

**Towards a Model for Improving Adoption and Utilization of Health  
Information Systems in Healthcare Delivery  
Case Studies: Nakasero Hospital and Savannah Sunrise Medical  
Center**

**Radooli Deborah Katiiti**

**2015-M142-20004**

**Uganda Martyrs University**



**February 2018**

**Towards a Model for Improving Adoption and Utilization of Health  
Information Systems in Healthcare Delivery  
Case Studies: Nakasero Hospital and Savannah Sunrise Medical  
Center**

**A postgraduate dissertation presented to the Faculty of Science in  
partial fulfilment of the requirements for the award of the degree of  
Master of Science in ICT Management, Policy and Architectural  
Design**

**Uganda Martyrs University**

**Radooli Deborah Katiiti**

**2015-M142-20004**

**February 2018**

## **DEDICATION**

I dedicate this dissertation to my dear parents, The Late Mr. Frederick Wavamunno Mpagi and Mrs. Eseza Kizza Mpagi, my dear husband Mr. Martin Othieno Radooli and my dear children Jesse Khumwenya Odera, Hannah Khwamukhera Akotsi, Jordan Khwasangala Ogutu and Hazael Owoluyali Radooli. Without their patience, support and encouragement in this journey, I would never have made it.

## **ACKNOWLEDGEMENTS**

I wish to acknowledge the contribution of the organisations and individuals that made this research a success. First, I express my gratitude to the Management of Uganda Martyrs University for giving me an opportunity to pursue a Masters' degree.

I am indebted to the Department of Computer Science and Information Systems, right from the Head of Department, the Research Coordinator, Academic Staff, down to the faculty administrators for all the support and enabling environment.

I acknowledge the Management of Savannah Sunrise Medical Center and Nakasero Hospital Limited and all respondents to this study for their valuable insights which are the hallmark of this dissertation.

In a special way, I thank my supervisor Dr. Richard Ssembatya for his guidance and great enthusiasm in my work. Without his critical and analytical mind, I would not be able to produce this dissertation.

I owe special thanks to my dear husband, Mr. Martin Othieno Radooli for his enduring support over the years. Furthermore, I specially thank my four children; Jesse Khumwenya Odera, Hannah Khwamukhera Akotsi, Jordan Khwasangala Ogutu and Hazael Owoluyali Radooli for selflessly walking the journey with me and enduring certain circumstances as I indulged in this programme. I will always appreciate their patience and understanding.

I express my sincere appreciation to my dear brother Andrew, my dear sisters Victoria, Alice, Joyce, Margaret, Samalie and Maydred and sister in law Annie for their prayers, great contribution, encouragement and support throughout this course. I also acknowledge the support and prayers of other family members and friends.

My colleague Joseph Wamema as well as my MSC ICT 2015 class also deserve a special mention for all the constant encouragement, experiences and knowledge shared.

Above all, I owe it all to my Lord Jesus Christ's wisdom, knowledge and understanding. His abundant special grace, wisdom and peace, which were indispensable ingredients for this academic journey.

# TABLE OF CONTENTS

LIST OF TABLES .....	I
LIST OF FIGURES .....	II
LIST OF ABBREVIATIONS .....	III
ABSTRACT .....	IV
CHAPTER ONE: INTRODUCTION .....	1
1.0 Introduction .....	1
1.1 Background of the Study .....	2
1.2 Statement of the Problem .....	4
1.3 Objectives of the Study.....	5
1.3.1 General Objective.....	5
1.3.2 Specific Objectives.....	5
1.4 Scope of the Study.....	5
1.4.1 Geographical Scope.....	5
1.4.2 Technical scope .....	6
1.5 Significance of the Study.....	6
1.6 Justification of the Study .....	7
CHAPTER TWO: LITERATURE REVIEW .....	8
2.0 Introduction .....	8
2.1 Key Terms and Definitions.....	8
2.2 Perceptions of Healthcare Professionals towards HIS Adoption and Utilization .....	10
2.3 Critical Success Factors for Adoption and Utilization of HISs.....	12
2.4 Information Technology Adoption and Utilization Models & Frameworks.....	14
2.4.1 Lewin’s Change Model .....	14
2.4.2 Diffusion of Innovations theory .....	17
2.4.3 Theory of Reasoned Action (TRA) (1975) .....	19
2.4.4 Theory of Planned Behavior (TPB) .....	20
2.4.5 The Technology Acceptance Model (TAM).....	21
2.4.6 The Unified Theory of Acceptance and Use of Technology (UTAUT) .....	23
2.4.7 The Open Group Architecture Framework (TOGAF) .....	25

2.5 Comparison of IT Adoption and Utilisation Models.....	27
<b>CHAPTER THREE: METHODOLOGY .....</b>	<b>29</b>
3.0 Introduction .....	29
3.1 Research Design .....	29
3.1.1 Research Philosophy .....	29
3.1.2 Research Approach .....	30
3.1.3 Research Strategy.....	30
3.1.4 Data Collection Method .....	31
3.2 Study Population.....	31
3.3 Sampling Technique and Procedure .....	32
3.4 Data Collection Methods and Instruments .....	33
3.5 Data Analysis.....	35
3.6 Data Control Methods .....	35
3.7 Development of Proposed Model.....	36
3.8 Ethical Considerations .....	36
3.9 Limitations to the study .....	37
3.10 Conclusion.....	37
<b>CHAPTER FOUR: FINDINGS AND ANALYSIS .....</b>	<b>38</b>
4.0 Introduction .....	38
4.1 The Respondents.....	38
4.2 The Case Studies .....	39
4.2.1 Savannah Sunrise Medical Center.....	39
4.2.2 Nakasero Hospital .....	40
4.3 HIS Adoption Process .....	41
4.4 HIS Utilization Process .....	51
4.5 Summary of Findings and Way Forward .....	58
4.6 Conclusion.....	60
<b>CHAPTER FIVE: PROPOSED HIS ADOPTION AND UTILISATION MODEL.....</b>	<b>61</b>
5.0 Introduction .....	61
5.1 Description of the Proposed Model.....	71

5.2 The HIS Adoption Stage.....	72
5.2.1 Initiation Phase.....	72
5.2.2 Deployment Phase.....	82
5.2.3 Acceptance Phase.....	85
5.3 The HIS Utilisation Stage.....	90
5.3.1 HIS Routinization Phase.....	90
5.3.2 HIS Infusion Phase.....	94
5.3.3 HIS Optimization Phase.....	98
5.4 HIS Model Evaluation.....	102
5.5 Conclusion.....	103
CHAPTER SIX: SUMMARY, CONCLUSION & RECOMMENDATIONS.....	105
6.0 Introduction.....	105
6.1 Summary of Findings.....	105
6.2 Conclusion.....	106
6.3 Recommendations for future work.....	107
References.....	108
Appendices.....	123
Appendix 1.....	123
Appendix 2.....	124
Appendix 3.....	125
Appendix 4.....	139

## LIST OF TABLES

<i>Table 1: Comparison of IT Adoption &amp; Utilisation Models</i> .....	28
<i>Table 2: Categories of Respondents Identified in the Study</i> .....	38
<i>Table 3: HIS Model Evaluation Results</i> .....	103
<i>Table 4: Work Breakdown Structure</i> .....	124



## LIST OF FIGURES

<i>Figure 1: Theory of Reasoned Action</i> .....	20
<i>Figure 2: Theory of Planned Behavior</i> .....	21
<i>Figure 3: Technology Acceptance Model</i> .....	23
<i>Figure 4: Unified Theory of Acceptance and Use of Technology</i> .....	24
<i>Figure 5: Proposed HIS Adoption &amp; Utilisation Model</i> .....	70
<i>Figure 6: Gantt Chart</i> .....	124

## **LIST OF ABBREVIATIONS**

ADM: Architecture Development Method

DOI: Diffusion of Innovations Theory

HIS: Health Information System

ICT: Information and Communications Technology

IT: Information Technology

TAM: Technology Acceptance Model

TRA: Theory of Reasoned Action

TPB: Theory of Planned Behavior

UTAUT: Unified Theory of Acceptance and Use of Technology

TOGAF: The Open Group Architecture Framework

## **ABSTRACT**

This study was about the development of a proposed model to improve adoption and utilisation of Health Information Systems (HISs) in Healthcare Delivery. It involved reviewing various literature about the perceptions of healthcare professionals towards health information systems adoption and utilisation and critical success factors for the adoption and utilisation of health information systems. Furthermore, it also included the review of the various existing IT adoption and utilisation models, theories and frameworks together with their comparison.

Two case studies were selected for purposes of this study; Nakasero Hospital and Savannah Sunrise Medical Center. These case studies were investigated with specific focus on gaining an in-depth understanding of the adoption and utilisation of HISs in healthcare institutions. Questionnaires, focus group discussions, interviews and document analysis were the main instruments for data collection. Data was analyzed qualitatively using Colaizzi's 1978 framework for qualitative data analysis. The analysis of the results indicated that a number of factors that affect the adoption and utilisation of technology were not well considered by these two case studies. Some of the challenges faced include; User resistance, absence of risk managing planning, insufficient resources, incomplete HIS roll out in the organisation, insufficient assessment of the organisation context, lack of HIS adoption readiness assessment in the organisation among others.

Based on the findings from this study, a proposed IT Model capable of improving the adoption and utilisation of HISs in healthcare institutions was developed. In developing this model, focus was put on clearly specifying the different phases of HIS adoption and utilisation together with the key considerations for each phase. It was based on The Open Group Architecture Framework (TOGAF) which represents best practice for adoption and utilisation of Information and Communication Technologies.

Although the proposed solution is expected to improve the adoption and utilisation of health information systems for healthcare delivery, there is need for ascertaining and confirming its ability and effectiveness in improving HIS adoption and Utilisation. In this regard, further research is needed to test and evaluate this model in live environments of various health institutions.

# CHAPTER ONE: INTRODUCTION

## 1.0 Introduction

The increasing and widespread use of Information and Communication Technologies (ICTs) has permeated almost all aspects of life and the healthcare sector has not been left behind (Almunawar & Anshari, 2012). According to HealthConnect International (2014), ICTs play a critical role in improving health care for both individuals and communities by providing new and more efficient ways of accessing, communicating and storing information. Almunawar & Anshari (2012) argue that the deployment of ICT into healthcare delivery environments has enabled healthcare professionals improve the efficiency and effectiveness of healthcare services.

The prospects for successful Healthcare Information Systems (HIS) implementation is really great with their successful adoption and use expected to increase legibility, reduce medical errors, shrink costs and boost the quality of healthcare (Jha et al., 2010; Blumenthal & Tavenner, 2010). HISs are frequently referred to as the interaction between people, process and technology to support operations and management in delivering essential information in order to improve the quality of healthcare services (Almunawar & Anshari, 2012). Whereas these HISs have been implemented widely for purposes of improved health care delivery, challenges of slow adoption and low utilization still exist (Ajami & Bagheri-Tadi, 2013; Besworth, 2016) despite the existence of various IT adoption and Utilisation models, frameworks and theories such as the Technology Acceptance Model (TAM), Diffusion of Innovation theory (DOI) among others.

This study therefore was aimed at improving the adoption and utilization of Health Information Systems in Healthcare delivery. In order to get a good understanding of adoption and utilization approaches used in Healthcare delivery, this study adopted two selected case studies namely; Nakasero Hospital and Savannah Sunrise Medical Center. The choice of these two healthcare delivery institutions was based on the fact that they both have been using Health Information

Systems for a period of more than three years. This chapter presents the background to this study, the problem statement, the research objectives, significance, scope and justification of the study.

## **1.1 Background of the Study**

In the past, Health data and information were created and stored mainly on paper but according to (Haux et al. 2004 cited in Ngafeeson 2014), there has been a clear migration from paper to computer based systems. This now implies that more data can be processed and stored using modern ICTs for better knowledge. According to Coyne (2013), the evolution of HISs has been strongly linked to the advent of computer technology with the start of computerized Health records starting in the 1950s. Brooks (2015) notes that the development of computers led to the exploration of the marriage of computers and medical records which overtime resulted into the development of HISs. The use of web technologies, database systems, and network infrastructures are some of the initiatives that are currently affecting both the practice and management of the healthcare market (Jardim, 2013). This scholar further argues that the main goal of HISs is to contribute to an efficient and high quality healthcare in addition to the promotion of development, rationalization and improvement of the management of healthcare.

Blumenthal (2010) cited in Buntin et al. (2011) adds that HISs have the potential to improve the health of individuals and the performance of providers, yielding improved quality, cost savings, and greater engagement by patients in their own healthcare. The implementation of HISs in hospitals and clinics enables clinicians and other providers to quickly access medical information about their patients by just a click of a button and therefore enables them have a complete understanding of the patient's condition before coming up with a treatment plan (Jeyakodi, 2015). James & Savitz (2011) reveal that use of HISs in healthcare institutions can lead to impressive gains in terms of quality and patient outcomes at significantly lower costs.

In a study conducted among Hong Kong Healthcare professionals to understand attitudes towards the use of computers in clinical settings, respondents indicated strong support for computerization of patient care (Jeyokadi, 2015). Furthermore, in another study conducted by Takhti et al. (2012) to explore perceptions of nurses towards the use of HISs in the provision of patient care in Malaysia, results indicated an 87.9% positive response. All these are indicators that the perceptions and attitudes towards the use of HISs in healthcare delivery is generally positive.

Despite the positive contribution of HISs in Healthcare delivery, a number of challenges continue to exist (Ajami & Bagheri-Tadi, 2013; Besworth, 2016). And this is despite of the existence of various IT Adoption and Utilisation Models. These challenges impede the success of HISs from realizing their intended goals. One of the challenges that has been prominently cited by several HIS researchers is the slow adoption and utilization rate (Goldschmidt 2005 cited in Ngafeeson 2014; Jeyokadi 2015; Mapesa 2016). Goldschmidt (2005) cited in Ngafeeson (2014) further reports that the adoption and utilization of IT in Healthcare has been very slow and has lagged behind in comparison to other industries. Another challenge to HIS in Healthcare delivery as reported in other studies is resistance from Healthcare professionals (Berg, 2001 cited in Ngafeeson, (2014); Heeks, 2006). This resistance has in most cases resulted into low HIS adoption and utilization. Reece (2012) cited in Kellermann & Jones (2013) observe that whereas there are various benefits of HISs, it is remarkable that there are few fans among health care professionals when it comes to adoption and utilization. Healthcare professionals often complain that these systems slow them down (Campbell, 2006 cited in Kellermann & Jones, 2013). This lack of enthusiasm might be due to HIS failure to deliver promised gains in productivity and patient safety or even failure on part of the HIS vendors to deliver user friendly products.

In view of the various challenges faced by HISs for Healthcare delivery, there was therefore need to conduct a study that focuses on improving adoption and utilization of Health Information Systems in

Healthcare delivery. This will not only help in highlighting issues associated with adoption and utilization of HISs in healthcare delivery but will also help in improving perceptions towards these technologies.

## **1.2 Statement of the Problem**

The adoption and utilization of HISs has a positive impact in healthcare delivery (Klosek, 2014). However, despite the positive contribution and high expectation worldwide, their adoption and utilization has remained relatively low (Boonstra & Broekhuis, (2010); Abajebel, Jira & Bayene, 2011; Khalifa, 2013; Ajami & Bagheri-Tadi, 2013). Previous studies reveal that majority of countries in Africa still do not have adequate health information systems for health record sharing and quality. Most of them are currently weak and fragmented, and unable to supply sound data in a timely way (Akanbi et al., 2012 & Mbondji et al; 2014). Additionally, the available literature demonstrates that only 70 of the 193 United Nations countries currently provide World Health Organisation (WHO) with regular data on mortality by age, sex and cause of death (WHO, 2016). A study by Angelo (2015) indicated that 60% to 70% of ICT projects fail due to various reasons such as not meeting business requirements, abandonment and not being completed on schedule. The low rate of adoption and utilization of HISs has been attributed to failure on part of the HIS vendors to deliver user friendly products, low return on investments, lack of patient safety and organization culture among others (Reece, 2012; Kellermann & Jones, 2013; Ngafeeson, 2014; Jeyokadi, 2015 & Mapesa, 2016).

There was therefore need to conduct a study aimed at improving adoption and utilization of HISs in Healthcare delivery in Uganda. Improving adoption and utilization of HISs will go a long way in improving patient safety, return on investments and productivity of healthcare professionals.

## **1.3 Objectives of the Study**

### **1.3.1 General Objective**

This is to improve Adoption and Utilization of Health Information Systems in Healthcare delivery through the development of a Model.

### **1.3.2 Specific Objectives**

- I. To investigate the perceptions of healthcare professionals towards the adoption and utilization of Health Information Systems in Health care delivery with an aim of understanding the critical success factors for Health Information Systems in HealthCare institutions
- II. To review existing models and frameworks that are currently used to improve adoption and utilization of Information Technology.
- III. To develop a model that can be used to improve adoption and utilization of HealthCare delivery.
- IV. To evaluate the developed model

## **1.4 Scope of the Study**

### **1.4.1 Geographical Scope**

This study was conducted in two selected case studies namely Savannah Sunrise Medical Center (SAS) and Nakasero Hospital (NH). Savannah Sunrise Medical Center now trading as SAS Clinic since 1998 is a private health care provider dedicated to satisfying the communities' healthcare needs through affordable, accessible and quality medical services. Nakasero Hospital also a private hospital in Kampala since 2009, is committed to providing quality, sustainable, compassionate health care by leveraging local and international talent and state-of-the-art technology. The choice of these two healthcare delivery institutions was based on the fact that they both have been using Health Information Systems for a period of more than three years. Respondents for this research were selected from the Medical and Operations departments as well as Management.



### **1.4.2 Technical scope**

This study focused on examining the approaches used in the adoption and utilization of Health Information Systems in health care institutions. In examining adoption and utilization, focus was put on understanding how the HISs support health care delivery. Special attention was also put on understanding the perceptions that the health care professionals have towards HISs. Understanding perceptions was expected to expose the attitude of health care professionals towards the HISs which in our view has an influence on adoption and utilization of any technology. This study however did not cover aspects of HIS design. The findings of this study were used as a basis for developing a model that can be used to improve adoption and utilization of Health Information Systems in health care delivery.

### **1.5 Significance of the Study**

Health Information Systems play an important role in improving healthcare delivery. HIS implementers and promoters continue to espouse the benefit of these systems as opportunities for the transformation of the healthcare sector. Nevertheless, the journey to this ideal is fraught with challenges associated with adoption and utilization of HISs. These challenges range from issues arising from the very nature of healthcare information, to issues pertaining to HIS technology and its users. This study focused on investigating the adoption and utilization of Health Information Systems in healthcare delivery. The findings and outputs of this study will go a long way in addressing issues related to and therefore improving the adoption and utilization of HISs in healthcare delivery.

Improving adoption and utilization of HISs will impact on productivity and efficiency of Healthcare professionals. They will be able to work on more patients in a shorter time, with minimal errors in areas such as patient diagnoses, dosages and medical prescriptions. This will in turn improve the

quality of patient care especially with the right dosage prescriptions. The adoption and utilisation of HISs will also improve efficiency in the provision of healthcare services especially when patient queues are better managed and patient information entry and retrieval is improved.

Furthermore, the Decision-makers in healthcare delivery will also be able to use the findings of this study to improve on investment decisions towards improving return on investments. This is mainly because the developed HIS model clearly specifies what considerations must be made by healthcare professionals during each stage of HIS adoption and utilisation. These specifications will support in guiding what decisions to make by the decision makers and what strategies to put in place to achieve their targets.

Lastly, it is also expected that the findings of this study will be used by future information systems researchers to carry out further research in effective adoption and utilization of HISs. Because this case study employed two case studies only, there is an opportunity to test and validate the study results for purposes of their generalization; as well as the developed HIS model for its applicability.

## **1.6 Justification of the Study**

World over, there is an increasing use of HISs in healthcare institutions to improve healthcare delivery (Besworth M.D., 2016). Despite the positive effects of HIS usage in healthcare delivery, the adoption rate of such systems is still low and meets resistance from healthcare professionals (Ajami & Bagheri-Tadi 2013, Goldschmidt, 2005 cited in Ngafeeson, 2014; Jeyokadi, 2015; Mapesa, 2016). Reece (2012) cited in Kellermann & Jones (2013) also confirm low utilization of HISs by healthcare professionals. With these existing challenges a lot needs to be done to improve the adoption and utilization of HISs for Healthcare delivery. This study therefore was aimed at addressing some of the challenges associated with adoption and utilization of HISs for healthcare delivery.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.0 Introduction**

This chapter offers a critical review of prior studies relevant to adoption and utilization of health information systems in healthcare delivery. Firstly, the chapter provides an overview about healthcare professionals' perceptions towards HIS adoption and utilization followed by Information Technology adoption & utilization models and Frameworks, the comparison of the IT Models and lastly a discussion on the Critical Success factors for HIS Adoption and Utilisation. These are the main research areas this report contributes to. The related work on adoption and utilization will contribute to gaining a deeper understanding of the area under study and identifying the gaps that need to be addressed.

### **2.1 Key Terms and Definitions**

For purposes of putting this study into perspective, the key terms and definitions used and the context in which they are used are here given.

#### **2.1.1 Health Information System**

According to the International Organisation Standard (ISO/TS 20514), a health information system has been formally defined as: “a repository of information regarding the health status of a subject of care in computer form stored and transmitted securely, and accessible by multiple authorized users.

On the other hand WHO (2004) defines a health information system as a system that integrates data collection, processing, reporting, and use of the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services.

Haux et al. (2004) cited in Ngafeeson (2014) also add that health information systems are those systems used to process data, information and knowledge in healthcare environments. For purposes

of this study a health information is any system that captures, stores, manages or transmits information related to the health of individuals or the activities of organisations that work within the health sector.

### **2.1.2 Technology Adoption**

Hall & Khan (2002) define technology adoption as the choice to acquire and use a new invention or innovation.

Rogers (1995:171) define a specific decision to adopt a technology as a decision to make full use of an innovation as the best course of action available.

Davis, Bagozzi & Warshaw (1989) define Technology Adoption as the implementation of the software and hardware technology in an organization to increase productivity, competitive advantage, improve processing speed and make information readily available. This definition will be used for purposes of this study.

### **2.1.3 Technology Utilization**

**Utilization** is the action of making practical and effective use of something, making it serve one's purpose (Dictionary.com). Staples & Seddon (2004) define technology utilization as the use of a system or a technology.

### **2.1.4 Model**

A model is a pictorial or graphic representation of key concepts. It shows, (with the help of arrows and other diagrams) the relationship between various types of variables e.g. independent, dependent, moderating, mediating variables etc. (Khan, 2015). It can also be defined as a systematic description of a system, a theory or a phenomenon that accounts for its known or inferred properties which may be used for further study of its characteristics.

## **2.2 Perceptions of Healthcare Professionals towards HIS Adoption and Utilization**

An individual's perception towards a technology has a significant impact on its adoption and utilization. In this regard, the general perception of healthcare professionals towards HISs is that they are valuable and beneficial to both patients and healthcare institutions (Al-Harbi, 2011). In a survey that was conducted by the Deloitte Center for Health Solutions in 2013, it was reported that U.S. Healthcare professionals who use HISs are optimistic about their prospects for better care and lower administrative costs once fully integrated (Deloitte, 2013). However, the same survey also revealed that whereas healthcare professional non-adopters accept HIS as an inevitable requirement for practicing medicine in the future, they are skeptical about clinical value and also concerned about implementation costs. The majority of Healthcare professionals believe that increased collaboration and improved care are potential positive effects of HISs but yet some believe that the promise of reduced costs resulting from increased use of HIS is often inflated. The belief among Healthcare professionals that upfront financial investment followed closely by ongoing maintenance costs were the greatest barriers to HIS adoption was contradicted by a perception in a study by Lakbala & Dindarloo (2014) which indicated that since HIS benefits outweigh costs then HIS investments should be made by health institutions.

The time wastage which in turn impacts on productivity has also been reported as a perception Healthcare professionals have towards the use of HISs (Al-Harbi, 2011). This perception is further confirmed in a study by Treister (1998) cited in Lakbala & Dindarloo (2014) which noted that healthcare professionals' experiences with HISs often offered little in the way of time savings. Another study by Campbell (2006) cited in Kellermann & Jones (2013) also revealed that Healthcare professionals often complained that these systems slowed them down. This is collaborated in a study conducted by Boonstra & Broekhuis (2010) where Healthcare professionals expressed that HISs slow their workflow especially during the process of data input and retrieval. On the other hand, a

survey by Deloitte Center for Health Solutions in 2013 indicated that healthcare professionals found the use of HISs time saving through e-prescribing, improved communication and care coordination capabilities (Deloitte, 2013). This contradiction in findings could have been as a result of different IT maturity levels in the respective organisations studied.

Weeks, et al. (2014) argue that whereas Healthcare professionals believe HISs to be an inevitable requirement for practicing medicine, they were skeptical about the value derived from their adoption and utilization. They felt that HISs would not reduce care disparities or improve the accuracy of patient information but would instead divert attention from treating patients to having to respond to reporting requirements by the Healthcare professionals. Their belief is that HISs would instead reduce their productivity and increase their workload (Boonstra & Broekhuis, 2010). This is collaborated in a study by Weeks, et al. (2014) where respondents felt that HISs brought about increased workload and were therefore viewed as a big burden to their productivity.

According to Alghamdi (2015), information security in software systems is another major problem in developing countries due to the fact that their systems are not advanced enough to monitor hackers. As such, Healthcare professionals have an impression that HISs have an impact on security and privacy of patient data which therefore becomes an issue to their usage (Menachemi & Collum, 2011 & McLane, 2005 cited in Lakbala & Dindarloo, 2014). Their view is that HISs should have the ability to limit access to various portions of the record to particular users to avoid unauthorized access to patient information. This was collaborated by a study conducted by Ancker et al. (2011) in which respondents expressed their concerns that the adoption and utilization of HISs would have adverse effects on privacy and security of medical information.

Overall, while healthcare professionals have some negative perceptions towards the adoption of HISs they at the same time have some positive perceptions towards their benefits. Therefore this

may be an indication that the resistance towards their adoption utilization is about the usefulness and ease of use of the technology rather than the HIS functions and benefits (Meinert, 2005 cited in Lakbala & Dindarloo, 2014).

