Effective Implementation of Technology Innovations in Higher Education Institutions: A Survey of Selected Projects in African Universities

John Mugo Kandiri

A Thesis Submitted to the School of Business in Partial Fulfillment of the Requirements for the Award of the Doctor of Philosophy in Management Information Systems of Kenyatta University

January, 2014

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university or for any other award.

Signature ..... 25.01.2014 .....

John Mugo Kandiri (BSc IS - Moi, MSc IS - UoN) Date

(D86/CTY/13734/2009)

We confirm that the work reported in this thesis was carried out by the candidate under our supervision.

Signature ..... 27/1/14 .....

Dr. Nixon Muganda Ochara Date

Senior Lecturer, Department of Informatics,

Faculty of Engineering, Built Environment and Information Technology,

University of Pretoria.

Signature ..... 27/1/2014 .....

Prof. Nelson H. W. Wawire Date

Associate Professor, Department of Applied Economics,

School of Economics, Kenyatta University.

Signature ..... 27/1/2014 .....

Dr. David Nzuki Date

Lecturer, Department of Management Science,

School of Business,

Kenyatta University.

DEDICATION

To my entire family. My loving wife, Nyokabi, and kids, Paul and Shiku; you are an inspiration to my life.

ACKNOWLEDGEMENTS

The journey to attaining a doctor of philosophy degree has been long and fraught with challenges. The adventure has not been easy but several individuals have made it manageable. It might not be possible to mention all who contributed to this journey but I feel indebted to them.

Glory to Father Almighty for the good health and many resources that enabled me pursue my PhD to my mentors: Professor Nelson Wawire, Dr. Nixon Ochara and Dr. David Nzuki, your guidance is immensely appreciated.

Neil Butcher and Associates and the South African Institute for Distance Education (SAIDE) team: thank you for funding and supporting my Ph.D research. I appreciate the fact that Kenyatta University Vice-chancellor Prof. Olive Mugenda, for appointing me a team leader in one of the PHEA-ETI projects, this appointment opened up the opportunity for me to pursue Ph.D study in this area.

PHEA-ETI team leaders and members who assisted me in cross-national data collection; Flora Ndumia, CIT secretary, for the encouragement during the process; and finally, Kenyatta University library staff led by Maryanne Muiruri and Dr. George Gitau: I appreciate your material and moral support!

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

CDE	Centre for Distance Education
CVL	Centre for Virtual Learning
ERP	Enterprise Resource Planning
ETI	Educational Technology Initiative
HEI	Higher Education Institution
ICT	Information and Communication Technology
IDI	In-depth Interview
IFMIS	Integrated Financial Management Information System
IS	Information System
KEWL	Knowledge Enhanced Web Learning
KMO	Kaiser-Meyer-Olkin
KU	Kenyatta University
LMS	Learning Management System
M&E	Monitoring and Evaluation
MOOC	Massive Open Online Course
OCW	Open Course Ware
ODEL	Open, Distance and e-Learning
OER	Open Education Resource/s
OLR	Ordinary Least Squares
PCA	Principal Component Analysis
PHEA	Partnership in Higher Education in Africa
SAIDE	South African Institute for Distance Education
SPSS	Statistical Product and Service Solutions
STI	Science, Technology and Innovation
UCM	Universidade Católica de Moçambique
UDSM	University of Dar es Salaam
UEW	University of Education, Winneba
UI	University of Ibadan
UJ	University of Jos

OPERATIONAL DEFINITION OF TERMS

Adoption: Also referred to here as initiation. The decision to take up a technological innovation.

HEI absorptive capacity: The capacity of an institution to manage an innovation once it has been implemented.

Financial resource motivation: This refers to monetary compensation or rewards given to project implementers.

Higher education institutions (HEIs): This refers to the universities involved in the study.

Implementation: This is the initial use of an innovation that has been adopted.

Implementation climate: This refers to targeted employees' shared perceptions of the extent to which use of a specific innovation is rewarded, supported and expected.

Implementation effectiveness: When an innovation has been put to use and users apply it in their sections. This starts with early use which has been used in this study.

Implementation policies and practices: This refers to the plans, practices, structures and strategies that an organization employs to put the innovation into place to support its use.

Implementer: This refers to a person who directly implements the programme or technological intervention: for example, a module writer.

Information technology (IT): This refers to all forms of artifacts used to create, store, exchange, and use information in its various forms (business data, voice conversations, still images, motion pictures, multimedia presentations, and other forms, including those not yet conceived).

Innovation: This refers to a practice or process that is new.

Innovative: This describes that which is characterized by newness: for example, using technology such as ICT to support teaching and learning constitutes an innovative approach in higher education institutions.

Instant messaging (IM): This refers to applications used for online chatting, which allow synchronous communication. They include: Skype, Facebook and Gmail chat.

Learning management system (LMS): This refers to a software application used to manage teaching content. Teachers/lecturers can use the platform to post notes, give assignments and administer examinations.

Mixed method research methodology: Method that employs both qualitative and quantitative strands of research in a study.

Monitoring and evaluation (M&E): Monitoring looks at what and how implementation is being done, while evaluation analyzes the immediate or direct effects of the programme intervention and implementation in order to measure performance.

Open educational resource/s (OER): This refers to an institution freely sharing its content with others. Adoption of OER means that institutions share content freely.

Organizational readiness for change: This means the extent to which targeted employees (especially the implementers) are psychologically and behaviourally prepared to make the changes in organizational policies and practices that are necessary to put the innovation into practice and to support innovation use.

Organizational climate: This refers to the psychological climate that makes implementers want to participate in an activity. While culture is global within an organization, climate could be limited to a given task.

Organizational culture: This includes the norms in an organization, how workers understand 'how we do things around here'.

Project leadership: These are the team leaders and overall leaders (within a university) who were involved in the implementation of each PHEA-ETI project.

Technology: This is the application of scientific, well-organized knowledge to processes. Information and communication technology (ICT) is one such technology that in modern application has been seen to achieve this scientific endeavour more efficiently. By educational technology is meant the application of technology with the intention of advancing education.

Top management: These are the people in management (for example, the vice-chancellor, the deputy vice-chancellor in charge of planning and research, and so on).

User involvement: This refers to a set of behaviours, activities and assignments that engage users throughout the systems development process.

ABSTRACT

The significance of technology in higher education institutions cannot be overstated. Research indicates that though there is a degree of usage of technology in teaching and learning, that has been below par as compared to other industries. Many models have been developed in attempt to explain how to spur success in technology use with little success. One such model is the organizational theory model. However, the role of monitoring and evaluation, the team leader and innovation efficacy plus the underlying issues that affect innovation implementation have not been clearly addressed. This study used the Partnership for Higher Education, Education Technology Initiative projects to investigate the determinants of technology innovation implementation effectiveness in higher education institutions. The projects that were implemented between 2008 and 2012 endeavored to stimulate technology uptake in African universities. The study was based on 26 technology implementation projects drawn from seven universities spread in six countries in Sub-Saharan Africa. The exploratory study adopted a critical realism method so as to unearth the issues that affect technology implementation effectiveness. A total of 105 usable survey responses were received with 53 interviews conducted. Due to the dichotomous nature of determining implementation effectiveness (successful or failure), logistic regression was used to determine the factors that influence technology innovation implementation effectiveness. Quantitative data were analysed using SPSS version 17 and R-statistical package while data from interviews were analysed using theoretical thematic analysis method. The items within the broader variables were subjected to exploratory factor analysis using principal component method. It was found that 30 percent of the projects were partial successful since they met only some of the objectives, 55 percent had techno-political failure with 15 percent absolute failures. The results showed that monitoring and evaluation, top management, organizational culture, team leadership, financial motivation, organizational climate and innovation efficacy were important determinant to technology implementation effectiveness. Technology framing, innovation environment and innovation attributes were found to be underlying issues in technology implementation. The study recommended need to manage technology transfer problem, develop innovation adopting nature and absorptive capacity in universities so as to enhance technology innovation implementation effectiveness.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter provides insights into the implementation of technology innovation in higher education institutions (HEIs). This is by looking at study background which first delves into need for technology in HEIs and then gives some background on the Partnership for Higher Education, Education Technology Initiatives. The statement of the problem, research objectives and research questions are then stated. The chapter concludes by providing at the significance of study, the scope and the organization of the other chapters.

1.2 Background to the Study

The significance of technology in HEIs cannot be overstated. The Economist Intelligence Unit (2008) noted that technology was a major attractor to students and the corporate sector in joining different HEIs. Technology has become a non-negotiable aspect of students' lives.Jhurree (2005) asserted that technology has the potential to drive economic, social, political and educational transformations. Jhurree (2005) advised that developing countries could not ignore technology if they were to remain competitive and relevant within the globalization trend. On the other hand, research indicated that though there was a degree of use of technology in teaching and learning, this use was not equal to technology use in administration and social circles.

McGregor (2002) and Dodds (2007) viewed technology as a powerful contributor to strengthening HEIs, and defined innovation as the implementation of a new or significantly improved idea, good, service, process or practice that is intended to be useful. From this definition, it was evident that Dodds (2007) believed technology had emancipatory power, able to assist institutions to move from the status quo and to perform their functions in a much improved way. Dodds categorized ICT's role as a contributor to innovation into three broad areas: building communities of innovation, radically changing institutional processes and practice, and implementing infrastructure and tools that enable people to excel. Furthermore, in HEIs, ICT could remove barriers

to effectiveness, help create affective services and new possibilities for collaboration, assist in establishing continual communication and help build trust among people. While technology cannot be taken as a panacea for all educational challenges, "it does leverage and extend traditional teaching and learning activities in certain circumstances and hence has the potential to impact on learning outcomes" (Jaffer, Ng'ambi, & Czerniewicz, 2007: 136).

The massive investment by HEIs in technology, mainly Information and Communication Technology (ICT), is evidence that institutions are cognizant of technology's potential for revolutionizing their operations (Jhurree, 2005). It also indicates readiness on the part of HEI management to make the most of potential benefits attributed to technology integration in their functional areas. Numerous theorists have argued and presented evidence to the effect that, despite significant investment and claimed benefits, the impact of technology on education has often been disappointing (Antonacci, 2002; Balasubramanian *et al.,* 2009; Macharia & Nyakwende, 2009; Veletsianos, 2010; Bertrand, 2010; Mirriahi, Dawson, & Hoven, 2012). This is despite the fact that most technological innovations are now emerging from developing countries. This massive spending ICT but with little to show for these investments, gives rise to a 'technology paradox'. Bertrand (2010) called this technological innovation transfer the effect of "Technosclerosis" and contended that modern universities have fallen behind the pace of technological change and have become irrelevant in the real life of an interconnected and globalizing world. Oliver (2002) agreed with Bertrand, claiming that the impact of technological innovations in HEIs has not been as extensive as in other fields. Oliver argued that there is a detachment between the belief in the potential of ICTs in HEIs and the application thereof; a lack of congruence between the belief in technology's potential and the actual realization of the benefits that should accrue from adopting these innovations. This is what Katz (1999) referred to as "dancing with the devil". It can be stated that HEIs often invest in technology with alacrity but having limited understanding of how to manage the implementation process. While there is much literature on technology adoption, however, the understanding of what leads to effective implementation once technology has been adopted remains blurred (Dong, Neufeld & Higgins, 2008; Chin & Marcolin, 2001). In addition, there is limited

information and understanding of the factors that determine effective implementation of technological innovations in HEIs.

By contrast, literature is replete with information on key barriers to the successful assimilation of the same innovations in HEIs (Wagner, Hassanein, & Head, 2008; Balasubramanian *et al.*, 2009; Bertrand, 2010; Safiul & Corresponding, 2010). Bertrand (2010) called for critical examination of factors related to education and administration that make institutions unable to adjust to the innovation adopted. Further, Bertrand (2010) called for a "revolutionary paradigm" to address the issue. Unfortunately, failure to achieve effective implementation of innovations has negative consequences. These consequences include: loss of the potential benefit of technology integration, loss of the finances already sunk into the project, opportunity costs relating to other resources that were sunk into the project, negative image and reputation, tarnished credibility of the management involved and the likelihood that management will in future be skeptical regarding adopting further innovations (Sawang & Unsworth, 2007; Osei-Bryson, Dong & Ngwenyama, 2008; Ke & Wei, 2006; Heeks, 2002). The reason that most technology project implementations are not effective, and that institutions fail to reap the benefits of innovation, is ineffective implementation arising from lack of knowledge – rather than failure of the innovation being adopted (Klein & Knight, 2005; Sawang, Unsworth, & Sorbello, 2006; Sawang & Unsworth, 2007; Klein, Conn, & Sorra, 2001; Johnson, 2000). There is a pressing need for HEIs in Africa to understand what determines the effective implementation of the technology innovations they are interested in adopting. This represents the main knowledge gap in the current study.

This study endeavoured to bridge the gap between the high costs of investment in technology and its effective integration in HEIs. To this end, the study adopted an optimistic view, proposing determinants that would result in bridging the gap. The study took up Bertrand's (2010) challenge – namely; how modern HEIs might counter the effects of "Technosclerosis" and re-establish their relevance in the real life of an interconnected and globalizing world – and adopted a critical realist philosophy to investigate the determinants of technology implementation effectiveness in HEIs.

In differentiating between critical realism and traditional realist approaches, Dobson (2010) posited that, in critical realism, reality is made up of three distinct ontological realisms: namely, empirical (i.e. experience), the actual objects, and the non-actual, which looked at associated structures, mechanisms and powers. Dobson (2010) referred to the non-actual as the "transcendental". These transcendental components are not directly observable but determine the events that are evident to an observer. Dobson, Jackson, and Gengatharen (2011) in citing Load (2001), posited that the purpose of science is to provide an explanation of a product of experience that guides prediction, but that critical realism is about thinking. Dobson *et al.* (2011) understood science as providing surface phenomena, but argued that critical realism digs deeper, to that which is non-observable yet causal. To achieve its objective, critical realism uses "abductive reasoning to propose possibilities" (Dobson *et al.*, 2011: 7). A critical realist seeks deeper knowledge and understanding of the social situation. Critical realism does not confine itself to generalizable truth (Sayer, 2000, as cited by Dobson *et al.*, 2011) but considers the best way an explanation can be provided at any given time.

1.2.1 Technology Innovations Implementation Environment

Projects are the instruments of choice for various technology transfer initiatives by various international development sponsors and their partners in Africa, yet failure in implementation seems to be the rule rather than the exception (Ika, Diallo, & Thuillier, 2010). For example, the technology project failure rate for World Bank projects in Africa since the year 2000 is estimated to be 50%; while Independent Evaluation Group (IEG) research discovered that 39% of World Bank projects were unsuccessful in 2010 (Ika *et al.*, 2010). Various organizational and managerial reasons are proffered, including imperfect project framing, poor stakeholder management, delays between project identification and start-up, delays during project implementation, cost overruns, and coordination failure (Kwak & Radler, 2002).

Some studies link the malaise related to ineffective implementation of technology projects in Africa to a colonial inheritance in terms of very limited technical capabilities of the bureaucracies; authoritarian decision-making processes under generalist administrators; and the predominance of patron–client relationships. Kizza (2009) attributed this sorry state of technology failure to the late start by African countries in

adopting technology. Dutta and Mia (2011), in a report to the World Economic Forum, noted that countries in sub-Saharan Africa continued to perform poorly in the Networked Readiness Index of 2011. The World Economic Forum and INSEAD (2013) noted that ICT usage in Sub-Saharan Africa was on a slow rise, observed that the impact of technology was too low. A report by Dutta and Mia (2011) supported findings by the Economist Intelligence Unit (2010) where only Nigeria appeared in the top 70 countries in the e-readiness ranking. Kizza (2009:1) noted that "African countries, and universities, face barriers in the use of ICT". These barriers, which had earlier been enumerated by Obijiofor, Inayatullah, and Stevenson (2005) included: difficulty in equipment acquisition, lack of capacity and skills development, limited research and development resources, and lack of investments in ICTs. Such studies tend to link the failure of projects to lack of capacity.

Jaffer *et al.* (2007) noted that in developing countries the emphasis was on technology capabilities, rather than on the educational issues requiring technology support. Gichoya (2005) reported on a high-priority technology project in Kenya, which after four years of implementation, realized only 9 out of 44 requirements. Likewise, the adoption of IT in Algeria's banking sector in the 1990s failed to generate expected results; while South Africa's Presidential Review Commission concluded that IT assets did not contribute to the expected transformation of service delivery. Thus given the history of failure of IT projects in Africa, especially from a capacity perspective which is linked to colonialism (Heeks, 2002), innovations that are introduced in public sector agencies in Africa can only be characterized as 'challenged'.

1.2.2 Partnership for Higher Education in Africa, Education Technology Initiative

The Partnership for Higher Education in Africa[1] (PHEA) was started as a joint venture of four US foundations in 2000 and subsequently grew to seven foundations. The PHEA initiative was started with the aim of supporting HEIs in sub-Saharan Africa (Lewis, Friedman, & Schoneboom, 2010; Parker, 2010; Lindow, 2011). Specifically, by the year

[1] The Partnership for Higher Education in Africa (PHEA) was started as a joint venture of four US foundations in 2000 and subsequently grew to seven foundations. The foundations were the Carnegie Corporation of New York, the Ford Foundation, the John D. and Catherine T. MacArthur Foundation, the Rockefeller Foundation, the William and Flora Hewlett Foundation, the Andrew W. Mellon Foundation, and the Kresge Foundation

2011, nine different African countries had received support from PHEA. According to Lindow (2011), these countries were: Egypt, Ghana, Kenya, Madagascar, Mozambique, Nigeria, South Africa, Tanzania, and Uganda.

The PHEA initiative also focused on assisting with resuscitating both primary and secondary education, which was neglected by African governments. The initiative was therefore aimed at accelerating the use of technology in teaching and learning. The projects, which ran between 2008 and 2012, endeavoured to achieve accelerated creativity and use of ICT in the education sector. By financing the technology-based projects, the objective was to stimulate uptake of technology innovations, mainly ICT, in selected universities in Africa.

The PHEA initiative identified the following five dimensions that the initiative was to address: effective use of technologies; helping HEIs to deal with an increasingly diverse student body; creation of high-level professional talent and new ideas; transfer of skills essential for national development; and strengthened university management and global engagement (Parker, 2010). Table 1.1 shows countries that had some of their universities participating in the PHEA Education Technology Initiative (PHEA-ETI).

Table 1.1: Important Information on of some of the countries involved in PHEA-ETI

FACTOR	GHANA	KENYA	NIGERIA	MOZAMBIQUE	TANZANIA	UGANDA
Population	24 million (2010 est., Ghana Statistical Service)	38.6 million (2009 census, Kenya National Bureau of Statistics)	140.4 million (2006 census, National Bureau of Statistics)	20.3 million (2007 census, National Institute of Statistics, INE)	40.7 million (2008 est., National Bureau of Statistics)	31.8 million (2010 est., Uganda Bureau of Statistics)
Gross National Income per capita at purchasing power parity (PPP)	US$1,480	US $1,570	US $1,980	US $880	US $1,350	US $1,190
Human Development Index	0.467 (Medium; ranked 17 in Africa, 130 globally)	0.470 (Medium; ranked 16 in Africa, 128 globally)	0.423 (Medium; ranked 25 in Africa, 142 globally)	0.284 (Low; ranked 46 in Africa, 165 globally)	0.398 (Low; ranked 30 in Africa, 148 globally)	0.422 (Medium; ranked 26 in Africa, 143 globally)
Tertiary education enrolment rate	6.20%	4.05%	10.20%	1.50%	1.48%	3.69%
Number of public and private universities	6 public 22 private	7 public 11 private	27 federal 36 state 41 private	17 public 21 private	13 public 21 private	5 public 11 private
Institutions supported by PHEA	University of Ghana, Legon University of Education, Winneba	Kenyatta University	Following universities: Ibadan, Jos, Port Harcourt	Catholic University of Mozambique Eduardo Mondlane University	University of Dar es Salaam Sokoine University of Agriculture	Makerere University

Source: Adopted from Lindow (2011:3), *Weaving Success Voices of Change in African Higher Education*, New York: The Institute of International Education.

From table 1.1, the countries involved in the study had very low enrollment rate (except Nigeria, all others were below 10 percent) with low Gross National Income per capita. This meant that government investment in education technology to improve education and have better enrollment would be a herculean task. PHEA-ETI coming in to support education was thus welcomed in the institutions.

Lewis *et al.* (2010) enumerate the following as being the accomplishments of the PHEA-ETI: enduring improvements in African higher education; increased resources for

African universities; collectively adding value beyond what individual foundations could do; and enhanced individual foundation efforts.

The PHEA-ETI started to support the adoption of ICTs in teaching and learning. Lewis *et al.* (2010) noted an enduring improvement as one of the accomplishments of the PHEA-ETI. The purpose of the ETI component of the PHEA was to expand and enhance the effective use of educational technologies for teaching and learning at seven of the PHEA-supported universities. This initiative, if well implemented, was to see PHEA addressing some of the underlying challenges facing the higher education sector in Africa. The PHEA-ETI was to run from July 2008 through June 2012, and projects under the initiative included: deployment of learning management systems (LMS); developing digital content; creating multimedia for distance learning; digitization of theses and past examination papers; developing students' e-portfolios; and studying the effects of gender on educational technology use (Lewis *et al.*, 2010). The universities that participated in PHEA-ETI during this period and the projects they were involved in are as shown in Table 1.2.

Table 1.2: Universities that were under the PHEA-ETI

COUNTRY	UNIVERSITY	ETI PROJECTS
Ghana	University of Education, Winneba (UEW)	Enhancing Quality of Teaching and Learning using an LMS
		Monitoring of Staff Behaviours in Moodle
		Base Line Study on e-Readiness of UEW
Nigeria	University of Ibadan	Capacity Building and Digital Content
		Open Courseware for Science and Technology
		Tele-classroom for General Studies
		Educational Radio and Mobile Phones for Distance Education
	University of Jos	Departmental Educational Technology Initiative (LMS)
		Educational Multimedia and Simulations Project
		e-Learning Fellowship Project
Kenya	Kenyatta University	Digitization of Past Examination Papers
		Postgraduate Research Methods Course
		Online eMBA Programme
		Creation of Chemistry and Communications Skills Modules
		Executive Information Systems Specification
		Digitization of Theses and Dissertations
Mozambique	Catholic University (Universidade Católica de Moçambique – UCM)	ICT Policy, Use Policy and Strategy Development
		e-Learning Project
		Research Project
		CDE (Centre for Distance Education) Electronic Support Project
		OER Health Sciences Project
Uganda	Makerere University	e-Content Project
		Gender Research Project
		e-Portfolio Project
Tanzania	University of Dar es Salaam	Online Course Migration and Improvement
		Computer Science Interactive Courses

Source: Adopted from PHEA-ETI reports

Table 1.2 presents the nature of the projects of which 19 (79%) of the projects involved developing online content. For the most part, this involved creating content on an learning management systems (LMS) (84%), while two involved digitization of materials – theses and past exam papers. Only eight of the projects (a paltry 31%) were

operational by the time the project ended in June 2012. Innovation projects that were not in use and had not been abandoned were in various stages of implementation.

