
<td>Eye Centre</td>
<td>10</td>
<td>0.1</td>
</tr>
<tr>
<td>6</td>
<td>Eye Clinic</td>
<td>3</td>
<td>0.001</td>
</tr>
<tr>
<td>7</td>
<td>Health Centre</td>
<td>1056</td>
<td>11.1</td>
</tr>
<tr>
<td>8</td>
<td>Health Programme</td>
<td>12</td>
<td>0.1</td>
</tr>
<tr>
<td>9</td>
<td>Health Project</td>
<td>8</td>
<td>0.1</td>
</tr>
<tr>
<td>10</td>
<td>Laboratory (Stand-alone)</td>
<td>51</td>
<td>0.5</td>
</tr>
<tr>
<td>11</td>
<td>Maternity Home</td>
<td>48</td>
<td>0.5</td>
</tr>
<tr>
<td>12</td>
<td>Medical Centre</td>
<td>22</td>
<td>0.2</td>
</tr>
<tr>
<td>13</td>
<td>Medical Clinic</td>
<td>3037</td>
<td>32.0</td>
</tr>
<tr>
<td>14</td>
<td>National Referral Hospital</td>
<td>3</td>
<td>0.0</td>
</tr>
<tr>
<td>15</td>
<td>Nursing Home</td>
<td>190</td>
<td>2.0</td>
</tr>
<tr>
<td>16</td>
<td>Other Hospital</td>
<td>238</td>
<td>2.5</td>
</tr>
<tr>
<td>17</td>
<td>Provincial General Hospital</td>
<td>9</td>
<td>0.1</td>
</tr>
<tr>
<td>18</td>
<td>Radiology Unit</td>
<td>9</td>
<td>0.1</td>
</tr>
<tr>
<td>19</td>
<td>Regional Blood Transfusion C</td>
<td>1</td>
<td>0.001</td>
</tr>
<tr>
<td>20</td>
<td>Rural Health Training Centre</td>
<td>1</td>
<td>0.001</td>
</tr>
<tr>
<td>21</td>
<td>Sub-District Hospital</td>
<td>131</td>
<td>1.4</td>
</tr>
<tr>
<td>22</td>
<td>Training Institution in Health</td>
<td>7</td>
<td>0.1</td>
</tr>
<tr>
<td>23</td>
<td>VCT Centre (Stand-alone)</td>
<td>162</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>9476</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Table 3.1. Kenya Healthcare facilities

However, more than 95% of the listed Healthcare providers did not meet the criteria because they do not have EHIS. The few who made the criteria I clustered them into three categories: Rural setup, urban setup and city setup to ensure that the findings could be used to make valid inferences from different environments. Using subjective sampling I selected informants who are mainly end-users using the system on a day to day basis in a healthcare facility. Such individuals include Receptionist, Medical Records officers, Pharmacists, Laboratory technicians, Billing and Accounts and other staff.

3.2.2. Sample selection

Care was taken to ensure that each of the three groups contained a range of people from different backgrounds for both the interview and the questionnaire. Participants consisted of a mix of staff
Receptionist, Medical Records officers, Pharmacists, Laboratory technicians, Billing and Accounts and other staff. It was hoped that this broad range of respondents would contribute to the generalisability of the results.

3.3. Data collection
During the initial stage, I used qualitative and open-ended research approaches to expand and enrich the framework presented above. The data collection exercised started on November 2013 and ended in January 2014 and managed to contact four healthcare providers. The four healthcare providers that participated in this research were Medheal Fertility Hospital, Kapsapet County Referral Hospital, Family Care Hospital all in Eldoret and Jamaa Mission hospital Buruburu. For each group, a detailed questionnaire and interview schedule was drafted. (Summary details of these survey instruments are included in Appendix I.

3.4. Data analysis
The main data analysis was carried out using quantitative software, SPSS for the descriptive statistics analysis, data transformations and multiple regressions in statistics, regression analysis is a statistical process for estimating the relationships among variables, and thus it was suitable to identify determinants.

In multiple linear regressions, there are several independent variables or functions of independent variables.

\[ y_i = \beta_0 + \beta_1 x_i + \beta_2 x_i^2 + \varepsilon_i, \ i = 1, \ldots, n. \]

This is still linear regression; although the expression on the right hand side is quadratic in the independent variable \( x_i \), it is linear in the parameters \( \beta_0, \beta_1 \) and \( \beta_2 \).