### **2.3 Critical Success Factors for Adoption and Utilization of HISs**

According to Cresswell, Bates & Sheikh (2013), health institutions that make very substantial financial, human, and organizational investments in HISs have the hope that they will streamline individual and organizational work processes and thereby improve the quality, safety, and efficiency of care. Safdari, Ghazisaeidi & Jebraeily (2015) add that the adoption and utilization of HISs results in the improved quality of care, customer-orientation and timely access to complete information but that despite all their potential benefits, their successful adoption and utilization would depend on many factors. Kaplan & Harris-Salamone (2009) and Pare, Sicotte, & Jacques (2006) cited in Stalker (2014) also argue that the complex process of HISs implementation is not complete without their successful adoption and utilization by healthcare professionals in direct patient care. Discussed below are some of the critical success factors for HIS Adoption and Utilisation.

Cresswell, Bates & Sheikh (2013) state that clarity of what problems the HIS is designed to resolve is one of the key adoption and utilization success factors. Most times HIS procurements are based on assumed benefits which are often poorly specified which can result into difficulties agreeing on a shared vision across the healthcare institutions and may in the long run slow down their adoption and utilization. They further advise further that thorough mapping of existing local processes before implementation can mitigate this risk and help to identify existing problems as well as areas for improvement. Stalker (2014) argues that the overall HIS project vision, benefits to be attained as well as the specific goals for the project and how these will be measured must be clearly determined and communicated among all stakeholders. This would go long way in building of consensus around the strategic vision among the professional, managerial, and administrative groups. Overall, patient-

centered discussions could therefore be a point of convergence between different professional viewpoints.

The Medical Records Institute (2005) cited in Safdari, Ghazisaeidi & Jebraeily (2015) notes success factors to be the preparation of human resources and organizations much as this study pointed out project management as the most important success factor. Project management was further emphasized by Stalker (2014) who advises that constant monitoring and evaluation by stakeholders throughout the project gives an indication on the likelihood of achieving HIS adoption and utilization by the healthcare professionals. Kruse et al. (2016) also cite management support, appropriate leadership and good communication within the Healthcare institutions as another determinant for successful adoption and utilization of HISs in Healthcare delivery. Specific attention to the preparation of human resources in terms of motivation and training is also key in this process. Yusof et al. (2008) cited in Cresswell, Bates & Sheikh (2013) add that trained users tend to be more satisfied with new technologies than those who have not been adequately trained. This in turn will impact on their adoption and utilization.

Stalker (2014) adds that for the successful adoption and utilization of HISs, the identification and cultivation of healthcare professional executive project leadership must be effected. Healthcare professionals must be involved meaningfully in every relevant step of the process with some taking up leadership roles. This builds a psychological sense of ownership of the HIS that would ease the adoption process by healthcare professionals. Creating this state occurs via activities and opportunities to develop leadership attitudes throughout the HIS project. Otherwise negative decisions that impact their effectiveness or efficiency will eventually negatively impact patient care.

The establishment of an effective HIS project governance & communications is another key success factor. This covers Governance, Change Management and Communications. Under change management, there is need to develop a critical mass of organizational members who are willing and



able to change the way they work; and operationally, an assessment of the organization's culture and ability to change is also recommended. Governance is about decision-making and therefore a written governance plan that determines who the stakeholders are and what the process for making decisions related to the HIS is must be in place. These stakeholders will be involved in decision-making or will need to be kept informed of decisions made. Lastly, communications planning is critical for physician adoption. The communications plan should be written and specify which messages are to be received by whom at what times and how they are to be received.

## **2.4 Information Technology Adoption and Utilization Models & Frameworks**

Many theories are used in Information Systems research (Wade 2009) but this study only discussed those theories that focus on technology adoption and utilization. The most commonly used theories include; Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1975), (Theory of Planned Behaviour (TPB) (Ajzen, 1985; Ajzen, 1991), Unified Theory of Acceptance & Use of Technology (UTAUT) (Venkatesh et al. 2003), Technology Acceptance Model (TAM) (Davis, 1986; Davis, 1989 & Davis et al. 1989), Diffusion of Innovation (DOI) (Rogers, 1995), Lewin (1947)'s Change Model and The Open Group Architecture Framework (TOGAF, 9.1). These are discussed hereunder.

### **2.4.1 Lewin's Change Model**

Change is a continuous aspect of any organization and its effective management is crucial to the success of organisations. Our world is changing fast and, as such, organizations must change quickly too. Organizations that handle change well thrive, whilst those that do not may struggle to survive. The concept of "change management" is a familiar one in most businesses today. But how businesses manage change varies enormously depending on the nature of the business, the change and the people involved. And a key part of this depends on how far people within it understand the change process. One of the cornerstone models for understanding organizational change was developed by Kurt Lewin back in the 1940s, and still holds true today (Bourda, 2013). According to Lewin (1947) change is best achieved through a planned approach where individuals have to go

through a learning process and understand the need for transformation. Lewin's Change model infers to organizational change in three stages: Unfreezing, Moving/transition and freezing. Each of these stages are discussed hereunder.

*Unfreezing:*

Lewin (1947b) suggests that for any organization intending to undergo change, the first stage of change should focus on preparing the organization to accept that change is necessary. This involves breaking down the existing status quo before building up a new way of operating. Key to this is developing a compelling message showing why the existing way of doing things cannot continue. To Lewin (1947), in the unfreezing stage organisations should start by understanding why change is necessary and for that reason prepare for the transition. Lewin further suggests that before old behavior is unlearned and new behavior adopted, the current situation needs to be destabilized or unfrozen. In the adoption of new technologies, the unfreezing stage can be considered as one of the more important stages to understand why an organization should adopt a new technology. Lewin (1947) however further observes that getting the organization to understand why change must occur is not an easy process and change management agents must take into consideration the different contexts before justifying the need for change.

*Moving/transition:*

Lewin (1947) observes that change is a process. Transition therefore involves taking a step towards the new behavior or a new way of doing things. Transition leads to a situation where organizational processes are identified, studied and evaluated in an iterative procedure (Sarayreh, Khudair & Barakat, 2013). This stage creates anxiety among people because of the fear of the unknown and several adjustments to be made. In the adoption of a new technology, this stage is normally the hardest step to overcome as it involves people learning new behaviors, processes and ways of thinking. It is therefore important that in the adoption of new technologies education, support and communication are given high priority. At this stage, employees of an organization should

continually be reminded of the reasons for change and how it is likely to benefit them once the new technology has been implemented. In trying to implement change, it is also important to look at the influence that people within an organization have on one another. Group dynamics stresses that group behavior rather than individuals should be the main focus of change (Dent & Goldberg, 1999 cited in Burnes, 2004). Lewin (1947) noted that it is fruitless to concentrate on changing the behavior of individuals because the individual in isolation is constrained by group pressures to conform. Therefore the focus of change in any technology adoption must be at group level and should focus on factors such as group norms, roles, interactions and socialization processes.

*Refreezing:*

Refreezing seeks to establish stability once the new changes have taken place. Lewin (1947) notes that at this stage, the new changes are accepted and become the norm, new relationships are created and the new becomes routine. New behavior must be to some degree compatible with the behavior, personality and environment of the target users to eliminate rejection (Schein, 1996 cited in Burnes, 2004). It is for this reason that Lewin sees successful change as a group activity without which norms and routines cannot be transformed. Lewin (1947) ascertains that the new change must be a group activity where the group routines and norms are transformed or else changes to an individual will not be sustained. Therefore, refreezing may call for a change in organizational cultures, norms, policies and practices (Burnes, 2004).

Looking at Lewin's change model, it can be argued that it is concerned with re-enforcing change and ensuring that the desired change is accepted and maintained into the future. This in our view is one of the limitations of Lewin's change model as it does not cater for continuous improvements. Thinking about change, one may think that it is a journey that has a beginning and an end. While this may appear true in everyday life, in the case of technology adoption there is always a need to optimize the adopted technology.

#### **2.4.2 Diffusion of Innovations theory**

The process of adopting new innovations has been studied for over 30 years and one of the most popular adoption models as described by Rogers (2003) is the Diffusion of Innovations theory (DOI) (Sahin, 2006). This theory has been used as a framework in a number of disciplines including political science, public health, history, economics, communications and technology among others (Stuart, 2000 cited in Sahin, 2006). Roger's DOI has been found by some scholars as the most appropriate model for the adoption of technology in organisations (Medlin, 2001 cited in Sahin, 2006). Rogers (2003) perceives adoption as a decision of "full use of an innovation as the best course of action available" and rejection as a decision "not to adopt an innovation". Rogers' innovation theory decomposes the diffusion of an innovation in terms of the innovation, communication channels, time and social systems. The key components of Roger's theory are discussed here under.

##### *Innovation*

Rogers (2003) describes an innovation as an idea, practice or project that is perceived as new by an individual or as a unit of adoption. According to Rogers, an innovation may have been invented long time ago but if individuals perceive it as new then it may still be an innovation for them. In our view, this perception by the prospective users of an innovation has a critical impact on the acceptance and eventual utilization of an innovation. Uncertainty is an important obstacle to the adoption of any technology. A new technology may create uncertainty among individuals or an entire social system especially if they are unaware of the impact that the new technology may have on their work routines and control. In order to reduce uncertainty of adopting an innovation, it is important that individuals are informed about its consequences. Consequences can be classified as desirable or undesirable (Rogers, 2003). This makes them aware of all the advantages and disadvantages of the

innovation and therefore allows them time to prepare for change. This need for awareness is in line with what is emphasized in the Unfreezing stage of Lewin (1947) Change model.

### *Communication Channels*

The second component of Rogers' DOI is the communication channel. Rogers (2003) defines communication as a process in which participants create and share information with one another in order to reach a mutual understanding. Rogers (2003) observes that for communication to take place, a channel must exist. In order for a technology to be effectively adopted and utilized, there is need for effective communication between the promoters of the technology and the individuals or social systems. Many times innovations have either been resisted or under-utilized because of poor understanding of their value.

### *Time:*

Rogers (2003) observes that the time aspect is normally ignored in the diffusion of most innovations. He argues that the time aspect should be included in all diffusion of innovations projects. This is because the innovation-diffusion process and the rate of adoption all include a time dimension. The rate of diffusion of a technology is normally influenced by the characteristics of the individuals within a social system. Innovators, (individuals who engage in research and search of new ideas or those who often adopt new technologies at an early stage), early adopters (individuals who adopt technology at a relatively early stage), early majority (individuals who adopt the technology at the rate of an average person or organisations), late majority (those often skeptical about whether the technology works and often wait till the average persons have adopted the new technology) and the laggards (a conservative group that are often suspicious of the new technology and may adopt the new innovation at a much later stage) all adopt new innovations at different rates. It is for this reason that we argue that promoters of new innovations must always factor in the characteristics of the various adopters when determining the time it will take for the diffusion of the innovation. This is in

line with what is suggested in Lewin (1947)'s Change model that the Freezing stage should not be rushed. However, it is important to note that the rate at which technology becomes obsolete keeps rising every other day and therefore promoters of new innovations should have it in mind when planning technology diffusion.

*Social system:*

The last component of the Rogers' DOI is the Social System. Rogers (2003) defines a social system as a set of interrelated units engaged in joint problem solving to accomplish a common goal. Since the diffusion of innovation takes place in a social system, it is normally influenced by the structure of the social system. The characteristics of the different individuals within a social system have a bearing on the adoption and utilization of an innovation. This is further emphasized by Rogers (2003) who claims that the nature of a social system affects the rate of diffusion of an innovation. Therefore it is important that in the process of diffusing an innovation, focus is put on the skill set and behavioral traits of the different individuals within the social system.

### **2.4.3 Theory of Reasoned Action (TRA) (1975)**

The Theory of Reasoned Action (TRA) was first formulated by Ajzen and Fishbein in 1975 and later improved in 1980 (Ajzen & Fishbein, 1980 cited in Alomary & Woollard, 2015). TRA resulted from an attitude research that tried to estimate the discrepancy between attitude and behavior. The key fundamentals of TRA come from the field of social psychology. Social psychologists attempt, among other things, to explain how and why attitude affects behavior, which in our view is equally very important in the adoption and utilization of a technology or an innovation. TRA has been widely used in technology adoption as well as in a number of other research studies as a foundation to such studies. It was used to a certain extent as a starting point for other theories such as the Technology Acceptance Models (Alomary & Woollard, 2015) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Otieno et al., 2016). TRA can be extended to conceptualize the human behavioral pattern in the decision-making strategy on the adoption and

utilization of a new innovation or technology which happens to be the focus of this study. It is capable of explaining whether individual behavior such as utilization of new innovation is driven by behavioral intentions, where behavioral intentions is a function of an individual's attitude towards a technology.

It is however important to note that TRA has not been extensively utilized in the evaluation of technology adoption and utilization ( Otieno et al., 2016) but has mainly been used in identifying users' behaviors and attitudes in issues relating to Internet use, online purchase, household computer use, and online privacy, security, and trust (Ajzen,1991 cited in Otieno,2016). Social psychologists suggest that attitude influences behavior and that attitude and behavior are positively correlated, giving the reason for applying TRA in the adoption and utilization of technology.

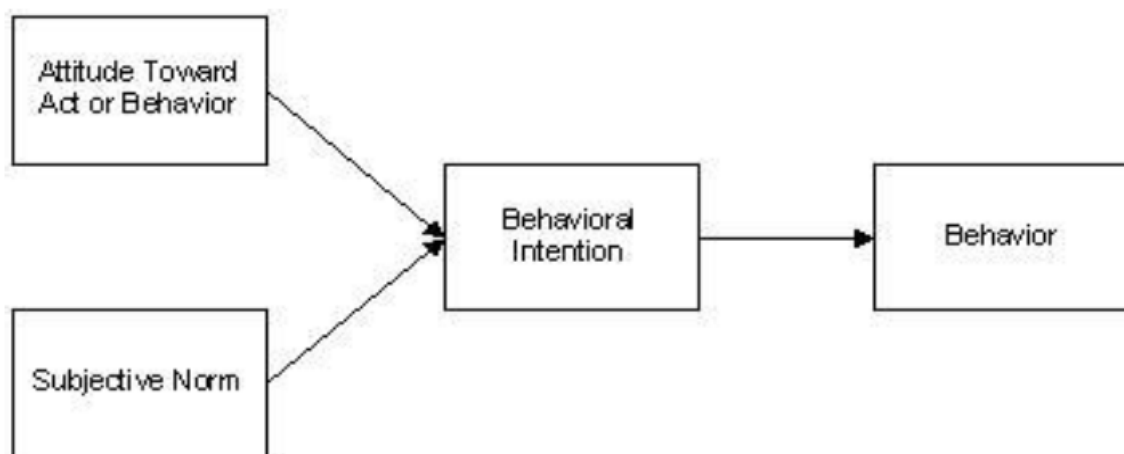


Figure 1: Theory of Reasoned Action

Source (Fishbein & Ajzen, 1975)

#### 2.4.4 Theory of Planned Behavior (TPB)

Developed by Ajzen (1991), the theory of planned behavior is an improved version of the Theory of Reasoned Action by Ajzen & Fishbein (1980). TPB is used to study how a person's *intention* to use new technology is affected by his/her *attitude, behavior control or subjective norm*. According to Abugabah, Sanzogni & Poropat (2009), TPB is a successful model that has been used by researchers

to predict behavior towards various situations such as new technology. The authors also suggest that TPB could be used to examine new technology adoption and utilization since it concentrates more on the user of the technology rather than the technology its self. However, Lehrer, Constantiou, & Hess (2011) argue that the theory focuses on the intention to use the system rather than, actual use and the value of technology, which also largely determine technology adoption and utilization.

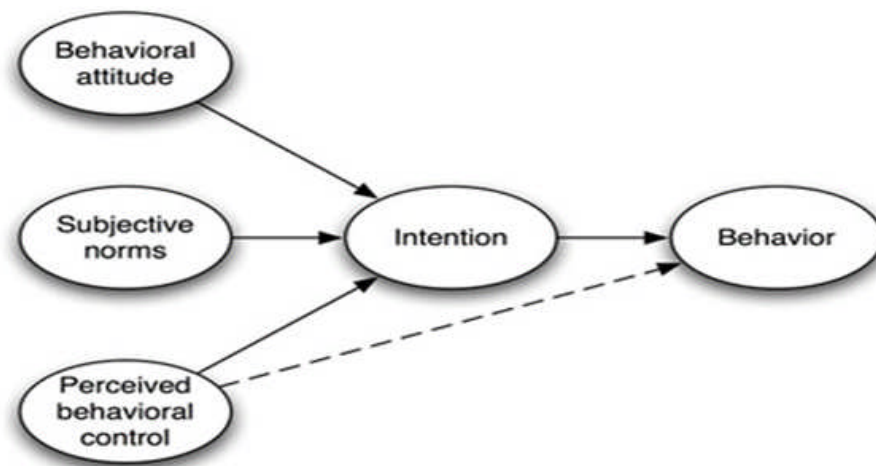


Figure 2: Theory of Planned Behavior

Source: Ajzen (1991)

#### 2.4.5 The Technology Acceptance Model (TAM)

The Technology Acceptance Model is generally considered as the most widely used model in the adoption and utilization of information systems in organisations (Lee et al. 2003 cited in Chang et al., 2010). The Technology Acceptance Model (TAM) as noted by Gagnon et al. (2010) was specifically developed to understand user's acceptance of information technology. The original version of TAM as observed by Gagnon et al. (2010) is similar to the Theory of Reasoned Action, which discusses how attitude impacts behavior. However, latter versions of TAM differ from The Theory of Reasoned Action in that they decompose the attitudinal construct into two distinct factors namely; perceived ease of use and perceived usefulness. In our view, these two factors are key in



influencing adoption and utilization of technology. Since the introduction of TAM in 1989, researchers have applied this model into several research streams (Chang et al., 2010). These studies have culminated into two more extensions namely; TAM2 and TAM3.

TAM2 developed by Venkatesh & Davis (2000), added two more determinants to the original TAM: social influences and cognitive instrumental processes. The social influences include subjective norms and beliefs. On the other hand, the cognitive instrumental processes include job relevance, output quality, result demonstrability and perceived ease of use. TAM2 keeps the concept of perceived ease of use from the original TAM as a direct determinant of perceived usefulness. All of these additional elements are believed to influence the acceptance of technology.

To give a further significance to 'perceived ease of use' TAM was further modified by Venkatesh & Bala (2008) to create TAM3. They also added the dimensions of computer self-efficacy, perception of external control, computer anxiety and computer playfulness (Alomary & Woollard, 2015). Two variables have also been added, which are perceived enjoyment and objective usability. It is however important to note that TAM3 is constructed on a theoretical framework of four classifications which Venkatesh & Bala (2008) claim is a synthesis of all prior TAM research. These four classifications are individual differences, system characteristics, social influence and facilitating conditions (Howard et al., 2010). TAM3 emphasizes that perceived ease of use is determined by computer self-efficacy, computer playfulness, computer anxiety, and perception of external control, perceived enjoyment and objective usability. The perceived usefulness is determined by subjective norms, job relevance, result demonstrability and image. One challenge of using TAM3 to ensure technology acceptance is that it has too many variables and too many relationships between the variables. As a result, it can't be effectively utilized in real life situations to ensure the acceptability of a particular technology.

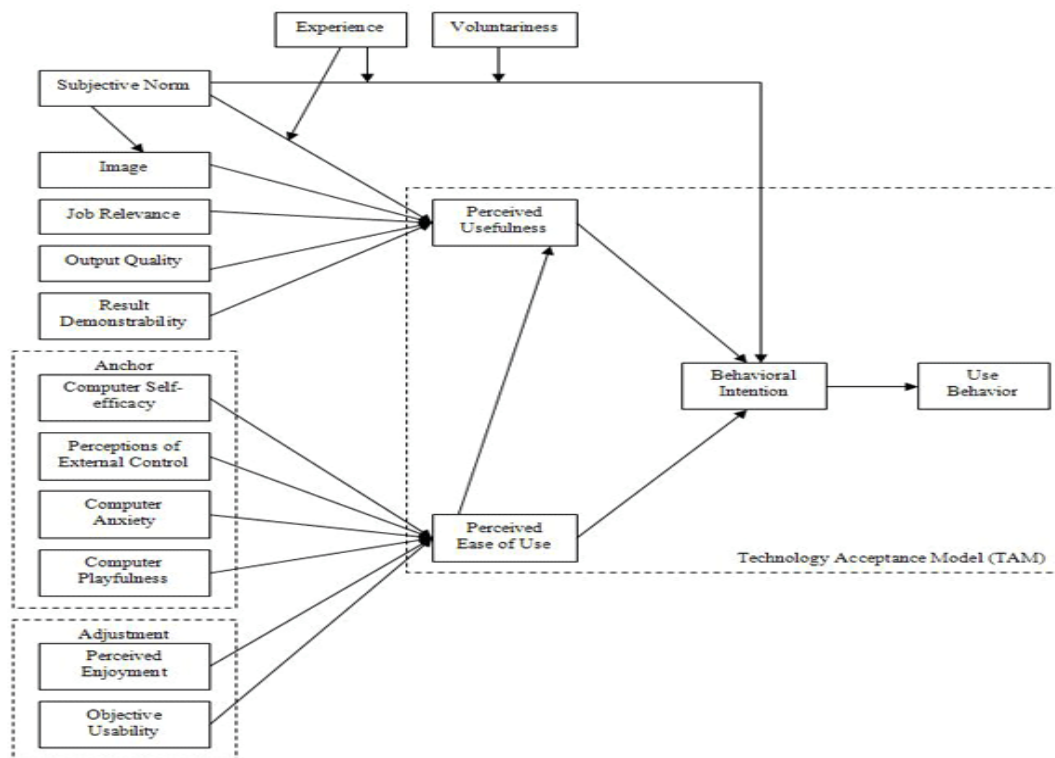


Figure 3: Technology Acceptance Model.

Source: Venkatesh & Bala (2008)

#### 2.4.6 The Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a unification theory that was developed by Venkatesh et al. (2003) as an effort to further improve technology acceptance. UTAUT is an integration of eight acceptance models and theories which include TRA, TAM, the motivational model, TPB, combined TAM-TPB, the model of PC utilization, innovation diffusion theory and social cognitive theory. According to Alomary & Woollard (2015) this model consists of four key elements that include; performance expectancy, effort expectancy, social influence and facilitating conditions. Performance expectancy is defined as 'the degree to which an individual believes that using a technology will help him or her attain gains in job performance' whereas Effort expectancy is defined as 'the degree of ease associated with the use of a technology. Social influence is on the other hand defined as 'the degree to which an individual perceives that important others believe that he or she should use the new technology and facilitating conditions is defined as' the

degree to which an individual believes that an organizational and technical infrastructure exists to support use of the new technology (Morris et al., 2003 cited in Alomary & Woollard, 2015).

Apart from the four key main constructs, UTAUT also has three additional constructs namely; anxiety, perceived credibility and attitude toward using a new technology or innovation. These constructs are however theorized not to be direct determinants of intention (Morris et al., 2003). It is gender, age, experience and voluntariness of use that are presumed to mediate the impact of the four key constructs on usage, intention and behavior (Morris et al., 2003). This model can be used in helping to predict how prospective users are likely to behave towards a new technology. However one criticism it has is that it has too many independent variables for predicting intention and behavior (Bagozzi, 2007). Despite the criticism, this model has been considered to be more robust than other technology acceptance models in evaluating and predicting technology acceptance (Venkatesh et al., 2003) which is a key element in effective adoption and utilization of an innovation.

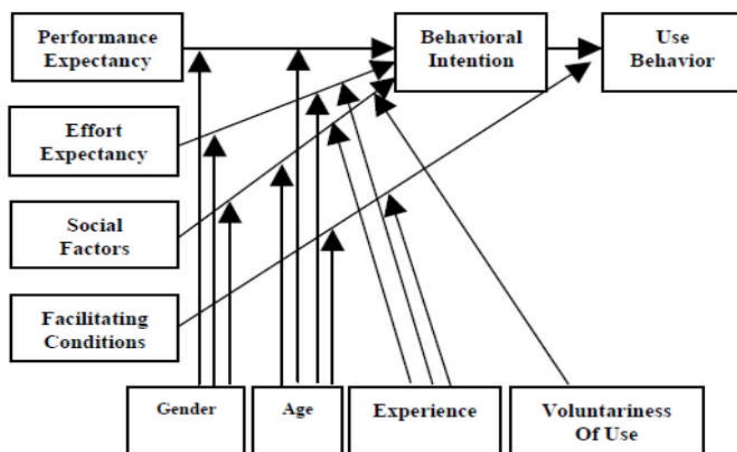


Figure 4: Unified Theory of Acceptance and Use of Technology

Source: Venkatesh et al. (2003)

#### **2.4.7 The Open Group Architecture Framework (TOGAF)**

According to The Open Group (2009), The Open Group Architecture Framework (TOGAF) defines an architecture framework as a foundational structure, or set of structures, which can be used for developing a broad range of different architectures. An Enterprise Architecture (EA) may be defined as a product while others look at it as a process. The Architecture Development Method (ADM) describes a method for developing an enterprise architecture and it forms the core of TOGAF. Its main goal is towards developing an EA that meets the Business and IT needs of an organization. The ADM covers different phases and it is iterative between these phases and within the phases themselves (The Open Group, 2009).

*The Preliminary Phase* is concerned with describing the preparation and initiation activities required to meet the business directive for a new enterprise architecture. It involves activities such as the definition of an organisation-specific architecture framework as well as the organisation principles.

*The Architecture Vision* is the initial phase of the ADM and it is concerned with defining what is in and what is outside the scope of the architecture. This phase involves the Identification of stakeholders, Creating an Architecture Vision and Obtaining approval using statement of Architecture work.

*The Business Architecture Phase* is concerned with the development of a Business Architecture to support an agreed Architecture Vision. The main activities include Describing the Baseline Business Architecture, Developing a Target Business Architecture and Analyzing gaps between the Baseline and Target Business Architectures among others.

*The Information Systems Architecture* is concerned with the development of an Information Systems Architecture to support the Business Architecture. It involves identifying and defining the applications and data considerations that support an enterprise's Business Architecture.