1.3 The Statement of the Problem

The literature abounds with studies that have attempted to devise prescriptions for effective implementation of technology. The prescriptions have been in an attempt to reverse the trenmd of high failure rate in implementing technology in teaching and learning among HEIs (Kirschner, Hendricks, Paas, Wopereis, & Cordewener, 2004; Macharia & Nyakwende, 2009). The prescriptive models adopt a variance logic approach to technology implementation (Orlikowski, 2009). This exogenous view, however, proceeding as it does from the assumption that technology is predictable and stable, ignores the complexity of technology innovation implementation.

In their organizational theory models as initially postulated by Klein *et al.* (2001), Sawang and Unsworth (2011) and Weiner, Lewis, and Linnan (2009), adopted the exogenous variance logic view, averring that the factors determining innovation implementation success are: top management, financial availability, organizational culture, and implementation policies and practices. Despite the existence of the prescriptive models, however, technological innovation implementation continues to experience high failure rates. What this meant was that individual characteristics alone might not be sufficient for achieving success in implementation of an innovation. Dobson, Myles, and Jackson (2007) contended that what might cause success in implementation of an innovation in one context might not be replicable in other contexts (organizations). Rather, no single approach has emerged as optimally effective in all implementation situations (Kukafka, Johnson, Linfante, & Allegrante, 2003). Such complexity can be explained by adopting a process logic view (Orlikowski, 2009; Sawang & Unsworth, 2011). Proponents of a process logic approach observe that implementation of an innovation is complex, and involves more than simply an acceptance of the need to adopt that innovation.

Given that institutions in developing countries – by virtue of their being in a developing context –are likely to be involved in adopting innovation, in evaluating technology implementation in Africa there was a need to take a process logic view, which looked at

the role of monitoring and evaluation, team leadership and innovation efficacy. Wiechetek (2012) claimed that understanding the whole implementation process plays a key role in implementation effectiveness. Kirschner *et al.* (2004) believed that effective implementation required understanding the interplay among organizational units. This further meant accepting Bertrand's (2010) call for critical examination of why HEIs were unable to adjust in using technology in education.

In terms of implementation, the educational technology projects that were funded by PHEA-ETI and ran between 2008 and 2012 faced the same fate as any other technology-based projects, in that some were in use by the end of the project's life, others were struggling with implementation, and others had been ended prematurely. This presented a valuable opportunity for the current exploratory study to conduct an in-depth investigation into the factors that led to implementation effectiveness. The case also presented a scenario to study the processes that led to effective implementation of the projects. The critical realism emphasis using a mixed-method approach made it possible to explore the technology innovation implementation phenomenon more deeply. This was beyond the prescriptive approach of theorists such as Sawang and Unsworth (2011). Specifically, the current study aimed to extend the variance logic with process logic so as to unearth specific issues that relate to implementing technological innovations in a challenged environment.

1.4 Objectives of the Study

The main objective of this study was to investigate the determinants of technology innovation implementation effectiveness in HEIs. The specific objectives included the following:

i) Investigate the contribution of monitoring and evaluation to technology innovation implementation effectiveness;
ii) Determine the influence of financial resource motivation on technology innovation implementation effectiveness;
iii) Determine the influence of organizational culture on technology innovation implementation effectiveness;
iv) Investigate the influence of organizational climate on technology innovation implementation effectiveness;

v) Investigate the influence of the project leadership on technology innovation implementation effectiveness;
vi) Find out how top management style contribute to technology innovation implementation effectiveness; and
vii) Determine how innovation efficacy can influence technology innovation implementation effectiveness.

1.5 Research Questions

i) How does project monitoring and evaluation contribute to technology innovation implementation effectiveness in HEIs in Africa?
ii) How does financial resource motivation contribute to technology innovation implementation effectiveness in HEIs in Africa?
iii) What is the influence of organizational culture in ensuring effective technology innovation implementation in HEIs in Africa?
iv) What is the influence of organizational climate on technology innovation implementation effectiveness in HEIs in Africa?
v) What is the influence of project leadership on effective technology innovation implementation in HEIs in Africa?
vi) How does top management style contribute to technology innovation implementation effectiveness in HEIs in Africa?
vii) How does innovation efficacy lead to technology innovation implementation effectiveness in HEIs in Africa?

1.6 Significance of the Study

This study contributes in the following areas: devising a viable model that can provide guidance in effective technology implementation in HEIs; making a scholarly contribution in the IS domain in terms of theory building; and increasing understanding, among technology project team members, of the social nature of the domain. In terms of a contribution that benefits stakeholders in IT, technology project donors, management, project teams and users (mainly but not limited to HEIs), the study should increase and clarify their understanding of the underlying issues in managing technology innovations – and specifically in challenged environments as are encountered in Africa. Specifically, the study aimed to provide a guide in terms of the following: technology

transfer; moving from innovation adopting to innovation generating; and creating an enabling environment for innovation by generating capacity. The document therefore, serves as a blueprint for effective implementation of technology innovation ventures. Any team leader in a technology-based project should find the research findings valuable and a source of useful tips regarding what might contribute to effective implementation of technology innovation projects. The assumption underlying the study is that this work will aid in more effective implementation of technology-based systems.

1.7 Scope and Limitations of the Study

This study used the case of PHEA-ETI funded projects in the seven participating African universities with a total of 26 technology interventions (projects) being undertaken. The projects ran between June 2008 and June 2012. The diversity, in terms of implementation characteristics, of these 26 projects provided rich grounds for carrying out the study on the implementation of technological innovations in challenged environments. Thus all 26 of the projects were included in the study. Further this study is limited to the implementation process of the technology initiatives and does delve into long term use.

1.8 Thesis Organization

This thesis was organized into the following chapter: Chapter one presented the background to the study, the statement of the problem, objectives of the study, the research questions, significance of the study, the scope and chapterization of the thesis. Chapter Two delves into the research domain, dealing specifically with technology integration in HEIs. The chapter provides further consideration of why technology integration in teaching and learning in HEIs could be viewed as innovation. Innovation implementation effectiveness is then discussed, along with the requisite frameworks. Theoretical models related to integration of technology are discussed, with a note on research gaps. Finally, the chapter proposes a conceptual model to be adopted in the study.

Chapter Three explains the detailed approach employed in the study. First, the research paradigm adopted in the study is discussed. A detailed research design is provided, which is followed by a discussion of the logistic regression model that was adopted in

the study. The chapter explains how the variables proposed in the current study were to be measured, including the data type for ease of data coding. Detailed discussion of the study population is provided. The chapter also provides an explanation of how the research instruments were developed, including how the instruments would assist in answering the research questions. In the section on data collection procedure, information is provided on how data were collected, with a detailed explanation of why web-/email-based survey dissemination was adopted. The chapter also discusses the response rate achieved and provides justification for the achieved response rate being considered acceptable. The chapter explains how data coding for both qualitative and quantitative data was done. The different methods and statistics adopted in the study are discussed, including how correlation between independent variables was tested. This chapter concludes by addressing the ethical issues that were considered in the study.

Chapter Four provides a detailed report on the findings of the research study. Taking that the study used both quantitative and qualitative approaches in data collection, it starts by providing the respondents' demographic details, and then reports the findings of statistical tests like reliability and validity. Results of factor analysis of the items within the different determinants are provided, indicating how the final items that were considered in the study were reached. The results of logistic regression analysis are also discussed. Finally, Chapter five provides conclusion, the contribution made by the study and ends with recommendations for further research that could be drawn from the current study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter deals with the domain of technology innovation implementation. It delves into technology in higher education institutions (HEIs) and the reasons why the corporate firms like the banking industry in developing countries have been performing better than HEIs in assimilating innovations. The chapter also reviews innovation and related models in implementation and then considers issues of implementation effectiveness. Technology implementation models that arose from the context of the current study are presented. The chapter then takes a critical review of the empirical literature on technology implementation effectiveness and comes up with a conceptual model for providing guidance in effective technology implementation in HEIs.

2.2 Educational Technology Innovations and Higher Education Institutions

HEIs' main goal is to produce skills through provision of education. A university, for example, builds a good reputation and becomes popular due to the quality of education it provides. It is natural that when discussing ICTs and HEI, the focus should be on supporting this main goal. There is a great deal of literature available on adoption of 'electronic learning' (e-learning) (Tinio 2002). Dodds (2007) took a different approach, focusing on areas where ICT can act as a contributor to university innovation. Dodds (2007) believed that when integrated in education, ICT has the potential to achieve the following: build communities of innovation; remove barriers to effectiveness; create effective services and new possibilities for collaboration; establish continuous communication; create a culture of trust; and empower staff and faculty. Dodds argued that integrating ICT in education could ensure the following: ubiquitous access to education by transcending time and space; access to remote learning resources; improvement of the quality of education and training even with massification of education; improved learner motivation to learn; and enhanced teacher training.

ICT has the potential to promote business excellence. The major benefits of computers and computerization could be argued as proving: speed and reliability. Dodds (2007)

noted that IT introduces simple time saving tools and reliable infrastructure. It is in these benefits of computing, combined with IT that is aligned with university business goals, which the potential for excellence can be found. Dodds further observed that contemporary research has moved away from lone-ranger scholar type research in the 'ivory tower' to "international multidisciplinary teams of investigators" (Dodds, 2007: 7), a notion that Balasubramanian *et al.* (2009) supported. Through ICT therefore, a university can tap into the research prowess of a myriad studies of a multidisciplinary nature drawn from elsewhere in the region, the continent and the globe.

Educational technologies refer to the application of technology with the express intention of advancing education. Technological innovations that have been applied in education in recent years include instructional radio, television, personal computers, computer-based instruction, the Internet, Web 2.0, e-learning, and m-learning (Veletsianos, 2010). These educational technologies are tools applied in diverse educational settings (including distance, face-to-face, and hybrid forms of education) to meet varied education-related purposes (for example instructional, social, and organizational goals). Computers, mobile phones and television have comprised a huge part of these educational technologies, which is why for the most part educational technology has been viewed as synonymous with information and communication technology (ICT).

ICT denotes a convergence between computers and communication devices, and due to this technological convergence, we mainly understand ICT to be synonymous with computers (which are often thus referred to as ICTs). In Sub-Saharan Africa, mobile phones have become more common than computers (Aker & Mbiti, 2010). With the convergence of mobile technologies and computers and with effective interoperability, then a better synonym for ICTs could 'computing devices'.

Veletsianos (2010:3) noted the "sense of isolation" as among the greatest hardships endured by the poor, and contended that ICTs are capable of removing and can indeed remove the poverty. ICTs have been touted as potentially powerful tools for enabling transformation in HEIs (Achimugu, Oluwagbemi, & Oluwaranti, 2010). If well aligned with HEI goals, ICTs can help expand education access, raise education quality, enhance

research, assist universities to cut management costs, and ensure proper tracking of resourcing, including human resources among others. Technology has numerous benefits to offer in the learning process. Ale and Chib (2011) believed that apart from enhancing technology literacy and familiarity, computer-based learning could help the students who actively participate in it to achieve enhanced levels of motivation and increased zeal in tackling challenging questions, with more understanding of concepts. ICTs can be a great resource in HEI in developing countries because they have the potential to assist in improving policy formulation and execution. They can also create a wide range of business opportunities.

2.3 Innovation in Context

The term 'innovation' has had a myriad of definitions and interpretations. Krizaj (2001) took an economic perspective and defined innovation as an activity in which an invented entity is further developed into a commercial application; this commercial application would be accepted in a specific social system, by virtue of assisting the institution to move from the status quo and would do things much better. Rogers (2003) defined innovation as newness of an idea, practice or material artifact. Rogers viewed the wider definition of innovation as an idea, practice or artifact perceived as new by the unit adopting the innovation.

On the other hand, in attempting to provide a definition of innovation in the context of higher education, Ng'ethe (2003) did not provide an explicit definition. Rather, Ng'ethe first correctly observed that the myriad of definitions is drawn from industrial and commercial settings, and claimed that the definition of the term innovation is blurred by other available concepts. Ng'ethe (2003) also viewed innovation as meaning a change in the way of doing things and/or doing different things. In comparing the various definitions available, Ng'ethe (2003) stated that the "main differences between the definitions are the use of the word innovation either as an event or as an engagement in an activity and the varied levels of organization to which the newness of innovation applies" (Ng'ethe, 2003: 16). Other definitions view innovation as introducing something new to the world – that is, something that has never existed before. This is where the term 'innovation' and 'invention' are synonymous. Quoting Hannard and Silver (2000), Ng'ethe noted that an innovation might be new to one institution or

person but might be practiced elsewhere. In this case, then, the HEI would be copying best practice from elsewhere. Nge'the's argument was supported by Klein and Knight (2005), who further contended that an innovation need not actually be new but might simply be perceived as new by the adopters. For the purpose of the current study, the definition of innovation that was adopted was "a planned process of introducing change, intended to bring about improvements or solve or alleviate some perceived problem" (Klein & Knight, 2005:15).

Attridge (2007) defined innovation as "something new" and thus that definition was supported by Chigona and Licker (2008), who defined innovation as the effective implementation of a new or significantly improved idea, service, process or practice that is intended to be useful. From this definition, it becomes clear that Dodds saw technology as having emancipatory power. Klein and Knight (2005) definition was adopted because in the case of PHEA-ETI projects, the universities involved did not invent the technologies but integrated them in existing teaching and learning processes. In short, the current study looked at a situation where HEIs are being innovative without being inventive – that is, implementing creative technology ideas.

Innovation plays a central role in income and employment growth (and quality of life more generally). Chigona and Licker (2008) contended that innovation holds the key to the continuity and growth of companies. Harkema and Schout (2008) observed a strong and positive correlation between innovation and economic growth – this, Attridge noted, makes a case for why governments in developed countries place high emphasis on innovation.

Kenya's development blueprint, the Kenya Vision 2030 (Republic of Kenya, 2007), recognized science, technology and innovation (STI) as one of the drivers of socio-economic transformation. Kenya Vision 2030 specifically underscored the need to move to a knowledge-led economy. Under the strategies for promoting STI, the blueprint, in the section on "intensification of innovation in priority sectors", recognized the role of institutions of higher learning and the importance of their collaboration with industry. The blueprint also noted that indigenous technology remains unmapped and untapped.

The failure to tap into our local capability for innovation has seen most companies in Kenya importing software from Finland and other developed and developing countries, thus losing a lot of revenue to foreign firms. The blueprint further stated that "in order to encourage innovation and scientific endeavours, a system of national recognition will be established to honor innovators" (Republic of Kenya, 2007: 23). The blueprint therefore clearly acknowledged the role of innovation and tapping into our local talents in achieving national development. The blueprint's vision of developing innovation supported the adage that for a firm or country to remain at the leading edge it must tap into the brain power of its human resources.

2.4 Technology Innovations and Higher Education Institutions

This section discusses the state of technological innovations in higher education institutions (HEIs) in Sub-Saharan Africa

2.4.1 State of Technology Implementation in Higher Education Institutions

Oliver (2002) contended that the impact of ICT in the fields of "medicine, tourism, travel, business, law, banking, engineering and architecture" has been quite enormous in the past two decades. Furthermore, Oliver (2002) conceptualized technology as being crucial to education and development; this is, in its ability to move content faster and further. Oliver (2002) bemoaned the state of technology in education and states: "there seems to have been an uncanny lack of influence and far less change" (Oliver 2002: 1). Among the reasons cited for slow uptake is lack of funds to acquire the ICTs and also for training. According to Oliver, another possible factor in a slow response on the part of HEIs might be that ICT in education makes learning learner-centred, which creates tension in some teachers and students. Oliver thus noted a paradox by claiming that the modern university evolved to foster and nurture technology but has fallen behind the pace of the same technology. Traditionally, HEIs have tended to have a lethargic approach to responding to the information that the IT revolution provided. Universities have not therefore played a key, proactive role in innovation diffusion. This know-it-all, arrogant attitude was evident when the Google duo tried to sell their idea to their alma mater (Vise, 2005).

Chigona and Licker's (2008) noted that the public perceives higher education as lacking in the ability to effect change. Brewer and Tierney cited the work of Getz, Siegfried, and Anderson (1997), found that HEIs took longer than 'other industries' to adapt to innovations. This is an indication that lack of innovativeness and a slowness to effect change are not confined to HEIs in Africa only. However, this trend has changed with the only problem being the adoption of technology with alacrity by HEIs.

Kizza (2009) noted that although African universities had a late start in ICT acquisition, there seemed to be a period of renaissance, and observed that part of this was brought about by NGOs and donor organizations. The PHEA-ETI projects were one example of such a donor initiative. Kizza (2009) observed that African universities had grappled with technology implementation due to the following: difficulties in equipment acquisition, limited capacity, limited research and development resources, and lack of investment in ICTs. The PHEA-ETI attempted to offer a solution to some of the challenges Kizza noted. Therefore the PHEA-ETI was answering Brewer and Tierney (2010) call to make technology innovation useful by maximizing its adoption.

Tinio (2009) agreed with Oliver and saw this as the fruits of institutional arrogance and resistance to change, which have caused universities to fail to tap into the opportunity to "level the education playing field worldwide" (Tinio, 2009: 102) – a potential provided by breakthrough technologies.

Balasubramanian *et al.,* 2009 and Brewer and Tierney (2010) contended that, compared to other industries, which have improved productivity by embracing technology, higher education has continued to suffer from "too slow" and "too little" innovation in technology. Brewer and Tierney (2010) reasoned that most universities' teaching and learning remain unchanged. Brewer and Tierney (2010) believed that HEIs are still glued to the "seminar method" – what is called "Socratic method" – and that the lecture method referred to as "sage on the stage" remains the dominant models. These models are not only labour-intensive but also put a lot of pressure on physical facilities. Furthermore, the methods have not been seen to engage the students well, and efficiency in learning is hampered.

In noting that higher education forms part of what is known as the labour-intensive sector, Brewer and Tierney (2010) argued that HEIs should ape the behaviour of industry. Brewer and Tierney (2010) contended that by adopting new technology (read ICT), industry has been able to achieve a more flexible use of labour, and change both organizational structure and external environment. To the authors, IT helps organizations "track outputs, monitor operations, communicate with customers and react to shifts in external demands" (2010: 8). Further, Brewer and Tierney (2010) noted that though industry has heavily integrated ICT in most of its functional areas, HEIs has continued to lag behind, relegating this technology to course support. Brewer and Tierney (2010) were succinct in illustrating the role of ICT in increasing organizational productivity. In the private sector, the alignment of ICT to business needs has seen industry reap benefits from investing in technology. In higher education, such alignment is simply lacking. ICT integration in industry has been seen to achieve cost saving, without requiring changes to product quality. These kinds of benefits provide a powerful argument and motivation for HEIs to institutionalize ICT; HEIs would be able to generate profits and put those profits towards upgrading and increasing physical infrastructure, reducing faculty workloads, enhancing administration and enhancing the monitoring of the performance of both teaching and administrative staff.

It seemed that no serious initiatives have been undertaken to address the key barriers to innovation integration (Bertrand, 2010). Bertrand (2010) called for a critical examination of the factors related to education and administration that make institutions unable to adjust; Bernard called for a "revolutionary paradigm".

Industry has been able to reap the benefits of technological innovations due to, among other things, engaging in innovative culture, developing absorptive capacity for technology and engaging in technology transfer. Firms that encourage innovation among the staff would be able to tap the potential ideas within. Fogg (2012) noted that everyone has and can develop creative and problem-solving skills; what is needed is to exploit that potential. This would in effect result in tangible benefits, which would ensure firms remained competitive. To achieve this, the organization, and the individuals within, must have the right attitude to innovation. Fogg (2012) noted that culture was one of the

factors that determined a firm's capability to absorb new knowledge. The support structures and processes, and the people's perception and valuing of innovation would determine whether an organization has an innovation culture. People and organizational behaviour could also be an indicator of how well a firm is ready to generate and accept innovations. Finally, the firm needs to have the capability in terms of capacity for innovation.

Institutional absorptive capacity refers to a firm's ability to "identify, assimilate and exploit knowledge from the environment" (Fogg, 2012: 1). It is the ability of a firm to deal with externally available knowledge. Fogg (2012) noted that the ability of a firm to absorb knowledge was key to attaining competitiveness. Fogg (2012: 3) noted that a firm with absorptive capacity should be able "to recognize the value of new knowledge, assimilate it and apply it to creating business value". A firm with absorptive capacity is able to use knowledge that is developed within, acquire knowledge from other industries and also generate knowledge through research. Fogg (2012) found that a firm's research and development intensity has no great significance in determining that firm's absorptive capacity. Fogg (2012) assertion could be exemplified by the case of higher education where, although the HEIs are involved in research, unfortunately the results are not comparable with those of industry. Having absorptive capacity would lead to diffusion of innovations adopted by a firm. Fogg (2012) noted that HEIs could be the antecedent factor in building absorptive capacity in small enterprises.

For inventions to be regarded as successful innovations, there is a need to transfer the inventions to organizations for use. Technology transfer involves sharing with others and/or the acquiring of skills, personnel and technologies by others who can exploit the technology for new products and services, Fogg (2012). Fogg (2012:1) conceptualized knowledge transfer as "how knowledge and ideas move between knowledge sources to the potential users of that knowledge". Institutions should, therefore, go beyond disseminating information on the new technologies and should also demonstrate their use. HEIs have played the key role of coming up with technology inventions and transferring these innovations to industry. Abrams, Leung, and Stevens (2009) found that HEIs in the United States spent 0.6% of their budgets on transferring technology

resulting from their research initiatives. Fogg (2012) proposed that HEIs could play a key role in knowledge transfer to small and medium enterprises.

Ng'ethe (2003) conducted a research on Higher Education Innovations in Sub-Saharan Africa and succinctly captured the need to innovate in the context of higher education. Ng'ethe noted some of the broad contextual factors affecting HEIs and stimulating innovation as being "economic, political and cultural" Ng'ethe, (2003: 18). Influence of globalization features strongly in his work. There is therefore external pressure too to be innovative. This recognition of the role of HEIs in national development is also acknowledged by business and industry. Ng'ethe (2003) cited other factors that support the need to innovate: high levels of student enrolment, globalization, and internationalization of higher education, rapid advances in technology, and the economic hardships and financial constraints experienced in HEIs.