In both cases, \( \varepsilon_i \) is an error term and the subscript \( i \) indexes a particular observation?

A low p-value indicates greater statistical significance, i.e. greater confidence that the observed deviation from the null hypothesis is significant. A p-value of 0.05 is often used as a bright-line cutoff between significant and not-significant results.
CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION AND PRESENTATION

4.1. Introduction

This chapter presents analysis and findings of the study which aimed at examination of determinants influencing adoption and use of EHIS in Kenya health sector. The chapter covers finding and analysis on personal information and personal opinion on aspects determinants of EHIS adoption and use. The findings were then presented in tables, graphs and charts as appropriate with explanations being given in prose thereafter. Before the main study, the researcher pre-tested the instrument to enhance its validity and reliability.

4.2.0. Demographic characteristics of the respondents

One of the objectives of this study is aimed at determining the current EHIS adoption and use status in sector in Kenya. The respondents came from four healthcare providers: Kapsabet county referral hospital, Mosoriot Rural training Health centre, Familycare hospital, Medheal hospital Jamaa Hospital and Getrude Children Hospital. The respondents’ characteristics were examined as presented in the next sections however the effects of individual characteristics on adoption and use were not tested. However some of the previous studies have indicated that demographic characteristics have an influence on ICT adoption and its usage. Under the profile of the respondent we examine age, gender, educational level, and job position among others.

4.2.1. Age Distribution

Age is in general positively related to ICT adoption and usage (see, for example: Morris and Venkatesh, 2000; Pijpers et al., 2001). In this study, the majority (33.3%) of the respondents were aged between 25 and 30 years followed by 30.8% aged between 31 to 34 and 25.5% are aged between 20 to 24 years. Therefore, 89.7% of the respondents are below 40 years. Meaning other factors are to be considered.
4.2.1. Gender distribution of the respondents

The literature review conducted found that gender is one of the most studied personal characteristics in ICT studies. For example, Van Slyke et al. (2002) found gender to be a significant predictor of an individual intention to make purchases over the web. Some of the ICT studies have examined mediation and moderation effects of gender on ICT adoption and usage rather than the direct relationship of gender with adoption and usage. The study sought to establish the gender of the respondents and the findings are as shown in Figure 4.1 below.

Figure 4.1. Age Distribution

Figure 4.2. Gender distribution of the respondents
From the findings, (54%) of the respondents were male while 46% were female. This implied that healthcare providers have almost an equal proportion of male and female in the various departments.

4.2.2 Distribution of the respondents by age bracket

Educational Level

Educational level is perhaps the most commonly agreed personal characteristic that is positively predicting ICT adoption and usage (see, for example: Pijpers et al., 2001; Zhu and He, 2000). A large proportion of the respondents had a Certificate or a Diploma educational level (39.0%), Secondary / High school educational level (24.1%)

Types and levels of EHIS adopted and used in health sector

The study in this area asked all the respondents to list EHIS they are using, from the findings the response is as represented below graphically.

Figure 4.3. Types of EHIS adoption
The study shows the systems are not unique, a pool of them are being used, with healthcare providers using more than one system.

Source: Field Data

Figure 4.4. Nature of EHIS used by healthcare providers
The study sought to investigate the nature of EHIS used by healthcare providers. Seventy six percent (60.7) % of all respondents indicated EHISs are integrated, 28.6% indicated systems are partly integrated and only 10.7% of the respondents indicated that the systems are not integrated. Therefore, according to staff of healthcare providers only 60% of the systems are exploited while the rest are underutilized.

4.3.0. Hypotheses Testing

The main objective of this study was to investigate the determinants for adoption and usage of EHIS among Healthcare providers in Kenya’s health sector from perspective. In this section various data analysis techniques used to test the hypotheses. We used multiple regression analysis to address the objective two in this study. In our study conclusions we have adopted multiple regressions of individual hypotheses blocks rather than combined multiple regressions. The study hypotheses were grouped into nine blocks. The hypotheses blocks include the following:

- Perceived Usefulness (Increasing performance, competitive edge, greater level of control, quality decision making, speed of my decision making) determine Adoption and Use of EHIS
- Facilitating conditions (resources, knowledge, and compatibility and assistance availability) determine Adoption and use of EHIS
- Perceived ease of use (learning to operate, doing what I want, becoming skillful and flexibility) determine Adoption and Use of EHIS
- Perceived Enjoyment (pleasant, learning new technology and user-friendliness) determine Adoption and Use of EHIS
- Perceived Peformance (Efficient, accurate, doing more and consisted documentation) determine Adoption and Use of EHIS
- Security of records (Unauthorized access, cannot change, not accessible and not easily lost) determine Adoption and Use of EHIS
- Personal Benefit (Communication, exposure and socialization) determine Adoption and Use of EHIS
- Awareness (orientation, training and providing opportunities) determine Adoption and Use of EHIS
- Habits (Attached and all the time) determine Adoption and Use of EHIS

The results of the hypotheses testing presented using multiple regression analysis as the major data analysis technique. I carried out the data analysis tests by using SPSS version 16.0. The main data analysis method was preceded with other statistical data analysis techniques such as correlation analysis, factor analysis, and scale analysis (Hair et al., 2006). In Section 7.6, we present the report on testing the integrated effects of the TOE characteristics on behavior intension.

### 4.3.1. Measuring the Dependent Variables

The dependent variable in this study is behavior intension. The different measurement of behavior intension was on a five point Likert scale where: 5-Strongly Agree, 4-Agree, 3-Not Sure, 2-Disagree, and 1-Strongly Disagree scales and was provided in the questionnaire. Therefore, testing the EHIS related hypotheses involved examining the individual hypotheses at each EHIS intended period, determined by the intended period of use analysis. The intended period of use of EHIS ranges from 1 year to 4 years. These identified EHIS levels correspond with the ICT adoptions stages previous discussed in the ICT adoption studies (Doherty et al., 2003; Hashim et al., 2006; Khemthong and Roberts, 2006). Therefore, in concluding the hypotheses, the related
hypothesis is accepted or rejected if the factors are supported by the data analysis. If two out of three factors are accepted, then we term it as partially accepted. The EHIS hypotheses have simple decisions as rejected or accepted.

![Research Frameworks Diagram]

Figure 4.5. Research Frameworks

In this section, I examine the influence of the determinants on behavior intension in adaption of EHIS in health facilities. In order to test hypotheses suggested in the conceptual model, a multiple regression analysis of the determinants and adoption of EHIS was performed.

<table>
<thead>
<tr>
<th>Model</th>
<th>Beta</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>.0323</td>
<td></td>
</tr>
<tr>
<td>Perceived Usefulness</td>
<td>.290</td>
<td>.0290</td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td>.241</td>
<td>.0212</td>
</tr>
<tr>
<td>Facilitation Condition</td>
<td>.072</td>
<td>.0710</td>
</tr>
<tr>
<td>Perceived Enjoyment</td>
<td>.240</td>
<td>.0371</td>
</tr>
<tr>
<td>Security of Records</td>
<td>.173</td>
<td>.0357</td>
</tr>
<tr>
<td>Awareness</td>
<td>.397</td>
<td>.0037</td>
</tr>
<tr>
<td>Habit</td>
<td>-.101</td>
<td>.0611</td>
</tr>
</tbody>
</table>
Table 4.1. Multiple regression analysis for determinants influencing adoption and use

<table>
<thead>
<tr>
<th></th>
<th>$\beta$</th>
<th>$p$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Benefit</td>
<td>0.016</td>
<td>0.0926</td>
<td>0.534</td>
</tr>
<tr>
<td>Expected performance</td>
<td>-0.011</td>
<td>0.0958</td>
<td>0.534</td>
</tr>
</tbody>
</table>

4.3.2. Determinants and EHIS – Multiple Regression Analysis

In this section, the influence of the determinants on the EHIS adoption and use was evaluated. Multiple regression analysis of the determinants and EHIS adoption performed as indicated in Table 4-1. Findings indicated that perceived usefulness is significantly related to EHIS adoption. The statistical parameters for perceived usefulness indicate a positive relationship with EHIS Adoption

$(\beta = 0.291, p=0.0290, R^2 = 0.534)$. 

The statistical parameters for perceived ease of use indicate a positive relationship with EHIS Adoption

$(\beta = 0.241, p=0.0212, R^2 = 0.534)$. 

The statistical parameters for performance expectance indicate a negative relationship with EHIS Adoption

$(\beta = -0.011, p=0.0958, R^2 = 0.534)$. 