*The Technology Architecture* is concerned with the mapping of application components defined in the Application Architecture phase into a set of technology components, which represent software and hardware components. It defines the physical realization of the architectural solution.

*The Opportunities and Solutions* is concerned with identifying delivery vehicles (projects, programs, or portfolios) that effectively deliver the Target Architecture identified in previous phases. It involves activities such as reviewing the target business objectives and capabilities, consolidate the gaps from the Business Architecture and Technology Architecture Phases, and then organize groups of building blocks to address these capabilities.

*The Migration Planning Phase* is concerned with the formulation of an Implementation and Migration Plan that will realize some or all of the Transition Architectures identified in the Opportunities and Solutions Phase.

*The Implementation Governance Phase* is concerned with providing an architectural oversight of the implementation of the target architecture. It involves key activities such as formulating recommendations for each implementation project, approving an implementation program that will enable the delivery of the Transition Architectures agreed for implementation during the Migration Planning phase and performing appropriate governance functions while the solution is being implemented and deployed.

*The Architecture Change Management Phase* is concerned with establishing procedures for managing change to the new architecture. The main goal here is to ensure that the architecture achieves its original target business value. During this phase, activities such as the continuous monitoring of such things as governance requests, new developments in technology, and changes in the business environment take place. Monitoring of business growth and decline is a critical aspect of this phase as well.

## 2.5 Comparison of IT Adoption and Utilisation Models

Ref No.	Model	Development Intention	Constructs	Limitations	Author
1.	Theory of Reasoned Action (TRA)	Prediction and explanation of individual Behaviour	<ul style="list-style-type: none"> <li>• Subjective Norm</li> <li>• Attitude towards behavior</li> </ul>	Does not explain how the decision to a particular behavior is arrived at	<ul style="list-style-type: none"> <li>• Ajzen &amp; Fishbein (1980)</li> <li>• Botha &amp; Atkins (2005)</li> </ul>
2.	Theory of Planned Behavior (TPB)	Understanding human attitude and predicting behavior	<ul style="list-style-type: none"> <li>• Subjective Norm</li> <li>• Attitude towards behavior</li> <li>• Perceived behavioral control</li> </ul>	<ul style="list-style-type: none"> <li>• Assumes people are rational and will make decisions based on the common good.</li> <li>• Ignores other factors such as economic, demographics &amp; personality</li> <li>• Timeframe between the intention to perform a certain behavior and the actual behavior is not addressed.</li> </ul>	<ul style="list-style-type: none"> <li>• Ajzen (1991)</li> <li>• Venkatesh et, al. (2003)</li> <li>• LaMorte (2016)</li> </ul>
3.	Technology Acceptance Model	Evaluation of IT Acceptance & Use	<ul style="list-style-type: none"> <li>• Perceived Ease of Use</li> <li>• Perceived Usefulness</li> </ul>	<p>Does not provide a mechanism for measuring actual IT usage</p> <p>Different interpretation of defined constructs by different researchers</p>	<ul style="list-style-type: none"> <li>• Venkatesh et, al. (2003)</li> <li>• Lee et, al. (2003)</li> <li>• Holden &amp; Karsh (2010)</li> </ul>
4.	Unified Theory of Acceptance & Use of Information Technology	To explain user intention of an IS and subsequent usage behavior	<ul style="list-style-type: none"> <li>• Performance Expectancy</li> <li>• Effort Expectancy</li> <li>• Social Influence</li> <li>• Facilitating Conditions</li> </ul>	Not known	<ul style="list-style-type: none"> <li>• Williams, Rana &amp; Bwivedi (2015)</li> <li>• Venkatesh et, al. (2003)</li> </ul>

5.	Diffusion of Innovation	Explains how, why and at what rate new ideas and technology spread through cultures operation at individual & firm level.	<ul style="list-style-type: none"> <li>• Communication channels</li> <li>• Social Systems</li> </ul>	<ul style="list-style-type: none"> <li>• Focuses on individual adopters and ignores other factors such as social structures</li> <li>• Associates innovation with progress while ignoring other possible means of resolving the problem</li> </ul>	<ul style="list-style-type: none"> <li>• Rogers (1995)</li> <li>• Olivera &amp; Martins (2011)</li> <li>• Botha &amp; Atkins (2005)</li> <li>• Kole (2000)</li> </ul>
6.	Lewin's Change Management	Understanding organizational change	Unfreezing, Movement/Transition & Re-Freezing	<ul style="list-style-type: none"> <li>• Does not encourage participatory approaches to change</li> <li>• Model is only relevant to incremental and isolated projects and not able to incorporate radical transformational changes</li> <li>• Relevant to small changes in stable conditions and does not account for organisation politics &amp; conflicts</li> </ul>	<ul style="list-style-type: none"> <li>• Lewin (1947)</li> <li>• Kotter (1996)</li> <li>• Stickland (1998)</li> <li>• Burnes (2004)</li> </ul>

*Table 1: Comparison of IT Adoption & Utilisation Models*

## **CHAPTER THREE: METHODOLOGY**

### **3.0 Introduction**

This chapter presents a description of the research design, study population, sampling technique & procedures, data collection methods & instruments that were used to achieve the research objectives, data analysis, data control methods, development of the proposed model, ethical considerations and the limitations of the study. According to Bowling (2002), the choice of the appropriate research method is essential in the achievement of the study objectives.

### **3.1 Research Design**

Polit et al. (2001) define a research design as “the researcher’s overall for answering the research question or testing the research hypothesis”. The research design for this study was based on the research onion developed by Saunders et al. (2007) which illustrates the key elements of a research design. These key elements as illustrated in the research onion include the research philosophy, research approach, research strategy and data collection methods.

#### **3.1.1 Research Philosophy**

This study adopted the Design Science research philosophy which essentially focuses on the creation of new knowledge through the design of innovative artifacts (Vaishnavi & Kuechler, 2015). According to Peffers et al. (2007), The Design Science process includes six steps: problem identification and motivation, definition of the objectives for a solution, design and development, demonstration, evaluation, and communication. Design Science is a scientific research method which has its roots in architecture, engineering, education, psychology, and the fine arts (Cross 2001) and has now gained prominence in Information Systems research (Hevner & Chatterjee, 2015). The design-science approach is preferred in this study because it seeks to extend the boundaries of human and organizational capabilities by creating new and innovative artifacts



(Hevner et al., 2004). In this study, the proposed artifact that was developed will be used for the improvement of HIS adoption and utilisation.

### **3.1.2 Research Approach**

According to Peirce (1931), a research approach is defined as the path of conscious scientific reasoning. Saunders et al. (2000) advise that when deciding on what research approach to adopt, the nature of the research topic must be put into consideration. Hyde (2000) advises that there are two general approaches in Western research that may result in the acquisition of new knowledge; namely the inductive and deductive research approaches. Gabriel (2013) explains that the main difference between the two approaches is that the deductive approach is aimed at testing theory while the inductive approach is concerned with the generation of new theory emerging from the data. She further adds that the deductive approach usually begins with a hypothesis while the inductive approach will usually use research questions to narrow the scope of the study.

This study therefore adopted the inductive research approach which is characterized as a move from the specific to the general (Bryman & Bell, 2011). This is because this approach allows the generalization of new theories from emerging data (Jebreen, 2012 & Gabriel, 2013). In the inductive approach, observations are the starting point for the researcher, and patterns are looked for in the data (Beiske, 2007). During the data analysis phase of this study using Colaizzi's (1978) framework, the collected raw data was examined and themes and patterns developed. These contributed to the construction of the proposed HIS Adoption and Utilisation Model.

### **3.1.3 Research Strategy**

A case study was considered viable for this study because it allows the researcher to conduct the study phenomenon in its natural setting (Benbasat et al. 1987). To be able to overcome the limitations associated with a single case study research approach, two case studies were used in this

study. Case studies based on multiple sources of evidence have proven to be rated higher in terms of overall quality than those that relied on a single source of information (Yin, 2004).

#### **3.1.4 Data Collection Method**

Holloway & Wheeler (2002) refer to qualitative research as “a form of social enquiry that focuses on the way people interpret and make sense of their experience and the world in which they live”. Burns & Grove (2011) state that qualitative research is usually suitable for unbiased subjected scrutiny of a research problem. Hancock, Ockleford & Windridge (2009) also state that researchers use the qualitative approach to explore the behavior, perspectives, experiences and feelings of people which happens to be the focus of this study. This study therefore adopted a qualitative data collection method. This method is preferred because it produces the detailed description of participants’ feelings, opinions, and experiences; and interprets the meanings of their actions (Denzin, 1989 cited in Rahman, 2016).

### **3.2 Study Population**

The study population included medical personnel, operations staff and management from Savannah Sunrise Medical Center and Nakasero Hospital. The medical personnel included doctors, nurses, laboratory attendants and pharmacists. These were employed by this study because they are major users of the HISs and therefore have some knowledge, perceptions and experiences about the phenomena being studied. The operations staff included the Customer Service, Finance, Inventory and Information Technology (IT) personnel. The customer service personnel were considered for this study because they are involved in the HIS data entry and retrieval of patient information and therefore are in a better position to provide an insight into the limitations they faced in the adoption and utilization of the HISs. The Finance and Inventory personnel were considered because they are users of the HISs from a financial management and stock management perspective respectively; for the two case studies. The decision to employ the IT Personnel in this study was based on their involvement in supporting the adoption and utilization of the HISs from an IT technical perspective.

In addition, all these respondents were expected to share their knowledge, opinions and experiences about HISs in Healthcare delivery towards their improved adoption and utilisation. The management group included the Directors and Managers and these were considered for this study because of their involvement in decision-making for IT investments and as such, they have information about strategies undertaken to ensure the effective adoption and utilization of HISs.

### **3.3 Sampling Technique and Procedure**

“A sample is a portion of the population chosen to represent the entire population” (Proctor & Allan, 2007). The main aim of sampling is to capture data from a minimal group that can increase efficiency by permitting generalizations to be concluded about the entire population without necessarily having to examine the entire population. “Sampling technique will affect the validity of the research therefore it should be undertaken with maximum rigor” (Proctor & Allan, 2007).

This study adopted the purposive sampling technique- a non-probability sampling technique that is used to select respondents based on their understanding of the area under study (Bryman, 2008). Purposive sampling was selected for this study because it is predominantly used in qualitative research as it involves the researcher intentionally selecting who to include in the study on the basis that those selected can present the requisite data (Parahoo 2006). The other advantage of using purposive sampling technique in this study was that it can be very useful for situations where the researcher needs to reach a targeted sample quickly and where sampling for proportionality is not the main concern (Procter & Allan, 2007). Respondents to this study were intentionally selected based on their ability to provide useful information related to the research objectives. The selection of participants was based on what Cresswell describes as “criterion” sampling which requires participants to have experience of the phenomenon under study and are able to clearly describe their “conscious experience” (Cresswell, 1998).

### **3.4 Data Collection Methods and Instruments**

Data Collection is an important aspect of any type of research. As mentioned by Yin (2004), case studies require multiple data collection methods, whose results hopefully converge, in order to establish construct validity. Qualitative studies normally rely on permitting researchers into the personal lives of participants. To facilitate this process, flexible and varied methods are required. This study therefore made use of questionnaires, interviews focus group discussions and document analysis. The rationale for using several data collection methods was to minimize the shortcomings of using a single data collection method. Using several data collection methods enables one to benefit from advantages associated with triangulation.

In this study, data was collected from both primary and secondary data sources. Questionnaires, Interviews and focus group discussions were used to collect primary data. Primary data was obtained from the respondents to this study. Document analysis was used to obtain secondary data; this included journal articles, text books and organizational documentation.

#### **3.4.1 Questionnaires**

Questionnaires were the main data collection instruments. Questionnaires were chosen as the main data collection instruments because they are cost-efficient, do not require as much effort from the researcher compared to verbal or telephone surveys, and often have standardized answers that allow easy data analysis (Katebire, 2007). The questionnaires constituted both open-ended and close-ended questions. Open-ended questionnaires allowed respondents give their personal opinions which enabled the collection of richer and more complex data (Whittemore & Grey, 2006).

The questionnaires were designed in such a way that they were divided into sections based on the information requirements, while ensuring that they are easy to be self-administered. Self-administered questionnaires are easy to administer, provide quick responses, and the analysis is

faster (Katebire, 2007). Respondents were also encouraged to expand upon their answers to specific questions by providing further explanations, rationale, and additional context.

### **3.4.2 Interviews**

Amin et al. (2005) observes that interviews are useful since they fetch variety of ideas needed for the study. While interviewing, data was collected from the respondents by asking questions in a face to face, one to one situation as well as phone conversations. The researcher directed questions to the respondent from an interview guide, which is well structured, and the responses were filled in by the researcher. This enabled the respondents to speak with more detail on the issues raised (Briony, 2005). This method was used because it helps obtain in-depth information, and allows probing (Berry, 1999). Although interviews are time consuming and rather expensive, they are also advantageous in many aspects as they generally help to minimize non-responses. In this study, interviews were mainly used as a follow up method on responses that were given by respondents using questionnaires.

### **3.4.3 Focus Group Discussions**

According to Walliman (2011), focus groups can be seen as a type of group interview, but one that tends to concentrate in depth on a particular theme or topic with an element of interaction. The group is often made up of people who have particular experience or knowledge about the subject of the research, or those that have a particular interest in a study. Focus group discussions were mainly used when collecting information from the medical personnel and the customer service personnel. Focus group discussions were used on these two categories of respondents because they are many in number, making it convenient to extract opinions from a group rather than individuals which is time saving for the researcher.

### **3.4.4 Document Analysis**

Document analysis is a form of qualitative research in which documents are interpreted by the researcher to give voice and meaning around the area of study (Schuh & Upcraft, 2001). Document

analysis was used to capture data that could not readily be obtained using the other data collection instruments. It will particularly be useful in helping the researcher get an in depth understanding of the concepts under study.

### **3.5 Data Analysis**

Data analysis is conducted to organize research data, provide structure to it, as well as provide clear meaning to data (Polit & Beck, 2008). Qualitative researchers must maintain a balance between the need to be concise and to preserve the richness of their data (Polit & Beck 2010). According to Parahoo (2006) a significant characteristic of qualitative data analysis is that data collection and analysis are conducted simultaneously and after data collection is completed. There are several frameworks that can be used for qualitative data analysis. This study adopted Colaizzi's (1978) qualitative data analysis framework (See appendix 1). Colaizzi's (1978) framework is preferred because it helps to provide an exhaustive description of data (Shosha 2012). The basic outcome of this framework is the description of the meaning of an experience often through the identification of useful themes which are a way of describing large quantities of data in a condensed manner.

To analyze the collected data, responses from the questionnaires, interviews and focus group discussions were initially reviewed and useful statements extracted. The meaning of each statement was then formulated. Thereafter, the formulated statements were then organized into clusters of themes. Then finally, the different themes were described and documented.

### **3.6 Data Control Methods**

The main purpose of ensuring data quality in research is to present information that is credible (Radhakrishnan et al. 2012). Research follows research protocols, conducted in an ethical manner, and withstand the test of scrutiny by reviewers. Data quality is generally understood to be the degree to which data, including research processes such as data collection and statistical accuracy, meet the needs of users (Vale, 2010). Among the critical aspects to consider when assessing data for quality

are content validity and reliability (Radhakrishnan et al, 2012). In order to ensure content validity the design of the research questions was based on instruments used in similar studies. Hyman, Lamb and Bulmer (2006) observe that using pre-existing questions provides accurate measures as they have already been pre-tested. The reliability of the research instruments was ensured by using a pilot study. The instruments were tested on a sample of the prospective respondents and thereafter adjustments were made basing on their feedback.

### **3.7 Development of Proposed Model**

The development of the proposed model was based on the existing IT adoption and utilization models, frameworks and theories. The Open Group Architecture Framework (TOGAF) was used as the foundation framework for the development of the HIS adoption and utilization model. Using TOGAF as the foundation framework allowed the development of a model that is consistent, reflects the needs of stakeholders and one that employs best practice for IT Adoption and Utilization. Key constructs of the proposed model were derived from data analysis results and the review of constructs in existing adoption and utilization models & frameworks. In the review of the existing models & frameworks, specific attention was placed on the critical success factors for adoption and utilization of HISs.

### **3.8 Ethical Considerations**

Respect for persons and informed consent are important ethical principles in research. Therefore in any study it is important that respondents knowingly and voluntarily give their consent to their participation in the study (Armiger, 1997). Permission to conduct this study was sought from Nakasero Hospital and Sunrise Savannah Medical Center. Respondents were informed about the purpose of the study and what their contribution was by their participation. They were also informed about their right to opt out of the study any time they felt so. Furthermore, respondents were assured of confidentiality and anonymity.

### **3.9 Limitations to the study**

The behavior of respondents and the quality of responses given were a limitation to this study. There was a tendency for respondents to claim that they are busy and therefore had no time to either respond to questionnaires, or attend interviews or focus group discussions. Efforts were made by the researcher to win over the respondents by making them feel comfortable and ensuring them of the ethical considerations mentioned above while putting them in practice as well. To overcome the issue of quality of responses the researcher endeavored to follow up the respondents for clarity.

Secondly, health institutions just like many other organisations are normally very conscious when it comes to releasing information to outsiders for purposes of information security and privacy reasons. It took about two months to get a second case study to work with as most were unwilling or had complicated protocols to follow for permission. Several trips and calls had to be made to various contacts for approval to be obtained.

### **3.10 Conclusion**

This chapter described the proposed methodology for this study. The research design that was used together with the reasons for that choice were also stated. This chapter also described the study population as well as the sampling techniques and procedures that were used for data collection. A description of how data was collected and analyzed were given together with the justification of the techniques that were used. Lastly, the ethical considerations and limitations to this research were also stated.



## CHAPTER FOUR: FINDINGS AND ANALYSIS

### 4.0 Introduction

The main goal of this study was to improve the adoption and utilization of Health Information Systems in Healthcare delivery through the development of a model. The main focus was put on understanding how organisations adopt and use Health Information Systems. Nakasero Hospital and Savannah Sunrise Medical Centre were adopted as case studies. These were employed in this study because they have been using HISs for some time.

This chapter constitutes four major sections with the first section giving a description of the respondents for this research. The second section provides the background of the two selected case studies, their business capabilities and HISs used. The third section analyses HIS adoption while the fourth section analyses HIS Utilization in the selected organisations.

### 4.1 The Respondents

This section describes the various categories of respondents that were involved in this study. The distribution of the respondents is reflected in Table 2 below.

Category	Number of Respondents
Management	8
Medical Personnel	12
Operations Staff	10

*Table 2: Categories of Respondents Identified in the Study*

**Source:** Field findings

A total of thirty respondents representing the two selected case studies were employed in this study. These included; Management, Medical Personnel and the Operations Staff. The Medical personnel included doctors (4), Nurses (4), Laboratory attendants (2) and Pharmacists (2). These were employed in this study because they are major users of the HISs and therefore have information about how these systems were adopted and how they are currently being utilized. The operations

staff included the Customer Service personnel (4), Finance Officers (2), Inventory officers (2) and Information Technology Officers (2). The Customer Service personnel, Finance Officers and Inventory Officers were considered for this study because they utilize the HISs on a daily basis and therefore are in position to explain issues around utilization. The decision to employ the IT personnel in this study was based on their key involvement in supporting the adoption and utilization of the HISs. The Management group included 8 Managers from the two case studies. These included; Medical Directors (2), IT Managers (2), Finance & Administration Managers (2) and Human Resource Managers (2). These were considered for this study because of their major involvement in decision-making for IT investments and as such have information about strategies undertaken to ensure the effective adoption and utilization of HISs.

## **4.2 The Case Studies**

### **4.2.1 Savannah Sunrise Medical Center**

Savannah Sunrise Medical Center (SAS) is a private healthcare provider that started operations in March 1998 trading as SAS Clinic offering a very wide range of medical services under one roof. (SAS, 2017). Services offered include; healthcare services for both in-patients and out-patients, in house pharmacy, laboratory, antenatal, counselling, physiotherapy among others. To deliver these services, SAS utilizes two major systems namely; LabGuru system and Allied Medical System (AMS). The LabGuru system handles data from laboratory analysers and labtechs and makes it available to doctors through an interface with the AMS. The AMS is used for managing data for clinical and medical processes and procedures. It also supports finance and accounting, stores and stock management and laboratory information reports access. In order to gain an in-depth understanding of how HISs are adopted and utilized in healthcare institutions, this study sought to investigate the adoption and utilization of the AMS in this organisation. The decision for selecting this system was based on the functions of the system and the period that this system has been

utilized. Despite the fact that the AMS is being utilized, concerns about the manner in which it was adopted and being utilized continue to arise.

#### *Vision*

Satisfying the communities' health care needs through affordable and accessible services with academic excellence.

#### *Mission*

At SAS, your families' health is our top priority. We promise to be sensitive to your needs and strive to provide you with timely care using the best professional medical practices.

### **4.2.2 Nakasero Hospital**

Nakasero Hospital Limited (NHL) is a major private hospital based in Kampala, Uganda. Operating out of centrally located and modern facilities, NHL provides best practice general and specialist medical services. NHL commenced business in March 2009, offering out-patient services, with in-patient services commencing in July 2009 (NHL, 2015). Services offered include; general care, pediatrics, surgeries, pharmacy, laboratory, antenatal, counselling, dental among others. To deliver these services, NHL utilizes two major systems namely; LabGuru system and the Med360 System. The LabGuru system; which is the laboratory information system handles and processes laboratory orders and inventory processes and also interfaces with the Med360 system for purposes of information sharing. The Med360 system is used for patient handling and financial management. For a further in-depth understanding of how HISs are adopted and utilized in healthcare institutions, this study sought to investigate the adoption and utilization of the Med360 system used in this organisation. The decision for selecting this system was based on the stability this system has when it comes to issues of how it was adopted and how it is being utilized. This therefore provides an opportunity for comparison between the two HISs that are under investigation for this study.

### *Vision*

Our vision is to make Nakasero Hospital Limited (NHL) the community's first choice and trusted private hospital in Uganda and East Africa.

### *Mission*

To provide quality medical care with compassion, using state of the art technology and innovation.

## **4.3 HIS Adoption Process**

In order to gain an in-depth understanding of how HISs are adopted in healthcare institutions, this study sought to investigate the adoption process of the AMS and the Med360 systems that had been implemented at Savannah Sunrise Medical Center (SAS) and Nakasero Hospital Limited (NHL) respectively. To investigate the adoption process of these two systems, this study examined various factors that influence technology adoption. Kruse et al. (2016) notes that some of the key issues that must be reflected upon during the system adoption process include; management commitment, management support, project planning and management, user commitment to change and user attitude towards change. These issues in relation to the adoption of both the AMS and Med360 are discussed hereunder.

### **4.3.1 Management Commitment**

Ghobakhloo et al. (2012) observes that in any enterprise, the IT adoption process is normally affected by top management. They argue that management is responsible for all decisions that relate to both daily operational functions and future investments. Therefore it is of great importance that management is involved in any system adoption process right from the start if the organisation goals are to be realized. The AMS like the Med360 was internally funded and as such management played a key role in its adoption process. This is evidenced by the responses from the various participants to this study. Responses from the two case studies indicated that management was very committed to the adoption process of their respective Health Information Systems. The reasons for management's

commitment to the adoption of the two systems as reported by several respondents included attainment of operational efficiency, improvement of internal controls and overall human resource productivity within the organisation. In an interview with the SAS Finance Manager, he said;

*“The entire management was fully committed to the adoption of the AMS together with the various heads of department. Infact management prioritized the adoption of this system to the extent that it fully funded its implementation and encouraged all employees to adopt it.” (Interview held at SAS on 15 May, 2017)*

The response of the SAS Finance Manager was collaborated by the NHL IT Manager who reported that the level of management commitment towards the Med360 system adoption process was very good. He further added that it enabled the organisation to make the right steps towards the Med360 system adoption targets.

These views align with Blass, Corbett & Delmus (2011) who assert that top management’s commitment is key to the success of any IT adoption process. They argue that commitment of top management enhances the removal of internal economic and organizational barriers that other employees would find difficult to overcome. Furthermore, Cascio, Mariadoss & Mouri (2010) note that even when all employees are committed to the adoption of a technology, the lack of top management commitment can still hurt the adoption process. This may result into lower employee adoption levels as the tone of being committed has to start from the top.

#### **4.3.2 Management Support**

To further examine the adoption of the two HISs, this study assessed the support of management in this process. Executive management support has been reported as one of the critical success factors in the successful adoption of any technology (Ben-Zion, Pliskin & Fink, 2014). According to the KPMG New Zealand Project Management Survey of 2010, it was indicated that one of the most common reasons why projects fall short is a lack of executive support and management buy-in (KPMG, 2010 cited in Moiz, 2015). In a focus group discussion held with the SAS Medical and Operations personnel, it was revealed that management was supportive of the adoption process. During the discussion, a Finance Officer mentioned that management provided the necessary help

and resources that were required for the AMS adoption. She further added that management support was key in helping Finance department employees learn the system fast. This resulted into quick migration from the old quick books system to the new HIS. However, one IT officer expressed a different view from the other focus group members. He noted that management did not provide sufficient resources to cover all the requirements for the different departments. In his exact words he said;

*“If all resources and help were provided by management, I think we would have all the modules of AMS working and there wouldn’t be any gap in some of the departments as is the case now. At some point it became too costly and expensive for management to pay the developers to customize the AMS to include all the required modules for all departments. At times it became expensive/costly to have people come to train us as every time they came they would have to be facilitated.” (FDG held at SAS on 7 June, 2017)*

The above responses indicate that the different stakeholders to the AMS project had differing opinions concerning the amount of financial support that was provided by management. Menachemi & Collum (2011) cite financial issues as a disincentive for healthcare institutions to adopt HISs. Despite the differing opinions on the financial support provided, there was a general agreement among all the respondents that management provided sufficient support for the AMS project.