Ng'ethe (2003) argued that there has been a revolution in African universities in the past decade. Sawang and Unsworth (2007: 14) observed that "innovate or die" was the mantra for global economy. For an organization to be successful, it must innovate. Innovation keeps organizations in a competitive position among their peers. This mantra is not lost on modern universities. For example, while in Kenya some years back the public universities did not see the need to innovate, the mushrooming of private universities that have entrepreneurial tendencies has made public universities sit up and take notice.

2.4.2 Innovation Adoption and Institutional Change

Organizational change is generally related to IT and can take many forms. For example, changes may occur in the following areas: service delivery – the development of new types of services to customers, including services based on new technologies and communications facilities, which might represent an organization's response to changing customer needs and market trends; the business changing its operations in order to compete on the same level as its competitors; business processes – including re-engineering a business process to use new technology for financial gain; people systems – changes in roles, responsibilities and working relationships; requirements for retraining based on new technologies; structures and facilities – the establishment of

new organizations, agencies and partnerships to facilitate the development and delivery of IT facilities. Change might be an organization's response to changing customer needs, and/or to new technologies, including the implementation of new IT infrastructure to support internal and external communications and information sharing for competitive advantage. Technological change can be driven both internally and externally. Heiss and Jankowsky (2001) pointed out, however, that establishing or re-engineering processes to link technology resources and company objectives is a major challenge.

Organizational change in response to technology developments has become a norm and an expectation; but all of these expectations come against a backdrop of reduced government funding, challenging economic times and thus ill-equipped centres of research. Somewhat ironically, perhaps, this makes it even more pressing that HEIs embrace innovation, to remain relevant and to meet public expectations that they achieve not just skills development but also inventions.

Innovative change has a positive connotation. Ng'ethe (2003) observed that innovation had to do with improvement and creativity in the way/s one wants to do things. In introducing the concept of reforms in innovation and HEIs, Ng'ethe (2003) stated that reforms also imply change and improvement. Weldon (2000) noted that change can be formal, proactive and planned, or emergent (unplanned and informal). Introducing a library circulation system would be an example of a planned process in a university; the automation of the library service could be aimed at faster processing, which keeps a credible method of tracking borrowing and returns. Innovation and change have been viewed as synonymous. For example, innovation has also been defined as a planned process of introducing change. Specifically, Sawang and Unsworth (2011) made the distinction that although automating processes that were previously done by humans could be regarded as an innovative change, laying off employees could *not* be viewed as an innovative change.

2.4.3 Technology Changing the Role and Function of Higher Education Institutions

Emergence of the global economy impacts heavily on the nature and purpose of educational institutions (Tinio, 2002). While access to information has grown

exponentially, HEIs must move away from their traditional role of transmitting information from teacher to student over fixed period of times and must embrace technology and play a proactive role in facilitating learning. Tinio (2002) noted ICTs' ability to transcend time and space, providing information anytime, anywhere. This allows access to remote information, thus facilitating the ubiquitousness of information/data. In this new scenario, some institutions have held to their obsolete and archaic 'chalk-and-talk' approaches, while others have embraced innovative ways of information dissemination. The Massachusetts Institute of Technology's (MIT) Open Course Ware (OCW) was just one illustration among many of such institutions. These new models provide 'uninterrupted' knowledge resources, thereby in effect promoting opportunities for professional development. Macharia and Nyakwende (2009) contended that "the future of Universities hinges on their ability to embrace and leverage the potential of emerging technologies – read ICTs – at all levels…" (Macharia & Nyakwende, 2009: 7). Macharia and Nyakwende went on to note the slow uptake of ICTs in HEIs in sub-Saharan Africa and contended that universities in the region needed to take advantage of ICTs.

Massive open online courses (MOOCs) have given rise to greater openness of higher education. Yuan and Powell (2013) noted that MOOCs have the potential to disrupt the traditional way universities have been offering education, and that the introduction of MOOCs has seen universities offering free learning through open learning platforms. The cost-effective massification of education is one attribute of MOOCs that should be of interest to universities and governments alike, especially given constrained budgets. Yuan and Powell (2013: 1) further noted that HEIs in South Africa were experiencing increased pressure from government to meet objectives related to "social transformation and skills". Further MOOCs would allow universities to remain competitive in the modern era of globalisation of education.

Modern technology – including wireless communication, instant messaging (IM), and social networks, among others – has had a disruptive effect on how information diffusion takes place. Knowledge is now seamlessly distributed across the globe (using different media, mobile, Internet, IM). Bertrand (2010) contended that location no longer presents a challenge to information access. Bertrand (2010) further cited the case

of the course "Epidemiology Super", which is a repository for thousands of health-promoting and disease-prevention lecturers from across the globe, drawn from more than 56,000 scientists from more than 174 countries. MIT's OCW and "Epidemiology Super" are just two examples of the ways that universities are innovating, in response to and via ICTs. Such cases might dictate what might be termed the "new model for global higher education.

African universities have not been left behind in opening up their institutions through open education, distance learning and online learning (Pedró, 2012,Yuan & Powell, 2013, Liyanagunawardena, Adams, & Williams, 2013).

2.5 Theories of Technology Innovation

This section studies a number of theories in the technology innovation domain. The discussion of these theories provides insight into how innovation occurs in organizations generally.

2.5.1 The Innovation Cycle

The Innovation Cycle is a model proposed by Schoen *et al.* (2005) and was also known as the Model for the Invention to Innovation Process. Directing their ideas at managers of technology incubators, Schoen *et al.* (2005) opined that past project management models were incomplete representations of the innovation cycle. They note that models like the Waterfall Model, adopted from the waterfall model of systems development, were staged and restrictive. Schoen *et al.* (2005: 5) referred to the Waterfall Model as a "stage-gate" model as there are gates from one phase of development to the other, with known deliverables from each phase, which become the inputs for the next phase. This means that each phase is dependent on successful completion of the previous one.

Schoen *et al.* (2005) contended that, unlike in the Waterfall Model, the processes are not necessarily strictly defined. In past project management models, the authors contended, there are well-defined outcomes and therefore one proceeds towards the outcomes. The authors then introduced the Spiral Model. Again, this is borrowed from the spiral model of systems development, which was proposed by Boehm in 1998. Schoen *et al.* (2005) noted that the Spiral Model is better suited than past project management models to development cycles, because in development the outcomes are not necessarily clear or

well defined. The developer therefore went through the cycles (iterations) to delve deeper into the requirements.

Schoen *et al.* (2005) noted that technology managers often deal with technologies that do not have well-defined outcomes, timelines or project goals; and that sometimes these technologies are emerging from university laboratories. This means these projects have no clear starting points, which past models such as the waterfall, funnel and vat models do not take into account. Schoen *et al.* then presented a modified spiral model that they referred to as the Innovation Cycle. Figure 2.1 illustrates the innovation cycle, as postulated by Schoen *et al.* (2005).

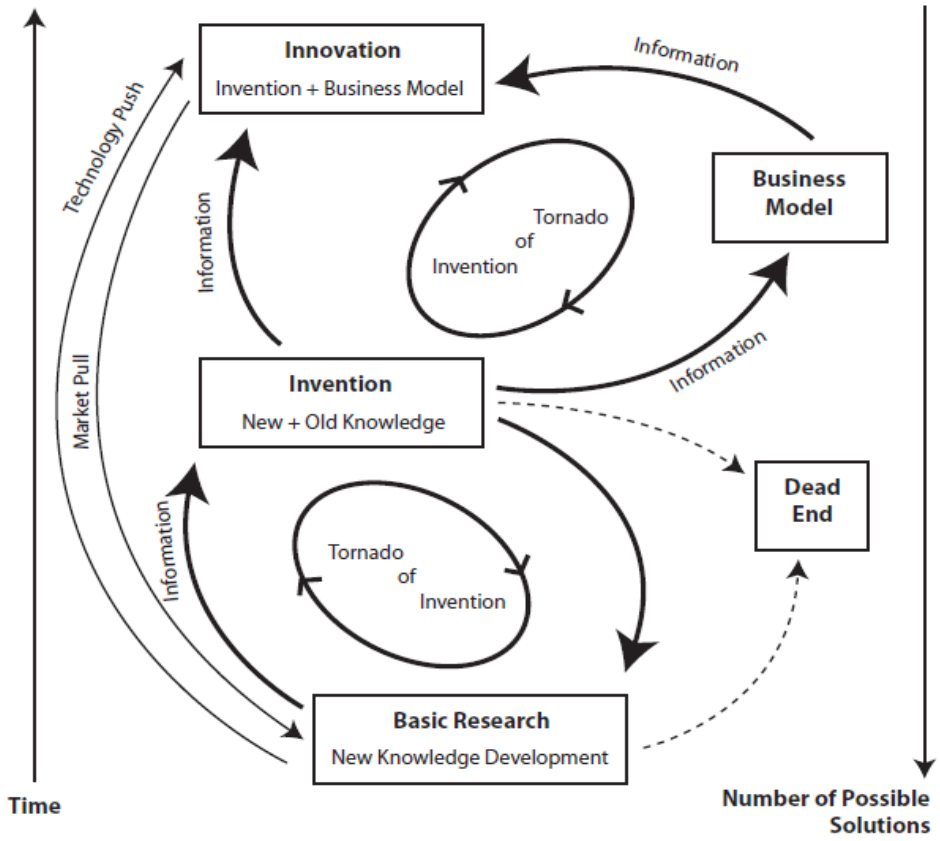

Figure 2.1: Model for the Invention to Innovation Process

Source: Reprinted from"The innovation cycle: A new model and case study for the invention to innovation process" by Schoen, Mason, Kline, & Bunch, 2005, Engineering Management Journal, 17(3), p.8.

Schoen *et al.* (2005: 8) noted that innovation "is not a step-by-step, set the pins up and knock them down type of operation and requires mating a good idea with an even better concept". This concept is echoed in the work of Albert Eistein, who believed that innovation was not a product of logical thought, although the result was tied to logical structure. The thinking of Schoen *et al.* (2005) in this regard echoed Hamel's (2000) assertion that innovation represents the triumph of contrarianism and the breaking free of mental constraints.

2.5.2 Technology Implementation Effectiveness

Weiner *et al.*, (2009) believed innovation adoption to be a process that can be divided into two phases (processes): the initial adoption process phase, of top management buy-in and acceptance of the need to adopt the technology; and the subsequent phase, where technology is institutionalized. The second phrase is the implementation phase. (In the initial process, the adopter might also, on being introduced to the innovation, decline to buy into the process and might rather discard the innovation.)

In the initial stage of innovation adoption, the problem is defined and the potential adopters conceptualize the solution in the form of the innovation and agree that the innovation would solve the stated problem. The implementation process begins once the user (management) has agreed to adopt. At this point, several activities take place, including redefining the problem, making it clear to the implementation team, and ensuring the team has understood the problem and how the innovation was brought in. The implementation team then engages in activities that will institutionalize the innovation. For the innovation to realize the intended benefits, the implementation process must be effective (i.e., a success).

When a decision is taken and an innovation is used, this is referred to as implementation (Klein & Sorra, 1996; Dong *et al.*, 2008; Ika, 2009, Damanpour & Marguerite (2009). Implementation is the process followed and the series of activities undertaken to ensure an idea or product has been put to productive use. The innovation implementation is a process that comes after adoption of an innovation. The innovation would be deemed as effective – a success – if the users appreciate the innovation, gain the necessary skills to

use it, appreciate it, and thus integrate the innovation into their work process. In the IS context, innovation users become part of the system and acknowledge their role. In attempting to define innovation implementation, Weiner *et al.* (2009) viewed the term 'adoption' as multifaceted. To them, adoption is a composite with three phases: decision-making, implementation, and assimilation. For Weiner *et al.* (2009), implementation is the phase between the time that the decision is made to adopt an innovation and the time that the innovation becomes institutionalized; that is, users take it and start using it in their daily business. Implementation can thus be seen as a deliberate and sequential set of activities, which are directed towards putting an adoption proposal into effect, making it occur. Implementation is synonymous with: achieving; fulfilling; setting in motion; establishing; accomplishing; finishing; realizing, actualizing or even deployment for ICT systems. Implementation follows the preliminary thinking (adoption) and is an active venture. In an ICT context, implementation encompasses all the processes involved in getting new software or hardware operating properly in its environment. These include: installation, configuration, and running, testing, and making the necessary changes.

Effectiveness can be viewed as a measure of output (Pfeffer & Salanacik as cited by Limmanont, 2010). Limmanont (2010) conceptualized effectiveness as a perception – a perception that the project has met the technical performance specifications and/or mission to be performed, followed by a high level of satisfaction concerning the project outcomes. Effectiveness measures organizational activities and is based on evidence and results as stipulated in the initial process phase. Being about perception, values and preferences, effectiveness could thus be termed an internal standard. Coming up with an objective measure of effectiveness can thus be challenging. Limmanont (2010) argued that what makes effectiveness difficult to measure is the multiplicity of outputs (goals) organizations pursue. If one cannot measure an attribute, then it means attaining it becomes ambiguous. Implementation, on the other hand, can be defined as translating an innovation into productive use in an organization. It can also be defined as putting something into effect according to some definite plan or procedure.

Peng and Kurnia (2010) defined innovation implementation effectiveness as the perceived benefits that an organization realizes from an innovation. They are not

succinct; however, when it comes to what IS implementation effectiveness is. According to Klein *et al.* (2001: 5) as cited by Peng and Kurnia (2010), implementation effectiveness is the "overall, pooled or aggregate consistency and quality of innovation use in an organization".

Implementation effectiveness can be viewed from a general project management perspective. For example, Peng and Kurnia (2010) posited project implementation success as comprising several variables: developed on time, developed within budget, achieves originally set goals (as per proposal), and finds acceptability by users (intended clients). Efficiency ensures that processes and controls are correctly implemented, working as intended and meeting the desired function. One needs to look at implementation through the lens of the stakeholders, who therefore determine if implementation has been effective or not.

Wunderlich and Größler (2011) posited that in looking at project success, there is a need to assume a range of different lenses: stockholders', managers', customers', and employees', as all of these stakeholders contribute to organizational implementation effectiveness. Wunderlich and Größler (2011) further observed that success could neither be treated as black nor white. Sawang and Unsworth (2011) and Wunderlich and Größler (2011) observed that early productive use of an innovation and with user satisfaction meant there was higher implementation effectiveness. According to Klein and Sorra (1996), implementation effectiveness describes the quality and consistency of the use of a specific innovation within an organization as a whole. Hence, implementation effectiveness can be interpreted as the extent of intraorganizational acceptance and usage of an innovation over time. Sawang and Unsworth (2011) posited further that during implementation, the immediate outcome of interest is initial or early use. For the current research study, the definition of implementation effectiveness was borrowed.

2.6 Theoretical Models

Theory is a set of interrelated concepts, definitions and propositions, which provide a systematic view of a phenomenon. Theory therefore guides practice and research, which then enables testing of the postulated theory. Through theory, a study is also able to

generate questions for research. The theoretical framework attempts to answer the following questions: i). What is the problem?; and ii). Why is the study's approach the feasible solution to the problem? (Anfara & Mertz, 2006). Chigona and Licker (2008) succinctly expressed the need for a theoretical framework. The two researchers identified four benefits of adopting a specific framework for a research study. First, Chigona and Licker (2008) indicated that a specific framework makes it possible to make predictions, which they say should be proven to be true over the course of the study. Second, a theoretical framework sets out a procedure for conducting the study in a systematic way, looking only at the things the study needs to measure. The third benefit, according to Chigona and Licker (2008), is that a theoretical framework helps when it comes to explaining what is happening; the explanation uses the terminology of the theory. Finally, Chigona and Licker (2008: 58) contended that using a theoretical framework provides an opportunity for the theory to be improved when used. Chigona and Licker (2008) noted that if the theory does not "do a good job of predicting, managing or explaining, it needs to be improved".

Thus in determining the effectiveness of technology innovation implementation, the researcher needs to identify a theoretical framework. To complete the current research study and provide a focus, the researcher sought more information on the IS domain from existing thematic models and measurements tools that could be harnessed to help measure innovation implementation effectiveness in HEIs.

2.7 Technology Implementation Effectiveness– Empirical Models

This section discusses some of the previous studies on innovation implementation effectiveness. Specifically, the study aims to understand the variables that were used and the test statistic results on each variable. The empirical literature cited in this section adopted the organizational theory model postulated by Klein *et al.* (2001). At the end of the section, the gaps that this study endeavours to fill will be highlighted.

2.7.1 Implementing Computerized Technology

Numerous studies have tried to explain what might lead to successful adoption of innovations. However, as already noted above, most of these studies address only the initial stage of innovation adoption, what could be referred to as the decision-to-adopt stage. One study, however, that came up with a model that looked at the whole process

of implementation, from initial decision making to innovation effectiveness, was by Klein *et al.* (2001). That work has been widely cited, reviewed, critiqued and modified. Klein *et al.* (2001) studied the implementation of computerized technology and proposed a model. Specifically, the study looked at manufacturing resource planning (MRP), that is, software integrated by manufacturing firms to assist in their processes. The software assisted firms in tracking production schedules, inventory control, management of the supply of parts, and management of sales. Specifically, the researchers studied the plans that had gone live, that is, the MRP systems that the firms in question had begun to use up to 24 months before commencement of the study. Thirty-nine plants based in the United States were considered for the study. Respondents to the survey tool used were plant managers, other managers and supervisors that were involved with the system, the team involved in the implementation of the system, and the users of the system. In total there were 1,219 respondents. The survey tool mainly used a five-point Likert scale measure, with the plant being the unit of analysis. Figure 2.2 shows the model of Klein *et al.* (2001) for innovation implementation effectiveness.

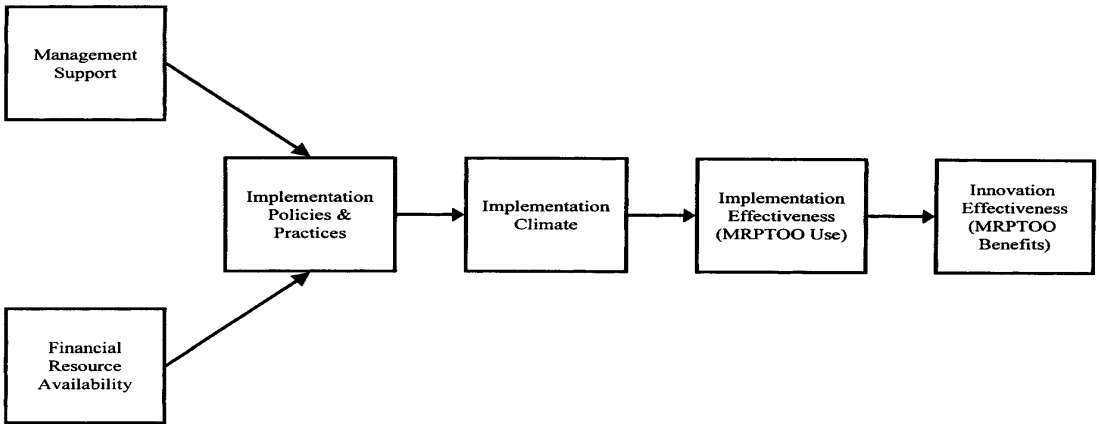

Figure 2.2: Innovation Implementation Effectiveness Model

Source: Reprinted from Klein, Conn, and Sorra, 2001, "The challenge of innovation implementation "Academy of Management Review, 21(4) p. 13.

In the study results of Klein *et al.*, (2001), the following variables were found to be important and thus could be used to measure computerized technology implementation effectiveness: financial resource availability ($p<0.01$); management support ($p<0.05$); implementation climate ($p<0.01$); and implementation policies and practice ($p<0.001$).

The study used structural equation modeling to test the overall fit of the model. Furthermore, Klein *et al.* (2001) noted that success in implementing innovations had a great influence on an organization's survival. The study therefore noted that for the first time it had elicited the information that management support, financial resource availability, implementation policies and practices, and the implementation climate would see different organizations either make the implementation process effective or not. Maditinos, Chatzoudes, and Tsairidis (2012), in their study on the effective implementation of enterprise resource planning (ERP) systems, adopted the model of Klein *et al.* They came up with a questionnaire that was distributed to 361 companies in Greece. The September–December 2008 data collection exercise saw 108 usable questionnaires returned. Structural equation modelling (SEM) was used to analyze the data. Just like in the case of Klein *et al.* the study by Maditinos *et al.* (2012) noted that top management support greatly determined effective implementation. Other significant factors included: user support, consultant support, communication effectiveness, conflict resolution, and knowledge transfer.

Klein *et al.* (2001) relied solely on the survey method and thus would have missed out on the details behind the figures. This is an area that further research might have pursued. The study also looked at only one innovation, which meant that there was a limit to the generalizability of the research findings.

2.7.2 Effective implementation of worksite health-promotion programmes

Weiner *et al.* (2009) studied the implementation effectiveness of worksite health-promotion programmes. This was one of the many studies that have adopted the implementation effectiveness model of Klein *et al.* (2001). The study by Weiner *et al.* (2009) noted that although the work of Klein *et al.* (2001) was based on technological innovations, it could also apply in health-promotion studies. Weiner *et al.* (2009: 293) defined implementation as a "course of action to put into use an idea, decision or program". Weiner *et al.* (2009) posited that during implementation the immediate outcome of interest is initial or early use. Weiner *et al.* (2009) advocated the adoption of the organizational theory when considering implementation effectiveness in such programmes. To Weiner *et al.* organizations have an authority-based innovation decision process, meaning that the decision regarding whether to adopt or not is based on the

organization. A study by Werlinger, Hawkey and Beznosov (2009), on implementing IT security, supports the application of organizational theory as suggested by Klein *et al.* (2001). Furthermore, Weiner *et al.* (2009) argued that the organizational structure produces the different levels of implementers and also introduces the organizational dynamics; they note that the implementation process is a collective undertaking, not a 'one-man show'. Weiner *et al.* (2009: 294) observed that the activities in the implementation – viz: planning, promotion, training, resource allocation, pilot testing – "must be coordinated and synchronized for employees working in different functional departments, work shifts and work locations", and that senior managers expected that the innovation implementation process would lead to collective benefits to the organization. Figure 2.3 shows the Weiner *et al.* (2009) model of implementation effectiveness.