The statistical parameters for facilitating Conditions indicate a positive relationship with EHIS Adoption

$(\beta = 0.072, p=0.0710, R^2 = 0.534)$. 

The statistical parameters for perceived enjoyment a positive relationship with EHIS Adoption

$(\beta = 0.240, p=0.0371, R^2 = 0.534)$. 

The statistical parameters for awareness indicate a positive relationship with EHIS Adoption

$(\beta = 0.397, p=0.037, R^2 = 0.534)$. 

The statistical parameters for habit indicate a negative relationship with EHIS Adoption

$(\beta = -0.101, p=0.0611, R^2 = 0.534)$. 

The statistical parameters for personal benefit indicate a positive relationship with EHIS Adoption

$(\beta = 0.016, p=0.0926, R^2 = 0.534)$. 

The statistical parameters for security of records indicate a positive relationship with EHIS Adoption

$(\beta = 0.173, p=0.0357, R^2 = 0.534)$. 

4.3.3 A Determinants and EHIS Hypotheses testing

H1. The Null Hypothesis state that there is no relationship between Perceived Usefulness and EHIS Adoption whose sig.value that is p value is 0.0290. Since P-value <0.05, I reject the Null Hypothesis Ho and take alternative Hypothesis H1. Therefore there is significant relationship between Perceived Usefulness and EHIS Adoption.

H2. The Null Hypothesis state that there is no relationship between Perceived ease of use and EHIS Adoption whose sig.value that is p value is 0.0212. Since P-value <0.05, I reject the Null Hypothesis Ho and take alternative Hypothesis H1. Therefore there is significant relationship between Perceived ease of use and EHIS Adoption.

H3. The Null Hypothesis state that there is no relationship between Facilitating conditions of use and EHIS Adoption whose sig.value that is p value is 0.0710. Since P-value >0.05, I accept the Null Hypothesis Ho and reject alternative Hypothesis H1. Therefore there is insignificant relationship between Facilitating conditions and EHIS Adoption.

H4. The Null Hypothesis state that there is no relationship between performance expectancy and EHIS Adoption whose sig.value that is p value is 0.0958. Since P-value <0.05, I accept the Null Hypothesis Ho and reject alternative Hypothesis H1. Therefore there is no significant relationship between Perceived ease of use and EHIS Adoption.

H5. The Null Hypothesis state that there is no relationship between Perceived Enjoyment and EHIS Adoption whose sig.value that is p value is 0.0371. Since P-value <0.05, I reject the Null Hypothesis Ho and take alternative Hypothesis H1. Therefore there is significant relationship between Perceived Enjoyment and EHIS Adoption.
H6. The Null Hypothesis state that there is no relationship between personal benefit and EHIS Adoption whose sig.value that is p value is 0.0926. Since P-value >0.05, I accept the Null Hypothesis Ho and reject alternative Hypothesis H1.

Therefore there is no significant relationship between personal benefit of use and EHIS Adoption.

H7. The Null Hypothesis state that there is no relationship between Security of records and EHIS Adoption whose sig.value that is p value is 0.0357. Since P-value <0.05, I reject the Null Hypothesis Ho and take alternative Hypothesis H1.

Therefore there is significant relationship between Security of records and EHIS Adoption.

H8. The Null Hypothesis state that there is no relationship between Awareness and EHIS Adoption whose sig.value that is p value is 0.037. Since P-value <0.05, I reject the Null Hypothesis Ho and take alternative Hypothesis H1.

Therefore there is significant relationship between Awareness and EHIS Adoption.

H9. The Null Hypothesis state that there is no relationship between Habit and EHIS Adoption whose sig.value that is p value is 0.0611. Since P-value >0.05, I accept the Null Hypothesis Ho and reject alternative Hypothesis H1.

Therefore there is no significant relationship between Habit of use and EHIS Adoption.

CHAPTER FIVE
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter presents summary of findings, conclusion and recommendations of the study in line with the objectives of the study. The research sought to establish the influence of determinants of adoption and use of EHIS by healthcare providers in Kenya's health sector.
The study was based on the hypothesis that successful adoption and use of EHIS requires strategies and actions that address the determinants described in the framework.

5.2. Summary

The study shows that a pool of EHIS are used, with healthcare providers using more than one system and according to staff of healthcare providers only 60% of the systems are integrated while the rest are underutilized.