Respondents from NHL generally indicated that management support for the Med360 system was sufficient. They reported that as a result of this support, critical resources such as skilled man power to train users, funding, and training facilities as well as the relevant internal human resource were available. However one of the Triage Nurses indicated that she was not sure whether management support had been sufficient in the Med360 project. She noted that management did not effectively communicate with the system adoption team about the challenges the users were facing in adopting the system. In her own words, she said;

*“Our managers did not sufficiently explain to the Med360 system developers about the problems that we were facing as Nurses during the adoption process. This resulted into us having to practice a lot on the system which negatively impacted on service delivery” (Interview held at NHL on 15 June, 2017)*

The response of the Triage Nurse indicates that not everyone at NHL was happy with the Management team's ability to communicate effectively with the system adoption team. Stalker (2014) advises that effective organizational communication during IT adoption is necessary to sustain the momentum of potential users by managing expectations and lessening uncertainty.

#### **4.3.3 Project Planning and Management**

Relatively few projects fail for technical reasons but rather most fail because they are not effectively managed (Scottish Qualifications Authority, 2007). Safdari, Ghazisaeidi & Jebraeily (2015) in their study about the critical success factors for HISs reported that Project planning and management was the highest rated factor in HIS adoption. Gallivan (2001) cited in Albers (2008) also collaborates the views of Safdari, Ghazisaeidi & Jebraeily (2015) that project management is one of the critical success factors for a successful implementation of information systems.

In an interview with one of the SAS managers, it was reported that SAS management had an AMS adoption team, adoption plan, training schedules as well as the AMS objectives in place and these were communicated to staff. The communication channels used included; staff meetings, departmental meetings, training sessions and memos. The requirement to setup a system's adoption team is in agreement with Grevendonk, Taliesin & Brigden (2013) who advise that a multidisciplinary team should be formed during the planning and management phase of an IT project. They add that the system adoption team's role should not stop at managing the development and deployment of the new system but must also cover the overall management and governance functions of the project.

When asked in an interview about how helpful it was to have an adoption plan for the AMS, one manager reported that it was very helpful. He explained that with the adoption plan, employees were able to know what was going to happen, when it was to happen, what was expected of them and the new skills required of them. He also said that the adoption plan clearly indicated the resources

required for the AMS adoption process and their sources. This is in agreement with Archibald (2003) who points out that good planning is a key requirement for any project to achieve the desired results on schedule and within the specified cost (in money or other critical resources).

However, another SAS manager reported that the AMS adoption process suffered a setback when the project technical lead passed on. The impact of this incident on the AMS adoption was that system customization to the AMS could not be completed and some AMS modules are still missing up to now. She noted that this incident caused a standstill to the project. According to her, there had been so much reliance on this one individual by SAS management without consideration for continuity. In an attempt to solve the problem, SAS management and the Vendor team identified a replacement which still didn't resolve the problem. This narration indicates that SAS Project Plan was not comprehensive enough as it did not address risk management aspects. According to Watt (2014), no matter how well one plans, any project can always encounter unexpected problems. He further advises that risk management planning should be used to identify potential problems, analyze their possibility of occurring and then take action for those that can be avoided while minimizing those that cannot be avoided.

Respondents from NHL reported that the organisation had a well-documented project plan that was shared with all project stakeholders. They added that their project plan contained a risk management strategy, a stakeholder engagement plan as well as Standard Operating Procedures. This possibly explains why the NHL HIS was better adopted than the SAS HIS. This is evidenced by the few complaints raised by the respondents about the system. Watt (2014) notes that project planning is the heart of the project lifecycle and tells everyone involved where they are going and how they are going to get there. Hughes (2012) advises that having good plans in place is not sufficient for project success but monitoring and effective control of the project is needed to fulfil the plans and achieve the agreed objectives. Someone has to take responsibility for controlling the work in accordance



with the plans. An interview with one of the NHL Managers revealed that during the initiation stage of the Med360 project, a project leader was identified whose major role was to ensure that the project was delivered as planned. He added that during this stage, various stakeholders to take part in the project were identified and engaged and the project sponsor also took the decision to proceed with the project by providing the necessary funding. These contributed to the smooth take off of the Med360 project at NHL.

#### **4.3.4 User Commitment to Change**

Kruse et al. (2016) cite user commitment as an important factor in the adoption process of an information system. Respondents from both SAS & NHL reported that despite the resistance to change by a few colleagues, the majority were committed to changing to the new HISs. The main reason for their commitment was due to the fact that they were well prepared through the various meetings and awareness campaigns, which gave them insight of how the new HISs were going to help them improve on their productivity and efficiency. This made it easy for them to adjust their work routines to suite the functionality of the new HISs. However one of the SAS Pharmacists reported that some of the employees had to forfeit their days off to focus on learning the AMS. She further mentioned that these employees found some difficulty in changing their daily programs to suite the AMS training schedule. Some Nurses at SAS also indicated that the system was complex and not user friendly, adding that some missing programs implied that they had to keep requesting for help all the time thus affecting their efficiency. All these issues negatively impacted on some of the SAS employees' commitment to change. At NHL, one of the Pharmacists reported that it was not very difficult for him to adjust his work routines to suite the Med360 system. He further said that much as he had to learn certain new steps in the new system his commitment towards the Med360, never waned. Commitment to change was further demonstrated by one of the NHL Triage Nurses who revealed that she had to stay long hours at the hospital to train consultants and other nurses on how to use the new system and also catch up with her daily assignments. This is in line with

Anderson & Anderson (2009) who advise that employees are more likely to commit to change when they have the full story about what is causing it, and they tend to resist change when they don't see the rationale for it. Considering that for both organisations there were a few employees who did not demonstrate commitment to change, it can be argued that both organisations did a good job in trying to achieve the full commitment of all stakeholders. This is evidenced by the reported continuous engagement through awareness campaigns and training workshops that were conducted.

It is however important to note that the HIS adoption process at both SAS and NHL did face some challenges that negatively affected some employees' commitment to changes as reported by the Medical and Operations personnel in both organisations. They reported that some of their colleagues did not want to change their work routines. One SAS IT Officer said that; "Some members of staff were used to paper work and they seemed more comfortable with that, and so they were a bit resistant to learning how to use the system." Amanyire et al. (2010) cited in Namakula & Kituyi (2014) argue that user resistance to change is one of the major causes of HIS failures in Healthcare Institutions. One of the NHL Pharmacists collaborated this argument by saying;

*"The Med360 system is designed in such a way that one has to follow a process as every step is important for output. Any person in the low not understanding or doing it STOPS the whole process." (Interview held at NHL on 16 June 2017)*

An NHL Triage Nurse also had this to say;

*"Some people were negative as it always is with new things and therefore it had to cost Management money and time through extra trainings and sensitization programs to get such people onboard." (Interview held at NHL on 15 June 2017)*

Another challenge that was faced by both SAS and NHL as reported by majority of the respondents to this study was the transfer of data from the old system to the new system. At SAS, respondents reported that data was lost during the data migration process. Bowman (2013) argues that the emergence of HIS related errors results in data being lost leading to loss of information integrity. Such occurrences can negatively impact on the user commitment to change to the new system.

Velimeneti (2016) advises that before the system goes live, there is need to carry out rigorous data testing. He cites characteristics such as the number of records, format of the data in the target system and maintenance of the integrity & quality of the data among others. It is therefore important for system users to be involved in verifying data and ensuring that it's fit for use. This would be one way of boosting user confidence and thereby increasing their willingness of using the new information system.

#### **4.3.5 User Attitude towards Change**

Attitude is a critical variable that affects both the intention to adopt as well as actual usage of a new technology. Attitude towards a new technology is influenced by a potential user's assessment of the perceived usefulness, perceived ease of use, trust, security and demographic characteristics of the potential user (Maduku, 2010). Therefore in this rapidly evolving environment, organizations cannot afford to ignore the effects of employee attitudes toward change on their own success (Chaudhary, Luss & Shriram, 2015). Chaudhary, Luss & Shriram (2015) assert that the way employees feel about changes at work may be influenced by their own attitudes toward change, the changes themselves or the way the changes are managed. Employees at SAS & NHL felt that the respective AMS and Med360 system related changes were well managed. This influenced their good attitude towards the change to the new systems. In an interview with one SAS Manager, it was revealed that events such as demonstrations by the vendor on the new AMS, visitation to facilities where this system is functional, the provision of staff training as well as the general look and feel of the system influenced their attitude towards the system. This was collaborated by another SAS Manager who reported that a dummy system was setup for the users to experience the functionality of the system. Respondents from NHL reported the same factors as SAS respondents that led to their positive attitude towards the new system. One of the NHL Managers revealed that Management was fully involved in all the planning and execution of the changes in the system routines. He said that

Management made a heavy investment into the Med360 system adoption and ensured a smooth transformation process. In a Focus Group Discussion one NHL Pharmacist had this to say;

*“We were all involved in the system adoption process. Management ensured that we contributed towards the needed features of the system. We also participated in the testing of the system before implementation. We therefore easily got ourselves acquainted with the system before use.” (FDG held at NHL on 20 June 2017)*

All these activities could have contributed to the general view among the SAS & NHL employees that the new HISs would be able to resolve the major challenges that their respective organisations were facing then. Some of the challenges as mentioned by several SAS respondents included; long waiting times by patients especially while the search for the hard copy files was going on, storage and retrieval of hard copy documents & medical information, tracing & loss of patients past medical history. The NHL Triage Nurse reported a stock management problem whereby requisitions could not be made using the old system and the other being retrieval of patient background information. The general view of the SAS employees as shared by the NHL employees as well, was further confirmed in an interview with the SAS Medical Director who said that *“The AMS is all inclusive. For instance it can capture activities from reception to doctors’ notes to lab requests and to accounts.”* One of the NHL Customer Service personnel said that; *“The Med360 system was easy to learn and to use compared to the old system and the patient information flow was well organized, which greatly improved our service delivery.”*

These views are aligned to the Theory of Reasoned Action (TRA, 1975) that states that attitude toward a behavior is determined by beliefs about the consequences of the behavior. Therefore basing on the views expressed by the employees of SAS and NHL, it can be argued that the positive attitude towards the adoption of the HISs both at both organisations was determined by the users’ beliefs that these systems would improve their productivity and efficiency.

#### 4.3.6 User Involvement and Participation

The process of buy-in from the key participants in an Information Systems implementation project normally begins during the adoption phase (Statnikova, 2005). According to Bano & Zowghi (2013), getting people involved in the project early enough and all the way through results into user buy-in. Ghobakhloo et al. (2012) further asserts that user buy-in can break or make the project and could affect the IT adoption process. Stewart et al. (2000) also advise that user involvement and participation should be initiated from the commencement of an IT project and should continue throughout the subsequent phases till the new technology is fully adopted.

Both the SAS and NHL respondents to this study indicated that they were involved in the HISs' adoption process in their respective organisations. They reported that they participated in various HIS adoption activities such as system pre-evaluation, vendor presentations & demonstrations, benchmarking visits, requirements gathering and planning meetings. According to their responses, their participation was based on the belief that the HISs would help them perform better at their workplace. This is in line with a Thakurta & Roy (2012) study which identifies perceived project importance and perceived ease of user participation to be the primary drivers behind user intention towards participation leading to involvement. Whereas majority of the respondents at SAS confirmed their involvement and participation in the HIS adoption process, a few reported that they were not involved and did not participate in the HIS adoption process. This was not the case for NHL as earlier reported by one of the Pharmacists who stated that Management made an effort to involve all employees in the entire process. Asked for a reason for not participating in this process the SAS Finance Officer responded that *"The IT head of department was able to handle that."* Another response from the SAS Theatre Nurse was that *"I have got a lot to do in my department after all we have an IT department. We have different activities depending on department."*

Judging from the above responses it is clear that the levels of ownership of the HISs in these two organisations differed. At SAS unlike NHL, there was a lack of ownership of the AMS from some of the employees, with a tendency to think that the AMS belonged to the IT department and not the organisation at large. This could have negatively impacted on the AMS adoption. Berg (2001) points out the necessity of a sense of ownership among system users as a necessary precursor of successful IT adoption. He further adds that creating this state of ownership occurs via activities and opportunities that can influence the employees' attitudes.

#### **4.4 HIS Utilization Process**

Various studies have cited different factors that influence the utilization of health information systems. These include factors such as user involvement and participation, user training, lack of adequate knowledge on the use of the health information system, the expected benefits from the system and technology fit among others (Kimani & Namusonge, 2015; Moiz, 2015; Namakula & Kituyi, 2014; George et al. 2012; Rouibah & Hamdy, 2009). This study analyzed how each of these factors influenced the utilisation of the HISs at SAS and NHL respectively.

##### **4.4.1 Management Support**

Top Management support has been cited as one of the key factors for successful information system utilisation. (Stalker, 2014; Kruse et al., 2016). SAS and NHL respondents to this study reported that top management was supportive in the utilization process of the HISs in their respective organisations. Respondents from the two case studies said that Management ensured that employees were well trained on the new systems' use. In the case of SAS, the AMS vendors from Kenya were on ground to carry out the training sessions which equipped users with more skills and confidence to use the system. At NHL, one of the respondents revealed that by going over and over what they had learned as well as using case scenarios they were able to greatly improve the utilisation of the Med360 system. Stalker (2014) advises that users must be trained if they are to get their work done

efficiently and effectively with the system. He adds that the more adept and comfortable the users are, the more likely they are to integrate the system into their work processes. The other strategy that SAS Management employed to improve AMS utilization was rewards and recognitions whereby users were evaluated and active users of the AMS rewarded for their effort. This encouraged others to get onboard and start using the system actively. SAS Management also ensured that technical support was always available to the users by paying overtime hours to the SAS IT team. Khalifa (2013) cites direct and indirect incentives as one of the motivations for healthcare professionals to learn and train on the utilisation of the HISs. He mentions overtime payments, bonuses and departmental rewards and recognition as some of the ways to increase the utilisation of HISs.

The NHL Finance Officer reported that Management ensured that there were sufficient resources to promote the system utilization. According to this officer, additional computers were procured and staff recruited to support the utilization process. Furthermore, in support of the system utilization process, Management ensured that there was effective communication within and among all the various teams. This clearly indicated that top management was fully committed to promoting the utilisation of the system. Alghamdi (2015) asserts that lack of communication can contribute to a resistance in changing over to new HISs. This resistance can deter the utilisation of an HIS in any organisation. In an interview with one of the managers at SAS, it was revealed that management kept staff informed about the entire process from the beginning to the end. A SAS Laboratory officer collaborated the views of other SAS respondents to this study by saying that;

*“The communication during the utilisation process was effective because they (system adoption team) always kept on coming to sort out complicated issues. And the communication between management and the system adoption team meant the adoption team got to know the changes that needed to be made for the successful running of the system.” (Interview held at SAS on 7 June, 2017)*

The same view was also echoed by the NHL Customer service personnel who said that *“Management’s ability to communicate effectively within the organisation during the entire system*

*utilisation process helped in addressing the different challenges the users were facing while using the system.”*

Overall, the respondents from both organisations felt that the support that top management provided during the utilization process increased HIS use among employees. There was continuous improvement of the systems as various errors were being flagged and resolved.

#### **4.4.2 Technology- Task fit, Complexity and Training**

Goodhue (1988) cited in Osang (2015) defines task-technology fit (TTF) as the degree to which a technology assists an individual in performing his or her tasks. Osang (2015) argues that the relationship between task technology fit and system utilization is based on the fact that the better the fit, the more the tendency for users to like the system and therefore utilize it more. There was a differing opinion among the respondents of the two case studies that were adopted by this study, about how well the new HISs fitted their work routines. NHL respondents reported that the Med360 system fitted well in their routine. They attributed this fit to the close similarities between the old and new systems. On the other hand, the SAS Operations staff reported that the AMS did not fit well with their work routines. They felt that they required more time and effort to alter their current work process flows to align with the processes built into the system. However, one SAS Medical personnel reported that the AMS fitted her work routine. She felt that the AMS had helped her in improving her individual efficiency and productivity. Goodhue & Thompson, (1995) cited in Baas, (2010) argues that ‘better’ tools not necessarily increase productivity, but that the ICT tools must show fit with someone’s task portfolio. They add that employees with different work routines exhibit different demands on ICT tools. Therefore heavily investing in technologies which are not utilized because they show no fit with the user’s task routines will not result in increased use. Overall there was a general consensus among the respondents from the two case studies that the new HISs simplified work and made patient records access faster.



From the HIS complexity and training perspective of both SAS and NHL, all respondents agreed that the systems were easy to learn and to use. SAS respondents reported that sufficient training was also received, as earlier mentioned. However, one Triage Nurse and one Customer Service personnel from NHL reported that more frequent and continuous training sessions were required for employees to master the new routines in the Med360 system. Reasons such as the user friendly interface, availability of good IT technical support, similarity with the old system and the frequent training received from knowledgeable trainers were cited by respondents from both organisations as having led to increased utilisation of the HISs. McGill & Klobas (2009) assert that the level of task-technology fit has an impact on learning of the system. Alghmadi (2015) also adds that the increased burden placed on users to learn new systems decreases their use and lowers the potential for achieving the set organisation goals.

#### **4.4.3 User Involvement and Participation**

Various scholars have suggested that user involvement and participation will have an impact on information system utilization and therefore system success (Stalker, 2014; Bano & Zowghi, 2013; Ghobakhloo, et al., 2012). Roubiah & Hamdy (2009) argue that the contribution of user participation/involvement in an information system project increases system usefulness and system usability. Respondents from both SAS and NHL reported that their involvement and participation in their respective HIS utilisation processes was majorly through attending regular training workshops. Others took part in information systems testing, training of colleagues and providing of feedback to Management and the technical team. The IT teams for both organisations were involved in the setup and configuration of the HISs; which equipped them with necessary skills to support the health information systems. All these activities greatly contributed to the improved utilisation of the new HISs. In one of the focus group discussions, one of the NHL Customer Service personnel reported the main reason for her involvement and participation as being that she believed that the new system was capable of improving her productivity. In another focus group discussion that was conducted at

SAS, one of the Radiology Nurses revealed that she initially was not excited nor interested in the new HIS because she thought it was complex. That attitude negatively affected her involvement and participation in the HIS utilisation process. Kimani & Namusonge (2015) and Angelo (2015) argue that user involvement and participation play a key role to the successful utilization of an information system. They add that with user involvement and participation comes the ability of users to air their views with regards to the project. This in our view can lead to the sustainability of the project since users will have owned it.

#### **4.4.4 User Satisfaction with the system**

There are various factors that may lead to user satisfaction of an information system. Osang (2015) advises that the TTF construct has been identified to influence user satisfaction with a given system. He argues that when the fit of a technology is high, users will be satisfied with the technology. Goodhue (1988) cited in Osang (2015) has defined user satisfaction as a fit between personal needs and the benefits of using a system and would be measured by an assessment of how a user feels about a system. Majority of the respondents at both organisations reported that they were satisfied with the HISs and felt that they were in control and had high confidence while using them. They cited factors such as availability of the system 24/7, ease of use, ease of access from any computer, improved access to patient information among others; as having contributed to their satisfaction with the HIS systems in their respective organisations. However, at SAS, there were a few respondents who felt they lacked confidence and control while working with the AMS. They attributed such feelings to some of the processes missing from the new system, lack of flexibility for the default fields and system errors that often delayed customer service. One of the SAS Theatre Nurses revealed that such system errors at times forced them to fall back to the old system which would not capture all patient information. According to Vries, Midden & Bouwhuis (2003), trust and self-confidence are considered to be crucial in people's decision to rely on a complex automated system to perform tasks for them and therefore impact on its utilisation.

#### **4.4.5 Trialability**

Rogers (1995) defines trialability as the degree to which innovations can be tested on a limited basis. Various studies have found that trialability has a positive effect on the intention to use a system. Lee, Hsieh & Hsu (2011) argue that when employees have more opportunities to try out an information system, then they are more likely to view it as being easier to use. It is important that Managers provide employees with organizational support for trying out the information systems prior to their roll out. One SAS Manager reported that Management ensured that a dummy AMS was setup and used alongside the old system with an aim of assessing the usability of the new AMS. This according to him went a long way in giving confidence to the employees involved in the trialability process and getting an idea of what to expect after the complete AMS roll out. NHL respondents also reported that they were involved in testing the Med360 system before its roll out. An NHL Pharmacist said that during the system testing, he was able to familiarize himself with the system as well as foresee changes in his work routine. This view was collaborated by the NHL Customer Service personnel who reported that the testing helped prepare her for the go-live system. In a focus group discussion with the SAS medical personnel, it was revealed that not all employees were given the opportunity to try out the new AMS before its roll out. This was in contradiction with a view from Hambling & Goethem (2013) that information system trialability should involve all actual users of the system. They add that if all users are not involved, then there would be a likelihood of facing system problems that were not considered by those that were involved. Such incidents can cause serious setbacks in the entire project and affect the system utilization.

#### **4.4.6 Relative Advantage**

Rogers (1995) defined relative advantage as the degree to which “an innovation is perceived as being better than the idea it supersedes”. According to Rogers & Shoemaker (1973) cited in Kimani & Namusonge (2015), users decide to adopt a given technology if they know the technology’s relative advantage or the benefits that a new technology offers to them. Majority of the respondents

from both organisations reported that they found utilizing the HISs more advantageous to their job. They cited attributes such as their ability to achieve efficiency and effectiveness in their roles, which were not existing before. Furthermore they added that the quality of their work was greatly improved with the use of the HISs and were now producing work with minimal errors and in a timely manner. These responses align with Brdese, Corbitt & Pittayachawan (2013)'s view that relative advantage is a contributor to IS utilization. When asked how advantageous the AMS was, one SAS Manager said that the system had improved their operations. He however noted that there were still some problems with the system's performance due to the vendor not completing some of the crucial features. This response from the SAS Manager indicates that he was not fully satisfied with the AMS and therefore unable to fully realize and experience the relative advantage it brings. Such experiences can negatively impact on the utilisation of an information system by employees. Other advantages of the AMS as reported by several SAS respondents included bill tracking, debtors management, centralized patient information access, paperless work environment, better information storage and shorter patient queues. Also NHL respondents reported reduced paper work and reduced movements from one office to another in such of information as some of the advantages they were getting from the Med360 system. They said that the system has also improved their quality of work by reducing on mistakes. Shih & Lee (2007) cited in Lee, Hsieh & Hsu (2011) note that research has consistently found that the perceived relative advantages positively affected the users' intention to use a system. The added that when users perceive higher relative advantages of a system, they perceive a higher level of usefulness of the system. Venkatesh & Davis (2000) cited in Leal & Albertin (2015) also point out that a perceived positive image of an innovation will positively influence its relative advantage and therefore its use.

## **4.5 Summary of Findings and Way Forward**

The focus of this study was to improve the adoption and utilization of Health Information Systems for Healthcare delivery; by developing an HIS model that would be fit for this purpose. Results of the analysis of the findings from the two case studies generally indicated demonstrated efforts by both organisations for a successful adoption and utilization of their respective HISs. Overall, there was strong Management Commitment and Support for the HISs and also management provided financial support for activities such as employee training, trainers' facilitation as well as the required IT infrastructure for the HISs. Communication of the entire project was also a key factor in the adoption and utilisation of these HISs, with various communication channels such as departmental meetings and emails being used. This greatly positively influenced employees' attitudes, commitments and perceptions towards these new HISs and as a result, contributed to their adoption and utilisation. The levels of employee involvement and participation were also high with majority of employees demonstrating that the new HISs were fit for purpose, easy to use and had a high relative advantage over the old systems they had been using.

However, there were a number of factors that affect the adoption and utilisation processes of technology that were not well considered during these two processes. Whereas both case studies considered some aspects of project planning and management, the issue of risk management planning, which is critical to successful adoption of IT innovations was not considered at all. Insufficient requirements gathering as well as the lack of business process mapping were other factors that negatively impacted on the HIS adoption and utilisation. In one of the case studies, this led to the incomplete roll out of the system with some departmental modules pending or incomplete. This issue further affected employee satisfaction with the system as it could not fully perform all functions. Challenges such as employee resistance to changing to the new system as well as data transfer from the old system to the new system were experienced along the way. In addition, some of

the employees who were key to the project success also had a wrong attitude of thinking the HISs belonged to the IT department and therefore there was no need for them to get involved or even participate.

Looking at the adoption and utilisation processes followed by the two case studies, it is clear that the methodology used was not inclined to any specific IT adoption and utilisation model. Both case studies seemed to rely on the expertise of their respective HIS vendors. Theoretically, a number of technology adoption and utilisation models have been developed to explain and predict user behaviors and intentions as well as improve user acceptance of IT innovations. Oliveira & Martins (2011) note that the most widely used IT adoption and utilisation models include; the diffusion of innovation (DOI) theory published by Rogers (1995), the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980), the theory of planned behavior (TPB) (Ajzen, 1991), technology acceptance model (TAM) (Davis, 1989) and the unified theory of acceptance and use of technology (Venkatesh et al., 2003). However, despite their existence and designated purpose, these models have various weaknesses as indicated in Table 2. One weakness that almost cuts across all of them is that they do not clearly specify what HealthCare institutions should do during the different adoption and utilisation phases of a given technology or innovation. Further still, many of them never emphasize optimization of HISs. This could possibly explain the low adoption and utilisation of HISs in healthcare delivery (Isabalija et al., 2011; World Health Statistics, 2016). There was therefore need to develop a model that clearly articulates what HealthCare institutions must do during each phase of adoption and utilisation if they are to improve HIS adoption and utilisation. Furthermore, it is important that this model is evaluated for purposes of confirmation of its fitness for purpose.

## **4.6 Conclusion**

This chapter presented an analysis of the findings from the two case studies. From the results, there is still an indication of a gap when it comes to the clear guidance about what activities should be carried out during the different phases of HIS adoption and Utilization. Having these clearly defined for this purpose will go a long way in improving the adoption and utilisation of HISs in HealthCare delivery. Chapter five presents the proposed HIS adoption and utilisation model for healthcare delivery.

# CHAPTER FIVE: PROPOSED HIS ADOPTION AND UTILISATION MODEL

## 5.0 Introduction

This chapter presents the proposed HIS Adoption and Utilisation model for Healthcare delivery. It also presents the evaluation results of this model by E-Health and ICT for Development Specialists. The proposed model is expected to guide Healthcare institutions in the process of adopting and utilizing Health Information Systems. The development of this model was based on The Open Group Architecture Framework (TOGAF 9.1). It is an integration of some constructs from several IT Adoption and Utilisation models including TRA, TPB, TAM, DOI, UTAUT, TOGAF (9.1) and Lewin's Change Model. Important to note also is that other constructs of the developed model were identified based on the critical success factors for the adoption and utilisation of HISs. Below is a brief outline of each of these models and framework.