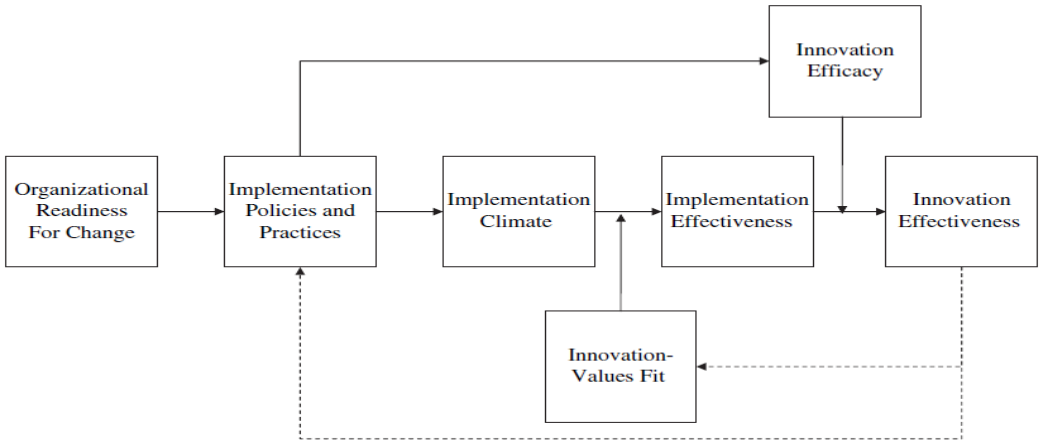

Figure 2.3: Determinants of implementation effectiveness

Source: Reprinted from Weiner, Lewis, & Linnan, 2009, "Using organization theory to understand the determinants of effective implementation of worksite health promotion programs." *Health Education Research,* 24(2), P.12

Weiner *et al.* (2009) study focused on the Working Well Trial, which involved four centres: Harvard/Dana Farber Cancer Institute, Brown/Miriam Hospital, MD Anderson Cancer Center and University of Florida. This was an experimental study that involved reduction of cancer risk by "increasing employees' consumption of dietary fiber and reducing consumption of dietary fat and use of tobacco products and changing the worksite environment to support these employee health changes". The study found the

following to be key in determining implementation effectiveness: organizational readiness for change (i.e., the extent to which employees were ready to make changes in organizational policy and practice, to make the innovation a success); implementation policies and practices (i.e., strategies put into place to support innovation use); implementation climate (i.e., employees' belief that the innovation was needed, and would be supported and rewarded); and a further variable: innovation-values fit (i.e., employees' belief that the innovation would be of benefit to their work).

The Weiner *et al.* (2009) model has not been empirically tested. The study by Weiner *et al.* was not clear on what tests had been done to confirm that the determinants were key to effective implementation. Furthermore, the Weiner *et al.* study concentrated on a "parsimonious" set of organizational constraints. Weiner *et al.* encouraged those who adopt their model to add more constructs, for the sake of accuracy. Many of the constructs proposed are those found in the Klein *et al.* (2001) model, which made the model's application quite plausible in studying implementation effectiveness.

2.7.3 Implementation effectiveness in small to medium firms

Sawang and Unsworth's (2011) study aimed to validate an earlier model by Sawang, Unsworth, and Sorbello (2006) that focused on implementation effectiveness. The Sawang, Unsworth, and Sorbello (2006) model was a test of the model of Klein *et al.* (2001) and undertook a comparison of Thai and Australian firms. In the 2011 study, Sawang and Unsworth surveyed 135 organizations, and "human resources" was noted as a significant contributor to implementation effectiveness. Specifically, the study found that skilled employees' availability was positively related to implementation effectiveness of innovations in firms. The initial model that the Sawang and Unsworth (2011) study adopted had the following variables: financial resources availability; top management support; implementation policies and practices; and implementation climate. Some 750 firms were selected from the Australian Business Register, and the unit of analysis was the firm itself. Of the sampled firms, only 135 firms, responded, which the study computed as an 18% response rate.

From the Sawang and Unsworth (2011) study, the following variables were found to be significant: financial resources availability with two items and $\alpha = 0.76$; top

management support with three items and α = 0.77; implementation policies and practices with six items and α = 0.81; implementation climate with three items and α = 0.92; and implementation effectiveness, where the employees in the firms were asked to describe their experience with innovation. Again the variable was tested for internal reliability and had an α = 0.74. Human resources availability had two items that were adapted from a 2009 study by Nystrom *et al.* The internal reliability estimate was 0.73. The enhanced model had adequate fit to the sample in the study. As with the Klein *et al.* (2001) study, the Sawang and Unsworth (2011) study used a single survey, which means that some of the underlying issues could not be brought out.

2.7.4 Assessing Implementation Success

One theoretical perspective that can help inform our understanding of assessing implementation effectiveness of IT projects in Africa, relevant for the education sector, is a set of constructs proposed by Johnson (2000). Johnson's argument was that in assessing implementation effectiveness, there should be a positive weighting of the three groups of factors of innovation framing, innovation environment and innovation attributes. Each of the three terms is the subject of a great deal of literature, although typically in a disaggregated manner. Thus the attractiveness of Johnson's approach is in how the three concepts are used as structuring metaphors for establishing the success of innovation implementation effectiveness. He makes the argument that none of the three, on its own, is sufficient to determine the success of a project, and that they present eight possible conditions of success that arise from a combination of the three factors (Johnson, 2000). Johnson pointed out that implementation effectiveness/success could only be realized if an innovation is properly framed according to stakeholder expectations; that an internal innovation environment must be present; and that the 'pros' of specific attributes of innovations must outweigh their 'cons' (Johnson, 2000). The key determinants in their conceptualization of success (the perceptions) need to be inferred as being positive or negative and the result is then used to determine the effectiveness of the implementation.

Johnson's conceptualization of success was in line with the thinking of Han, Yusof, Ismail, and Aun (2012), who concluded that there was no such thing as "absolute success" and that there was only the "perceived success of a project", with evaluation

changing over time. As per Ika *et al.* (2010), such a conceptualization of success would imply that implementation success and failure were not necessarily contradictory notions (Fincham, 2008), nor were they a "black and white" issue (Ika, 2009: 2), but could analytically be on a continuum to explain various shades of success and failure of innovations. Johnson (2000) adopted the above conceptualization and linked it to implementation effectiveness based on eight propositions, as outlined in Table 2.1.

Table 2.1: Conditions of innovation implementation

Implementation Outcome	**Proposition**
Success	Innovation implementation success results from high framing, a good internal environment and pro attributes.
Forced success	The condition of forced success, where there is high framing, a good internal environment and con attributes, results in partial success.
Mandated failure	The condition of mandated failure, where there is high framing, a bad internal environment and con attributes, results in partial failure.
Tactical success	The condition of tactical success, where there is low framing, a good internal environment, and pro attributes, results in partial success.
Techno-political failure	The condition of techno-political failure, where there is low framing, a good internal environment and con attributes, results in partial failure
Support failure	The condition of support failure, where there is low framing, a bad internal environment and pro attributes, results in partial failure.
Failure	Low framing, a bad internal environment and con attributes will result in failure.

Source: Adapted from Johnson (2000), "Levels of success in implementing information technologies". *Innovative Higher Education*, 25(1), p.4.

The simplicity and versatility of the classification adopted by Johnson (2000) allows for an evaluation of project success without falling into the trap of an either/or judgment as to whether an innovation is a success or a failure. For instance, using the three concepts of innovation framing, innovation environment and innovation attributes, it is possible to map out influence processes at the macro level (framing), the meta-level (environment) and the micro level (attributes). While there may be other theories for studying innovation implementation effectiveness, the concepts and approach advocated by Johnson (2000) appears to be uniquely suited to uncovering factors that influence

success at various levels, and thus this research fills a gap in IT innovations research focusing on implementation effectiveness.

2.8 Research Gaps

The following gaps could be identified in the empirical studies above. As already noted, the Klein *et al.* (2001) study relied on a single survey and thus might have ignored the details behind the figures. This is an area that further research would have looked into. The study also only looked at a single innovation, which meant that there was a limit to the generalizability of the study results. The model by Weiner *et al.* (2009) had not been empirically tested. For example, the study was not clear on what tests were done to confirm that the determinants were key to effective implementation. Furthermore, the authors stated that Sawang and Unsworth concentrated on a parsimonious set of organizational constraints. Sawang and Unsworth encouraged those who adopt it to add more constructs for accuracy. Many of the constructs proposed are those in the Klein *et al.* (2001) model. This makes the model's application quite plausible in implementation effectiveness study. Like the Klein *et al.* (2001) study, the study by Sawang and Unsworth (2011) used a survey method that was more prescriptive. A way of exploring the underlying issues in technology implementation would thus be more satisfactory.

In general, the studies cited above took a prescriptive approach. The view adopted was of innovation implementation as a product, instead of as a process with different issues from one project to the other. Although the different studies cited above adapted the organizational theory model, they did not focus on the role of monitoring and evaluation, team leader and innovation efficacy. Further, the underlying issues in technology implementation process have been ignored. The issues include: technology transfer, institutional absorptive capacity and the effect of technology-adopting culture on innovation implementation. The current study proposes a conceptual framework to help identify the determinants of technology implementation effectiveness in HEIs in Africa using a process-based approach.

2.9 Summary

Literature review chapter began with a review of technology in HEIs and what has necessitated adoption of technology. This was followed with a review of literature on

state of technology in HEIs. Different theories of innovation were then discussed followed by a review of some empirical models that could apply in technology implementation in HEIs. Based on the empirical studies, it is therefore easy to develop conceptual model for this study. The remaining section of the chapter thus discusses the conceptual model with chapter three concentrated on construct operationalization, data collection and analysis.

2.10 Conceptual Framework

A conceptual framework is used in research to outline possible courses of action or to present a preferred approach to an idea or thought. A conceptual framework – also called a research framework – gives the research an overview of how various issues in the research work are conceived, and their relationships. Sawang and Unsworth (2011) believed that through the issues developed in clarifying the conceptual framework, the research study gets a better understanding of the whole process under investigation.

In the this study, previous models of innovation implementation effectiveness were used as the basis for proposing the conceptual framework to be used. From the empirical theories, Klein *et al.* (2001), Weiner *et al.* (2009) and Sawang and Unsworth (2011) formed a good basis for devising the current study's conceptual framework/model. These models integrate social/human factors in determining implementation effectiveness. The research aimed at describing the key constructs emerging from the study that are relevant to the study. Figure 2.4 illustrates the conceptual model used in the study.

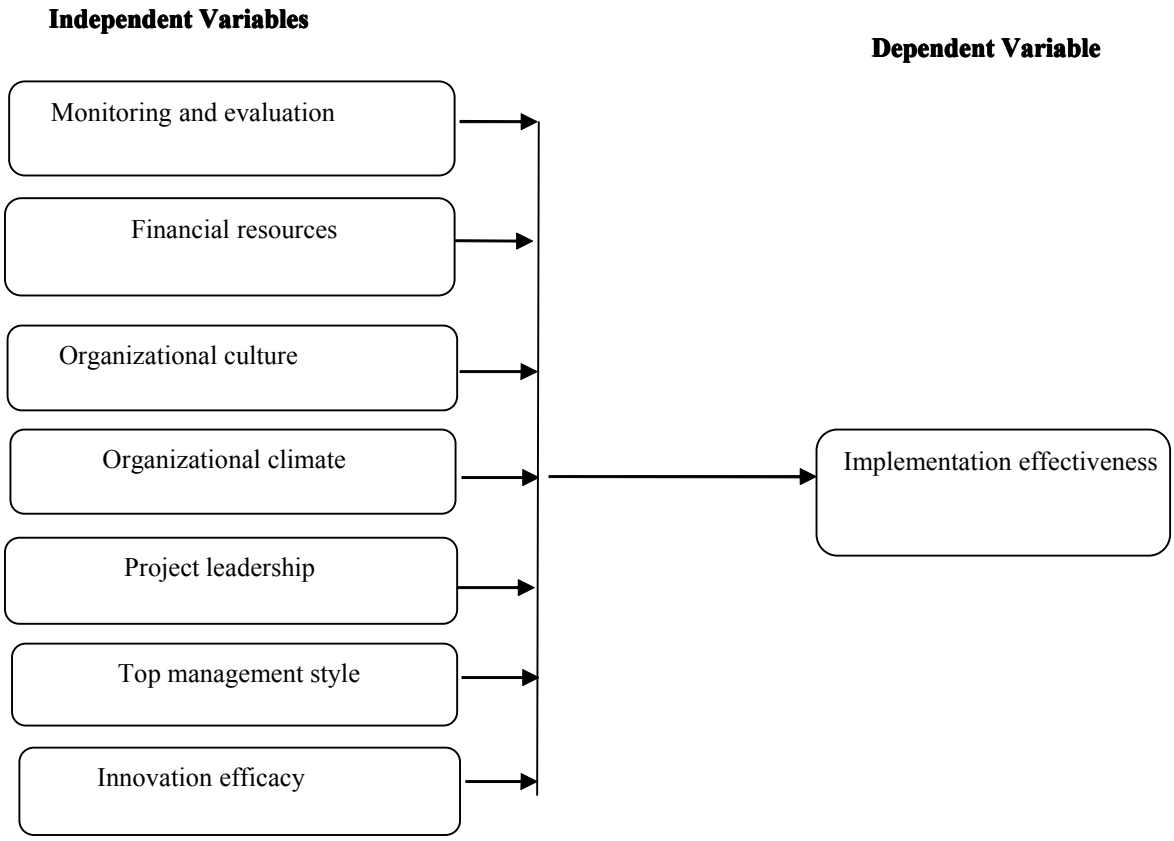

Figure 2.4: Conceptual model with propositions

The current study proposed to adopt and modify constructs used in researching implementation effectiveness of IT (Weiner *et al.*, 2009; Sawang & Unsworth, 2011). The conceptual model adopted a social angle in studying IT implementation effectiveness. The proposed conceptual framework assumed that the dependent variable "IT implementation effectiveness" was influenced by a range of other variables, including: implementation climate (workflow/workload, changes, new reporting systems, provision of feedback); monitoring and evaluation (through project workshops, milestones, evaluator feedback, and lobbying with management); financial resource motivation (availability of money when needed, compensation); project leadership (knowledge of project management, ICT knowledge, commitment); and top management (appointing of leaders, appointing of internal monitoring team, and provision of resources).

2.10.1 Determinants of Implementation Effectiveness

From the above theoretical and empirical literature, the following can be construed as the overarching drivers of effective implementation: monitoring and evaluation; financial resources; organizational culture; organizational climate; project leadership; top management style; and innovation's efficacy. Various studies have biases towards some factors; for example, for Osei-Bryson *et al.* (2008) and Vaughan (2001), users and managers play the most significant role in successful implementation of ICT-based systems.

Discussing what is meant by effective (successful) or ineffective (unsuccessful) implementation of IS, Fitz-Gerald and Carroll (2003) added another angle: of challenged implementation. Fitz-Gerald and Carroll regarded this as partial success and contended that this is an area commonly ignored. They cited Standish's (1999) definition of challenged implementations as "implementations which may have run over budget, are operational but still not delivering full functionality" (Fitz-Gerald and Carroll, 2003: 7). King (2002) looked at the implementation of technology-based IS and argued that in achieving successful implementation, the principles that differentiate engineering from alchemy, and an organized process through the adoption of models, should be regarded as key ingredients. King (2002) argued that top management support, user involvement, and a clear statement of requirements form a framework for success. King advised that Management must ensure optimal use of existing resources before engaging any financial commitment.

2.10.2 Monitoring and evaluation

Citing Thomson and Hoffman (2003), Montgomery and Zint (2010) argued that evaluation should not be encouraged in the following circumstances: when a programme is unstable, unpredictable and/or has not achieved a consistent routine; when those involved cannot agree about what the programme is trying to achieve; and when a funder and/or manager refuse to include important and central issues in the evaluation. Montgomery and Zint (2010), in their online publication, defined evaluation as the critical examination of a programme. Montgomery and Zint posited that evaluation involves collecting and analyzing information on programme activities, characteristics and outcomes. Montgomery and Zint saw the purpose of evaluation as making a

judgment so as to improve the programme's effectiveness, thus informing programming decisions.

Project implementation requires considerable financial, human and other resources. The project sponsor defines the project characteristics. Investment in these resources is key to the project success. It is incumbent on the investors – whether these resources are international, national, regional or even local – to assess the impact and success of the activities and outcomes according to the description of the project to be implemented. First Tranche online blog (2012) noted that the success rate for projects with high levels of quality monitoring and evaluation (QME) was 93%, compared to a 3% success rate for those with low levels of QME. Montgomery and Zint (2010) noted that effective supervision was necessary for project success. The following can be regarded as important in effective M&E: it allows actors to specify the determinants of success, it provides points of unity for adjustments, it identifies best practices, and it encourages the improved use of resources and capacities.

2.10.3 Financial Resource Motivation

Most studies in ICT adoption contend that lack of funds in Africa has been a great factor in the slow uptake of technology (Klein *et al.*,2001, Ng'ethe, 2003). Studer (2005) noted that adequate financial resources were among the main determinants of project success. Finances are vital for project development and operation so as to realize the specified outputs. Some costs will cover maintenance. Finance therefore needs to comprise the following: development finance, to cater for feasibility studies and preliminary design of the project; finance for construction and implementation; and contingency finance to deal with possible overruns.

Studer (2005), in looking at the adoption of electronic medical records (EMR), noted that the high cost of implementation and the need to support the operation of the IS were major hindrances to their adoption. In the midterm evaluation report on the Republic of Angola project on decentralization of local government financing, this came out as one of the project concerns. High direct and indirect costs have been noted as barriers to technology adoption (Studer, 2005). These costs include hardware and software costs, training, facilitation, promotion, and motivation of staff, among others. Macharia and

Nyakwende (2010) believed that finances are vital in the acquisition of ICT (hardware and software), as are training in technology and allowing time to experiment with the new technology. Macharia and Nyakwende further contended that finances are required in order to come up with the policies and practices required for implementation. This shows that finances could be regarded as critical in conceiving of any adoption process. In the project planning process, the critical role finances play is elicited in the financial feasibility studies undertaken.

2.10.4 Organizational Culture

In their study based in Kenya on implementation of an integrated financial management system (IFMIS), Indeje and Zheng (2010) investigated the role of culture in IS implementation. Indeje and Zheng argued that culture links the adoption of a given technology and the organizational growth. To understand the cultural aspect better, Indeje and Zheng (2010: 2) took a structuration theory approach, and posited that the structure of "social systems exists only in so far as forums of social conduct are reproduced chronically across time and space". Indeje and Zheng (2010) further argued that through socialization, people became dependent on some social structures. On the other hand, the activities of the people alter these same social structures. New structures created, in turn create new norms, meaning and power. The roles that define interaction are interpretive schemes. Duties and rights expected of the actors are the norms. Indeje and Zheng (2010) argue that a financial IS comprises people, hardware, software, suppliers and procedures. They also argued that IS could be understood when the 'people aspect' is isolated from the rest. People within an organization are defined by beliefs, culture and work practices. Indeje and Zheng (2010) therefore viewed IS as social systems in which technology is just one of the many comprising facets.

Indeje and Zheng (2010) adopted an ethnographic research approach in their IFMIS study. This was to help understand the intrigues involved in the implementation of the IFMIS. In their findings the researchers noted that senior managers were always too busy with managerial activities to attend training. Although the senior managers were required to attend initial training, especially for purposes of familiarization with the system, this did not happen. The senior managers would send lower-ranked officers. Furthermore, the study showed that those sent for training were considered unreliable

and dispensable by their bosses. This, according to the study, affected the adoption of the IFMIS. The centralization of the IFMIS under the Accountant General's office was noted as causing resentment in other departments. After the IFMIS was initiated, the directorate of human resources developed an "Integrated Personnel Payroll Database (IPPD)" (Indeje & Zheng, 2010: 6). To the researchers, this was evidence of the resentment felt by departments; the IPPD was stand-alone, meaning that each ministry ran its separate database – and yet the IFMIS was meant to run on a centralized server. All of this helped to explain why the IFMIS project, though launched in 1997, was still fraught with implementation challenges at the time of the research. In their interviews with administrative and support staff, the study's researchers noted that there were a lot of emotions associated with the project. Some respondents were even happy that the project was not successful. Some believed an integrated system in government would never work, while others disapproved of the style adopted in the management of the project. Ten years down the line, affected government departments were still using manual reports running parallel to computerized reports.

In looking at system implementation success, Vaughan (2001) argued that user involvement is one of the practices highly correlated with success. In a study on a hospital information system (HIS) adoption, Peng and Kurnia (2010) found that user involvement had a direct correlation with smooth implementation of the HIS. Furthermore, Peng and Kurnia (2010) argued that through user involvement a strong sense of ownership is forged among end-users, thereby enhancing system acceptance. This is further supported by Lin and Shao (2000), who argue that having strong user involvement in the design of a system has three benefits: it results in wider usage of the system; the system gains user acceptance; and users are more satisfied with the system. All of these studies indicate user involvement as being a key factor in improving IS implementation success. It is due to the key role users play in the implementation of a system that Damodaran (1996) focused on user roles in a system. The argument in Damodaran's (1996) study was that users should not just be used to 'rubber stamp' processes but should have direct participation in system implementation. In fact, Damodaran (1996) reasoned that the high rate of IS failure that is prevalent could be attributed to inadequate involvement of users.

Vaughan's (2001) assertions were supported by the various models that elucidate the role of users in systems implementation, including the Technology Adoption Model (TAM) and the Diffusion of Innovation Model (DIM). TAM indicates that the perceived usefulness (among users) of a system acts as an 'enzyme' to encourage the right attitude among users with regard to adopting an innovation. Involving users results in their buying in to the project idea and seeing its significance for their daily routines. By contrast, any user surprises might lead to system rejection. Vaughan (2001) further outlined that acceptance of a new system could be achieved through the following: anticipating changes by getting inputs from knowledgeable sources; free expression, even where there are contrasting views on the system; system surprises reduced by allowing previewing by users and realistic system testing; and ready assistance provided to users.

By the same token, it is necessary that users are informed early enough of their responsibility or responsibilities and what would be expected of them in terms of the project. Furthermore, users need to understand what relationship they could have with the system and be allowed a preview of the feel of the system. When users consider a system as important to their work, they are highly likely to value that system. This ensures post-implementation involvement and a positive attitude. Peansupap and Walker (2005) argued that users need support and encouragement to use an innovation. In citing Egbu *et al.* (2001), Peansupap and Walker observed that users pose a major motivation factor towards IT/ICT use. Peansupap and Walker's (2005) research indicated that user characteristics and attitude form the motivation for use of IT/ICT; and users who are eager to learn and who have high self-confidence are more likely to use new ICT applications. Importantly, previous exposure to technology might provide the much-needed self-confidence on the part of the user.