The main of the study is to identify determinants for adoption and use of EHIS in healthcare providers from the perspective of staff. According to the findings, participating staff in healthcare providers believed that Perceived Usefulness, Perceived Ease of Use, Expectancy confirmation, perceived performance, Perceived Enjoyment, Security, Benefits, Awareness and Habit influence adoption and usage of EHIS.

The study further tested for the associations between variables: perceived usefulness, perceived ease of use, expectancy confirmation, perceived performance, behavioral intention, perceived enjoyment, awareness, security, benefits and habit and usage of EHIS for efficient service delivery in Kenya Health sector.

The results for testing indicate that Perceived Usefulness, Perceived Ease of Use, Perceived Enjoyment, Security of Records and Awareness have an association with adoption and usage of EHIS. Therefore determinants for adoption of EHIS by healthcare providers in Kenya are Perceived Usefulness, Perceived Ease of Use, Perceived Enjoyment, Security of Records and Awareness

5.3. Conclusion

It is evident that for implementation of EHIS to be successful the staff should be actively involved to address the following aspects: Perceived Usefulness, Perceived Ease of Use, Perceived Enjoyment, Security of Records and Awareness which are determinants of EHIS adoption and use in healthcare facilities in Kenya’s health sector.

<table>
<thead>
<tr>
<th>STAFF</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Usefulness</td>
<td></td>
</tr>
<tr>
<td>Perceived Ease of Use</td>
<td></td>
</tr>
<tr>
<td>Perceived Enjoyment</td>
<td></td>
</tr>
<tr>
<td>Security of Records</td>
<td></td>
</tr>
</tbody>
</table>
5.4. Recommendations

This study has, undoubtedly given insights on the adoption and use of EHIS by healthcare providers in the Kenyan health sector. The recommendations arising from this study include:

i. Since EHIS can play an important role in transforming healthcare providers to provide better services, performance can be improved by making use of user-friendly hardware such as touch screens among others.

ii. In order to realize its potentials, policy framework must be formulated that will encourage and promote the use of EHIS; the policies must address the long term users' and organizational needs, to transform and standardize service to patients.

iii. Healthcare providers should be encouraged to implement EHIS in modules to make it more affordable so as to enable clients enjoy its benefits even if it is in a smaller scale.

iv. To address system implementation failures it is important to focus on the staff concerns during implementation and as much as possible involve all stakeholders during the exercise.

v. Building ICT skills is an important component of any ICT intervention because new skills are required for operating the EHIS. Providers and users need continuing education and training to learn ICT and keep up with new developments in hardware, software and services. Investment in human capacity is essential in ICT initiatives.

vi. Adequate budgetary allocation should be provided for by government for the purchase of appropriate hardware and software and other accessories; costs of installation, support and maintenance.

5.5. Further areas of research
Current changes in government policy present exceptional opportunities for information professionals to contribute to the delivery of quality health care by emphasizing the centrality of high-quality information to the achievement of the goals of the health services. Conducting relevant research on integrating determinants from various perspectives i.e. management, patients and staff is necessary.

APPENDIX I

REFERENCES


George M. Gatero, 2010. Utilization of ICTs for Accessing Health Information by Medical Professionals in Kenya: A Case Study of Kenyatta National Hospital

Venkatesh, V., and Davis, F. D. “A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies,”

Davis, F. D. “Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology,”


Hong, S.-J., Thong, J. Y. L., Moon, J.-Y., & Tam, K.-Y. (2008). Understanding the behavior of mobile data services consumers. Information Systems Frontiers,
APPENDIX II
QUESTIONNAIRE

INTRODUCTION

Dear Sir/Madam,

This questionnaire is an invitation to participate in a research which attempts to identify determinants for adoption and use of Electronic Health information systems (EHIS), such as district routine information systems, disease surveillance systems, laboratory information systems, hospital patient administration systems (PAS) and human resource management information systems (HRMIS), among others.

The questionnaire is therefore designed to collect data from staff of healthcare providers both government and private.

The aim of the research project is to develop a suitable framework that hopefully can be used during planning and implementation of Electronic Health information systems (EHIS) by healthcare providers, successful implementation of EHIS is envisaged to turn-around service delivery leading to quality healthcare.

Thank You.

With regards

M.N. Bernard

University of Nairobi

Date .................................................. Serial No..........................