TRA was used to a certain extent as a starting point for other theories such as the Technology Acceptance Models (Alomary & Woollard, 2015) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Otieno et al., 2016). It can be extended to conceptualize the human behavioral pattern in the decision-making strategy on the adoption and utilization of a new innovation or technology.

TPB is used to study how a person's *intention* to use new technology is affected by his/her *attitude, behavior control or subjective norm*. According to Abugabah, Sanzogni & Poropat (2009), TPB is a successful model that has been used by researchers to predict behavior towards various situations such as new technology.

Roger's DOI has been found by some scholars as the most appropriate model for the adoption of technology in organisations (Medlin, 2001 cited in Sahin, 2006). Rogers (2003) perceives adoption



as a decision of “full use of an innovation as the best course of action available” and rejection as a decision “not to adopt an innovation”. Rogers’ innovation theory decomposes the diffusion of an innovation in terms of the innovation, communication channels, time and social systems.

UTAUT aims to explain user intentions to use an IS and subsequent usage behavior. The theorized four constructs of performance expectancy, effort expectancy, social influence, and facilitating conditions are direct determinants of user acceptance of an IS and usage behavior (Venkatesh et al., 2003). Gender, age, experience, and voluntariness of use are posited to moderate the impact of the four key constructs on usage intention and behavior (Venkatesh et al., 2003).

One of the cornerstone models for understanding organizational change was developed by Kurt Lewin back in the 1940s, and still holds true today (Bourda, 2013). According to Lewin (1947) change is best achieved through a planned approach where individuals have to go through a learning process and understand the need for transformation. Lewin's Change model infers to organizational change in three stages: Unfreezing, Moving/transition and freezing.

The Open Group Architecture Framework (TOGAF) defines an architecture framework as a foundational structure, or set of structures, which can be used for developing a broad range of different architectures. An Enterprise Architecture (EA) may be defined as a product while others look at it as a process. TOGAF constitutes of the Architecture Development Method (ADM) which describes a method for developing an enterprise architecture.

Figure 5 below illustrates a graphical representation of the proposed HIS Adoption & Utilisation Model.

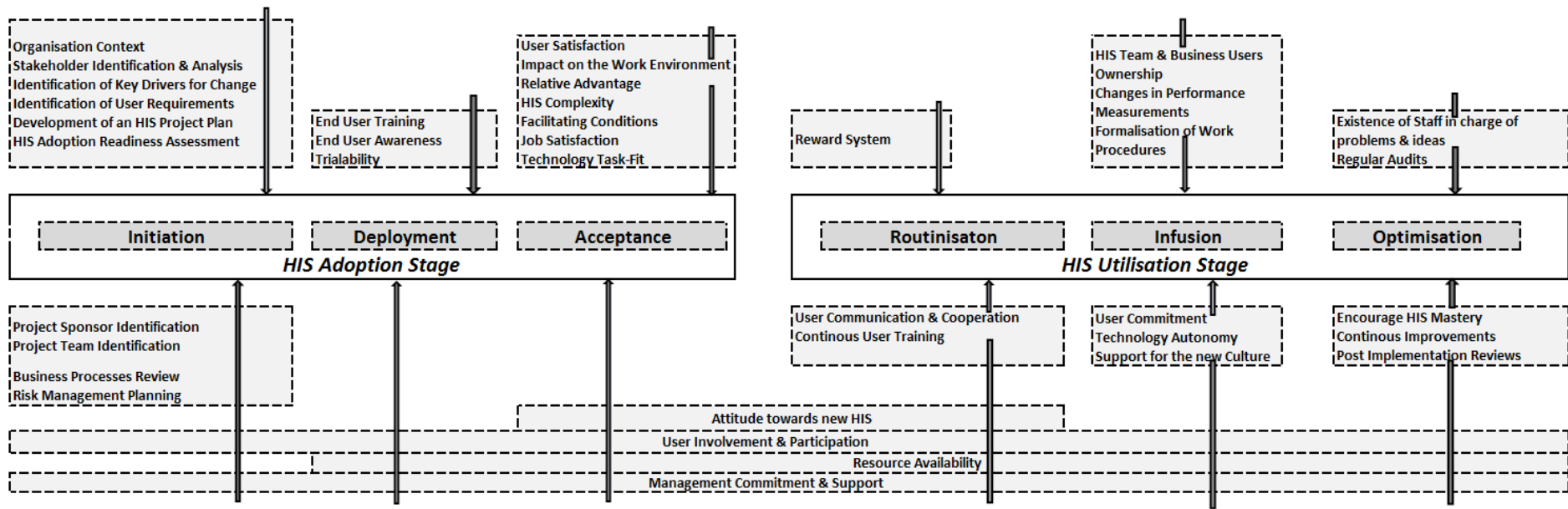


Figure 5: Proposed HIS Adoption & Utilisation Model

The Model is categorized into two major components being Adoption and Utilisation and these are discussed further below. The Adoption component is further broken down into three phases namely; HIS Initiation, HIS Deployment and HIS Acceptance. On the other hand, the Utilisation component was broken down into three phases including Routinization, Infusion and Optimization. It is however important to note that the proposed model has not been evaluated to assess its fitness for purpose in any Healthcare institution. There is need to evaluate this model in several healthcare institutions for purposes of verifying its effectiveness in different environments as each organisation environment is different. While additional components may be required for some healthcare institutions, others may not be relevant. The proposed model was developed based on the Open Group Architecture Framework (TOGAF 9.1) as a guiding framework. It was built using different constructs from the different existing IT adoption and utilisation models, organizational change models as well as critical success factors for HIS Adoption and Utilisation.

## **5.1 Description of the Proposed Model**

The next two sections of this chapter contain an in-depth discussion of the two major components of this study. These are the HIS Adoption Stage and HIS Utilisation Stage. Under each of these stages are the respective phases that an organisation needs to undergo during the adoption and utilisation stage. Each phase clearly describes various factors that should be considered for a successful HIS in an organisation.

## **5.2 The HIS Adoption Stage**

The HIS Adoption Stage comprises of three major phases namely Initiation, Deployment and Acceptance phases. These are phases that an organisation should consider if it is to achieve full Adoption of an HIS. The respective phases are discussed hereunder.

### **5.2.1 Initiation Phase**

Initiation is the first phase of any technology adoption process (Rasmussen & Hall, 2015). It is the stage at which an organisation scans through the problems at hand, the available opportunities and the entire organizational environment (Matta, Koonce & Jeyaraj, 2011). Rogers (2003) notes that during the initiation phase, an organisation learns about the innovation, its capabilities, advantages, disadvantages as well as its compatibility and suitability. The initiation stage results into the creation of an overall initial attitude towards the innovation which leads to the conception and the development of an adoption plan (Kamal, 2006 cited in Matta, Koonce & Jeyaraj, 2011). In order to achieve successful HIS adoption, there is need to look at a number of issues. Various aspects that need to be considered during this phase are discussed below.

#### **5.2.1.1 Organisation Context**

Assessment of an organisation's context is one of the key aspects that any HIS adoption team must consider during the initiation phase. According to Glushko (2008) organisation context is key in determining how readily new systems or applications or methods can be adopted. He further adds that it determines the influence and priority of stakeholder roles and individuals in the adoption of the new innovation. Therefore in assessing the organisation context there is need for a deeper understanding of various attributes that have the potential to affect performance,

attitudes and behavior. These include attributes such as organisation climate, technology context, work group characteristics, job characteristics, satisfaction with current system, attitude towards change, power of the IT unit and attitude towards computers. All these attributes relate to the issues that the TRA and TPB IT models emphasize in the adoption of any innovation.

### *Organisation Climate*

Organisation climate is mainly concerned with the environment in which a technology innovation is going to reside. It involves organisation culture, goals, nature of leadership, management relationships with staff, reward systems, organisation politics and technology environment (Kalegai, 2005). Understanding these aspects within an organisation is very important for the successful adoption of any HIS. These aspects are not only directly linked to an organisation's commitment to embrace the new innovation but also its capacity to take it on. Deeper understanding of the organisation climate helps the HIS adoption team plan better to overcome any inherent difficulties that may arise. On the contrary, if these aspects are not considered there will be resistance to the adoption process.

### *Attitude towards Computers*

Computerized work environments are penetrating organisations at an exponential rate and therefore the recognition of employees' attitude towards computers becomes key for the successful adoption of HISs. The Theory of Reasoned Action (TRA) developed by Ajzen & Fishbein (1980) illustrates the importance of attitude towards a behavior in eventually determining the behavior. According to Perl & Griffin (2009) many end-users have little technical knowledge of computers and therefore are likely to experience computer anxiety and negative attitudes. McLane (2005) advises that understanding how the employees feel about

computers in the workplace enables the new system adoption team to structure communications, reframe misconceptions, and offer possible new perceptions before moving into the implementation of the system.

### *Attitude towards Change*

Understanding the employee attitude towards change is another aspect that must be thought about in the initial stage of the adoption of an HIS. This is in line with Lewin (1947)'s model that emphasizes the importance of change management during the unfreezing stage of new innovations in organisations. In this rapidly evolving environment, organizations cannot afford to ignore the effects of employee attitudes towards change. Chaudhary, Luss & Shriram (2015) assert that the way employees feel about changes at work may be influenced by their own attitudes toward change, the changes themselves or the way the changes are managed. Vakola & Nikolaou (2005) cite good and effective work relationships, handling conflicts effectively, building supportive work relationships and communicating effectively as being very important in influencing attitudes towards change. They also add that other aspects such as increase in work load which the organizational change may create should be closely examined by the organisations. Whereas this can be easily attributable to the change, it can also make the change unattractive and problematic leading to non-supportive attitudes towards the new technology adoption.

### *Workgroup Characteristics*

Work groups are gaining importance in many organizations and they present many potential risks and opportunities, so there is a need to understand their characteristics if organizational effectiveness is to be attained (Campion & Medsker, 1993). Borrill et al., (2001) posit that

workgroups are built within health care organizations in order for employees to work together, learn together, engage with one another and generate innovations to ensure progress in practice and service. Therefore investigating the unique characteristics of these work groups when adopting a new HIS can help the adoption team in shaping the technology adoption process in a way that would best fit the group. Lewin (1947) emphasizes the importance of considering group activity while considering a new innovation in the organisation. Here, the group routines and norms are transformed rather than changing individuals which may not be sustainable. Furthermore, Roman (2013) adds that workgroup characteristics can influence employee readiness for adopting improvement initiatives. Nelson (1990) suggests that collaborative characteristics can encourage innovative behavior among work groups.

#### *Job Characteristics*

Lakshmil & Vanithmani (2010) state that many studies have showed that job characteristics are primary determinants of work outcomes. They add that the way a job is designed would have an impact upon the attitudes, beliefs, and feelings of the employee. All these would have an impact on the successful adoption of the new HIS. Morris & Venkatesh (2010) also advise that researchers and practitioners should not only focus on system design but must also have a deeper understanding of the new system impact on the day to day jobs of the affected employees.

#### *Satisfaction with the current system*

There are various factors that may lead to user satisfaction of an information system. The level of satisfaction with the current system among users provide useful insights into what will motivate users to adopt the new IS (Statnikova, 2005). His study further confirms the relationship between satisfaction with the old system and the successful adoption of the new IS. TAM emphasizes the

need to assess the perceived usefulness and perceived ease of use of a technology to determine its acceptance within an organisation. (Venkatesh et al., 2003). Goodhue (1988) cited in Osang (2015) has defined user satisfaction as a fit between personal needs and the benefits of using a system and this satisfaction would be measured by an assessment of how a user feels about a system. Osang (2015) also argues that when the fit of a technology is high, users will be satisfied with the technology. Therefore during the adoption a new HIS, there is need for an assessment of those factors that may be contributing to the high satisfaction of the old system for these to be considered in the initial stage of the new system adoption.

#### **5.2.1.2 HIS Adoption Readiness Assessment**

Understanding the likelihood of a successful technology adoption before embarking on its implementation can help an organisation invest wisely in new technologies. Omosigho & Abeysinghe (2012) assert that many organizations fail to reap the benefits of new technology after its adoption simply because they were unprepared for its adoption. According to Liljander et al. (2006), Technology Readiness is one of the critical success factors that affects users' attitudes towards systems adoption. They add that there is need to assess the user's mental readiness to accept the new technology. Also Lewin (1947)'s change model points the need to assess an organisation's readiness before embarking on any change. Performing an assessment of an organisation's technological characteristics can help in evaluating its likelihood for adoption of a new technology (CCRC, 2014). During the adoption of HISs, such an assessment can lead to the identification of issues that may need to be addressed to facilitate the successful adoption of an HIS. CCRC (2014) further advises four areas or readiness for evaluation: technological readiness which covers attributes such as availability of required hardware and software to support the new system, project readiness covering factors such as resource availability, training



capacity, incentives & support; Organizational readiness that includes factors such as clarity of mission, openness to change and effective communication, and lastly motivational readiness that includes a clear need for change as well as the benefits that the change will bring.

### **5.2.1.3 Stakeholder Identification & Analysis**

Stakeholder identification involves determining who your project stakeholders are and their key groupings. During the stakeholder identification process, the most powerful stakeholders are identified early and their input used to shape the adoption process. On the other hand, stakeholder analysis involves a more in-depth look at stakeholder group interests, how they will be affected and to what degree, and what influence they could have on a project (PMI, 2011). Stakeholder analysis is key to understanding who the winners and losers of the project are (Mayers, 2005; The Open Group, 2009). Aapaaj & Haapasalo (2014) advise that because the stakeholders define the characteristics of the proposed project, most challenges stem from the requirements they place on the project and therefore identification of which types of stakeholders are going to be part of the project is very critical. Mayers (2005) adds that stakeholder analysis helps in highlighting challenges, developing capabilities as well as tackling any inequalities. All this helps in gauging the level of support or opposition that may be received during the HIS adoption as well as predict any behavior once the new system has been adopted. The Open Group (2009) advises that support from the more powerful stakeholders can help win more resources, thus making the adoption process more likely to succeed.

### **5.2.1.4 Identification of Key Drivers for Change**

The identification of key drivers for change is an important aspect of Change Management in any organisation. Lewin's (1947) change model advises that during the unfreezing stage, organisations should develop a compelling message showing why the existing way of doing

things cannot continue. In any IS adoption process, it is important to recognize both what the change drivers are and their effects on the workplace, so that their effects can be addressed (Adkins, 2016). In most cases when faced with the need to change, the affected parties will seek for reasons as to why the change must happen. Therefore at the initiation phase of an HIS adoption process, it is important that the drivers for change are defined and communicated clearly to all stakeholders. Dentinger & Derlyn (2009) therefore advise that it is of great importance that key drivers for change are identified early as this provides input for the adoption process.

#### **5.2.1.5 Identification of User Requirements**

Identification of user requirements is another important activity that must be considered by the HIS adoption team during the initiation phase. TOGAF (2009) underpins the importance of requirements identification during any transformation. According to Kraus & Zheng (2007) identification of user requirements forms a basis for the new system meeting stakeholders' needs. They add that in order for user requirements to be effectively identified there is need to understand as much as possible the users and their work context. Butkiene & Butleris (2001) advise that user requirements should be expressed in the notation understandable to the user. This makes it easy for the user to understand them and confirm whether they will meet their needs.

#### **5.2.1.6 Project Sponsor Identification**

One key factor in the success of any project is the leadership and motivation (University of Manchester, 2013). Identifying a project sponsor in the early stages of an HIS adoption process helps in the mobilization of resources as well as ensuring stakeholder buy-in. PMI (2012)

emphasizes the need to identify a project sponsor who has a vested business interest in the project from kickoff to close and who will ensure that the User's strategic project objectives are identified, maintained and achieved in successfully completing the project. Such a project sponsor will ensure that users' aspirations, the project requirements and the organisation's long term vision remain aligned.

#### **5.2.1.7 Project Team Identification**

Another key success factor that should be considered at the initiation phase of an HIS project is the assembling of an efficient project team. Grevendonk, Taliesin & Brigden (2013) advise that putting together a project team should be one of the very first steps in setting up a new project. Newton (2015) asserts that the people who make up a project team are very important to the success of a project. He adds that these must possess knowledge, experience and the motivation to get the job done on time and within budget, otherwise all the other planning would be wasted. While building up the project team, there is need to confirm resource availability as well as obtaining the right staff at the appropriate time of the project for successful delivery of results (CDC, 2011).

#### **5.2.1.8 Business Processes Review**

The objective of a Business Process Review (BPR) is to evaluate the current business process for the purpose of identifying enhancements and opportunities for improvements (Zigiaris, 2000). In the initial stages of HIS adoption, it is important that the business processes are reviewed as this will help the adoption team identify areas where improvements are needed. According to TOGAF (2009), organisations should always carry out a review of their business processes for purposes of understanding their current status which is key to Business-IT alignment. Hoyt

(2011) notes that Business Process Reviews can help in the identification and management of risks leading to smoother adoption of a technology. However in the review of business processes, it is important that the HIS adoption team assesses whether they are in line with the mission and vision of the healthcare institution.

#### **5.2.1.9 Management Commitment and Support**

Top management commitment and support have been cited as one of the key factors for successful information systems adoption (Kruse et al., 2016). In the initial phase of HIS adoption, it is important that the adoption team ensures management commitment and support. Ghobakhloo et al. (2012) argues that the IT adoption process is directly affected by top management because all decisions including investment decisions are made by them. Blass, Corbett & Delmus (2011) further add that management commitment and support can make the system adoption process much faster and easier. The New Zealand Project Management Survey of 2010 indicated that one of the most common reasons why projects fall short is a lack of executive support and management buy-in (KPMG, 2010 cited in Moiz, 2015). Cascio, Mariadoss & Mouri (2010) advise that the lack of top management commitment and support can hurt the adoption process of any technology and in other cases lower the adoption levels of employees. KPMG (2010) cited in Moiz (2015), emphasizes the importance of the commitment of management in the success of any project. This therefore confirms the need for management commitment in the adoption and utilisation of HISs.

#### **5.2.1.10 Risk Management Planning**

Risk management planning is key to the initial phase of the HIS adoption stage. Risk management is about making decisions that contribute to the achievement of an organization's

objectives. Watt (2014) advises that no matter how well one plans, any project can always encounter unexpected problems of different kinds. It is therefore necessary that risks to HIS adoption are identified and mitigation measures put in place early enough into the project. The mitigation measures should cover both the original and residual risks. Berg (2010) argues that risk management is an integral component of good management and decision-making at all levels of an organization. Since risk management is directed at uncertainties related to future events and outcomes, all planning exercises for HIS adoption should include some form of risk management.

#### **5.2.1.11 Development of an HIS project Plan**

Archibald (2003) emphasizes that a good plan is a key requirement if any project is to achieve the desired results on schedule and within the specified cost; whether in form money or other critical resources. Chan (2013) argues that technology changes are likely to increase risk and be resisted by some stakeholders; which calls for careful planning if a technology is to be successfully adopted. Cresswell, Bates and Sheikh (2013) note that whereas the aspect of planning is sometimes under-estimated and often rushed, careful planning is central to the success of Health Information Technology. Ghobakhloo et al. (2012) argue that much as it is generally believed that barriers to IT adoption arise mostly out of inaccessibility to funds and technology, the major barrier to IT adoption is the lack of an information system plan. Therefore, the adoption of new technology in a manner that creates risk, business problems and additional costs can be avoided from the start if an adoption plan is put in place during the initiation phase. Apart from having a HIS project plan in place, it is also important that this plan is aligned to the Healthcare institutions business plans. According to Premkumar & King (1991), the alignment of IS plan and business plan results in information resources supporting the business objectives and

taking advantage of the opportunities arising from the use of IS. Kearns & Lederer (2000) also state that, “the alignment of the IS plan with the business plan, is the direct reference in the IS plan to the business plan’s mission, objectives and strategies”.

### **5.2.2 Deployment Phase**

Aalst & Stahl (2011) infer that the deployment phase of an information system involves the installation of the system in its target environment and the training of users on how to use and work with it. During this phase, activities such as system tests, database installations, migration of data, training of users and finally converting users from the old to the new system are carried out. For this phase to be executed successfully, various aspects need to be considered. These aspects are discussed hereunder.

#### **5.2.2.1 End User Participation**

End user participation is an important factor that must be considered by top management during system deployment because of its positive effects (Batenburg & Koopman, 2010). If end-users are ignored in the deployment of an HIS this may lead to its failure. This is because end-users possess some existing knowledge that may otherwise be very helpful to the deployment team (Khan et al., 2012). Amoako-Gyampah (2007) also advises that end user participation can increase the perceived usefulness of the system which will help in increasing motivation, user commitment and user acceptance of the system in the organization. End user participation influences user behavioral intention which is a key construct of TAM. Batenburg & Koopman (2010) point out that there is a positive and significant relationship between user participation and user satisfaction and that systems or tasks with a high complexity call for more user

participation. However it is important to note that suitable and relevant staff members are selected for participation if the set objectives for the deployment of an HIS are to be realized.

#### **5.2.2.2 Resource Availability**

UTAUT underpins the need for facilitating conditions in the successful uptake of an innovation (Venkantesh et al., 2003). Mahoney & Wixom (2008) cited in Mwangi, Mbabazi & Nkechi (2017) point out that one way that an organisation's top management can show support towards the success of a project is by committing the necessary project resources, thereby facilitating the project. This according to Young & Jordan (2008) can leverage greatly the success of projects. Making these resources available is key in funding and supporting project activities which would otherwise fail the HIS deployment process. Mwangi, Mbabazi & Nkechi (2017) cite lack of resources as one of the challenges to the deployment of IT projects. They cite resources such as the allocation of human capital resources, financial capital resources and physical capital resources as having a significant effect on the successful system deployment. During the deployment of an HIS, the right number of employees with their respective roles must be made available. Sufficient funds to support the entire deployment process must also be made available and accessible, to avoid an incomplete system deployment which may have no impact in the end.

#### **5.2.2.3 End User Training**

According to Schinder (2006), managers and IT departments often rush to deploy the latest and greatest software without considering the need to train end-users in its use. Users must as quickly as possible be brought up to the skill level required to do their jobs at least as quickly and accurately as they were doing with the old system or manual methods. Lewin (1947) advises that for any organization intending to undergo change, the first stage of change should focus on preparing the organization to accept that change is necessary. This can be achieved through

conducting training workshops for users. A scalable end-user training strategy can make the deployment of a new HIS both more cost effective and a happier experience for everyone involved. Not only does end user training help users to quickly adapt to the new system but also helps the organisation during the change process (Zornada, 2005). Getting people educated/trained and keeping them informed throughout the adoption process must be addressed if the benefits of the new system are to be achieved (Dorobăț et al., 2010). Some of the contributors that will support this success factor include top management support, availability of a training budget, curriculum and schedule, user training needs analysis as well as user commitment to the training itself (Esteves et al., 2002).

#### **5.2.2.4 End User Awareness**

Uncertainty is an important obstacle to the adoption of any technology (Sahin, 2006). A new technology may create uncertainty among individuals especially if they are unaware of the impact that the new technology may have on their work routines. In order to reduce that uncertainty, it is important that prospective users of HISs are made aware of the consequences of the new system. Consequences can be classified as desirable or undesirable (Rogers, 2003) but the deployment team must be ready to communicate these in a manner that is acceptable. These sessions can be in form of workshops, presentations, demonstrations or interviews. This makes end users aware of all the advantages and disadvantages of the innovation and therefore allows them time to prepare for change. The need for user awareness is in line with what is emphasized in the Unfreezing stage of Lewin (1947) Change model. Tiong Thye (2009) advises that during the awareness sessions different stakeholders should be allowed to voice their concerns. These should be attended to by the deployment team in a convincing manner while dispelling any misunderstandings.



### **5.2.2.5 Trialability**

Rogers (1995) defines trialability as the degree to which an innovation may be experimented with on a limited basis. Robinson (2009) infers that an innovation that is trialable represents less risk to the individual who is considering it. Trying out a new HIS during its deployment is likely to influence the end users' perception of its ease of use and usefulness which are key constructs of TAM. Lee, Hsieh & Hsu, (2011) argue that when employees have more opportunities to try out the new information system, then they are more likely to view it as being easier to use once it has been deployed. Giving an individual an opportunity to try out a new innovation presents an opportunity of giving meaning to it and how it works in the individual's context. This provides an opportunity for raising any issues around the new system functionality or its fitness for purpose so that these are resolved.

### **5.2.3 Acceptance Phase**

User acceptance can be defined as the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support (Dillon & Morris, 1996). With millions of dollars being spent on information technology globally, one wonders whether such expenditures have produced the desired benefits to businesses. This raises a question as to whether HISs are actually being accepted by their intended users; if the desired benefits are to be realized. Lack of user acceptance is a significant impediment to the success of new information systems (Gould et al., 1991). Davis (1993) adds that user acceptance is viewed as the pivotal factor in determining the success or failure of any information system project. Without acceptance, discretionary users will seek alternatives, while even the dedicated users will likely manifest dissatisfaction and perform in an inefficient manner, negating many, if not all, the

presumed benefits of a new technology (Dillion, 2001). Discussed below are some of the aspects that need to be considered during the acceptance of an HIS adoption.

### **5.2.3.1 Facilitating Conditions**

Venkatesh et al., (2003) defines facilitating conditions as the degree to which an individual believes that an organization and/or technical infrastructure exist to support their use of the system. It is one of the major constructs in TAM that is used to determine user behavioral intention towards technology use (Davis, 1986). Alraja (2016) argues that if employees are able to access the required resources, gain needed knowledge and have the necessary support to use the new system, then they are more likely to adopt it. Dillon (2001) advises that enhancement factors such as sense of mastery, growth of knowledge, discretion, ability to act informally, requirement for certain skills, and enabling worker cooperation are likely to increase user acceptance in an organisation and therefore should be maximized.