Among the benefits of user involvement are the following: improved quality of the system arising from more accurate understanding of and catering to user requirements; avoiding costly system features that the user did not want or cannot use; improved levels of acceptance of the system; and greater understanding of the system by the user, resulting in more effective use and increased participation in decision-making in the organization. Damodaran (1996) contended that lack of user involvement from the

preliminary stages of an ICT project is a recipe for problems for the future. In advocating addressing human (user) issues and costing them early enough in the project, Damodaran (1996) argued that it is more costly to integrate changes in post-implementation stages. Damodaran (1996) further argued that effective participation of users should be encouraged. To be effective in an IS innovation, users should not simply be expected to rubber stamp what already exists but should be involved from the project inception stage onwards.

2.10.5 Organizational Climate

Klein and Sorra (1996) contended that various institutional policies and practices can contribute to developing a positive organizational climate that promotes innovation use. Klein (1996) argued that the extent to which institutional members feel that innovation use is supported, expected or rewarded is positively associated with implementation effectiveness. Klein *et al.* (2001) posited that a strong organizational implementation climate provided more consistent high-quality innovation use in an organization, provided that the innovation fits with the intended users' values. The focus in terms of organizational climate should be on members who will either use innovation directly or will support others in doing so (for example ICT specialists). Klein *et al.* (2001) viewed an organization's implementation climate as different from organizational member satisfaction or appraisal of the innovation itself. For an organization that values innovation and implementation, the implementation climate might not be essential and cultural values might suffice.

Patterson *et al.* (2005) defined organizational climate as the shared perceptions, among employees, of events, practices and procedures. Therefore, the concept of organizational climate has applications to analysis of individuals, groups and/or entire organizations. Furthermore, organizational climate can be aggregated within a group or department. Organizational climate is different from culture, and culture describes the organizational mental model. There is a thin line between climate and culture; thus Patterson *et al.* (2005) agreed that the two could be used interchangeably, and that both describe employee experiences within their organizations. While climate could be designated by patterns of behaviours for some task, however, culture explains why the patterns exist, which means that culture is a longer-lived phenomenon, whereas organizational climate

can change from one task to another. Specifically, organizational climate addresses the question of whether the work environment is a stimulating one for any task undertaken.

Leaders greatly influence the organizational climate. Four dimensions of organizational climate could be: individual autonomy; degree of structure imposed on the situation; reward orientation; and consideration, warmth, and support. Furthermore, Patterson *et al.* (2005) posited that these four dimensions could be analysed, in turn, by thinking about four areas: (1) the role of stress and lack of harmony; (2) job challenge and autonomy; (3) leadership facilitation and support; and (4) work-group cooperation, friendliness, and warmth.

Previous contention by Klein was supported by Rivard, Lapointe, and Kappos (2011). Rivard *et al.* (2011) believed that measuring the implementation climate of an organization can be challenging, due to the fact that this attribute operates at organizational level but also requires the collection of multi-dimensional perceptional data from many expected innovation users within the organization.

Rivard *et al.* (2011) furthermore contended that an organization's implementation climate is more pertinent in cases of innovation that requires collected, coordinated behaviour benefits. The policies and practices include: training, technical support, incentives, persuasive communication, end-user participation, workflow changes, workload changes, alteration of staffing levels, alteration in staffing mix, new reporting requirements, new authority relationships, implementation, mounting, and an enforcement procedure. Noor and Dzulkifli (2012) and Noor and Dzulkifli (2013) noted that there were mixed results on research into the role of the organizational climate in innovation.

2.10.6 Top management

Pinto and Slevin (1987) viewed implementation as a complex undertaking. This is because human attention to budgetary and technical variables is involved. According to Pinto and Slevin, how adoption takes place would make implementation either easier or more difficult. For example, top management makes the decision to adopt an innovation but the manager/s at the lower level/s are tasked with seeing the project succeed. King

(2002) argued that leadership plays a key role in times of change, because in order to succeed a project will need commitment at organizational level. It is the leadership that provides sponsorship; for example, avails finances, appoints a team, and appoints team leaders. Ke and Wei (2006) contend that top leadership also assists in getting user support in system implementation.

2.10.7 Innovation efficacy

Peansupap and Walker (2005) noted that the technology characteristics play a significant role in technology diffusion. In supporting Rogers' (2003) model, Peansupap and Walker argued that users' perception of technology is important during technology implementation. Thus an innovation should be easy to try by users and theys should feel it would be of benefit to use. Finally, the innovation should be relevant to the section being implemented.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter explains in detail the approach that the study employed. First, the research paradigm adopted in the current study is discussed. A detailed research design is provided, followed by a discussion of the logistic regression model that was adopted in the study. The chapter also provides an explanation of how the variables proposed in the study were to be measured, including the data type for ease of data coding. Detailed discussion of the study population is provided. The chapter explains how the research instruments were developed, including how the instruments would assist in answering the research questions. The section on the data collection procedure provides information on how the data was collected. The chapter explains how data coding for both qualitative and quantitative data was done. The different methods and statistics adopted in the study are discussed, including how correlation between independent variables was tested and the importance thereof. The chapter concludes by addressing the ethical issues that were considered in the study.

3.2 Research Paradigm

The study adopted a Critical Realist (CR) approach to investigate the determinants of effective implementation of technological innovations in HEIs. CR assumes that there are different entities independent of us and that investigation into them is possible. To a critical realist, organizational impacts are not determined solely by pre-determined factors; rather, these (pre-determined factors) are just one of the components that must be considered in accounting for effective implementation of an intervention in an organization. This is supported by Patomaki (2006), who posited that most mainstream social scientists attempt to apply deductivist ideas and methodical tools that are only suitable for use in closed systems of directly observable phenomena. CR does not blindly accept the traditional research approaches; rather, it supports the use of a positivist and an interpretive approach, and is engaged in extensive and intensive research design that is both fixed and flexible.

Dobson *et al.* (2007) enumerated four identifying features of CR: the assumption that something (for example the entity to be investigated) exists independently; it encompasses reflexivity; has the assumption that surface meaning can be misleading; has the assumption that when further information is discovered, the initial conclusions are subject to change. Zachariadis, Scott, and Barrett (2001) and Dobson *et al.* (2007), in advocating for CR, noted that it is often seen as a middle way between empiricism and positivism, on the one hand, and anti-naturalism or interpretivism, on the other, and can thus be said to reinvent realist ontology in a new and more sophisticated form. CR simultaneously confronts the central concerns of both natural and social science regimes. This makes CR of particular interest in the study of technological innovations, which bear significant relevance to natural science (due to their technological characteristics) and social science (due to their applications in deeply human contexts such as organizations). In studying the theoretical angle of technology, CR goes beyond the organizational level, in undertaking technological analysis. This builds a better understanding between the social and technical worlds, thus building on existing theory.

Dobson *et al.* (2007) contended that both positivist and interpretivist approaches address causal factors. Technological innovation implementation, however, poses the challenge of an open system, which has a non-observable components and layers, explanations and prediction of which are asymmetrical. Studying technology implementation therefore means precise scientific predictions can only be used to identify the descriptors. In arguing for the use of CR in such cases, Carlsson (2005) said that "traditional" research methods missed the "causal" factors that inhibit/promote implementation of technology. To understand the underlying issues in technology implementation, the current study applied mixed-method approach in both data collection and analysis.

Ågerfalk (2013) and Caruth (2013: 2) referred to mixed method approach as "the third methodological movement". Venkatesh, Brown and Bala (2013) and Ågerfalk (2013) observed that the mixed method "allowed the researcher to understand the phenomenon [for] which one method would otherwise be insufficient" Ågerfalk (2013:1). By combining both quantitative and qualitative methods in the same study, the research gains more insight (Caruth, 2013). Venkatesh *et al.* (2013), Caruth (2013) and Ågerfalk (2013) observed that the application of multiple paradigms would enable capturing: (a)

the objective (the material) world, (b) the subjective (my personal) world, and (c) the social (our intersubjective) world.

A mixed method approach has several benefits (Bryman, 2006; Venkatesh *et al.*, 2013; Ågerfalk, 2013; and Caruth, 2013): Triangulation – using different methods and designs in studying a phenomenon to identify convergence and corroboration; Complementarity – using the results from one method to clarify or illustrate the results from another; Initiation – discovering paradoxes and contradictions that lead to reframing of the research question; Development – using findings from one method to inform a research design involving another method; Expansion – using different methods for different inquiry components to expand the depth and breadth of the research; and, Diversity – using different methods to identify diverging views of the same phenomenon.

3.3 Research Design

This section provides an overview of how the research proceeded. The current study adopted an exploratory approach to implementation effectiveness. It utilized elements in both qualitative and quantitative research methodologies. The research answered the questions: Who?, What?, Where?, When?, Why?, and How? The study can therefore be classified as a combination of quantitative and qualitative research, because it is designed to establish the extent to which various variables contribute to realization of the project outputs, and the extent to which these variables determine implementation effectiveness. The descriptive survey in the study endeavoured to describe the status quo, but then the qualitative data to provided an explanatory dimension to the study. Both primary and secondary data were collected. Primary data collection involved the use of both interviews and questionnaires, while evaluation reports from the South African Institute for Distance Education (SAIDE) were reviewed and formed the basis of the secondary data, as a result of which appropriate tools were developed.

3.4 Empirical Model

The study uses a logistic regression model as an inferential analysis tool in the quantitative aspects of the study. In the study, the universities were viewed as adopters of ICT. Once adoption has taken place, consumers in each project (i.e., the users) intend

to be satisfied by the system they implement. This assumption is guided by utility maximization theory and, taking the rational choice theory, universities would expect to realize most of the outputs envisaged in each project. Users, therefore, would get more satisfaction if the projects were effectively implemented $U(a_i)$. If there was failure in effective implementation then utility would be $U(a_j)$.

Therefore, for utility maximization:

$$U(a_i) > U(a_j) \text{ ----------} \quad (3.1)$$

$U(a_i)$ and $U(a_j)$ denote the utility derived from the project$_i$ from effective implementation $U(a_i)$and failure in effective implementation $U(a_j)$.

Each project had a binary output; that is, either effectively implemented or failed to be effectively implemented. The dependent variable took binary response variables. Taking Y to represent project implementation, then:

$$y_i = \begin{cases} 1 \text{ if an innovation was effectively implemented} - \text{probability } p \\ 0 \text{ if innovation implementation was not effective} - \text{probability } 1-p \end{cases} \quad ----(3.2)$$

The values of 1 and 0 are chosen because of the binary outcome:

$$P_i \equiv \Pr[y_i = 1|X] = F(x_i'\beta) \quad ----------(3.3)$$

Where F(.) is a specific function. To ensure that $0 \leq p \leq 1$, it is natural to specify F(.) to be a cumulative distribution function.

The estimation model chosen as appropriate for this study was the logit model. A logit model is one of the models that can be used to analyze and predict data whose outcome is categorical (Peng, Lee, & Ingersoll, 2002). Logistic regression analysis is thus suitable where there is a dichotomous outcome – of success or failure. The logit model is also well suited for describing and testing relationships of categorical outcomes and one or more categorical or continuous predictor and where errors are neither normally distributed nor constant across the entire data range.

Logistic regression is based on the logit concept, which is a natural logarithm of odds ratio.

Peng *et al.* (2002) defined the logistic model as shown below:

$$logit\,(Y) = Ln\,(odds\;) - \frac{ln(\pi)}{1-\pi} = \alpha + \beta X + \varepsilon \qquad \text{……...…(3.4)}$$

Where:

α is Y intercept.

β is a vector of the regression coefficient.

π is the probability of the outcome of interest (implementation effectiveness in this study).

$e = 2.71828$, which is the base of natural log.

Taking antilog therefore:

$$\pi = Prob\,(Y = Outcome\ of Interest \mid X = X\ a\ specific\ value\ of\ X)$$

$$= \frac{e^{\alpha+\beta X}}{1-e^{\alpha+\beta X}} \qquad \text{……...…(3.5)}$$

Where:

X is a vector of categorical or continuous variables.

Y is always a categorical (dichotomous) variable.

The value of β determines the relationship between X and Y.

If β > 0, larger or smaller values of X are associated with larger or smaller values of the logit of Y. The converse also applies: if β < 0, larger or smaller values of X are associated with larger or smaller value of the logit of Y.

Where β = 0 there is no linear relationship.

For a multiple predictor mode (Peng *et al.*, 2002):

$$logit\,(Y) = \frac{ln(\pi)}{1-\pi} = \alpha + \beta_1 X_1 + ... + \beta_n X_n \qquad \text{……...……. (3.6)}$$

Therefore:

$$\pi = Probability\,(Y = outcome\ of\ Interest \mid X_1 = X_2 = X_3 = \frac{e^{\alpha+\beta_1 X_1+.....+\beta_n X_n}}{1+e^{\beta_1 X_1+.....+\beta_n X_n}}$$

……(3.7)

Where:

π= probability of an outcome.

α= Y intercept term.

βs= regression coefficients.

X_s= set of predictors.

α and β s were estimated using the Markov chain Monte Carlo (MC) method for maximum likelihood. Interpretation of results was done using odds ratio for both categorical and continuous predictors. The compound predictors were: monitoring and evaluation (X_1); financial resource motivation (X_2); organizational culture (X_3); organizational climate (X_4); project leadership (X_5); top management style (X_6); and innovation efficacy (X_7) – against an independent variable: implementation effectiveness (Y).

As noted, predictors (X_1…..X_7) were composite variables. Factors analysis was, therefore, used to combine the sub-variables to one composite variable to fit into the model.

A seven-predictor logistic model was used to fit the data for testing. The relationship between the likelihood of a project's effective implementation (Y) and its determinants (X_1….X_7) is described as follows:

$$IE(Y) = \alpha + \beta_1 X_1 + ... + \beta_7 X_7 + \varepsilon_i \qquad .... (3.8)$$

The logistic regression model is given as follows:

$$ln\frac{P}{1-P} = \alpha + \beta_1 X_1 + ... + \beta_7 X_7 + \varepsilon_i \qquad .... (3.9)$$

Where:

p	probability that a project was effectively implemented;
1-P	probability that a project was not effectively implemented;
Ln	natural logarithms;
α	Constant of the equation;

$\beta_1 \ldots \beta_7$ The parameters to be estimated;

$X_1 \ldots X_7$ The explanatory variables;

X_1 monitoring and evaluation;

X_2 financial resource motivations;

X_3 organizational culture;

X_4 organizational climate;

X_5 style of project leadership;

X_6 top management style;

X_7 innovation efficacy; and

ε_i the error term.

3.5 Definition and Measurement of Variables

Implementation effectiveness (Y): This is the dependent variable. Was measured on whether a technological innovation was effectively implemented or not. To be effectively implemented meant the innovation was in use and had achieved 60% of other objectives. A value of 1 meant effectiveness in implementation while 0 indicated not effectively implemented.

Monitoring and evaluation (X_1): This independent variable measured the role the external stakeholders played in implementation of the technological innovations. This was measured in terms of involvement in vouching for projects with top management, follow-up on the implementation process, and evaluators.

Financial motivation (X_2): The role of financial rewards in project implementation was adapted from the study by Sawang and Unsworth (2011).This attribute was measured in terms of financial compensation.

*Organizational culture (X_3):*This variable looked at the organization in terms of beliefs. This was measured in terms of the following: existing ICT infrastructure; assistance in using the innovation; awareness of the new system.

Organizational climate (X_4): In the current study, this variable looked at the social environment that defined the implementation of a specific project. While culture was understood to cut across the organization, climate was understood as being restricted to a project and/or task. This variable looked at skills (training); facilitation; and lack of obstacles. The attributes were adopted from Patterson *et al.* (2005), Dong *et al.* (2008) and Sawang and Unsworth (2009).

Project leadership (X_5): Leadership attributes looked at leader voluntariness; dedication to the project; previous projects managed; and ICT knowledge.

Top management (X_6): This variable was measured in terms of the role of top management in the following: appointing team leaders; and willingness to provide resources.

Innovation efficacy (X_7): This variable was measured on how well the users believed the innovation would foster of their values and, specifically, whether the innovation would add value to their work. This was measured based on how well the implementers believed the innovation would resonate with their section/department goals and thus whether it was of benefit to them. This measurement was adapted from the definition by Dong *et al.* (2008).

3.6 Target Population

The target population for the study was drawn from all the team leaders and implementation teams of the 26 projects based in the seven universities that participated in the PHEA-ETI from 2008 to June 2012. The study took a census of all these projects. The table in Appendix B shows the total respondents for the study.

3.7 Research Instruments

The study endeavoured to use mainly primary data collected using structured questionnaires and semi-structured interviews. The questionnaires were administered to all project team members and members co-opted during the implementation process. For ease of filling, the questions in the survey tool were mainly closed ended, but for the purposes of allowing respondents to provide data not captured in the questions, some open-ended questions were included.

The design of the questionnaire was based on knowledge elicited from related studies on technology implementation. Specifically, the questionnaire was adopted, with permission, from research on the same domain by Klein *et al.* (2001). Professor Katherine Klein was kind enough to share the research tool. Professor Klein with her two others had done a study on technology implementation based on manufacturing industry. The tool they used was thus customized to fit in this study. The questions in the questionnaire covered concepts contained in the conceptual model and were thus aimed

at answering the research questions. The questions specifically covered the areas of: financial resource motivation; top management; organizational culture; monitoring and evaluation; and success in implementation. The formatting of questions was based on these variable, where: section A collected demographic data; section B collected user involvement data; section C collects financial resource motivation data; section D collected team leadership data; section E collects organizational culture and ICT data; section F collected top management data; section G collected monitoring and evaluation data; section H collected monitoring data; and section I collects system efficacy.

To format the survey tool for ease of access and administration by users, the Google docs application was used. This application facilitated the creation of the questionnaires and administration via email. The use of web-based methods in disseminating the questionnaires had many benefits, including bypassing data entry and administration bottlenecks (Nulty, 2008; Hsieh & Liao, 2009). Web-based methods also provided real-time evaluation. This was evident in the case of the current survey, where once the respondent keyed in the data in the questionnaire, this was automatically reflected on the analysis sheet.

Using the web-survey approach was the most practical method for reaching the respondents. Furthermore, the email-administered questionnaire reduced costs while increasing the quality of the response in terms of the following: avoiding response error, avoiding item omission, and ensuring completeness of answers. The respondents ware prompted to fill in a compulsory field and this meant responses received were immediately usable. The researcher got buy-in from the project team leaders and also the project managers who distributed the questionnaire. A hot link URL was provided in the respondents' email body just after the introduction of the study (see Appendix E).

In designing the online survey, the researcher drew on Schafer (2007) to provide the guidelines on formatting the questionnaire. In Tip 8, for example, Schafer (2007) argued, "Always pretest the survey and revise it according to the feedback you receive". The questionnaire was therefore first typed in MS Word and formatted as form fill. This test version of the questionnaire was then sent to selected respondents from three participating universities, while another set of this test questionnaire was sent to

professionals in technology and IS research (including Prof. Katherine Klein and Lisa Foster, whose feedback was incorporated). Prof. Klein made available the tool she used to collect data in her research on technology implementation, and the existing tool for the current study was adopted and customized, with some questions re-formulated and others discarded. Survey instruments of Klein *et al.* (2001) and Sawang and Unsworth (2011) were highly applicable in the current study as those researchers' studies were also on technology implementation effectiveness.

For example, an item in the Klein *et al.* (2001) survey studied "financial resource availability". In the current study, though, all of the projects were funded, that meant that the question attempted to understand how the funds were made available for the intended purpose and to what extent the same funds were used as a motivation to participating members. Similarly, the role of sponsors who provided M&E was also studied. In total, there were seven constructs measured in the current study. These constructs were: monitoring and evaluation; financial resource motivation; organizational culture; organizational climate; style of project leadership; top management style; and innovation efficacy. These constructs were further contextualized though 25 sub-constructs. All of these were measured using a five-point Likert scale and limited listing questions, as per the attached questionnaire in Appendix C.

An interview guide (see Appendix D) was prepared to assist during in-depth interviews (IDIs) and focus group discussions. The respondents comprised all project implementers and the team leaders. Focus groups with project implementers from each university were also run in order to elicit further information on the projects. The validity of a research instrument is the extent to which the instrument – an experiment, test, or any measuring procedure – measures what it is intended to measure. Patrick, Burke and Gwaltney (2011: 1) envisaged that validity should have answered the question: does it "measure the important aspects of concepts that developers or users purport it to assess?" To ensure validity, the draft survey tool was developed from the variables in the conceptual model. As already mentioned, researchers in the ICT implementation domain (who have been cited in the current report) were emailed the survey draft to comment on it.

The reliability of a research instrument is the extent to which the research instrument yields the same result on repeated trials. Instrument reliability was achieved through the following approaches: training research assistants on use of the tools; paying the research assistants as one method of motivation; and broadening the measurement instrument by adding more questions relevant to the study objectives. Citing Straub *et al.* (2004), Dwivedi *et al.*(2010) explained on the need for conducting reliability testing so as to confirm internal consistency. In the current study, individual item reliability was measured using Cronbach's alpha. Cronbach's alpha tests how closely related a set of items are in a group. Krippendorff and Bock (2007), arguing what constitutes a valid reliability interpretation, posited that an analyst must employ an agreement coefficient in the statistic that could measure agreements among the values/categories that are used to represent the set of units. Yet, as Krippendorff and Bock (2007) noted, was be statistically implausible to get either a 1 or a 0 but it could be any point between the two. Thus, if the estimated Cronbach's alpha was above 0.7, then the instrument would be deemed to have a high internal consistency, and thus high reliability (Golafshani, 2003; Dwivedi, Choudrie, & Brinkman, 2006; Sanchez-Franco & Rondan-Cataluña, 2010; Çokluk, 2011; Bülbül, 2012). Krippendorff and Bock (2007) recommended $\alpha \geq .667$ as a minimum acceptable level of reliability.

Factor analysis was used to reduce to reduce the factors. Dwivedi *et al.* (2006) recommended employing factor analysis in order to confirm convergent and discriminant validity under construct validity. Before subjecting the data to factor analysis, Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity were performed. In the test, a value of 1 was deemed to be perfect, while a value below 0.5 was unacceptable (Bülbül, 2012). Specifically, Bülbül (2012) argued that "perfect in 0.90 range, very good in 0.80 range, average in 0.70 and 0.60 ranges and bad at 0.50 range" (2012: 4). Furthermore, Dwivedi *et al.* (2006) argued that construct validity exists if the Eigen value was at least 1.