Instructions

✓ Please answer all questions
✓ Tick within the box and fill in the spaces provided

PART A

1.1. Gender   □ Male   □ Female

1.2. Age Bracket in years
1.3. Level of education

☐ Secondary  ☐ Certificate  ☐ College  ☐ University

☐ Others Specify... .

1.4. What is your profession (e.g. Nurse, Accountant, Clerk, Doctor, Computer Programmer, etc)...

1.5. What is your Designation (e.g. Matron, Senior, Accountant, and Deputy Director)?

1.6. In your designation do you use EHIS?  ☐ Yes  ☐ No

1.7. If Yes how did you know to use EHIS?

☐ On Job Training  ☐ Formal Training  ☐ Others Specify... .

1.8. If formal training, what is your level of training?

☐ Computer Applications  ☐ Certificate  ☐ Diploma  ☐ Degree

☐ Others Specify... .

1.9. In your opinion being computer literate will it help you perform your duty?

☐ Yes  ☐ No

2.0. If yes, How? ...........................................................................................................

2.1. If No, Why? ...........................................................................................................

2.2. Please list the system(s) in use in your organization

..
2.3. If the systems are more than one system, are they:

- [ ] Integrated
- [ ] Partly Integrated
- [ ] Not Integrated

2.4. How long have you been using the Electronic system(s).

- [ ] Less than 1 Year
- [ ] 1-2 Years
- [ ] 3-4 years
- [ ] 5-6 Years

2.5. How many times do you use the system in a day?

- [ ] Continuously
- [ ] Half day
- [ ] On and Off

Please indicate your level of agreement or disagreement with each of the following statements. For each statement below please circle the number that best describes your view on your Healthcare Facility.

<table>
<thead>
<tr>
<th></th>
<th>Perceived Usefulness</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not Sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>26a</td>
<td>Increase my performance</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26b</td>
<td>Give my Organization</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>competitive edge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26c</td>
<td>Provide greater level of</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>control of processes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26d</td>
<td>Increase quality of my</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>decision making</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26e</td>
<td>Increase the speed of my</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>decision making</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please indicate your level of agreement or disagreement with each of the following statements. For each statement below please circle the number that best describes your view on your Healthcare Facility.

<table>
<thead>
<tr>
<th></th>
<th>Perceived ease of use of</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not Sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>the system EHIS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27a</td>
<td>Is easy to learn to operate the system</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27b</td>
<td>It is easy to get the system to do what I want it to do</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27c</td>
<td>I would find the system easy to use</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>27d</td>
<td>It would be easy to become</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Please indicate your level of agreement or disagreement with each of the following statements. For each statement below please circle the number that best describes your view on your Healthcare Facility.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not Sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have the resources necessary to use the system</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I have the knowledge necessary to use the system</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The system is not compatible with other systems I use</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>A specific person (or group) is available for assistance with system difficulties</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Please indicate your level of agreement or disagreement with each of the following statements. For each statement below please circle the number that best describes your view on your Healthcare Facility.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not Sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unauthorized staff cannot access patient records in the system</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I can capture data but I cannot change existing ones in the system</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The records are not accessible to visitors or patients in the system</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Records are not easily lost</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Please indicate your level of agreement or disagreement with each of the following statements. For each statement below please circle the number that best describes your view on your Healthcare Facility.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not Sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perceived Enjoyment in</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
It is enjoyable to use the system

The actual process of using it is pleasant

I enjoy learning new technology

I find the system user-friendly

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not Sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unauthorized staff cannot access patient records in the system</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I can capture data but I cannot change existing ones in the system</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The records are not accessible to visitors or patients in the system</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Records are not easily lost</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

I can also use the system communicate with friends e.g emails

I am now exposed to using computers

I can socialize with others e.g facebook

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not Sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can also use the system communicate with friends e.g emails</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I am now exposed to using computers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I can socialize with others e.g facebook</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Agree</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
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<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>36a</td>
<td>I was given orientation in using the system</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>36b</td>
<td>I was trained before using the system</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>36c</td>
<td>The introduction of system provided Opportunities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Please indicate your level of agreement or disagreement with each of the following statements. For each statement below please circle the number that best describes your view on your Healthcare Facility.

<table>
<thead>
<tr>
<th></th>
<th>Developed habit</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not Sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>37a</td>
<td>I am attached to using the system</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>37b</td>
<td>I rely on the system all the time</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

38. **Behavior Intention to Use**

- 5 year
- 4 years
- 3 years
- 2 years
- 1 year

39. Others specify

é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é é