### **5.2.3.2 Technology Task- Fit**

Goodhue (1988) cited in Osang (2015) defines task-technology fit (TTF) as the degree to which a technology assists an individual in performing his or her tasks. Osang (2015) argues that the relationship between task technology fit and system utilization is based on the fact that the better the fit, the more the tendency for users to like the system. When the new HIS being deployed demonstrates a fit with the employees' daily task routine, its acceptance by the employees will be much higher. Employees will foresee higher productivity and satisfaction at the time of the new HIS deployment. According to Dwyer (2007), fit or goodness of fit, is a predictor of performance benefits from the use of information systems. If the new HIS is deemed task fit for purpose, it is

highly likely that its desired benefits will be realized. It is for this reason that we propose that the new HIS should be assessed for fitness for purpose if it is to gain user acceptance.

### **5.2.3.3 User Satisfaction**

Goodhue (1988) cited in Osang (2015) has defined user satisfaction as a fit between personal needs and the benefits of using a system. This is measured by an assessment of how a user feels about a system. User satisfaction towards a system influences user attitudes which eventually determines their behavioral intention as suggested by the TPB model. Various factors can lead to user satisfaction of a given information system, one of which being TTF (Osang, 2015). Osang (2015) argues that when the fit of a technology is high, users will be satisfied with the technology. Whereas HISs have often been promoted as an efficient means to deliver high quality care through rapid information retrieval and efficient data management, they have experienced high levels of user resistance (Palm et al., (2006). User satisfaction can lead to decisions that save money and increase service effectiveness (Lang, 2012). Baas (2010) also argues that higher user satisfaction leads to higher actual system use and ultimately in increased individual and organizational performance. Bano & Zowghi (2012) cite user satisfaction as an important factor of information system success.

### **5.2.3.4 Complexity**

Complexity is considered as a key barrier of HISs because an HIS's ease of use is a key element in the efficiency and acceptance of such systems (Boonstra, 2010). Miller & Sim (2004) argue that most physicians consider HISs as challenging to use. The complexity problem associated with HISs results in physicians having to allocate time and effort if they are to master them as they have to learn how to use it effectively and efficiently. Once the system users perceive the

system as complicated, they begin to see it as a burden and a waste of both personal and patient time, which will in the long run impact on the user acceptance of the system. Therefore it is of great importance that HIS systems are user-friendly with considerations about the user interface, response time of the system, logical and efficient flow of tasks, ability to complete desired tasks, ease of data entry, and effects on an individual's time (Berg, 2001). TAM emphasizes the importance of the need to assess the ease of use of an innovation. HISs can transform the way healthcare is delivered when these technologies are designed appropriately otherwise they could lead to unintended adverse consequences such as dosage errors, failure to detect serious illnesses, and delays in treatment due to poor human-computer interactions or loss of data (Bowman, 2013).

#### **5.2.3.5 Relative Advantage**

Rogers (1995) defines relative advantage as the degree to which “an innovation is perceived as being better than the idea it supersedes”. Rogers & Shoemaker (1973) cited in Kimani & Namusonge (2015) advise that users decide to adopt a given technology if they know the technology's relative advantage or the benefits that a new technology offers to them. If users are to accept the adoption of the new HIS, it should have attributes such as the ability to achieve efficiency and effectiveness in their roles, especially if they were not existing before with the old system. Furthermore, the new HIS should have the ability to improve quality of their work. This will clearly demonstrate the advantage and benefit of the new HIS being deployed.

#### **5.2.3.6 Attitude towards the new system**

Attitude is a critical variable that affects a user's acceptance of a new HIS. Attitude towards a new technology is influenced by a potential user's assessment of the perceived usefulness,

perceived ease of use, trust, security and demographic characteristics of the potential user (Maduku, 2010). Therefore in this rapidly evolving environment, organizations cannot afford to ignore the effects of employee attitudes toward change to the new system (Chaudhary, Luss & Shriram, 2015). End-users with little technical knowledge of computers are likely to experience computer anxiety and therefore have negative attitudes if expected to suddenly perform a considerable amount of their work using the new system (Perl & Griffin, 2009). This raises the importance of user training and awareness campaigns during the acceptance phase.

#### **5.2.3.7 Job Satisfaction**

Organisations that need to be in the forefront in this cut-throat, competitive and rapidly changing business environment must ensure that employees are satisfied with their jobs. According to Carter (2011), job satisfaction is considered to be the measure of an employee's satisfaction or contention with their work. Careful consideration must be taken during the adoption process of a new HIS, to ensure that it brings about the desired job satisfaction. Dessler (2010) infers that job satisfaction plays a critical role in determining an individual's performance. The users' acceptance of the new HIS results into them operating at good levels, which enables the organisation compete favorably. Bulwana & Pellissier, (2017) add that individuals that perform above their job profiles contribute to the organisation attaining its strategic set targets. Koedel (2015) also argues that there is a link between job satisfaction and employee turnover. Therefore it is important that the new HIS is seen to improve employee productivity.

#### **5.2.3.8 Impact of new HIS on work environment**

The adoption of a new HIS into an organisation comes with various changes, some of which may disrupt business as usual. These changes are bound to either positively or negatively impact an

organisation and can influence user acceptance of the HIS. Guimaraes et al. (1996); Joshi & Lauer (1998); Turner (1984) cited in Statnikova (2005) emphasize the importance of understanding how the introduction of the new IS impacts user environment and psychological aspects of work. They cite particular factors such as satisfaction with the work itself, and satisfaction with interpersonal relationships such as communication and relationships with fellow employees. The Evidence Centre for Skills for Health Care (2011) reports that the introduction of a new HIS has an impact on the core processes, staff, patient outcomes and resource use. The report further states that new technologies can improve the quality of healthcare processes by enhancing communication, standardization processes and workflow which make a significant difference to the quality and safety of healthcare. This report also revealed that new technology can free up staff capacity, increase job satisfaction and enhance role responsibilities. All these factors will influence the users' acceptance of the new HIS especially if the impact the system has on the work environment is positive.

### **5.3 The HIS Utilisation Stage**

The HIS Utilisation Stage comprises of three major phases namely Routinization, Infusion and Optimization phases. These are phases that an organisation should consider if it is to achieve full utilisation of an HIS. The respective phases are discussed hereunder.

#### **5.3.1 HIS Routinization Phase**

According to Bouisson (2002), routinization corresponds to the execution of behaviors or activities in the same way over time. During the routinization phase, the focus is mostly on organizational commitment to system use to the level that the information system is no longer perceived as new. Routinization characterizes an Information System's transition to normal part of work activity with other business processes aligned with it (Nickerson, Eng & Ho, 2003).

Zmud & Apple (1989) cited in Touheed et al. (2013) advise that routinization is an important process in the success of an information system. Habitual usage of information technology can lead to high levels of infusion (Agarwal et al. 1998 cited in Song, Zhang & Huang (2007) which is the next phase of the HIS Utilisation Stage. Robert et al. (2009) add that one purpose of routinization in organisations is to reduce uncertainty. This is because during this phase, the HIS processes will be regarded as routine by the HIS users with minimal surprises. Discussed hereunder are some of the factors that are important for the success of the HIS routinization in organisations.

#### **5.3.1.1 User Communication & Cooperation**

Considering that the routinization phase is where the system is no longer perceived as something out of the ordinary, the communication and cooperation between departments are of great importance if departments are to share knowledge about their experiences with the system (Krantz & Skold, 2013 and Ahmad & Cuenca, 2013). Communication between the IT departments and business units can improve the IT users' cognition and understanding of the information technology as well as improve users' capacity of using the information system (Francisco et al. 1995; Kefi & Kalika 2005; Chan & Reich, 2007 cited in Jing-hua, Kang & Xiao-wei, 2010). Therefore the extent of communication among the different stakeholders of an HIS can have an impact on how often its respective users make use of it. If these levels are high, then this will result into high motivation for the new HIS use which will improve its performance in the organisation.

The Cooperation among the different stakeholders is another equally important aspect for consideration during the routinization stage of an HIS. User Cooperation will support HIS problem solving, information sharing and quick decision-making when it comes to work

procedures related tasks. Jing-hua, Kang & Xiao-wei (2010) suggest that during routinization stage of the new information system, the grass-roots employees recommend improvements for optimization of the operational processes for enhancement. They add that managers can use the generated data from the information system to conduct prediction, decision-making and planning, which can reduce operational costs and improve operational efficiency and quality through good decision-making and control. User cooperation results into team work among stakeholders and Laudon & Laudon (2012) emphasize that a team-oriented organisation culture will result into team members working towards organizational goals and objectives.

#### **5.3.1.2 Continuous User Training**

Continuous User Training is another critical factor for consideration during the routinization stage of a new innovation in an organisation. Sumner (1999) advises that organisations should carry out continuous in-house training for the users to understand how the system will change the business processes. He adds that it is vital that organizations invest time and money in continuous user training. Jing-hua, Kang & Xiao-wei (2010) emphasize that the variety of training received by users can help them master operations, skills and application methods of the information technology. Not only does continuous user training minimize mistakes that may result from lack of information and knowledge about the new HIS but it can also help the organisation increase employee retention, gain their loyalty, and ultimately boost organizational productivity. This is important for the new HIS as frequent turn-overs imply frequent training for new staff on the system, which may impede the progress of the HIS in the organisation at this stage. Continuous user training can also help address HIS usage weaknesses as well as improve employee satisfaction and performance.



### **5.3.1.3 Staff Participation**

Organisation strategies, regulations and standards are created and developed by top management. However their success is heavily reliant on the active engagement and execution of staff in that organisation. As the main users of the new HIS, staff attitude towards the new HIS as well as their IT competence becomes critical to the HIS performance (Somers & Nelson, 2001) otherwise the HIS could easily be faced with resistance during the routinization stage. This is mainly because the new HIS maybe perceived as a contradiction to the established ways and customs of working of the staff. Jing-hua, Kang & Xiao-wei (2010) advise that during the routinization stage, the habit and competence of using the HIS has been cultivated and therefore the staff become the leading actor for the HIS to penetrate the entire organisation's work. This qualifies the need for vigorous staff participation during this stage.

### **5.3.1.4 Reward System**

The employee reward system is one method of motivating employees to change work habits and key behaviors while providing a systematic way of delivering positive consequences. Therefore if an HIS is to undergo routinization, there is need for a reward system for the high performers and innovators. Andersen (1995) suggests that the rewarding of the more innovative individuals in the use of a new information system can result into increased regular use of the new Information System. The reward system turns out to be attractive and therefore enticing to other employees who then start using the HIS more regularly. This is emphasized by Murphy (2015) who advises that reward management influences performance by recognizing and rewarding good performance and by providing incentives to improve it. He adds that conveying a message that employees are valued within the organisation and that their performance and commitment matters fosters a positive environment which leads to high morale, motivation and ultimately

high performance. A relevant and applicable reward system is crucial in driving home this message as it shows existing and potential new employees that the employer is serious about their interests.

### **5.3.2 HIS Infusion Phase**

Infusion has been typically considered as one of the post-acceptance stages of an HIS and as one that refers to deeply and comprehensively embedding an IS in the work processes of an organisation (Cooper & Zmud, 1990 cited in Popovic, 2017). At this stage the system eventually becomes fully institutionalized in the organisation. For an IS to be fully institutionalized, all procedures and activities related to it should become habits, with users feeling very comfortable working with it (Govindaraju, 2012). HIS infusion in an organisation will establish a new way of working, which can be facilitated by aspects discussed below.

#### **5.3.2.1 User Commitment**

Kim, Chan & Gupta (2016) argue that user commitment has a positive effect on IS infusion with this being mainly influenced by attributes such as task technology fit, technology self-efficacy, and task autonomy. Employees in the organisation are expected to commit themselves to the HIS usage as a normal activity for it to be successfully utilized. Whereas Govindaraju (2012) advises that organizational effectiveness can be obtained through the use of an IS in a comprehensive and integrated manner; this effectiveness cannot be achieved without the commitment from the IS users. Support and ownership of the IS by the involved employees and other stakeholders are essential in integrating technology in the organisation (Walton, 1989).

### **5.3.2.2 Technology Autonomy**

Technology autonomy is another aspect with critical impact on IS infusion. An individual user having authority in using and regulating the system is required for HIS infusion otherwise excess user dependency on other factors can negatively impact on the level of user control. This may eventually deter the HIS infusion in the organisation. A high level user control leads to a complete and fine-grained control over different aspects of the application (Ng, 2004). This supports the infusion stage as users are able to complete regular tasks more easily, efficiently and effectively.

### **5.3.2.3 Support for the new Culture**

Organizational culture is the way that an organisation's members relate to each other, their work, and the outside world (Govindaraju, Bruijn & Fisscher, 2002). The infusion of an HIS into an organisation can change the way people work and eventually lead to a different culture (Davenport, 2000). Therefore infusion has a relationship with providing support for the new culture (Levinson, 1988). Culture changes may include some systems and procedures being integrated between departments or even the degree of formalization and power distribution. All these changes can bring about new ways of working or even changed roles. Whereas change is difficult, especially if the new ways of working seem so challenge the earlier business culture, Norris et al. (2000) cited in Govindaraju (2002), advises that it is of great importance that the new culture obtains support from all stakeholders in the organisation. All stakeholders must change to take advantage of the new environment (Davenport, 2000) otherwise the success of the HIS may not be achieved by the organisation. He further suggests facilitating mechanisms that may support the new culture include supporting policies, changes in measurement systems and opportunities for continuous training.

#### **5.3.2.4 Formalization of Work Procedures**

According to Silva & Backhouse (1997) cited in Govindaraju (2012) the infusion stage of the IS in an organisation is seen as a process to stabilize the system. Berchet & Habchi (2005) cite the lack of formalization of some work procedures during the stabilization stage, as one of the causes for the overflowing of key users' demands for maintenance. Work formalization is crucial at the infusion phase of an HIS as it allows coherence between the different work procedures and only valid demands for the maintenance of the system can be raised and attended to. This also brings about clarity of the defined roles for each employee therefore eliminating confusion and uncertainty; further supporting the infusion of the IS in the organisation. Danish, Ramzan & Ahmad (2015) advise that formalized practices and procedures in an organisation attract employees towards the organization. Adler & Borys (1996) cited in Danish, Ramzan & Ahmad (2015) add that it enhances motivation levels among employees and makes them more efficient. All these are critical factors during the infusion stage of an HIS which is heavily reliant on the work force of the organisation. Villagarcia (2011) infers that formalization guarantees reliable indicators that can be used to control and evaluate a new technology and verify whether the organisation is achieving its goals.

#### **5.3.2.5 Changes in Performance Measurement Systems**

According to Wolk, Dholakia & Kreitz (2009), a performance measurement system provides an efficient way for organizations dedicated to social impact to collect and make use of data about their programs and operations using different indicators. They add that performance measurement enables profit organizations collect data that can help identify potential improvements to their businesses. The infusion of an IS in an organisation cannot leave the business processes the same, otherwise there will be no organisation performance improvement

(Govindaraju, Bruijn & Fisscher, 2002). When business process changes take place, they need accompanying changes in the arrangement of formal structures in the organisation; such as performance measures (Davenport, 1998). Nudurupati et al. (2010) advise that the lack of dynamic and sensitive performance measures in organisations leads to irrelevant, inaccurate and not up to date information. Considering that such information is critical for decision-making in an organisation, it affects the organisation in such a way that it can't be responsive and agile in both its internal and external environments. Schneiderman (1999) cited in Nudurupati (2010) argues that in many companies, performance measures are too poorly defined. The poor definition of performance measures is likely to bring about confusion among different people, negatively impacting on the HIS infusion. It is therefore important that during the infusion stage of an HIS performance measurement systems with their respective indicators are reviewed and changed accordingly to align with the changes brought about by the HIS.

#### **5.3.2.6 HIS Team & Business Users ownership**

During the Infusion stage of the new HIS in the organisation, the ownership of the HIS by both the IS people and the Business Users is very important. Govindaraju et al. (2002) emphasize the importance of these two groups working closely together during the utilization stage of the IS as a way of integrating the new technology into the organisation. When both groups own the new HIS, then they are bound to work together towards its success. The user perception that the HIS belongs to the HIS team should not exist among business users but rather that the new HIS is for purposes of realizing the organisation's goals and objectives. The lack of ownership by the two groups may hinder the active continuous improvement effort of the HIS within the organisation due to the lack of one voice. It is therefore important that management ensures that both the HIS team and Business users take ownership of the new HIS.

### **5.3.3 HIS Optimization Phase**

The optimization of information systems is nowadays becoming a major factor for firms striving to reach their performance objectives. Roque (2012) emphasizes that a system optimization is mainly geared towards the maximization of return on investments of the organisation. He further advises that a more formalized approach to system optimization will yield positive results much as this process is rare. HIS optimization focuses on major enhancements to the existing system as well as activating additional functions, within the system. It follows similar stages of selecting and installing any information system i.e. the requirements stage, the implementation stage, and the post implementation phase which is used to support the optimization. Abair (2009) argues that those leaders that choose to optimize their systems best position themselves and their companies for ultimate success. He adds that when optimizing your system, the focus must be aligning the application with your business processes and business rules. Discussed below are various aspects that can facilitate system optimization in organisations.

#### **5.3.3.1 Post Implementation Reviews**

Post Implementation Reviews (PIRs) evaluate whether the project has achieved its intended objectives, reviews the performance of project management activities and captures learning points for future improvements (Efficiency Unit, 2009). PIR occurs after the HIS has fully stabilized in the organisation as suggested by Wallace (1999) who states that PIRs should be done some time after the solution has been deployed. Govindaraju (2012) advises that during the PIR process the users of the system and management evaluate the use of the current system in relation to the changes in the business. He adds that it is these changes in the business that determine optimization efforts. PIR supports the ability to identify further functional improvements and changes that would deliver greater benefit. Wallace (1999) suggest that there

could be specific improvements required in procedures, documentation and support. As a result, as the new system is being optimized it is aligned to the business goals and objectives of the organisation.

### **5.3.3.2 Encourage HIS Mastery**

Mastery is a special state of mind in which the skill runs almost entirely within the unconscious (Johannsen, 1986 cited in Johannsen, 2016). It can only be attained through the development of a comprehensive knowledge or skill in a particular activity or subject; however it is not an easy process to achieve as it takes time. Encouraging HIS Mastery can result into proficiency, capability, knowledge, comprehension, familiarity, command and grasp. The demonstration of such attributes by HIS users during the optimization stage will yield various benefits for the organisation. Service levels offered by the healthcare institutions will be greatly improved because of the efficiency attained. Organizational time will be saved due to better user performance speed which time will be used for other productive initiatives. Utilization levels of the new HIS will also increase because just like any tool, the more one knows about it the better they are likely to use it. Last but not least, the organisation will compete more favorably in the market.

### **5.3.3.3 Continuous HIS Improvement**

Cresswell, Bates & Sheikh (2016) argue that work surrounding HIS optimization activities is best conceptualized as an ongoing process of improvement with no actual endpoint. Continuous improvement is a key component of system optimization towards quality management otherwise serious system defects could easily occur that may cost the organisation much more. Continual improvement of an HIS can lead to enhanced safety performance and efficiency benefits such as

cost reductions and improved cycle times. According to the IAEA (2006) report, when continual improvement of a system is introduced into an organization, it is not uncommon to encounter difficulties such as lack of leadership from management, resistance to change by users and time wasting on criticism of the current process among others. This report therefore states the importance of having the basic principles that will support continual improvement of the system established early enough. System processes that impact on the goals and objectives of the organisation must be well understood by the various stakeholders if the continuous improvement process of the system is to be successful. Furthermore, whereas individual continual improvement projects can be successful within an organization, greater success can generally be achieved through an organization-wide coordinated approach that is linked closely to the goals of the organization and its business plan.

#### **5.3.3.4 Existence of staff in charge of problems and improvement ideas**

Considering that HIS optimization focuses on major enhancements to the existing system as well as activating additional functions within the system, it is obvious that problems will be encountered during this process. This underpins the importance of having on ground executive teams to handle the encountered problems for quick resolution. According to Labtech Software (2012), a help desk is designed to provide clients with an immediate point of contact when they experience problems with their IT services and therefore becomes a vital resource for any business. Its ultimate goal is to offer first contact resolution as often and as quickly as possible. During the HIS optimization process, the HIS users should be able to present their HIS problems to this capable HIS team for quick resolution. According to Reese & Sutton (2007), help desk services will lead to user satisfaction as a result of the quick resolution and system availability, quality improvement of services as well as process efficiencies as problems are being resolved



by the same people. Furthermore, innovative ideas towards the HIS improvement in the organisation will be developed as the process of the HIS optimization goes on. These may be developed from the frequent issues logged for resolution or when proactive and innovative users come up with improvement ideas once the system has stabilized. Therefore this necessitates for a team on ground to receive these ideas and ensure they are well managed and implemented for purposes of the HIS improvement where applicable.

#### **5.3.3.5 Regular HIS Audits**

Information systems are efficient and can achieve results accurately and at great speed if they work the way they are designed to. Information systems have inbuilt controls that are meant to ensure ISs perform as expected, however these must be effective if the desired performance levels are to be achieved. According to Norris et al. (2000) cited in Govindaraju (2002) & Russell (2003) regular audits are among others ways to facilitate continuous improvement efforts of systems in organisations. Brecken (2013) advises that the overall objective of the audit is to identify opportunities for improvement and to present recommendations the organisation can consider for improvement. Therefore regular audits of HISs are important for healthcare institutions to assess their effectiveness in achieving organizational goals. These audits will not only ensure that only adequate controls exist in the HISs but also that these controls work effectively to attain the desired results. Russell (2003) advises that auditing for continual improvement is needed for organizations to remain competitive. He adds that one way regular audits can add value to the organisation is when these audits can verify that there is continual improvement and provide data that can result in more organizational improvements.

### 5.3.3.6 Vendor Support

Castellina (2012) advises that vendor support is critical during system optimization and that it is of great importance for the organisation to continue working with its software vendor even after the HIS has been fully implemented. This is mainly to offer support for those complex issues the organisation HIS team is unable to resolve on their own. The IAEA (2006) report also emphasizes that consideration should be given, where appropriate, to involving staff from contractors and suppliers as process improvement project team members. These individuals are expected to provide a range of experience and skills relevant to the improvement of the HIS. This therefore underpins the necessity for healthcare institutions to maintain good working relationships with the HIS vendors in order to get the attention they need for the success of their HIS.

### 5.4 HIS Model Evaluation

The developed HIS model was evaluated using experts' opinion with E-Health experience. Nine experts filled out the questionnaire attached in the appendices as Appendix 4. They were required to answer A – Strongly Agree, B - Agree, C – Neither Agree or Disagree, D – Disagree or E – Strongly Disagree to the questions in the table below that is included in the questionnaire. The frequency of their responses is shown in the table below.

	A	B	C	D	E
1. The improvement of HIS Adoption & Utilisation is important to me	8	1	1		
2. There is an increasing need to improve the Adoption & Utilisation of HISs in healthcare delivery	8	1	1		
3. This HIS model clearly specifies some of the considerations to make during the HIS Adoption & Utilisation processes	1	7	1		
4. This model provides a solution for improving HIS Adoption &	0	5	4		

Utilisation in healthcare delivery					
5. I would recommend this HIS model to other healthcare institutions	0	4	5		

*Table 3: HIS Model Evaluation Results*

Table 3 demonstrates that eight the nine interviewed experts strongly agree that the improvement of HIS Adoption & Utilisation is important. The same number strongly agreed that there is an increasing need to improve the Adoption & Utilisation of HISs in healthcare delivery. Seven out of nine agreed that this HIS model clearly specifies some of the considerations to make during the HIS Adoption & Utilisation processes. Five out of nine agreed that this model provides a solution for improving HIS Adoption & Utilisation in healthcare delivery while the remaining four neither agreed nor disagreed. Four out of nine said they would recommend this HIS model to other healthcare institutions.

Therefore based on the evaluation results above, this HIS model is fit for uptake by healthcare institutions to improve HIS adoption and utilisation. However, based on the numbers that neither agreed or disagreed that the model can provide a solution for improving HIS Adoption & Utilisation in healthcare delivery as well as neither agreeing or disagreeing to recommending the model to other healthcare institutions, this model will need testing in a live environment and results documented and assessed.

## **5.5 Conclusion**

This chapter presented the proposed HIS Adoption and Utilisation Model as well as the Model evaluation results. In this chapter, some of the various aspects that are critical to the success of an HIS adoption and utilisation were explained. Furthermore, these were presented as constructs in the respective stages and phases of the proposed model. If these different aspects are

considered in the respective stages and phases, there can be great improvement in the way HISs are adopted and utilized in healthcare institutions. Chapter six presents the conclusion of the study as well as some recommendations for future work.

# **CHAPTER SIX: SUMMARY, CONCLUSION & RECOMMENDATIONS**

## **6.0 Introduction**

This chapter presents the Summary of Findings, Conclusions and the Recommendations of this study. The summary of findings form the basis for the conclusions and the recommendations. The conclusions constitute a summary of the most significant issues of the study and their perceived implications while the recommendations constitute proposals aimed at specifically improving HIS adoption and Utilisation as well as other healthcare technologies for healthcare delivery improvements.

## **6.1 Summary of Findings**

This study aimed at improving the adoption and utilisation of HISs for healthcare delivery. It mainly focused on investigating how HISs were adopted and how they are being utilized in health institutions. To gain a deep understanding of the challenges that Healthcare institutions face in the adoption and utilisation of HISs two case studies were selected. The decision to use two case studies was motivated by the limitations of using a single case study to study a phenomenon. These case studies included; Nakasero Hospital and Savannah Sunrise Medical Centre. These two case studies were employed in this study because they have used HISs for over three years and therefore were in better position to provide useful experiences regarding HIS adoption and utilisation. To collect data, this study adopted the qualitative data collection methods. Questionnaires, Interviews, Focus Group Discussions and Document Analysis were used to collect data.

Questionnaires were used as the main data collection method because they are cost-efficient, do not require as much effort from the researcher and often have standardized answers that allow easy data analysis (Katebire 2007).

The collected data was analyzed using Collaizi's (1978) framework for qualitative data analysis. The analysed results indicated that healthcare institutions face a number of challenges in the adoption and utilisation of HISs. These challenges included; User resistance, absence of risk management, insufficient resources, incomplete HIS roll out in the organisation, insufficient assessment of the organisation context, lack of HIS adoption readiness assessment in the organisation among others.