To enhance validity, the study adopted an existing data collection tool and an implementation effectiveness model. Analysis of the model was based on: overall model evaluation; statistical tests of individual predictors; goodness-of-fit statistics; and validations of predicted probabilities (Dwivedi *et al.*, 2010; Peng *et al.,* 2002).

Specifically, in the case of predictor variables' coefficients, Wald statistics of each, associated degrees of freedom and probability values were measured. Empirical data on each of these measures is discussed in detail in the chapter. The results of the study are thus presented.

Multicollinearity analysis was performed to test the correlation between explanatory variables. This was done by regressing each of the independent variables on all the others. In this study, a pair wise relationship between any two variables using a correlation matrix was used. The same results were supported using standard error in the regression analysis. The standard error test was done in SPSS version 17, specifically; multicollinearity in the logistic regression solution was tested by examining the standard errors for the coefficients. A standard error larger than 2.0 would indicate numerical problems, such as multicollinearity among the independent variables

3.8 Pilot Study

Pilot testing was carried out with respondents selected from project teams and with a cited researcher in the domain area. Two respondents were drawn from each university participating in the PHEA-ETI projects. There were thus 14 pilot study respondents, who did not form part of the final respondents whose response was to be considered during analysis. Pilot testing helped check that the survey questionnaire elicited data for analysis on all of the concepts intended by the study, and it allowed the researcher to check for repeated and ambiguous questions and to get an idea of the approximate time the research instrument took to fill. Feedback received during the pilot informed modification of the research instrument and was incorporated to produce the final version of the survey questionnaire.

3.9 Data Collection Procedure

The study used both survey method where questionnaire was administered through web-based methods and also interview method.

3.9.1 Questionnaires

In this study, a standard set of questions were developed. The design of the questionnaire was based on knowledge elicited from related studies on technology implementation. Specifically, the questionnaire was adopted, with permission, from

research on the same domain by Klein *et al.* (2001). Professor Katherine Klein was kind enough to share the research tool. The questions in the questionnaire covered concepts contained in the conceptual model and were thus aimed at answering the research questions. The questions specifically covered the areas of: monitoring and evaluation, financial resource motivation; top management; organizational culture; organizational climate, team leadership and innovation efficacy. Some survey questions were developed so as to elicit responses to the dependent variable, whether a project was effectively implemented or not.

Gendall (2000) recommended following up with email respondents and also writing personalized reminders, and this technique was employed in the current study; it saw the number of responses rise from 77 to 105. The researcher contacted the team leaders to implore their members to fill the questionnaire. In a bid to increase the response rate, the study made a point of limiting the number of questions and also ensuring that most of the questions were closed ended. Although monetary incentives have been found to increase the response rate (Kenyon *et al.* 2005), this was not considered in the current research for two reasons: to avoid bias; and considering that the response rate before the first reminder was 20%, which is an acceptable threshold for a web-administered questionnaire. In the current study, a pre-notification of the survey and a request for respondents in each project in each university participating to fill out the questionnaire was done twice: first during the project workshop in South Africa in March 2012, and subsequently during the IDI in September–December 2012. Lusinchi (2007) and Jacob and Jacob (2012) believed that pre-notification during data collection has the potential to improve the response rate.

The study endeavoured to achieve a response rate of at least 60%. This according to Net (2009) and Schmidt *et al.* (2012) was what would constitute an acceptable response rate. Further, a higher response rate would have reduced non-response bias.

3.9.2 Interviews

For qualitative data, a semi-structured interview schedule was used to guide the process. In-depth interviews were conducted with each project team leader and with the overall PHEA-ETI project leader in each university. The team leaders assisted in getting the

project implementers to form a focus group discussion. Each in-depth interview and focus group lasted between 45 minutes and an hour.

Donalek (2005) argued that interviews help researchers in understanding the human experience. Pratt (2009) added that interviews are the part of the qualitative research process that helps to answer the "how?" rather than the "how many?" questions. To Pratt (2009), interviews help the researcher gather information on the issues from the informant's or respondent's perspective and thus help the researcher examine and articulate the process. Borrell (2008) posited that interviews are highly applicable in exploratory research. Smith, Bekker, and Cheater (2011) supported the assertion that qualitative research is more applicable in exploratory study and added that a qualitative research approach helps unravel complex phenomena and construct themes, thus bringing in a deeper understanding. Furthermore, Smith *et al.* (2011) argued that qualitative research complements quantitative research. In the current study, interviews and focus group discussions were conducted as itemized in Table 3.1.

Table 3.1. Interview respondents

University	**Number of respondents**	
	In-depth interviews	**Focus groups**
Makerere University	7	2
Universidade Católica de Moçambique	6	1
University of Dar es Salaam	6	2
University of Ibadan	7	4
University of Jos	1	2
Kenyatta University	6	5
University of Education Wineba	2	3
Total	35	19

Source: Survey data, 2013

Pratt (2009) argued that qualitative research (for example, interviews), unlike surveys, lack an agreed-upon number that comprise an acceptable number of respondents. To Pratt (2009) and to McCabe, Diez, Boyd, Nelson and Weitzman (2006), what might constitute enough responses depends on the research question that the study sets out to answer. Smith *et al.* (2011) argued that, unlike in quantitative research where large samples are important, for qualitative research the depth of data is more important. In

the current study, data was collected from a location where implementation was taking place, thus increasing the validity of data collection. For the current study, therefore, it was felt that the above interviews were sufficient in number to answer the research questions.

3.10 Data Screening, Coding and Refinement

Initially, the questionnaire that was emailed to respondents had all fields as compulsory. This had two implications: there were no missing values; and the response rate was low because some respondents, when they could not fill some fields, abandoned completing the questionnaire. This was mitigated by sending the respondents an MS Word version of the survey tool, which resulted in 20 missing values. Saunders (2012) indicated that missing values are a challenge to researchers. Saunders (2012) argued that the missing values could be dealt with in one of two ways: either ignore the missing values or use data imputation. Given that the data collection methodology ensured reduced missing values, in the current study the former approach was adopted.

Once the qualitative data had been transcribed, themes in the data were coded, which ensured that the concepts that were drawn out were directly drawn from the research. A phrase or word repeated by many was recorded as salient in the minds of respondents. For example, if all indicate that without finances the project would not have kicked off, then that would raise a flag. Data coding was also applied to the limited open section in the questionnaires. A code book was generated to standardize formatting data captured from the respondents, thus assisting in applying statistical analysis.

3.11 Data Analysis

Data were analysed quantitatively and qualitatively. Quantitative research (*realist or positivist philosophy*) involves collecting numerical data to explain a certain phenomenon and then using mathematical methods to analyse the data. All the seven research objectives were first analysed quantitatively. Qualitative analysis was used to explain survey findings. Smith, Bekker, and Cheater (2011) posited that qualitative analysis helped get deeper understanding of the phenomenon. Objectives were to be empirically analysed by getting a mean measure of composite responses from users.

Logit regression was used in conducting empirical analysis where inferences were drawn based on study population. In the logic model, the following independent variables were considered: Monitoring and evaluation, financial resource motivation, top management, organizational climate, organizational culture and innovation efficacy. The regression coefficient of each independent variable was tested using the Wald chi-square statistic. A p-value of 0.05 was used to test the goodness of fit. The Hosmer-Leme (H-L) test was used to test significance. The significance of each independent variable to the dependent variable was tested. A test of association between independent variables was performed and validation of predicted probabilities, Gamma statistic, which is based on Kendall's coefficient, was used. The adjusted odds ratio was used as the basis for data interpretation

Apart from getting a deeper understanding of what would support or impede innovation implementation effectiveness, qualitative analysis was used to corroborate the quantitative findings and also provide insights to the descriptive results. Qualitative research (also known as constructivist and interpretivist paradigm) is a non-numerical method that attempts to answer the 'why" questions. Qualitative research that and why was used to explain the quantitative findings. The interviews were transcribed verbatim and then theoretical thematic analysis was conducted. The transcribed write-up was read and re-read and the analysts extracted the overarching themes, referred to as thematic analysis. Thematic analysis was used to draw out the overarching themes from the transcribed work (i.e., from the qualitative data). The theoretical thematic analysis framework ensured that units with meanings that were related to the study objectives were identified. The meanings were coded against sub-categories, as per the framework adopted. Smith *et al.* (2011) contend that thematic analysis is among the common methods of analyzing qualitative data.

On what would be regarded as an accurate result, Glaser (2008: 1) argued that qualitative data provides the "meaning and factual interpretation" and thus was more accurate than quantitative data. Glaser's (2008) position was in support of Anderson (2006: 3) who argued that the "qualitative data generated rich, detailed and valid (process) data", thus enabling the researcher to gain in-depth understanding of the phenomenon. On the other hand, Wagner *et al.* (2013) advised on the need to understand

"the politics of representation and social roles and biases inherent in" conducting data collection in a given domain.

Wagner *et al.* (2013) argued that incongruous results between quantitative and qualitative findings could yield a more nuanced and comprehensive understanding of the phenomenon, giving various viewpoints. Mixed methods research is not always about supporting/corroboration or completeness, but through this method, the analyst gets an opportunity to explain the conflicting results and offer own interpretations.

Multicollinearity analysis was performed to test the correlation between explanatory variables. This was done by regressing each of the independent variables on all the other variables. In this study, a pairwise relationship between any two variables using a correlation matrix was used. The same results were supported using standard error in the regression analysis. The standard error test was done in SPSS version 17, specifically; multicollinearity in the logistic regression solution was tested by examining the standard errors for the coefficients. A standard error larger than 2.0 would indicate numerical problems, such as multicollinearity among the independent variables (Thapa *et al*, 2014).

3.12 Ethical Considerations

Before conducting the research, the researcher gained consent for the study from the following: PHEA-ETI donors; the different countries and institutions sampled for data collection; and the Kenyan government. Respondents were also assured of confidentiality of their response data. The researcher in this study was involved in the PHEA-ETI project as a team leader. To ensure objectivity in data collected, an independent person conducted the interviews with the implementers of the project the researcher was leading.

3.13 Summary

This chapter commenced by considering the research design used in the study. It then discussed the model, research instruments and testing for validity and reliability. Data collection and response rate were also discussed plus ethical considerations. The chapter also set the stage for the next chapter by discussing the data analysis methods that were adopted for the study.

CHAPTER FOUR

EMPIRICAL FINDINGS AND INTERPRETATIONS

4.1 Introduction

This chapter discusses the study findings. The first section discusses the response rate and next section discusses test of instrument validity and reliability. The empirical results of determinants of innovation implementation effectiveness in HEIs are presented, interpreted and discussed.

4.2 Response Rate

In this study, out of the expected 163 survey respondents, there were 105 completed and usable survey responses, which gave a response rate of 64.4%. In addition, a total of 35 in-depth interviews and 19 focus group discussions were conducted. Citing Hosie (1995) and Pew Research Centre (2000), Gendall (2000) concluded that a 50% response rate could be regarded as "…a rough rule of thumb for a minimum acceptable response rate in survey research" (2000: 5). Gendall further averred that it was possible to achieve a response rate of 60% or more. Nulty (2008), Net (2009) and Schmid *et al.* (2012) supported Gendall (2000) assertion and affirmed that though a 50% response rate was acceptable, a 60% response rate was desirable and achievable. It can therefore be concluded that 64.4% response rate, in this study met the minimum threshold and thus could be considered to be acceptable.

4.3 Assessment of Validity and Reliability of the Instruments and Internal Consistency

The survey questionnaire was tested for validity and reliability. Table 4.1 shows the reliability results.

Table 4.1: Individual item reliability

Variable	Reliability Test	Iterations	Comments
Monitoring and evaluation	NIL	-	Only one item, variable included
Financial resource motivation	0.514	4	Variable included
Organizational climate	0.603	2	Variable included
Top management	0.738		Variable included
Innovation efficacy	0.774	-	Variable included
Organizational culture	0.774	2	Variable included
Project leadership	0.703	2	Variable included
Contributing factors	0.839		Was to test all variables

Source: Field study (May, 2013)

When the items were tested for reliability using SPSS version 17, the determinant "Financial resource motivation" had an index of 0.350 but this rose to 0.514 after four iterations. The variable "Project leadership" had an index of 0.645 but this rose to 0.703 after two iterations. The variable "top management" had a reliability index of 0.738 with no iteration. The variable "Organizational climate" had a reliability index of 0.603 after two iterations. "Innovation efficacy" had a reliability result of 0.774 with no iteration. The variable "organizational culture" gave an output of 0.774 after two iterations. When a test of reliability was done on all of the contributing factors, the result was 0.839 with no iteration. Reliability of the individual variables was therefore assessed. Fillion *et al.* (2009) recommended the use of confirmatory factor analysis to verify the reliability of each individual variable. In the current study, this was done on all the sub-variables within the seven. It resulted in a high internal consistency of corresponding items. Discriminant validity was therefore satisfied. This meant that there was a high level of consistency in the survey responses provided, and thus all items making up the determinants were included in the study.

A test of internal consistency was also performed on the survey questionnaire. Internal consistency was tested using the split half reliability test. Under this test, if all items are drawn from the same domain, then the two halves should correlate highly with each other (Cook & Beckman, 2006). Table 4.2 shows the test results.

Table 4.2: Internal consistency results

Variable	Value	Iterations	Comments
Monitoring and evaluation	NIL	-	Only one item, variable Included
Financial resource motivation	0.70	4	Variable included
Top management	0.842	2	Variable included
Organizational climate	0.712	2	Variable included
Innovation efficacy	0.831	-	Variable included
Organizational culture	0.735	1	Variable included
Contributing factors	0.848	-	Was to test all variables

Source: Field study (May, 2013)

When internal consistency test was run on the data, the "Financial resource motivation" had a value of 0.70 after four iterations. Golafshani (2003) argued that iterations help to stabilise the results. The variable "Top management" had an internal consistency of 0.842 after two iterations. "Organizational climate" had a value of 0.712 after two

iterations. The variable "Innovation efficacy" had an internal consistency of 0.831, while "Organizational culture" had a value of 0.735 after one iteration. Finally, when a test of internal consistency was done on all the variables included in the model, the result was 0.848 with no iterations. This meant that all the variables had a high internal consistency, and thus all could be considered as determinants of innovation implementation effectiveness.

4.4 Implementation Effectiveness

The overall objective of the study was to determine if projects were effectively implemented. The dependent variable, which measured implementation effectiveness, was categorically represented by "Yes" or "No". Yes was equal to 1 and it meant that the technological innovation was in use and had achieved at least 60% of other outputs. A No was equal to 0 and it meant that that the innovation being implemented was not in use and also had not achieved at least 60% of other outputs. Early use is an important measure of implementation effectiveness because it illustrates the organizations' intention to make use of the technology. Shea, Pickett and Li (2005) posited that when implementing new technology, the major goal would be to put the innovation into early use. The use of the technology as a measure of effectiveness was further supported by Weiner *et al.*, (2009) who argued that diffusion of innovation formed the basis of effective implementation of online teaching.

The respondents were therefore asked if they were using the technology in teaching and learning. The results are in table 4.3. From the survey, in response to the question "Are you using the technology for teaching and learning?" 38 out of 105 respondents answered affirmatively (i.e., 36.1% responses with yes), while 59 responses were negative and 9 respondents did not answer either yes or no.

To test if projects were effectively implemented, the interviewer asked the respondents if the individual technological innovations being implementations were in use. The interview responses were analysed and recorded in table 4.3.

Table 4.3: Results of the use of technology in teaching and learning in various universities

UNIVERSITY	Project	Effective/Not
Makerere University	Project 1 - e-Content Project	No
	Project 2 - Gender Research Project	Yes
	Project 3 - e-Portfolio Project	No
Kenyatta University (KU)	Project 1 - Digitization of Past Examination Papers	Yes
	Project 2 - Postgraduate Research Methods Course	Yes
	Project 3 - Online eMBA Programme	Yes
	Project 4 - Creation of Chemistry and Communications Skills Modules	Yes
	Project 5 - Executive Information Systems Specification	No
	Project 6 - Digitization of Theses and Dissertations	No
University of Dar es Salaam (UDSM)	Project 1 - Online Course Migration and Improvement	Yes
	Project 2 - Computer Science Interactive Courses	No
Universidade Católica de Moçambique (UCM)	Project 1 - ICT Policy, Use Policy and Strategy Development	No
	Project 2 - e-Learning Project	No
	Project 3 - CED Electronic Support Project	No
	Project 4 - OER Health Sciences Project	No
	Project 5 - Research Project	No
University of Education, Winneba (UEW)	Project 1 - Base Line Study on e-Readiness of UEW	No
	Project 2 - Enhancing Quality of Teaching and Learning using an LMS	No
	Team Leader & Project 3 - Monitoring of Staff Behaviours in Moodle	No
Jos University(UJ)	Project 1 - Departmental Educ Tech Initiative (LMS)	Yes
	Team Leader & Project 2 - Educational Multimedia & Simulations Project	No
	Project 3 - e-Learning Fellowship Project	No
University of Ibadan **(UI)**	Project 1 - Capacity Building and Digital Content	Yes
	Project 2 - Open Courseware for Science and Technology	No
	(Project 3 - Tele-Classroom for General Studies	No
	Project 4 - Educational Radio and Mobile Phones for Distance Education	No

Source: Field study (May, 2013)
Note: Yes means innovation in use and also had produced 60% of other outputs.

During the interview sessions, respondents from 18 projects indicated they were not using the technology which they were implementing (i.e., responded "No"). That meant

out of the 26 projects, only eight projects' outputs were effective by the end of project life. From the interview results, 30.7% of the projects had been effectively implemented. An overall team leader from one of the universities, when asked if the university was using the innovations, responded that they were start using them after June 2013. The projects were to be implemented up to June 2013 and thus it meant this university was to start using the innovations after the time line. In some other cases, although the technological innovations were ready for use, some other factors, as will be discussed later, meant the innovations had been ignored.

Though the quantitative and qualitative data were analysed separately, there was convergence of the findings on the number of projects that were effectively implemented. For example, the qualitative results supported the quantitative findings that only about 30% of the projects were effectively implemented. This low rate of success in technology implementation in higher education supports earlier findings in the area (Johnson, 2000; Gichoya, 2005; Kumar, 2007; Sawang & Unsworth, 2011; and Then & Amaria, 2013).

Specifically, although some projects were deemed not to be effectively implemented as per the study's main objective, it was noted that the projects were at different stages. Gonçalves and Pedro (2012), in their study on innovation, e-learning and higher education, noted that ICT in HEI is not progressively successful. In the current study, the fact that some projects were not effectively implemented did not necessarily mean that all these projects had failed. Some projects were complete but were awaiting either students to resume or some protocols within the universities to be complete. Johnson (2000) discussed project failure and success, and argued that project failure could be caused by poor rationalization or conceptualization of the project. In this study, one of the PHEA-ETI projects experienced total failure after kick off. The team leader argued that this was because implementers discovered the project was more complex than had been expected. Table 4.4 shows the levels of success for the various projects under study.

Table 4.4: Level of Implementation Success for the projects

UNIVERSITY	Project	Level of Success/Failure
Makerere University	Project 1 - e-Content Project	Failure
	Project 2 - Gender Research Project	Partial Success
	Project 3 - e-Portfolio Project	Failure
Kenyatta University (KU)	Project 1 - Digitization of Past Examination Papers	Partial Success
	Project 2 - Postgraduate research Methods Course	Partial Success
	Project 3 - Online eMBA Programme	Partial Success
	Project 4 - Creation of Chemistry and Communications Skills Modules	Partial Success
	Project 5 - Executive Information Systems Specification	Failure
	Project 6 - Digitization of Theses and Dissertations	Failure
University of Dar es Salaam (UDSM)	Project 1 - Online Course Migration and Improvement	Partial Success
	Project 2 - Computer Science Interactive Courses	Failure
Universidade Católica de Moçambique (UCM)	Project 1 - ICT Policy, Use Policy and Strategy Development	Failure
	Project 2 - e-Learning Project	Failure
	Project 3 - CED Electronic Support Project	Failure
	Project 4 - OER Health Sciences Project	Total Failure
	Project 5 - Research Project	Partial Success
University of Education, Winneba (UEW)	Project 1 - Base Line Study on e-Readiness of UEW	Failure
	Project 2 - Enhancing Quality of Teaching and Learning using an LMS	Failure
	Team Leader & Project 3 - Monitoring of Staff Behaviours in Moodle	Failure
Jos University(UJ)	Project 1 - Departmental Education Tech Initiative (LMS)	Partial Success
	Team Leader & Project 2 - Educational Multimedia & Simulations Project	Failure
	Project 3 - e-Learning Fellowship Project	Failure
University of Ibadan **(UI)**	Team Leader & Project 1 - Capacity Building and Digital Content	Partial Success
	Project 2 - Open Courseware for Science and Technology	Failure
	(Project 3 - Tele-Classroom for General Studies	Failure
	Project 4 - Educational Radio and Mobile Phones for Distance Education	Failure

Source: Field study (May 2013)

From table 4.4, it can be noted that none of the 26 projects was an outright success. Interview responses during the interview sessions indicated that none of the projects had

met all objectives. That therefore meant that the projects that came out as effectively implemented only realised partial success. Kumar (2007) made similar findings when studying technology projects in India. Kumar found out most technology projects in developing countries rarely meet all objectives set out thus those that could be classified as successful fell under the category of partial- success.

Several issues were noted to have influence the maintenance the status quo in the PHEA-ETI case – where the results of technology implementation in HEIs were poor. To analyse the reasons why the disappointing performance was realized, the study adopted Johnson's (2000) framework on project success. Johnson (2000) stipulated that to realize success in projects there is a need for positive weighting of the three groups of factors: innovation framing, innovation environment and innovation attributes.

4.4.1 Innovation Framing

In this study, there were various practices of sense making revealed by the various respondents. What was apparent from the interviews with the project leaders was that the sources of project ideas were influenced by mostly external stakeholders who had an impact on how the projects were conceptualized in terms of objectives and expectations. This was experienced in all the 26 projects where SAIDE asked for innovation ideas from the institutions.

Throughout the PHEA-ETI projects, there were also concerted efforts by project sponsors to target training to particular groups that they considered primary; which can be linked to the classic communication practice of discounting certain stakeholders not considered key, while orienting the 'framing' of the project to certain users for political capital. Of course it is recognized that training may also have been meant to help in overcoming a number of unsupportive innovation environments and internal resistance/sabotage that was commonplace in these institutions. What is evident in the approaches adopted in creating awareness is a bias towards stakeholders that are deemed critical for the project: in this case, middle management representatives and executive-levels offices. This approach, in which ideas generators or project sponsors couch their awareness messages oriented towards external stakeholders for funding reasons and to key internal stakeholders may lead to minimal adoption of the innovations by the

secondary users (Johnson, 2000). This was the case in these projects, and a number of institutions reported more 'cons' when it came to user involvement

Establishing a common conversational tone was also employed as an innovation mechanism for enrolling internal stakeholders, for instance, through public lectures as was evident in four projects (15% of projects). Thus, the PHEA-ETI projects were not really the first attempt by the universities to experiment with an innovation; but, as the logistic regression illustrated, the criticality of external funding in some sense ensured some form of sustainability.

Project management effectiveness typically rests on the management of meanings, accomplished through framing (Fairhurst & Sarr, 1996). Wiechetek (2012) argued for the need to look at the implementation process as a whole so as to realize effectiveness. Wiechetek further argued that the level of understanding of implementation objectives affects implementation effectiveness. A study by Then and Amaria (2013) noted that 91% of respondents, with test statistics chi-square = 7.02, df = 8, p = 0.319, believed that the organizational strategic goals were a major driver in adopting technology in HEIs.

4.4.2 Innovation Attributes

Technology Innovation Implementation is a Complex venture: It was also noted that there was the changing nature of projects, their names and sponsors, constantly required the enrolment of stakeholders. Four (15%) of the projects had been initiated before with different funders and different application platforms. Changing nature may create a situation in which an innovation becomes "paralyzed by analysis", since with every change, the project needs to be (re)initiated. The process of stakeholder enrolment is critical for creating an innovation environment However; this process was fraught with challenges in all of the organizations that formed part of the current study. When the stakeholders, especially the users, view the technological innovation as meeting their objectives, then they would come into the project having internalized it. However, in most of the PHEA-ETI projects, that internalization was not achieved and thus implementers came in simply in order to comply with a university demand or for specific rewards (for example financial) (Dong *et al.*, 2008).

Complexity of projects resulting to lack of fidelity in implementation. Fidelity of implementation is the extent to which the delivered technology intervention adheres to the original design (Shapley, Sheehan, Maloney & Caranikas-walker, 2010; Javeri & Persichitte, 2007). From the interviews conducted, although some of the technology implementation projects were seen to be on course, some had digressed from the main goal. Four projects, comprising 11% of all projects lacked fidelity in implementation.

Lack of implementation fidelity could be explained by either due to the complexity of the project or failure to fully grasp the project requirements. This was noted in four of the technology innovation projects, which was 11% of all the projects. This could be explained to have resulted from poor framing of the project at conception, resulting in project complexity. Examples of some of the reasons given to justify the changes made to the projects during the course of implementation were obtained from the interviews

Loss of fidelity could be explained as resulting from the project initiation. It seemed the implementers had neither internalized the tasks nor understood the extent of the work expected. Furthermore, project proposals must have been drafted hurriedly with no prior assessment of the capability – human and material resources – the institution had. Once the projects kicked off, the reality became clear and thus had to change course in order for projects to come near the required outputs.

4.4.3 Innovation Environment

Fragmentation and a silo mentality: Another observation from the interviews was the existence of a silo mentality. This was noted in four of the projects. Some of the departments were reluctant to share technology knowledge, while in other cases were individuals who did not want to share. Fragmented adoption remained a challenge and pockets of innovations are risky and do not become stable for acceptability by other departments. Furthermore, the existence of a silo mentality in some departments meant that HEIs had not developed the proper environment for internal technology transfer. It was evident that departments and sections were unwilling to share what skills they possessed. This therefore would not be supportive of technology implementation.

This form of structure, which reinforces the 'silo mentality', was antithetical to a supportive organizational climate, which recognizes the inter-dependence of departments and organizational units. In such fragmentation, as it relates to integration, the result was an unsupportive innovation environment.

Peansupap and Walker (2005) found that sharing is key to the successful diffusion of technology. Mirriahi *et al.* (2012), however, posited that one's position was critical in being seen as a role model. They argued that facilitating adoption of technology required that the senior administrators in the university turn to those who are experts in technology or those who are already technology/innovation leaders. A study by Dexter and Anderson (2002) also found shared commitment and collaborative activity to be important to project success. These are attributes that were missing in some of the projects under the PHEA-ETI.

The findings above corroborated those of by Indeje and Zheng (2009) who, while interviewing users of the Integrated Financial Management Information System (IFMIS), observed that the fact that the system was centralized caused "disquietedness" in its use by other departments. In the PHEA-ETI projects, it is noted that some projects were doomed to fail because there was no collaboration. Sections did not want to share their knowledge. Silo mentalities could be related to the lack of a conducive implementation climate within universities, as discussed later.

Resistance and Sabotage: There were also frequent staff changes in 80% of the projects, which saw the initiatives disrupted. One of the other negative aspects related to the innovation environment was frequent staff changes seconded to the projects. In almost all the organizations, different people had been involved with the project at different times, which could be seen as creating an unsupportive organizational climate for stabilization of an innovation within an organization. The frequent changes may also point to top management attitudes that consider the innovation to be on "the periphery of mainstream organizational processes", and thus that the likelihood of gaining political capital from such initiatives is minimal. Organizational changes related to frequent staff redeployments negatively impacted on the innovation environment, thus creating a situation where the effectiveness of implementation is questionable.

In some instances, stakeholders responded by engaging in actions that could be construed as 'sabotage'. Sabotage was not only from the users' perspective; frequently, the implementers used the authority they had to sabotage users into accepting the system. This kind of behaviour is reminiscent of an innovation environment full of mistrust, which is anathema to implementation effectiveness. A number of scenarios indicated that there was some form of resistance to/sabotage in these projects. Thus the forms of sabotage recorded are indicative of an innovation environment that is not supportive, which may imply a lack of trust on the part of users.

Lack of absorptive capacity: Universities in general were noted to lack an absorptive capacity, causing implementers to view innovations as complex, when implementers were asked why their projects were not in use by functional sections, some said. As noted, though the projects had passed through adoption stage, implementation was challenging as some implementers found it difficult to understand. Team leaders from eight of the projects, 30%, noted the projects they dealt with were complex to understand. The complexity issue could be attributed to lack of absorptive capacity in the universities – which the requisite skills for technology adoption were lacking.

Gelb, *et al.* (2009) noted that insufficient ICT proficiency to match application complexities is one of the common challenges in ICT adoption. Klein *et al.* (2001) noted that innovation complexity is negatively related to user satisfaction levels and thus affects the speed at which users come to understand the innovation.

Furthermore, lack of an absorptive capacity could be explained by evidence of championship and piloting in the course of the project implementations. The role of individual championship in these projects was quite remarkable and unmistakable, though the study's analytic intent was to go beyond the surface and attempt to understand why championship was preferred. In all of the organizations, championship played a key role, yet the paradox is whether or not these individual campaigns were effective.

Lack of technology transfer initiatives: In 60% of the projects, the technology adoption in techning and learning was not a new venture. As part of the framing process, the

different organizations have been involved in the implementation of various projects known by different names (KEWL, PHEA-ETI, Blackboard, etc.), yet all had similar systems features. This may allow a claim to be made: that the innovations known by various names provided a 'common conversational tone' that ensured resources were marshalled for project continuity, especially since the projects were regarded as peripheral to the main objectives of the organizations. As evident from replication of the technology initiatives, HEIs lacked development of absorptive capacity.

Unethical reporting: A final observation was clearly unethical reporting, which demonstrated that either the implementers lacked capacity or time for the initiatives. Three of the projects (11%) were noted to have suffered from unethical reporting. The interview transcriptions in illustrate other unethical reporting.

In summary, the findings from the overall objective of this study supported Johnson's (2000) argument that there is no such thing as "absolute success"; that there is only the "perceived success of a project"; and that evaluation changes over time. Thus success or failure cannot be categorised in black or white. In the current study, most of the PHEA-ETI projects that failed could be classified as failing for techno-political reasons. This was a scenario where project framing was low; the implementers were willing to see project success but it seemed the way the projects were conceived worked against success. The projects were simply not aligned to the university strategic plan but were picked as show projects. This means failure was imminent, as no specific educational objective was to be met. Those projects that were effectively implemented were mainly noted to fall under tactical success. Under tactical success, Johnson (2000) observed that such initiatives often have poor alignment to organizational goals during adoption, but the implementation team is positive on the technology potential. Furthermore, the innovation itself potentially has a positive impact on the organization.

4.5 Factor Analysis

In this study, sixty three variables were included in the factor analysis because they were thought to relate to the constructs it intended to measure. The perceived constructs were obtained from the related literature. Factor analysis using principal component analysis was conducted to reduce the data and to develop the convergent validity of meaningful constructs as explained in chapter three. In order to determine the number of factors to

be used, the co-variance of the variables was computed. Then, the Eigen value and Eigen vectors were evaluated for the variance co-variance matrix and the data was transformed into factors. Furthermore, the factor scores, which were obtained from factor analysis, were used to arrive at the variables to be included in the regression.

The following were the results of the factor analysis. First, the researcher used the KMO statistics to measure the sampling adequacy and Bartlett's Test of Sphericity to measure the null hypothesis that the correlation matrix is inverse.. KMO value of 0.724 was obtained, which was above the 0.5 threshold. Yil and Yil (2009) study had a KMO of 0.892 and argued that a high KMO was preferred. The data was therefore a perfect fit for factor analysis and yielded distinct and reliable factors. The Bartlett's Test of Sphericity tests whether the correlation matrix is an identity matrix, which would be an indicator that the factor model was inappropriate. For factor analysis to work, it is necessary to have some relationships between variables, and if the R-matrix were an identity matrix, then all correlation coefficients would be zero. In this study, the Bartlett's Test of Sphericity was significant; that is, the associated p-value was 0.000. Yil and Yil (2009) posited that a $p < 0.05$ indicated that the factor model was appropriate. This meant that the correlation matrix was not an identity matrix and thus factor analysis was appropriate.

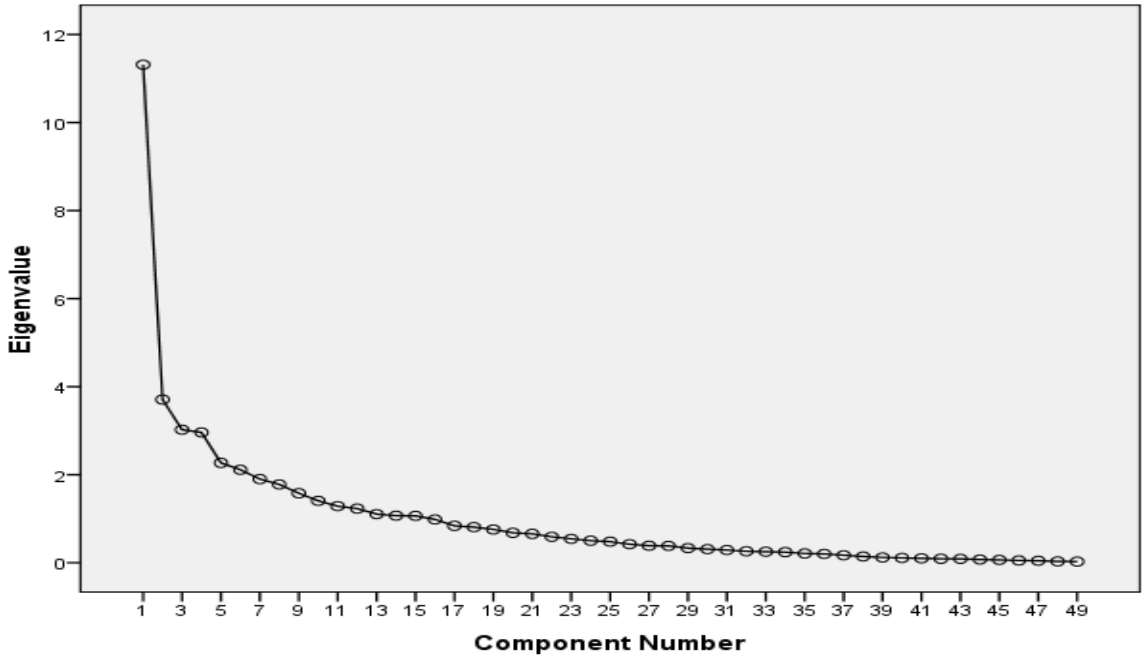

Figure 4.1: Screen plot for the Eigen value against the factor number

SPSS software was able to provide a screen plot for choosing the appropriate number of factors to retain. The resulting screen plot (Figure 4.1) suggests about seven meaningful factors – and hence seven factors were retained. The number of factors to be retained was chosen on the basis of the screen plot where takes an elbow shape as proposed by Kaiser (1959), and in this case the elbow shape was observed at the seventh factor.

The Kaiser Varimax rotation scheme was implemented to evaluate factor loadings that correlate the factors and the variables. The rotated factor matrix of the seven-factor model was created. The factor loadings were used to group the factors based on the factor loadings of the individual variables, as follows: monitoring and evaluation (factor 1); financial motivation (factor 2); organizational culture (factor 3); organizational climate (factor 4), top management (factor 5); project leadership (factor 6) and innovation efficacy (factor 7). If a variable came as complex, that is, had substantial loading on more than one variable the factor was retained, on the side, if the variable did not have a substantial loading on one factor, the factor was eliminated from factor analysis. From the initial 63 factors, only 7 factors were used to carry out the regression analysis (see Appendix F).

4.6 Test for Multicollinearity

The multicollinearity test was done to check if there were predictor variables that were highly correlated – meaning that one variable could be predicted by the other. Variables are said to have a multicollinearity problem if they are very closely related such that it would be difficult to arrive at the regression coefficient of each individual variable. Table 4.5 presents the multicollinearity test result in a matrix.

Table 4.5: Correlation coefficient matrix for variables

	Implementation Effectiveness	Monitoring and Evaluation	Financial Resource Motivation	Financial Resource Motivation Organisational Climate	Organisational Culture	Team Leadership	Top Management	Innovation Efficacy
Implementation Effectiveness	1.00							
Monitoring and Evaluation	0.299 *(0.059)*	1.000						
Financial Resource Motivation	0.321** *(0.001)*	0.021 *(0.332)*	1.000					
Organisational Climate	0.449** *(0.000)*	-0.119 *(0.201)*	-0.101 *(0.199)*	1.000				
Organisational Culture	0.282 *(0.075)*	-0.096 *(0.298)*	0.044 *(0.364)*	-0.083 *(0.329)*	1.000			
Team Leadership	0.111 *(0.091)*	0.120 *(0.211)*	0.070 *(0.331)*	-0.015 *(0.438)*	0.112 *(0.093)*	1.000		
Top Management	0.318** *(0.002)*	0.086 *(0.276)*	0.091 *(0.290)*	-0.136 *(0.225)*	0.088 *(0.286)*	0.113 *(0.094)*	1.000	
Innovation Efficacy	0.333** *(0.002)*	0.079 *(0.259)*	0.053 *(0.372)*	-0.009 *(0.519)*	0.073 *(0.328)*	0.025 *(0.300)*	0.062 *(0.299)*	1.000

Source: Field study (May 2013); *** Correlation Significant at 5%,*

KEY: IE - Implementation effectiveness (the dependent variable); FRM – Financial resource motivation; OCu – Organizational culture; OCl – Organizational climate; PL – Project leadership; TM – top management; IE - Innovation efficacy.

From the correlation matrix in Table 4.5, a correlation of 1.0 meant the two variables were perfectly correlated while a correlation of 0.0 means no correlation. From the

matrix, the cells with a correlation of 1.0 show the correlation of the explanatory variable with itself. What were important in the test are the figures below 1.0 correlation. As one moves down row by row, it is clear that the values were closer to 0.0 than 1.0. Further, based on the results in table 4.5, it was clear that there was a strong correlation between the dependent variable and the each of the explanatory variable. For instance the relationship between the dependent variable and the financial resource motivation, organization culture, top management and innovation efficacy was significant at 5% level and monitoring and evaluation, Organizational climate and project leadership were significant in determining implementation effectiveness at 10%. Additionally, the results show that there existed very weak association between the independent variable themselves. This is an indication of little or no multicolliniearity among the independent variables.

This test was also checked using the standard error method. Specifically, multicollinearity in the logistic regression solution was tested by examining the standard errors for the coefficients. A standard error larger than 2.0 indicates numerical problems, such as multicollinearity among the independent variables (Thapa *et al*, 2014). From the regression results in Table 4.6, it is evident that none of the independent variables in the current analysis had a standard error larger than 2.0, which supports that there was no evidence of multicollinearity.

From the above tests, there was no multicollinearity among the explanatory variables. This meant all the variables were acceptable in predicting the dependent variable, innovation implementation effectiveness.

4.7 Regression Analysis

This section provides inferential statistical results and their interpretation. Logistic regression analysis was adopted in the study. In the analysis, the guidelines by Peng *et al.* (2002) were applied. Peng *et al.* (2002) claimed that to test the soundness of a logistic regression model, the following tests need to be applied: overall model evaluation; statistical tests of individual predictors; goodness-of-fit statistics; and validations of predicted probabilities.

Before subjecting the data to logistic regression analysis, it was necessary to run two tests: i) multicollinearity test; and ii) reliability tests to determine which constructs were to be used in the model. Reliability test results are available in section 4.3 while multicollinearity test results are available in section 4.6. The following table shows results for the logistic regression estimation.

Table 4.6: Regression results

Variables	β	SE	Sig.
Monitoring and evaluation	0.217	0.393	0.581
Financial resource motivation	0.511*	0.275	0.063
Organizational culture	0.822**	0.338	0.015
Organizational climate	0.318	0.434	0.464
Project leadership	0.262	0.261	0.316
Top management	0.681**	0.161	0.049
Innovation efficacy	0.651*	0.350	0.063
Constant	0.585**	0.223	0.009
LR chi^2			15.08
Prob > chi^2			0.0350
Log likelihood			-62.234582
Pseudo R^2			0.1081
Cox & Snell R^2			0.54
Nagelkerke R^2			0.63
Hosmer-Leme (H-L)			6.975
Sig.			0.432

Note: * means the coefficient is significant at 10%, ** means the coefficient is significant at 5%

Source: Survey data, 2013

The LR chi-square of 15.08 with a p-value of 0.035 indicated that the model as a whole fitted significantly better than an empty model (i.e. a model with no predictor). The log likelihood of -62.23 showed that the model fitted the data. In terms of the inferential statistics: The LR chi-square of 15.08 with a p-value of 0.035 and the log likelihood of -62.23 showed that the model was better than a null one. The test intercept, the constant,

which had p-value<0.05, suggested that the intercept was of importance in the model and thus must be included.

Another descriptive measure of goodness of fit used was R^2. Peng *et al.* (2002) explained that in a linear regression, R^2 has a clear definition: the proportion of the variations in the dependent variable that could be explained by predictor variables. In logistic regression, however, R^2 is not well defined; and in this study this was supplemented by the Cox and Snell R^2 and the Nagelkerke R^2. The results of the model showed that the Cox and Snell R^2 was 0.54 while the Nagelkerke R^2 was 0.63. This meant the predictor variables explained between 54% and 63% of the changes in innovation implementation effectiveness.

The inferential goodness-of-fit test is the Hosmer-Leme (H-L) test, which yielded chi-square of 6.975 and a p-value of 0.432. The null hypothesis could have stated that the data fits the logistic regression model, with the alternative saying that the data does not fit the logistic regression model. A p-value of 0.432 means that the null hypothesis was not rejected. This meant that there was evidence for goodness of fit of the data; that is, the logistic regression fitted the data perfectly. The findings supported Peng *et al.*, 2002 and Dwivedi *et al.*, 2010 studies. Interpretation of the coefficients for the predictor variables is explained in the section that follows**.**

4.7.1 Monitoring and Evaluation

The first specific objective of the study was to test the role of monitoring and evaluation in achieving innovation implementation effectiveness. The coefficient of monitoring and evaluation was positive and not significant from survey data (β = 0.217 with P- value = 0.581). This meant that monitoring and evaluation has no effect on implementation effectiveness from the survey results. However, the qualitative data showed that the South African Institute for Distance education (SAIDE) team played a key role in the projects implementation process. The implementers experienced SAIDE in facilitation aspects like training. Essentially training should not be the role of the external stakeholders. This clearly showed that the external stakeholders were helping to drive the project success. Here, the project sponsor contributes in developing capacity in technology. These results resonated with the findings of Saak (2007), that sponsor

involvement in the project is positively related to project success. SAIDE represented project sponsors and though sponsors should indeed be involved throughout the life of the project, the involvement in actual implementation should have been more implicit, especially to implementers.

Essentially, the role of the M&E team seemed to be to push or help drive project success. In all the 26 projects, the role of sponsor in facilitating training was noted. As noted above, 100% of the respondents believed SAIDE, which represented external stakeholders, was mainly involved in training.

Therefore, from specific questions in survey and also from interview response, monitoring and evaluation played a significant role in determining implementation effectiveness. With the positive coefficient, it therefore means that innovation implementation effectiveness increases with more enhanced monitoring and evaluation mechanisms in place. This result supports Saak (2007) findings that sponsors play a key role in project success. All respondents during interviews acknowledged the critical role the monitoring and evaluation process played in ensuring projects were on course. The monitoring and evaluation role was performed by the sponsors. The role of sponsors has been noted to be, among other responsibilities, to perform monitoring and evaluation. Sponsors also act as project champions and thus are critical in implementation success (Saak, 2007).

4.7.2 Financial Resource Motivation

This construct investigated how financial rewards influenced innovation implementation. Innovation implementation is time consuming and disrupts the normal schedule. From the quantitative results, the coefficients of financial resource motivation was positive and significance at 10% ($\beta = 0.511$ and $p = .063$). Albeit a weak statistical relationship between the predictor and predicted variable (at 10% significance level), it means that the probability of technology innovation implementation effectiveness increased with an increase in financial motivation to implementers. The qualitative findings corroborated the survey findings that financial resource motivation was a big motivator for the implementers to be involved. The interview responses had 100% of all respondents indicating that money boosted implementers' involvement in the project. Some projects

had been put on hold due to lack of finances. This clearly shows that staff need some appreciation to participate in implementing a new idea.

From the interview findings, it was clear that most implementers engaged in the projects for financial gain. Some were willing to attend training and develop technology materials. The underlying issue here could be traced back to innovation environment and framing. Implementers were therefore interested in financial gain but not in the success of technology implementation. This was especially evident where, after coming up with innovation; there was no drive to start applying it in teaching and learning. The result in the supported earlier findings by Klein *et al.* (2001) and Sawang and Unsworth's (2011) which found out that financial availability is significant in determining technological innovation implementation effectiveness.

The incongruence between the survey response and interview response is evident in this response. However, the interview response confirms that the implementation environment was not conducive to successfully implementing the projects. Implementers participated in the projects not because they believed in the technology. This could be explained by again lack of absorptive capacity and a dearth on innovation culture in the institutions under study.