These challenges if resolved are considered as critical success factors for HISs in healthcare institutions. Whereas some of the user perceptions towards HIS adoption and utilisation were positive, there are those HIS users that had negative perceptions and therefore had high chances of resisting the systems in their organisations. Our investigation further revealed that whereas there are existing IT models that have been used for successful adoption and utilisation, these have some limitations. One general observation is that whereas these models state the different constructs for consideration during the adoption and utilisation of HISs, they are not specific on which factors to consider during each stage and phase of HIS adoption and utilisation. Providing this specification would go a long way in directing and guiding those organisations considering HIS investments; hence meeting their goals and objectives.

## **6.2 Conclusion**

Having analyzed the challenges faced by the two selected case studies as well as those derived from literature review, one conclusion was arrived at. There was need to develop a model that

clearly specifies the key issues that Healthcare institutions should take into consideration during the HIS adoption and utilisation stages. Several IT adoption and Utilisation models exist, however these models do not clearly spell out what should be done at every phase of adoption and utilisation. The model that has been proposed by this study clearly specifies the different phases of HIS adoption and utilisation together with the key considerations for each phase. It was based on The Open Group Architecture Framework (TOGAF) which represents best practice for adoption and utilisation of Information and Communication Technologies.

Key constructs of the proposed model were derived from data analysis results and review of constructs in existing adoption and utilization models. In the review of existing models specific attention was placed on the critical success factors for adoption and utilization of HISs. We believe that if organisations consider the different aspects defined for each stage and phase, they are likely to extract maximum benefits from their HIS investments while minimizing the associated challenges.

### **6.3 Recommendations for future work**

Potential research areas for future research work have been identified as a result of the findings and limitations of this study. These are outlined below:

The developed model should be tested in live environments of various health institutions. This will go a long way in ascertaining and confirming the model's ability and effectiveness to improve HIS adoption and Utilisation; as stated in our main objective of this study. In addition, other similar studies outside the HIS field but within the ICT for Development domain should be conducted with an aim of attaining the benefits of applying information technology in the improvement of health care.

## References

Aalst, W. V. & Stahl, C. 2011. *Modeling business processes: a Petri net-oriented approach*. Cambridge, MA: MIT Press.

Abair, R. 2009. <http://www.clientsfirst-us.com/blog/partners-perspective/industry-insights/erp-optimization-lean-a-winning-strategy-in-challenging-times/>

Abugabah, A., Sanzogni, L. & Poropat, A. 2009. *The impact of information systems on user performance: A critical review and theoretical model*

Ahmad, M. M. & Cuenca, R. P. 2013. *Critical Success Factors in ERP Implementation in SMEs*.

Ajami, S. & Arab-Chadegani, R. 2013. 'Barriers to implement electronic health records (EHRs)', 25(3).

Ajami, S. & BagheriTadi, T. 2013. 'Barriers for adopting electronic health records EHRs by physicians', Acta Informatica Medica, 21(2), p. 129. doi: 10.5455/aim.2013.21.129-134.

Ajzen, I. 1991. *The Theory of Planned Behavior*. Retrieved from <http://sphweb.bumc.bu.edu/otlt/MPH-Modules/SB/BehavioralChangeTheories/BehavioralChangeTheories3.html>

Ajzen, I. & Fishbein, M. 1980. *Understanding Attitudes and Predicting Social Behavior*. Prentice-Hall; Englewood Cliffs, NJ:

Akanbi, O. M., Ocheke, N. A., Patricia A., Agaba, A. P., Daniyam, A. C., Agaba, I. E., Okeke, N. E. & Ukoli, O. C. 2012. *Use of Electronic Health Records in sub-Saharan Africa: Progress and challenges*

Alghamdi, S. A. 2015 'Factors associated with the implementation and adoption of electronic health records (EHRs) in Saudi Arabia', doi: 10.7282/T3WS8W6K.

Al-Harbi, A. 2011. 'Healthcare providers' perceptions towards health information applications at king Abdul-Aziz medical city, Saudi Arabia', International Journal of Advanced Computer Science and Applications, 2(10). doi: 10.14569/ijacsa.2011.021003.

Almunawar, M.N. & Anshari, M. 2012 'Health information systems (HIS): Concept and technology'



Alomary, A. & Woollard, J. 2015. *HOW IS TECHNOLOGY ACCEPTED BY USERS? A REVIEW OF TECHNOLOGY ACCEPTANCE MODELS AND THEORIES*

Amoako-Gyampah, K. 2007. *Perceived usefulness, user involvement and behavioral intention: an empirical study of ERP implementation*, Computers in Human Behavior

Ancker, J., Silver, M., Miller, M. & Kaushal, R. (2012) 'Consumer experience with and attitudes toward health information technology: A nationwide survey', Journal of the American Medical Informatics Association: JAMIA., 20(1), pp. 152–6.

Andersen, M. R., (1995). *Revisiting the Behavioral Model and Access to Medical Care: Does it Matter?*

Anderson, D. & Anderson, L.A. 2009. *How to Increase Employee Commitment to Change*. Available at: [http://changeleadersnetwork.com/wp-content/uploads/2016/03/AR\\_PDF\\_HowToIncreaseEmployeeCommitmentToChange\\_091124.pdf](http://changeleadersnetwork.com/wp-content/uploads/2016/03/AR_PDF_HowToIncreaseEmployeeCommitmentToChange_091124.pdf).

Angelo, R. 2015. *Healthcare gov. A Retrospective Lesson in the failure of the project Stakeholders*

Archibald, R.D. 2003. *The Importance and Value of Project Management for Enterprises and Institutions*.

Armiger, B. 1997. *Ethics in Nursing Research: Profile, Principles, Perspective*. Nursing Research.

Baars, W. 2006. *Project Management Handbook*. Retrieved from [https://textbookequity.org/Textbooks/Baars\\_book\\_project\\_management.pdf](https://textbookequity.org/Textbooks/Baars_book_project_management.pdf).

Baas, P. 2010. *TASK-TECHNOLOGY FIT IN THE WORKPLACE: AFFECTING EMPLOYEE SATISFACTION AND PRODUCTIVITY*. Available at: [https://www.erim.eur.nl/fileadmin/default/content/erim/research/centres/sbni/projects/nwow/about/who\\_are\\_we/st2009/baas%20\(2010\)%20-%20task-technology%20fit%20in%20the%20workplace%20-%20aff.pdf](https://www.erim.eur.nl/fileadmin/default/content/erim/research/centres/sbni/projects/nwow/about/who_are_we/st2009/baas%20(2010)%20-%20task-technology%20fit%20in%20the%20workplace%20-%20aff.pdf) [Accessed 2010].

Bano, M. & Zowghi, D. 2013. *User involvement in software development and system success*.

Batenburg, R. & Koopman, G. 2010. *The conditional benefits of early user involvement at employee self-service applications in four Dutch ministries*.

Beasley, J.W., Holden, R.J. & Sullivan, F. 2011. 'Electronic health records: Research into design and implementation', 61(591).

Beiske, B. 2007. *Research Methods: Uses and limitations of questionnaires, interviews and case studies*, Munich: GRIN Verlag.

Ben-Zion, R., Pliskin, N. & Fink, L. 2014. 'Critical success factors for adoption of electronic health record systems: Literature review and prescriptive analysis', *Information Systems Management*, 31(4), pp. 296–312. doi: 10.1080/10580530.2014.958024.

Berchet, C. & Habchi, G. 2005. *The implementation and deployment of an ERP system: An industrial case study*.

Berg, M. 2001. *Implementing information systems in health care organizations: myths and challenges*. *International Journal of Medical Informatics*, 64(2-3), 143-156.

Berry, Y. S. R. 1999. *Collecting data by in-depth interviewing*.

Besworth, M.D. 2016. 'Health Information System Implementation in a Complex Acute Care Environment: A Sociotechnical Analysis'.

Blass, V., Corbett, J. C. & Delmas, A. M. 2011. *Top Management Involvement in the Adoption of Energy Efficiency Projects*. SSRN Electronic Journal.

Boonstra, A. & Broekhuis, M. 2010. 'Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions', *BMC Health Services Research*, 10(1), p. 231. doi: 10.1186/1472-6963-10-231.

Botha, N. & Atkins, K. 2005. *An assessment of five different theoretical frameworks to study the uptake of innovations*. Retrieved from <http://ageconsearch.umn.edu/bitstream/98497/2/2005-5-assessment%20of%20five%20different%20theoretical%20frameworks%20to%20study%20the%20uptake%20of%20innovations.pdf>

Bouisson, J. 2002. *Routinization preferences, anxiety and depression in an elderly French sample*

Bourda, M. F. 2013. *Change Management Theories and Methodologies*.

Bowling, A. 2002. *RESEARCH METHODS IN HEALTH: Investigating health and health services*

Bowman, S. 2013. *Impact of Electronic Health Record Systems on Information Integrity: Quality and Safety Implications*. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3797550/>

Brdese, H, Corbitt, B & Pittayachawan, S. 2013, '*Barriers and motivations affecting information systems usage by Hajj-Umrah religious tourism operators in Saudi Arabia*', *Australasian Journal of Information Systems*, vol. 18, no. 1, pp. 5-23.

Brecken, D. 2013. *A Practical Approach to Business Improvement Auditing*

Briony, J. O. 2005. *Researching Information Systems and Computing*

Brooks, A. 2015. *Health Information Management History: Past, Present & Future*. <http://www.rasmussen.edu/degrees/health-sciences/blog/health-information-management-history/>

Bryman, A. 2012. *Social Research Methods, 4<sup>th</sup> Edition-Oxford University Press*

Bryman, A. & Bell, E. 2011. *Business Research Methods* (3rd ed.) Oxford: Oxford University Press.

Bulwana, N. P. & Pellissier, P. 2017. *An Investigation into the Perceived Job Satisfaction of Employees in a Telemarketing Center due to the Introduction of a New System*.

Burnes, B. 2004. *Kurt Lewin and complexity theories: back to the future?*

Burns, N. & Grove, S.K. 2001. *The practice of nursing research: Conduct, critique & utilization*. 4th edition. Philadelphia: WB Saunders.

Carter, J. 2011. *Career progression is the key to retention*. Human Capital Magazine, Canada

Cascio, R., Mariadoss, B.J. & Mouri, N. 2010. *The impact of management commitment alignment on salespersons adoption of sales force automation technologies: An empirical investigation*. *Industrial Marketing Management*, 39(7), pp.1088–1096.

Castellina, N. 2012. *ERP Implementation and Training*

Chan, K. 2013. *5 New Technology Adoption Tips*. Retrieved from <https://www.onedesk.com/5-new-technology-adoption-tips/>.

Chaudhary, K. Luss, R. & Shiram, U. 2015. *How Employee Attitudes Toward Change Affect Change Management*. Available at <https://www.towerswatson.com/en/Insights/Newsletters/Americas/insider/2015/06/how-employee-attitudes-toward-change-affect-change-management>

Community College Research Center, 2014. *Evaluating Your College's Readiness for Technology Adoption*

Cresswell, K., Bates, D. & Sheikh, A. 2013. 'Ten key considerations for the successful implementation and adoption of large-scale health information technology', Journal of the American Medical Informatics Association: JAMIA., 20.

Cresswell, J. W. 1998. *Qualitative Inquiry and Research design: Choosing among five traditions*. London:Sage

Lehrer, C., Constantiou, I. & Hess, T. 2011. *A COGNITIVE PROCESSES ANALYSIS OF INDIVIDUALS' USE OF LOCATION-BASED SERVICES*

Danish, R. Q., Ramzan, S., & Amzan, F. 2015. *Effect of Formalization on Organizational Commitment; Interactional Role of Self-Monitoring in the Service Sector*.

Davis, D. R., Bagozzi, P. R. & Warshaw, R. P. 1989. *User Acceptance of Computer Technology: A Comparison of two theoretical Models*

Davis, F.D. 1989. *Perceived usefulness, perceived ease of use and user acceptance of information technology*. *MIS Quarterly*, 13(3), 319-340.

Davis, F.D. 1985. *A technology acceptance model for empirically testing new end-user information systems: theory and results*. Unpublished Doctoral dissertation, MIT Sloan School of management, Cambridge, M.A.

Davenport, T. H. 2000. *Mission Critical: Realizing the Promise of Enterprise* doi:10.1108/itp.2001.14.4.406.3

Dessler, A.E. 2010. *A Determination of the cloud feedback from climate variations over the past decade*. *Science* Vol.330, pp 1523-1527 <http://science.sciencemag.org/content/330/6010/1523.full>

Deloitte, 2013. *Physician adoption of health information technology: Implications for medical practice leaders and business partners*

Dillion, A. 2001. *User Acceptance of Information Technology: Theories and Models*  
<https://www.ischool.utexas.edu/~adillon/BookChapters/User%20acceptance.htm>

Dwyer, C. 2007. *Task Technology Fit, the Social Technical Gap, and Social Networking Sites*

"Efficiency Unit, 2009. *A User Guide to Post Implementation Reviews*"

Esteves, J., Pastor, J. & Casanovas, J. 2002. "A *Framework Proposal for Monitoring and Evaluating Training in ERP Implementation Projects*"

Gabriel, D. 2013. *Inductive and Deductive approaches to research*.  
<http://deborahgabriel.com/2013/03/17/inductive-and-deductive-approaches-to-research/>

Gagnon, M.P., Ouimet, M., Godin, G., Rousseau, M., Labrecque, M., Leduc, Y. & Ben, A. A. 2010. 'Multi-level analysis of electronic health record adoption by health care professionals: A study protocol', *Implementation Science*, 5(1). doi: 10.1186/1748-5908-5-30.

George, S. 2013. *Factors shaping effective utilization of health information technology in urban safety-net clinics*. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/23981394>.

Ghobakhloo, M. 2012. *Strategies for Successful Information Technology Adoption in Small and Medium-sized Enterprises*.

Govindaraju, R. 2012. *Enterprise Systems Implementation Framework: An Organisational Perspective*. *Procedia - Social and Behavioral Sciences*, 65, 473-478. doi:10.1016/j.sbspro.2012.11.151

Govindaraju, R. Bruijn, E. & Fisscher, O. M. 2002. *ENTERPRISE SYSTEMS IMPLEMENTATION: MANAGING PROJECT AND POST PROJECT STAGE – CASE STUDY IN AN INDONESIAN COMPANY*.

Grevendonk, J. Taliesin, B. & Brigden, D. 2013. *Planning an information systems project. A toolkit for Public Health Managers*.

Hall, H. B. & Khan, B. 2002. *Adoption of New Technology*

Hambling, B. & Goethem, P. 2013. *User Acceptance Testing: A Step by Step Guide*. Available at: <http://shop.bcs.org/resources/pdf/9781780171678.pdf>.

Hancock, B. Ockleford, E. & Windridge, K. 2009. *An Introduction to Qualitative Research*

Hasanain, R.A. & Cooper, H. 2014. '*Solutions to overcome technical and social barriers to electronic health records implementation in Saudi public and private hospitals*', *Journal of Health Informatics in Developing Countries*, 8(1).

Hevner, R. A. March, T. A. Park, J. & Ram, S. 2004. *Design Science in Information Systems Research*

Hevner, R. A. & Chatterjee, S. 2015. *Design Science in Information Systems*

Holloway, I. & Wheeler, S. 2002. *Qualitative research in nursing*. 2nd edition. Oxford: Blackwell Publishing.

Holt, S. 2016. *How do you use mastery to build progress over time?* <https://skills-mastery.co.uk/mastery-to-build-progress-over-time/>

Hughes, B. 2012. *Project Management for IT-Related Projects* (Second Edition). Retrieved from <http://aetos.it.teithe.gr/~vkostogl/files/Epixeirisiaki/PROJECT%20MANAGEMENT%20FOR%20IT-RELATED%20PROJECTS.pdf>

Hyde, F.K. 2000. *Recognizing deductive process in qualitative research*. *Qualitative Market Research: An International Journal*, 3(2), 82-89.

Hyman, L., Lamb, J. & Bulmer, M. 2006. *The Use of Pre-Existing Survey Questions: Implications for Data Quality*

Isabaliija, R.S., Mayoka, G. K., Rwashana, S. A. & Mbarika, W. V. 2011. *Factors Affecting Adoption, Implementation and Sustainability of Telemedicine Information Systems in Uganda*

IAEA, 2006. *Management of continual improvement for facilities and activities: A structured approach*

Jardim, S.V.B. 2013. '*The electronic health record and its contribution to healthcare information systems Interoperability*', *Procedia Technology*, 9, pp. 940–948. doi: 10.1016/j.protcy.2013.12.105.

Jebreen, I. 2012. *Using Inductive Approach as Research Strategy in Requirements Engineering*. *International Journal Of Computer And Information Technology*, 01(02), 1-11. Retrieved from <http://www.ijcit.com/archives/volume1/issue2/Paper>

Jeyakodi, T. 2015. *'Adoption of health information systems in Sri Lanka'*, March 29-30, 2015 Singapore, . doi: 10.17758/ur.u0315204.

Jing-Hua, X., Kang, X. & Xiao-Wei, W. 2010. *Key Factors Influencing Enterprise to Improve IT Application Level: Stage Difference Research — An Empirical Research on 165 Enterprises through Field Study*

Johannsen, M. 2016. *MASTERY: WHAT IT IS AND WHY IT'S IMPORTANT*  
<https://www.legacee.com/mastery/>

Jones, S.S., Rudin, R.S., Perry, T. & Shekelle, P.G. 2014. *'Health information technology: An updated systematic review with a focus on meaningful use'*, *Annals of Internal Medicine*, 160(1), pp. 48–54. doi: 10.7326/M13-1531.

Katebire, D. A. 2007. *Social Research Methodology: An introduction.*

Kaur, A. & Mann, K. 2014. *'Suggested solutions to obstacles perceived in Implementations of health information systems'*, *International Journal of Advanced Research in Computer Science and Software Engineering*, 4(12).

Kaye, R., Kokia, E., Shalev, V., Idar, D. & Chinitz, D. 2010. *'Barriers and success factors in health information technology: A practitioner's perspective'*, *Journal of Management & Marketing in Healthcare*, 3(2), pp. 163–175. doi: 10.1179/175330310x12736577732764.

Kearns, G. S., & Lederer, A. L. 2000. *The effect of strategic alignment on the use of IS based resources for competitive advantage.*

Kellermann, L.A. & Jones, S. S. 2013. *What It Will Take To Achieve the As-Yet-Unfulfilled Promises Of Health Information Technology.*

Khalifa, M. 2013. *'Barriers to health information systems and electronic medical records implementation. A field study of Saudi Arabian hospitals'*, *Procedia Computer Science*, 21, pp. 335–342. doi: 10.1016/j.procs.2013.09.044.

Kim, H., Chan, H. C. & Gupta, S. 2016. *Examining information systems infusion from a user commitment perspective.* *Information Technology & People*, 173-199. doi:10.1108/itp-09-2014-0197

Kimani, J.N. & Namusonge, S. 2015. *FACTORS AFFECTING THE UTILIZATION OF HEALTH INFORMATION TECHNOLOGY PROJECTS IN NAIROBI COUNTY.*

Kimiafar, K., Sarbaz, M., Sheikhtaheri, A. & Azizi, A. 2015. *'The impact of management factors on the success and failure of health information systems'*, Indian Journal of Science and Technology, 8(27). doi: 10.17485/ijst/2015/v8i1/84083.

Klosek, J. 2014. *'Notre dame journal of law, ethics & public policy exploring the barriers to the more widespread adoption of electronic health records'*.

Koedel, C., Li, J., & Springer, M. G. 2015. *The Impact of Performance Ratings on Job Satisfaction for Public School Teachers*.

Krantz, N. & Skold, M. 2013. *Critical Success Factors across the ERP Life Cycle. A Study of SMEs in Jonkoping County*.

Kruse, C., Kothman, K., Anerobi, K. Abanaka, L. 2016. *'Adoption factors of the electronic health record: A systematic review'*, JMIR medical informatics. 4(2).

Lakbala, P. and Dindarloo, K. 2014. *'Physicians' perception and attitude toward electronic medical record'*, Springer Plus., 3.

Lakbala, P., Lakbala, M. and Inaloo, K.D. (2015) *'Factors affecting electronic medical record acceptance by specialist physicians'*, Lecture Notes on Information Theory, 2(4). doi: 10.12720/lnit.2.4.316-321.

LaMorte, W. W. 2016. *The Theory of Planned Behavior*. Retrieved from <http://sphweb.bumc.bu.edu/otlt/MPH-Modules/SB/BehavioralChangeTheories/BehavioralChangeTheories3.html>

Lang, L. 2012. *Measuring User Satisfaction*

Laudon, C. K. & Laudon, P. J. 2012. *Management Information Systems. Managing the Digital Firm*

Leal, E. A., & Albertin, A. L. 2015. *Determinants of the Use of Technological Innovation in Distance Learning: A Study with Business School Instructors*. doi:10.17718/tojde.70207

Lee, Y., Hsieh, Y. & Hsu, C. 2011. *Adding Innovation Diffusion Theory to the Technology Acceptance Model: Supporting Employees' Intentions to use E-Learning Systems*. Retrieved from <https://ai2-s2-pdfs.s3.amazonaws.com/ee5d/8b63b1a0713c5a6959839f05f0c543f4f589.pdf>

Levinson, E. 1988. *The Line Manager and Systems-induced organisation changes*.



Maduku, D.K. 2010. *UNDERSTANDING ATTITUDES TOWARDS AND USAGE OF TECHNOLOGY-BASED BANKING SERVICES IN GAUTENG, SOUTH AFRICA.*

Mahmood, M. Burn, J.M. Gemoets, & L.A. Jacquez, C. 2000. "Variables affecting information technology end-user satisfaction: a meta-analysis of the empirical literature"

Mahoney, M., & Wixom, B. 2008. *Achieving Top Management Support in Strategic Technology Initiatives.* Project management journal, 36(2), 49–61.

Mapesa, N.M. 2016. 'Health information technology implementation strategies in Zimbabwe'

Mbondji, E. P., Kebede, D., Soumbey-Alley, W. E., Zielinski, C., Kouvidila, W. & Paul-Lusamba-Dikassa, P. 2014. *Health information systems in Africa: descriptive analysis of data sources, information products and health statistics.*

Menachemi, N. & Collum, H. T. 2011. *Benefits and drawbacks of electronic health record systems.* Risk Management and Healthcare Policy, p.47.

Moiz, S. 2015. *The Importance of Executive Management Support.* Available at <https://www.projectmanagement.com/articles/306739/The-Importance-of-Executive-Management-Support>.

Murphy, B. 2015. *The impact of reward systems on employee performance*

Mwangi, J. P., Mbabazi, M. & Nkechi, E. 2017. *ROLE OF PROJECT RESOURCE AVAILABILITY ON PROJECT SUCCESS IN BANKING INDUSTRY IN RWANDA: A CASE OF KCB ATM MIS PROJECT.* Retrieved from <http://www.ejbss.com/Data/Sites/1/vol6no02may2017/ejbss-1871-17-roleofprojectresourceavailability.pdf>

Namakula, S. & Kituyi, G.M. 2014. *Examining Health Information Systems Success Factors in Uganda's Healthcare System.*

Ngafeeson, M. 2015. 'Healthcare information systems: Opportunities and challenges'

Nguyen, T.H., Newby, M. & Macaulay, M.J. 2015. *Information Technology Adoption in Small Business: Confirmation of a Proposed Framework.* Journal of Small Business Management, 53(1), pp.207–227.

Nickerson, R. C., Eng, J. & Ho, L. C. 2003. *AN EXPLORATORY STUDY OF STRATEGIC ALIGNMENT AND GLOBAL INFORMATION SYSTEM IMPLEMENTATION SUCCESS IN FORTUNE 500 COMPANIES.*

Nudurupati, S., Bititci, U., Kumar, V., & Chan, F. 2010. *State of the art literature review on performance measurement.* Computers & Industrial Engineering, 60(2), 279-290. doi:10.1016/j.cie.2010.11.010

Osang, F.B., 2015. *Task Technology Fit and Lecturers Performance Impacts: The Technology Utilization, Satisfaction and Performance (TUSPEM) Dimension.* Available at: <https://www.ijcsi.org/papers/IJCSI-12-3-232-239.pdf>.

Otieno, C. O., Liyala, S., Odongo, C. B., & Abeka, S. 2016. *Theory of Reasoned Action as an Underpinning to Technological Innovation Adoption Studies.*

Palm, J., Colombet, I., Sicotte, C., & Degoulet, P. 2006. *Determinants of User Satisfaction with a Clinical Information System.* Retrieved from <http://www.sciencedirect.com/science/article/pii/S1532046414002731>

Parahoo K. 2006. *Nursing Research: Principles, Process and Issues*, 2nd edn. Palgrave Macmillan, Houndsmill.

Patel, V., Hughes, P., Mph, J., Savage, L. & Barker, W. 2015 *'Individuals' perceptions of the privacy and security of medical records'*.

Perl, M. & Griffin, T. 2011. *21st Century End-User Attitudes Toward Information Technology.* Review of Business Information Systems (RBIS). doi:10.19030/rbis.v13i2.4325

Polit, D. F., Cheryl, B. & Bernaddette, P. H. 2001. *Essentials of Nursing Research: Methods, Appraisal, and Utilization* 5th ed

Popovič, A. 2017. *If we implement it, will they come? User resistance in post-acceptance usage behaviour within a business intelligence systems context.* 911-921. doi:10.1080/1331677x.2017.1311232

Porter, M. 2013. *'Adoption of Electronic Health Records in the United States'*

Premkumar, G. & King, W. R. 1994. *Organizational Characteristics and Information Systems Planning: An Empirical Study.*

Pretorius, G. M. 2015. *A critical analysis of information and communications technology adoption: The strategy-as-practice perspective.*

Proctor, S. & Allan, T. 2006. *Sampling. In The Research Process in Nursing, 5th edn.*

Radhakrishnan, K., Jacelon, C. & Roche, J. 2012. *Perceptions on the Use of Telehealth by Homecare Nurses and Patients With Heart Failure*

Reese, B. J. & Sutton, B. 2007. *PROPOSAL FOR SETTING UP INTEGRATED SERVICE DESK FOR INFORMATION TECHNOLOGY (IT) DIVISION OF A PROMINENT INSURANCE AND TAKAFUL COMPANY IN MALAYSIA*

Robinson, L. 2009. *A summary of Diffusion of Innovations*

Rogers, M. E. 1995. *Diffusion of Innovations, Third Edition*

Rogers, M. E. 2003. *Diffusion of Innovations, Fifth Edition*

Roque, R. 2012. *Optimizing ERP in your organisation*

Rouibah, K., Hamdy, H.I. & Al-Enezi, M.Z. 2009. *Effect of management support, training, and user involvement on system usage and satisfaction in Kuwait.*

Russell, J. P. 2003. *Auditing for Continual Improvement: A process for adding value*

Ryan, J.R., Doty, M.D.M., Abrams, M.A.K. & Riley, P.R. 2014. *The adoption and use of health information technology by community health centers, 2009-2013.* Available at: [http://www.commonwealthfund.org/~media/files/publications/issue-brief/2014/may/1746\\_ryan\\_adoption\\_use\\_hlt\\_it\\_chcs\\_rb.pdf](http://www.commonwealthfund.org/~media/files/publications/issue-brief/2014/may/1746_ryan_adoption_use_hlt_it_chcs_rb.pdf) (Accessed: 13 January 2017).

Safdari, R., Ghazisaeidi, M. & Jebraeily, M. 2015. '*Electronic health records: Critical success factors in implementation* (PDF Download available)', 23(2), p. 102. doi: <http://dx..org/10.5455/aim.2015.23.102-104>.

Sahin, I. 2006. *DETAILED REVIEW OF ROGERS' DIFFUSION OF INNOVATIONS THEORY AND EDUCATIONAL TECHNOLOGY-RELATED STUDIES BASED ON ROGERS' THEORY*

Sarayreh, H. B., Khudair, H & Barakat, E. 2013. *Comparative Study: The Kurt Lewin of Change Management*

- Saunders, M., Lewis, P. & Thornhill, A. 2007. *Research Methods for Business Students*
- Schuh, H. J. & Upcraft, L. M. 2001. *Assessment Practice in Student Affairs: An Applications Manual*
- Sezgin, E. & Yildirim, S.Ö. 2017. 'A literature review on attitudes of health professionals towards health information systems: From e-health to m-health', *Procedia Technology*, 16, pp. 1317–1326. doi: 10.1016/j.protcy.2014.10.148
- Shelc, R. 2016. 'Authorized access and the challenges of health information systems'
- Shinder, D. 2006. <http://www.techrepublic.com/article/plan-your-end-user-training-strategy-before-software-roll-out/>
- Shosha, A. G. 2012. *EMPLOYMENT OF COLAIZZI'S STRATEGY IN DESCRIPTIVE PHENOMENOLOGY: A REFLECTION OF A RESEARCHER*
- Somers, T. & Nelson, K. 2001. *The impact of critical success factors across the stages of enterprise resource planning implementations*. doi:10.1109/hicss.2001.927129
- Song, P., Zhang C. & Huang, L. 2007. *Determinants of Information Technology Usage Habits*
- Stalker, P.H. 2015. 'Critical success factors for physician adoption of electronic health records: Reconciling systematic and heuristic knowledge'
- Staples, S. D. & Seddon, P. 2004. *Testing the Technology-to-Performance Chain Model*
- Statnikova, K. 2005. *Information Technology Implementation: What works and what does not*
- Stewart, G., Milford, M., Jewels, T., Hunter, T. & Hunter, B. 2000. *Organisational readiness for ERP implementation*. Paper Presented at the Americas Conference on Information Systems AMCIS, Long Beach, CA, USA
- Sumner, M. 1999. *Projects Critical Success Factors in Enterprise Wide Information Management Systems*
- Takhti, H.K. et al., 2012. *Impact of Hospital Information Systems on patient care: Nurses' perceptions*. Available at: <http://cjni.net/journal/?p=1796>.

Terry, A.L., Brown, J.B., Bestard Denomme, L., Thind, A. & Stewart, M. 2012. '*Perspectives on electronic medical record implementation after Two years of use in primary health care practice*', The Journal of the American Board of Family Medicine, 25(4), pp. 522–527. doi: 10.3122/jabfm.2012.04.110089.

Thakurta, R. & Roy, R., 2012. *Determinants of User Involvement in Software Projects*.

The Evidence Centre, 2011. *How do new technologies impact on workforce organisation?*

Tiong Thye, G. 2009. Multiplatform E-Learning Systems and Technologies: Mobile Devices for Ubiquitous ICT – Based Education

The Open Group, 2009. *The Open Group Architecture Framework 9.1*

Turan, A.C.B.C., Tunç, A.Ö. & Zehir, C. 2015. *A Theoretical Model Proposal: Personal Innovativeness and User Involvement as Antecedents of Unified Theory of Acceptance and Use of Technology*. Procedia - Social and Behavioral Sciences, pp.43–51.

Vaishnavi, V. & Kuechler, B. 2015. *Design Science Research in Information Systems*

Vale, S. 2010. *Statistical data quality in the UNECE, 2010 version*. Statistical Division, United Nations. Retrieved from: <http://unstats.un.org/unsd/dnss/docs-nquaf/UNECE-quality%20Improvement%20Programme%202010.pdf>

Velimeneti, S. 2016. *Data Migration from Mainframe (Legacy) Systems to Modern Database*. Retrieved from [http://repository.stcloudstate.edu/cgi/viewcontent.cgi?article=1054&context=mme\\_etds](http://repository.stcloudstate.edu/cgi/viewcontent.cgi?article=1054&context=mme_etds)

Venkatesh, V., Morris, M.G., Davis, G.B. & Davis, F.D. 2003. *User acceptance of information technology: Toward a unified view*, MIS Quarterly, 27(3), 425-478.

Venkatesh, V. & Davis, F. 2000. *A theoretical extension of the technology acceptance model: four longitudinal field studies*. Management Science

Villagarcia, S. 2011. *FORMALIZATION AS A WAY OF COORDINATION AND CONTROL IN A CONSTRUCTION FIRM*.

Wallace, S. 1999-2016. *Post Implementation Review*

Walton, D. N. 1989. *Dialogue Theory for Critical Thinking*.

Watt, A., 2014. *Project Management*. Available at: [http://www2.ensc.sfu.ca/~whitmore/courses/ensc305/pdf%20files/Project\\_Management\\_Watt.pdf](http://www2.ensc.sfu.ca/~whitmore/courses/ensc305/pdf%20files/Project_Management_Watt.pdf).

Weeks, D., Keeney, B., Evans, P., Moore, Q. & Conrad, D. 2014. 'Provider perceptions of the electronic health record incentive programs: A survey of eligible professionals who have and have not attested to meaningful use', *Journal of general internal medicine*

Whittemore R. & Grey M. 2006. *Data-collection methods. In Nursing Research: Methods and Critical Appraisal for Evidence-Based Practice*, 6 th edn.

Wolk, A., Dholakia, A. & Kreitz, K. 2009. *Building a performance measurement system*.

WHO. 2004. 'Developing health management information systems A PRACTICAL GUIDE FOR DEVELOPING COUNTRIES

Yin, K. R. (2004). CASE STUDY METHODS

Young, R. & Jordan, E. 2008. *Top management support: Mantra or necessity?* *International Journal of Project Management*, 26(7), 713–725

Zigiaris, S. 2000. *Business Process Re-Engineering*

# Appendices

## Appendix 1

### Colaizzi's (1978) Framework

1. Read all protocols to acquire a feeling for them.
2. Review each protocol and extract significant statements.
3. Spell out the meaning of each significant statement i.e. formulate meanings.
4. Organize the formulated meanings into cluster of themes. Refer these clusters back to the original protocols to validate them. Note discrepancies among or between the various clusters, avoiding the temptation of ignoring data or themes that do not fit.
5. Integrate results into an exhaustive description of the phenomenon under study.
6. Formulate an exhaustive description of the phenomenon under study in as unequivocal a statement of identification as possible.
7. Ask participants about the findings thus far as a final validating step.

## Appendix 2

### Work Plan

#### Activity List (Work Breakdown Structure)

The table below gives a summary of the activities, the duration and the dates on which these activities commenced.

Activity	Activity Name	Activity Description	Duration	Start Date	Milestone
1.	Preparation	Preparation of data collection instruments	19 days	06/04/17	Data Collection instruments
2.	Data	Data collection	60 days	03/05/17	Collected Field Data
3.	Analysis	Data analysis	60 days	05/06/17	Data Analysis report
4.	Constructs Identification	Review and analysis of existing models	12 days	26/08/17	Identified Constructs
5.	Model development	Development of model	22 days	01/09/17	Proposed Model
6.	Report writing	Research report writing	142 days	01/04/17	Research report

Table 4: Work Breakdown Structure

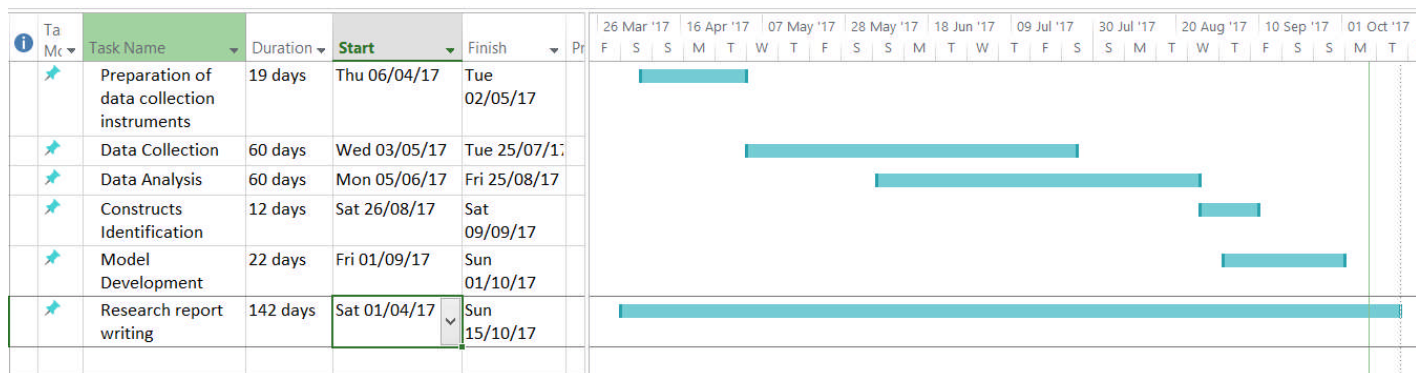


Figure 6: Gantt Chart



## **Appendix 3**

### **Sample Questionnaire**

# ***UGANDA MARTYRS UNIVERSITY***

## **SAVANNAH SUNRISE MEDICAL CENTRE OPERATIONS STAFF QUESTIONNAIRE**

### **Preamble**

My name is Radooli Deborah Katiiti. I am conducting research to improve the adoption and utilization of health information systems in Healthcare delivery. Health Information Systems (HISs) are used in health institutions for purposes of patient management.

This questionnaire is part of my Masters studies where I aim to improve the adoption and utilization of HISs in the delivery of healthcare. The purpose of the questionnaire therefore is to generate constructs for HIS adoption and utilization in healthcare organisations. Results from this questionnaire will inform the researcher on what the requirements are to improve their adoption and utilization.

Please answer the following questions. Responses you give are restricted for this purpose only and will remain confidential.

Thank you.

**Demographic Information**

1. What is your role in this organisation?

.....

2. How long have you worked for this organisation?

.....

**Attitude towards change**

1. Were you notified about the purpose of the Allied Medical System (AMS) currently used in your organisation before it was adopted?  
(a) Yes (b) No (Skip to Qn.3)

2.If yes, how were you notified?

.....  
.....  
.....

3.If no, why do you think you were not notified?

.....  
.....  
.....

4.What are some of the challenges your organisation was facing before adopting this system?

.....  
.....  
.....

5.Were you satisfied with the process that your organisation went through to adopt this system?  
(a) Yes (b) No (Skip to Qn.10)

6.If yes, what contributed to your satisfaction to the process that your organisation went through to adopt this system?

.....  
.....  
.....

7.If no, what aspects of the adoption process weren't you satisfied with?

.....  
.....  
.....

**Project Planning and Management**

1. In your opinion, did the team that was charged with the adoption of this system have a good understanding of your work routine?

(a) Yes (b) No (Skip to Qn.6)

2. If yes, how important was it that the team that was charged with this system's adoption process had a good understanding about your work routine?

.....  
.....  
.....

3. If No, how do you think the results of this system use would have been different if the team that was charged with its adoption had a better understanding of your work routines?

.....  
.....  
.....

**Commitment to Change**

1. Were you willing to make the necessary changes in your work routines that were important for the system to work?

(a) Yes (b) No (Skip to Qn.3)

2. If yes, how difficult it was for you to make changes in your work routines that were necessary for the AMS system to work?

.....  
.....  
.....

3. If No, why were you not committed to make necessary changes in your work routines that were important for the system to work?

.....  
.....  
.....

4. Did your organisation encounter any problems in the process of adopting this system?

(a) Yes No (Skip to Qn. 11)

5. If yes, what problems did your organisation encounter?

.....  
.....  
.....

6. How were these problems handled by the team that was in charge of adopting this system?

.....  
.....  
.....

7. If no, why do you think there were no problems encountered in the adoption of this system?

.....  
.....  
.....

8. In your opinion, do you think that work routines and procedures should have been an important consideration in assessing the usability of this system? **(Kindly give a reason for your answer)**

.....  
.....  
.....

**Technology- task fit, complexity and training**

1. Does the AMS system fit well with your way of doing work at your organisation?

- (a) Yes
- (b) No (Skip to Qn.4)

2. If yes, what makes the system to fit well with your work routines and the way you like to work?

.....  
.....  
.....

3. How would you describe the time and effort required by you to alter your current work process flows to align with the processes built into the system?

.....  
.....  
.....

4. If no, what aspects of your work routines are not compatible with this system?

.....  
.....

5. Was this system easy for you to learn?

- (a) Yes
- (b) No (Skip to Qn.7 & 8)

6. If yes, what made the system easy for you to learn?

.....  
.....  
.....

7. If no, what aspects of this system were difficult for you to learn?

.....  
.....  
.....

8. In your opinion, what should have been done to make the system easy to learn?

.....  
.....  
.....

9. On the overall, do you think that this system is easy to use?

- (a) Yes
- (b) No (Skip to Qn.11)

10. If yes, what makes the system easy to work with?

.....  
.....  
.....

11. If no, what makes the system difficult to work with?

.....  
.....  
.....

12. Did you receive any training on how to use this system?

- (a) Yes
- (b) No (Skip to Qn.14)

13. If yes,

i. How were you trained in the use of this system?

.....  
.....

ii. In your opinion what made the training you received on the system's use sufficient and effective?

.....  
.....  
.....

14. If no, how were you able to use this system without any training?

.....  
.....  
.....

**Management Support**

1. At the time of adoption of the AMS system, did management provide you with the necessary help and resources to use the system?

- (a) Yes      (b) No (Skip to Qn.3)

2. If yes, how important was this for the AMS system' success?

.....  
.....  
.....

3. If no,

i. How do you think the results of the AMS system adoption would have been different if enough resources and help had been be secured?

.....  
.....

ii. In your opinion why wasn't there enough help and resources pooled into the project?

.....  
.....  
.....

4. Did management encourage and support you to use the AMS system?

- (a) Yes (b) No (Skip to Qn.6)

5. If yes,

i. How did management support and encourage you to use this system and to participate in the adoption efforts?

.....  
.....  
.....

ii. How do you think this was important for the success of the project?

.....

.....  
.....

6. If no,

i. Why do you think that management did not support and encourage you to use this system and to participate in its adoption efforts?

.....  
.....  
.....

ii. How would your decision about this system use and participation in the adoption efforts have been different if management had supported and encouraged you to use the AMS system and to participate in its adoption efforts?

.....  
.....  
.....

7. Was management very effective in addressing problems raised by the AMS system adoption team?

(a)Yes (b) No (Skip to Qn.9)

8. If yes, how do you think management's ability to communicate effectively with the systems adoption team contributed to the successful adoption of this system?

.....  
.....  
.....

9. If no, why do you think that management was not effective in addressing problems of the systems adoption team?

.....  
.....  
.....

10. In your opinion, do you think that management was effective in supporting changes in existing routines and processes that were critical to the successful adoption of this system? (a) Yes (b) No (Skip to Qn.12)

11. If yes,

How did management support the new changes in existing routines and processes?

.....  
.....  
.....

How do you think that contributed to the AMS system acceptance?

.....

.....  
.....

12. If No, in what ways did this affect the system adoption process?

.....  
.....  
.....

13. Did management try to find a solution wherever difficulties arose during the adoption phase of this system? (a) Yes (b) No (Skip to Qn.15)

14. If yes, how effective was management in handling these difficulties?

.....  
.....  
.....

15. If no, why do you think management was not able to handle problems that arose during the adoption phase?

.....  
.....  
.....

**Attitude towards computers and innovations**

1. Do you think that computer systems and services are important and valuable to you in the performance of your job? (a) Yes (b) No (Skip to Qn.3)

2. If yes,

i. Why do you find computer systems and services an important and valuable aid to you in the performance of your job?

.....  
.....  
.....

ii. How would you describe your organization's computer environment and its impact on your effectiveness and productivity in your job?

.....  
.....  
.....



3. If no, why do you think computer systems and services are not an important and valuable aid to you in the performance at your job?

.....  
.....  
.....

**Triability**

1. Before committing to the use of this system, did you have a chance to experiment with it on a trial basis.  
(a) Yes (b) No (Skip to Qn.3)

2. If yes,

i. How important was it for you to try it out first?

.....  
.....  
.....

ii. How did it help you to make a decision about whether or not to continue using it?

.....  
.....  
.....

3. If no, how do you think your use of this system would be different if you had an opportunity to experiment with it on a trial basis before committing to its use?

.....  
.....  
.....

**User Involvement and Participation**

1. As a prospective user of this system, were you interested and excited about it?

(a) Yes (b) No (Skip to Qn.3)

2. If yes, did you feel that this system would be both important and personally relevant to you?

.....  
.....  
.....

3. If no, why weren't you excited and interested in this system adoption effort?

.....  
.....

4. Was your participation in the adoption of this system extensive?

- (a) Yes      (b) No (Skip to Qn. 6)

5. If yes,

i. In what ways did you participate in this system's adoption process?

.....  
.....  
.....

ii. Why did you participate in this system adoption process?

.....  
.....  
.....

iii. How did it influence your decision to continue using it?

.....  
.....  
.....

6. If no,

i. Why didn't you participate in the adoption process of this system?

.....  
.....  
.....

ii. How do you think your system use would be different if you took an active part in this systems adoption process?

.....  
.....  
.....

**Relative advantage**

1. Do you find using the current system more advantageous to your job?

- (a) Yes      (b) No (Skip to Qn.3)

2. If yes, in what ways does this system enable you to accomplish tasks more quickly?

.....  
.....  
.....

3. If no, why doesn't this system help you to accomplish tasks more quickly?

.....  
.....  
.....

4. Does this system enhance your effectiveness on the job?

(a) Yes (b) No (Skip to Qn.6)

5. If yes, how does this system enhance your effectiveness on the job?

.....  
.....  
.....

6. If no, why doesn't this system enhance your effectiveness on the job?

.....  
.....  
.....

7. Does this system improve the quality of work that you do?

(a) Yes (b) No (Skip to Qn.9)

8. If yes, how does this system improve the quality of the work that you do?

.....  
.....  
.....

9. If no, why doesn't this system improve the quality of work you do?

.....  
.....  
.....

10. Does this system ease your job?

(a) Yes (b) No (Skip to Qn. 12)

11. If yes, what aspects of this system makes it easy for you to do your job?

.....  
.....  
.....

12. If no, why doesn't this system ease your job?

.....  
.....  
.....

**User Satisfaction with the System**

1. Do you have a high level of confidence and control when working with this system?

- (a) Yes
- (b) No (Skip to Qn.3)

2. If yes, to what do you attribute the high level of confidence and control you have while working with the system?

.....  
.....  
.....

3. If no, what makes you lack the feeling of confidence and control while working with this system?

.....  
.....  
.....

4. Is access to this system easy and convenient for you?

- (a) Yes
- (b) No (Skip to Qn.6)

5. If yes, what makes the system easy and convenient to access?

.....  
.....  
.....

6. If no, what makes the system hard and not convenient to access?

.....  
.....  
.....

7. Does this system have errors that you have to work around?

- (a) Yes
- (b) No (Skip to Qn.9)

8. If yes,

i. How has that affected your work effectiveness?

.....  
.....  
.....

ii. Was it hard to figure out how to work around those errors?

.....  
.....  
.....

9. Does this system have the ability to integrate data with other information systems that you are using if any?

- (a) Yes
- (b) No (Skip to Qn.11)

10. If yes, how convenient and easy is it for you to integrate data from this system with other systems that you use in your day-to-day work?

.....  
.....  
.....

11. If no, how important is it for you that this system would have the ability to integrate its data with other systems you use?

.....  
.....  
.....

12. Is this system flexible to changes and adjustments that result from new conditions, demands, or circumstances at your work?

- (a) Yes
- (b) No (Skip to Qn.14)

13. If yes, what makes this system easy to do what you want?

.....  
.....  
.....

14. If no, what makes this system difficult to adjust to the changes in the way you work and new conditions at your job?

.....  
.....  
.....

15. Does this system overload you with more data than what you need to do your work?  
(a) Yes (b) No (Skip to Qn.17)

16. If yes,

i. Why do you think this happens?

.....  
.....  
.....

ii. In what ways is this irritating to you?

.....  
.....  
.....

17. Does this system provide you with output that is complete and accurate?

(a) Yes (b) No (Skip to Qn.19)

18. If yes, how satisfied are you with this output?

.....  
.....  
.....

19. If no, why is it that the output of this system does not fit what you require?

.....  
.....  
.....

## **Appendix 4**

### ***UGANDA MARTYRS UNIVERSITY***

#### **QUESTIONNAIRE TO BE FILLED IN BY E-Health and ICT FOR DEVELOPMENT SPECIALISTS**

Dear Respondent,

This questionnaire is designed for an academic study on developing a model towards improving the adoption and utilisation of health information systems (HISs) in healthcare delivery. This study is being carried out as a partial fulfillment for the award of the degree of Master of Science in ICT Management, Policy and Architectural Design of Uganda Martyrs University.

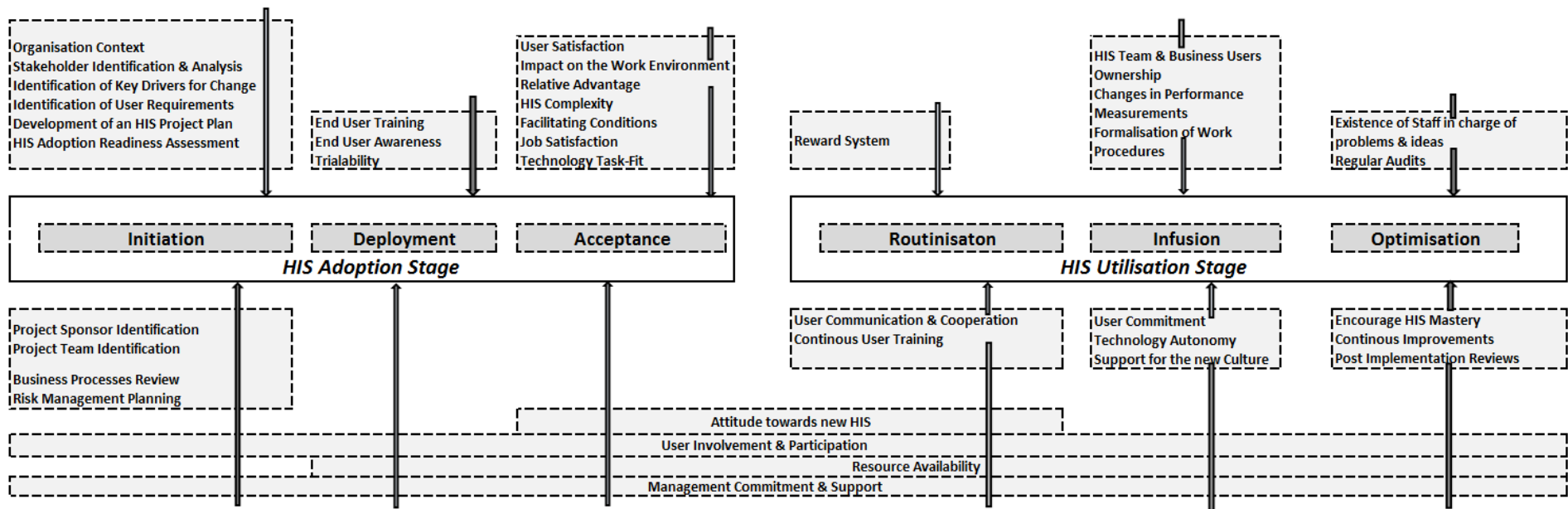
Despite the fact that several IT adoption and Utilisation models, frameworks and theories exist, these models do not clearly spell out what should be done at every stage and phase of HIS adoption and utilisation. The developed model clearly specifies the different stages and phases of HIS adoption and utilisation together with their key considerations.

Therefore the objective of this questionnaire is to determine the extent to which this model meets the requirements for improving adoption and utilisation of health information systems in healthcare delivery.

As one of the respondents, your participation and opinions are very important to the success and completion of this study. This information will be used for academic purposes only.

Thank you for your time and cooperation.

## The Developed HIS Adoption & Utilisation Model





Date of Evaluation: .....

Title of Respondent: .....

**Instructions:**

➤ *The following grade scale is used:*

A – Strongly Agree

B – Agree

C – Neither agree nor disagree

D – Disagree

E – Strongly Disagree

➤ *Please tick/shade the grade scale that applies to every statement in your opinion:*

	A	B	C	D	E
1. The improvement of HIS Adoption & Utilisation is important to me					
2. There is an increasing need to improve the Adoption & Utilisation of HISs in healthcare delivery					
3. This HIS model clearly specifies some of the considerations to make during the HIS Adoption & Utilisation processes					
4. This model provides a solution for improving HIS Adoption & Utilisation in healthcare delivery					
5. I would recommend this HIS model to other healthcare institutions					

➤ *Any Additional Comments:*

.....  
.....  
.....  
.....