4.7.3 Organizational Culture

The role organizational culture plays in innovation implementation was the third objective in this study. Organisational culture had a positive coefficient that was statistically significant in determining innovation implementation effectiveness (β = 0.822 and p = .015). This means a positive organizational culture (one that supports innovation implementation) would lead to the probability of effectiveness implementation. When asked if staff were encouraged to take time off for the PHEA-ETI projects, the respondents answered as follows:

Table 4.7: Whether Staff Were Given Time to Concentrate on Project

Criteria	Number of Responses	% Response Rate
Strongly disagree	6	6
Disagree	13	12
Neither agree nor disagree	17	16
Agree	38	36
Strongly agree	25	24

Source: Data collection (May 2013)

On the role of legacy ICT systems and past exposure to ICT, 80% of the respondents agreed that the availability of ICT prior to the PHEA-ETI projects played a positive role in project progress. Furthermore, 90% of the respondents indicated that the availability of ICT technical persons in the university facilitated project progress. When asked if team members' prior ICT skills facilitated project progress, 23 (22%) indicated they strongly agreed, 59 (57%) indicated they agreed, 12 (12%) neither agreed nor disagreed, 6 (6%) disagreed, while none strongly disagreed. The availability of other ICT systems in the university was also viewed as a complement to project success. Under the statement, "Having other ICT-based systems in the university was a big boost in project progress", 75% of respondents answered affirmatively. Further, 97 (95%) respondents believed that their universities supported the use of technology. This response was further corroborated by the question that asked if the respondent believed that the project they were involved in was a priority in the university: 45 respondents (43%) agreed while a further 22 respondents (21%) strongly agreed. The majority also agreed that the university top management and the overall team leaders pushed for the success of the project. Under this question, 56 (54%) agreed while 21 (20%) strongly agreed. In response to the statement, "Team leader showed a lot of enthusiasm in the project", 94 (90%) of respondents either agreed (43%) or strongly agreed (47%), while 7 (6%) respondents indicated they neither agreed nor disagreed. No respondent disagreed.

Then and Amaria (2013) found in a study that 75% of respondents agreed that existing physical technology infrastructure (with statistics chi-square = 4.03, df = 8, p = 0.854) encouraged adoption of new technologies. Wiechetek (2012) found that organizational or 'project' culture plays a role in effective implementation of technology-based projects. Other factors related to organizational culture and legacy ICT systems include training

of users and implementers of technology-based projects. Then and Amaria (2013) found that 30% of respondents believed training played a role in successful technology adoption. Shea *et al.* (2005) found that technical support and a positive learning experience in developing and teaching a course play a key role in faculty use of e-learning in HEIs**.**

The qualitative results corroborated the survey findings by showing that a positive culture to innovation enabled implementation effectiveness. The qualitative data also found that aspects of culture such as training were made available. However, digging deeper into the underlying issues, the qualitative findings observed that the projects that were not in use or were still under development were affected by issues of culture.

In some institutions, there was noted to be a culture that supported use of technology while in others, that culture did not exist. From the interview responses, it is clear that in some institutions there was lacked of collaboration among implementing sections. Further, it is clear that use of the technology was not mandatory.
As noted during the interview process, some implementers were silently unhappy with the section that was mandated to oversee project implementation. This corroborated the interview findings of Indeje and Zheng (2010), who noted that poor housing of (in their case) the IFMIS made some users oppose the new system. Indeje and Zheng noted that "the centralization of the IFMIS project under the Accountant General's office may have had the effect of causing resentment among other departments that claim a stake in the IFMIS" (Indeje & Zheng 2010: 9).

The organizations typically used "training" for enrolling various categories of stakeholders to foster "acceptance" of the innovation during the implementation process. During observations and in analysis of the interview transcripts, the persistency and constancy of training in the enrolment process is unmistakable, yet as has been seen from other interview results , the training only resulted in pockets of excellence in user involvement, and the approach begs the question as to the effectiveness of using training as an "enrolment tool*".* Based on the interview results and observations made, a claim may be made: those participants in the training sessions are typically using the chance to enhance their skills and possibly for political capital reasons rather than for actual

adoption of the innovation. Thus training as a critical factor in ensuring adoption of an innovation is questionable, even though the approach comes up as a critical process in building trust in the new system. The focus on training by a majority of the respondents may imply that training occupies a vantage point in ensuring acceptability of the project, but the impact of training on acceptability of the innovation is uncertain. Thus user involvement was muted and therefore the stability of the innovations risky.

It could be noted that an organisational culture that is pro technology would enhance implementation of innovations in organisations. This is because, positive (pro technology) would see receptive implementers and accelerate technology absorptive capacity and transfer.

4.7.4 Organizational Climate

With the organizational climate construct the research wanted to find out how well the innovation was received in the organization and especially within a project. The survey results showed that organizational culture had a positive correlation relationship (β = 0.318) to implementation effectiveness. However, with a P-value of 0.464 it meant that the predictor was not statistically significant in determining implementation effectiveness. This was against qualitative findings which showed organizational climate was an important factor in determining successful implementation of innovations. The qualitative findings were similar to previous studies by Klein *et al.* (2001), Weiner *et al.* (2009) and Sawang and Unsworth (2011), which found organizational climate to be significant with a p-value less than 0.05.For the respondents, lack of proper climate derailed some of the projects.

Most team leaders thus played the role of project champions. Among the championship roles was pushing the agenda to the implementers. Additional financial compensation to staff that arose from the innovations played a key role in improving the implementation climate by, for instance, being used to orchestrate mindset changes as well as ownership transfer. While financial motivation played a key role in the establishment of a supportive organizational climate, there was a need for other considerations given limitations of financial resources in those organizations. For instance, the need to meet the expectations of other stakeholders (students) – given that the organization had

already committed to a technology-enhanced learning environment – implied that top management members occasionally have to resort to the use of the 'stick' rather than the 'carrot'. This again plays on the notion that there is some form of forced implementation through the use of authority.

Wagner *et al.* (2013) reported similar findings of discordance between quantitative and qualitative results. Wagner *et al.* studied why drug addicts shared needles. Interview respondents indicated they shared needles when they did not have enough clean needles and feared the onset of drug withdrawal symptoms. However, the emphasis on risk of withdrawal symptoms was not evident in the quantitative findings. On further probing this discrepancy, the study noted that the respondents thought the interviewer was a government employee and did not want to show they were knowingly engaging in a risky behaviour. The answer they provided during interviews was therefore more political. This case clearly showed a need to probe data further when incongruous results are encountered.

A technology climate that's encourages implementers' participation in a venture ensures implementation success. This is because everyone feels part of the process and takes ownership of the process. However, negative climate would make implementers side-lined or forced into the initiative. This would result into forced implementation.

4.7.5 Project Leadership

Project leadership was the fourth specific objective of this study. This construct was meant to examine how the project leaders influenced the implementation of the technological innovation. Projects leadership had a positive coefficient but was not statistically significant in determining innovation implementation effectiveness ($p=0.316$). The survey findings contradicted with the qualitative findings which showed that team leaders played a key role in technology implementation. The positive correlation showed that the more a team leader was involved in the project, the higher the likelihood of project being effectively implemented. Actually, from the qualitative findings, all projects that failed to kick off or they started off then they stalled had a leadership problem. The qualitative findings were supported by survey questions that specifically probed the respondents on the role of team leader. When asked how team

members were picked, 65% of respondents answered that they were picked because they worked in the section in which the project was being implemented. That meant that they came from the functional sections where the innovation was to be used. When the respondents were asked what role the team leaders played, most of the implementation team members concurred that their team leaders either provided an inspiration or were quite focused on results (with 71% of respondents answering the team leaders were focused and 54% answering they provided inspiration). Only 6% answered that their team leaders were either 'laid back' (2%) or too busy for the project (4%).

The qualitative findings were similar to Roberts (2008) who found out that leadership is key to effective implementation of technology. Hamre and Vidgen (2008) studied the role of team leadership in project implementation and noted that the individuals at the centre can either support an innovation or be a hindrance to effective implementation. Hamre and Vidgen (2008) argued that team leaders, as central players, might be too busy to share, or they might use information at their disposal as power. Weiner *et al.* (2009), in trying to differentiate between adoption and implementation, put into perspective the role of team leaders, arguing that while the top management makes the initial decision to adopt, the real process (action) of putting the innovation into use is left to team leaders. Therefore, while adoption is for the most part a mental process, team leaders are the ones involved in the visible process of putting the decision into action.

These individuals can be the centre of communication to others, and thus become champions in the innovation implementation process. Other central individuals might hold back, thus becoming bottlenecks to innovation implementation. Wiechetek (2012) discovered in a study of implementation effectiveness that project leaders play a big role in technology project implementation. In the PHEA-ETI project, team leaders were involved in the implementation activities: planning, promotion, training, resource allocation and pilot testing. Furthermore, how well the implementation team understands the organization is important in implementation effectiveness. This could be the reason why most of the team leaders in the PHEA-ETI projects were drawn from leadership levels: deans, heads of sections and open, distance and e-learning (ODEL) coordinators.

Project leaders could play two roles, either be catalysts or inhibitors implementation effectiveness. Where project leaders take championship and mentorship roles, then the project has higher chances of succeeding, but where leadership lacks in a project, then project could slow down or die.

4.7.6 Top Management Style

The sixth specific objective looked at the importance of top management in determining innovation implementation effectiveness. The coefficients for top management style variable with the dependent variable was positive and statistically significant at five percent in determining innovation implementation effectiveness (p= 0.04). The survey findings results were corroborated by the qualitative results. The positive correlation between the dependent and independent variable meant that the more top management was involved in project implementation, the more the likelihood of achieving effective implementation. The respondents noted that the team leaders would report to top management on project progress. Also, top management appointed team leaders and ensured that some procedures, such as those in procurement, were facilitated. The findings were supported earlier findings by Sawang and Unsworth (2011) and Wiechetek (2012).

4.7.7 Innovation Efficacy

The last specific objective of the study was to determine if innovation efficacy had any importance in technology implementation. Innovation efficacy coefficient is statistically significant but at 10% so there is a weak statistical relationship between innovation efficacy and Implementation effectiveness but with a positive correlation. On the importance of the projects to the institutions, all 26 project leaders felt the projects were important to the universities, however, from interviews with implementers, only 40% of respondents felt strongly the need for the innovation in their functional areas.

The results show clearly that the innovation projects were deemed important and that all sections that had an innovation to implement were cognizant of the support it would have. But why this never contributed to success would have to be taken to be as a result of poor framing and also lack of absorptive capacity among the universities.

The study concluded that it was clear that what was lacking in the innovation was proper framing – meaning that the project implementers had not been involved early enough in the project, for example, in deciding what projects would have been their priority. It would seem that the implementers might have bought into the project a bit late.

The difference in findings and in results could be a result of a lack of understanding on the part of respondents. Most of the respondents for the survey data were implementers and thus were just brought in to implement the innovations. As noted under financial motivation, most implementers got involved due to financial benefits accruing from being a member. Furthermore, in some instances it could be construed that implementers were into this to meet a management requirement.

The relevance of the innovations to the sections affected came out clearly from some of the implementers. The findings were similar to those of Limthongchai and Speece (2003) and De Veer, Fleuren, Bekkema, and Francke (2011), who found that if a new technology was relevant to users' application area, it was easy to implement.

When implementers appreciate the relevance of an innovation in their workplace, they would not require any push to engage. The implementers and system users would come in as champions when they feel that the innovation would be of benefit to them. It would also be easier for technology transfer to take place from initiators (in this case the sponsors) to the implementers.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Introduction

This chapter presents a summary of the study, and takes the reader through the conclusions; the contributions made by the study, the policy implications and, finally, suggested areas for further research.

5.2 Summary

Literature on innovation implementation is replete with frameworks that attempt to show how the sorry state of technology implementation could be revamped. However, with even worse results in technology implementation there is a dearth of literature on how to reverse the sorry state of technology implementation in HEIs. This is despite the fact that the importance of technology in HEIs cannot be overstated. Further, with the dwindling funding from their governments, external donors have come in to fund some technology projects in HEIs. The donors in trying to meet their endeavours perform the monitoring and evaluation task. However literature on the role of monitoring and evaluation, team leadership and innovation efficacy in innovation implementation is scant. This study endeavoured to establish what would determine effective implementation of technology innovations in Africa. The main objective of this study was to find out the determinants of effective implementation of educational technologies in HEIs. To achieve this objective, 26 technology implementation projects funded by PHEA-ETI were studied. The selected projects were based in seven countries in sub-Saharan Africa.

The exploratory study used a mixed method approach to collect and analyse data. From the survey, a total of 105 usable questionnaires were returned, which was a 64.4% response rate. Survey respondents included the project team leaders, overall university team leaders and project implementers. In total, 53 interviews (34 in-depth interviews and 19 focus group discussions) were conducted. Interview respondents included project leaders (in-depth interviews) and project implementers (focus group discussions).

The mixed method analysis found out that all the seven variables – : monitoring and evaluation; financial motivation; organizational culture; organizational climate; style of project leadership; top management style; and innovation efficacy – needed to be considered in implementing technology-based projects. Multicollinearity test results showed that none of the seven variables were correlate, meaning that all were acceptable in predicting the dependent variable. Due to the dichotomous nature of the dependent variable, implementation effectiveness, a logit model was used. Further analysis found that there is a need for proper framing of an innovation, creating an enabling environment. The study also found that the attributes of an innovation need consideration if the positive impact of an innovation is to be realized. A further finding was that the HEIs lacked absorptive capacity for technology innovations, being more inclined to innovation adoption than implementation or generation, with poor technology transfer among HEIs. The study thus called for HEIs in Africa to re-think these three issues.

Specifically, the study found out that monitoring and evaluation; financial motivation; organizational culture; organizational climate; style of project leadership; top management style; and innovation efficacy were determinants in innovation implementation effectiveness. The study found that by the end of the project life, some 30% of projects had started to be used by the universities for the intended purposes. However, the remaining 70% had not been put to use, and two projects that had been completely terminated. The current study first corroborated the findings of earlier studies, which noted poor diffusion of technology in teaching and learning in HEIs.

In summary, the study has supported that technology implementation as a complex undertaking, and one that requires individual and organizational attributes to be considered while ensuring user participation. How well the innovation fits within the specific area in which the innovation has been adopted plays a key role in implementation effectiveness. For example, in areas where the innovation fits well, the study found that the innovation users helped drive project success, as they pushed for acceleration in implementing the technology, which contributed to implementation efficacy. The need to focus on innovation efficacy emerged clearly during the planning phase of the innovations to adopt for specific institutions. Thus monitoring and

evaluation, financial motivation, influence of users, organizational culture, organizational climate, and style of project leadership, top management style, and innovation efficacy were seen to contribute to implementation effectiveness.

5.3 Conclusion

HEIs in sub-saharan Africa fall in a region which could be termed as challenged environment in terms of technology adoption and implementation. It is a challenged environment because technology implementation in government and workplace environment is just picking up momentum and fraught with failure. There is great demand for education in developing countries but with dwindling funding from the governments to support the academic institutions HEIs growth to accommodate the education demand face a deadlock. The immense potential technology has in supporting higher education institutions in Africa can thus not be overstated in this scenario. To join the world trends in globalisation and massification of education, HEIs in Africa can only ignore technology in teaching and learning and their own peril.

In order to realize effective implementation of technological innovations in a challenged and challenging environment (such as the HEI environments in which the PHEA-ETI projects were run), the following issues need to be addressed: technology transfer, institutional absorptive capacity, innovation framing, and the need for HEIs to move from a culture of technology *adopting* to one of technolo*gy generating.* These concerns need to be addressed both internally and externally by both HEIs and the governments.

On technology transfer, the HEIs should be able to tap the capacity of the donors. The traditional perception was that HEIs did the invention through their research and development initiatives and transferred the invention to industry. There is a need, however, for HEIs to recognize that they could be recipients of their own inventions and innovations. HEIs should therefore go beyond disseminating information on the new technologies and should instead demonstrate their efficacy by using. This could be across departments. As has been noted, the technology initiatives were proposed by PHEA-ETI, and what was lacking was a consultative forum where implementers would be fully involved in determining what educational initiatives needed technological support. HEIs needed to leverage their resources with what the donors were making

available. Some of the HEIs were able to tap the ideas and propagate the same to external organizations or support technology initiatives in other colleges, thus earning revenue through this initiative. However, most of the HEIs involved in the initiative did not propagate the skills outside the projects. What came out clearly was that HEIs involved in the initiative lacked the vision to encourage and accelerate evaluation and use of the technology initiatives. Through technology transfer, HEI would have avoided dependency on external donors, and would have achieved sustained and equitable development in educational technologies.

On institutional absorptive capacity, the institutions involved in the PHEA-ETI had differing capabilities in identifying the technology potential. This meant that the institutions' implementers could not recognize the value of new knowledge. Developing technology capacities within the institutions would ensure assimilation of educational technologies. Furthermore, the institutions would reap the rewards of technology by creating business value in education.

HEIs should be at the helm of innovation. Specifically, HEIs should take idea creation to the next level – of assimilating these innovations into their operations. This way, HEIs in Africa would tap into the knowledge bases within and not rely on adopting ideas from outside. It would also mean the institutions could themselves be change agents. By being involved in innovation generation, HEIs could ensure that new technologies would easily be assimilated.

5.4 Contribution to Knowledge

The current study's contribution to knowledge could be categorized into the following: theoretical; methodological; and practical contributions. Specifically, the conceptual framework proposed for the current study addresses technology implementation effectiveness in HEIs. The current study adapted the existing frameworks by including monitoring and evaluation and financial motivation constructs. Apart from the usual determinants, this study brought out the roles of financial motivation, team leadership, and monitoring and evaluation in innovation implementation effectiveness. The study therefore brought new insights. Furthermore, the current study took an optimistic view in the implementation of technologies. That is to say, the study focused mainly on the

determinants of innovation implementation effectiveness – unlike the majority of cited studies, which tend to focus on innovation implementation failures. Overall, therefore, the current study has contributed empirical data to the literature on the determinants of innovation implementation effectiveness in HEIs. Furthermore, the importance of proper innovation framing comes out clearly. Proper innovation framing would ensure buy-in from implementers – and users. Innovation framing would also result in applying technology to the education initiatives that users can relate to, thus enhancing implementation effectiveness.

In terms of its methodological contribution, the study has demonstrated the efficacy of a mixed method approach in helping to answer the research questions. Specifically, the use of a mixed method approach provided more insight into the phenomenon than a single method approach would have. The qualitative data enabled getting to the depths on why for example most innovation implementations were not effective. Details of poor framing, unsupportive implementation climate and lack of absorptive capacity were brought out from the interview responses.

Finally, in terms of its practical contribution, the study endeavoured to investigate determinants of innovation implementation effectiveness. First the study confirmed the alacrity with which HEIs adopt technologies. This was evident in the enthusiasm that all of the participating universities had towards the PHEA-ETI. Specifically, the study has brought out the following issues as being key to creating a climate for technology innovation absorption: technology transfer, institutional absorptive capacity, and the need for HEIs to move from a culture of technology adopting to one of technology generating. The study can therefore be used as a blueprint by donors, project managers and HEIs who are in the process of implementing technology innovations.

5.5 Policy Implications

Government and top management in universities should develop mechanisms for technology transfer, especially for projects that emanate from external stakeholders. The institutions seem to rely on the external stakeholders during the implementation process. This is because, the result showed that there was a lot of replication of the technology initiatives. This was an indication there was no proper mechanism to tap technology

transfer. Study results showed there was replication of technology initiatives in all institutions.

Top management and project team leaders need to engage users early in the technological innovation implementation process. For example, once the top management decided to adopt technology, it would have been important to incorporate affected departments in deciding which areas within their sections needed urgent attention. This is to ensure early buy-in, which would contribute greatly to project success. Furthermore, in line with organizational culture, there is the need for proper centralization of the project. From the study, it was found out that project leaders were pushing the initiatives as champions while team members participation was financial gain thus showing a disconnect.

There is a need for top management, in appointing team leaders, to avoid appointing someone senior in the university management to lead. Alternatively, if the team leader must be senior, then there is a need to appoint another team member, who is less engaged, who could assist project leadership by being more hands-on. In the current study, most of the senior members at the level of registrars were noted to be too engrossed in their work to concentrate on the project. This is because the result showed that team leaders played a central role to project success. The leaders therefore could inhibit or facilitate project success.

Team leaders should also be drawn from the department or section that will be affected by the technological innovation: for example, a department, or a school, or the library. This would ensure that affected section members do not view the team leader as an outsider and thus sabotage the process. From the study, there was evidence of silo mentality and exclusion where some implementers felt the innovation was not housed in the rightful section.

Technological innovations are time consuming while requiring financial and human resource investment. It would therefore be important for top management to consider setting up a section to deal with these innovations. Study results showed that there was alacrity with no proper framing in taking up the technology initiatives while the

institutions lacked absorptive capacity. In most of the HEIs participating in the current study, the project leader came out as a 'virtual institution' where, without that specific team leader, that project would likely not have succeeded. With enough absorptive capacity, projects will be delinked from a person, enabling the whole institution to own the projects. 'Skilling up' all users should therefore be made a continual process, not a one-off thing only when introducing new technology. This is because results showed that some championship was common among the projects.

Given that implementation of technological innovations is not only about the technology, there is a need for proactive means of getting buy-in from faculty members. Faculty members need to know how to deal with an environment where they are no longer the 'paragon of knowledge' but are rather facilitators of learning. Also, given that instructors were found to spend almost twice the amount of time to prepare online materials as compared to traditional methods, there is a need for incentives. Incentives might include reduction of workload, promoting staff who use technology in teaching and learning, or recognizing such staff by issuing certificates. Monetary incentives could also be used to compensate for time spent in content development because once content has been developed, it remains available for use by the institution. Study results showed that monetary incentives acted as bait for implementer involvement.

5.6 Areas for Further Research

This study adopted technology implementation model from other fields outside HEIs. There is thus need to enrich the framework proposed. This study focused mainly on funded technology implementation initiatives; future research could focus on internal initiatives undertaken by HEIs. This could provide insights into how other, non-monetary incentives could affect technological innovation implementation effectiveness.

Another area of future research could be to apply the organizational theory applied in the current study to private HEIs. With the exception of UCM, all of the other institutions in the current study were public HEIs. Private institutions could have a different implementation environment, and thus the findings would vary. Carrying out a study using the same model on private HEIs would thus help to provide some comparison from a different environmental perspective.

From the current study it became clear that there were several previously initiated technological initiatives already under way in the HEIs that participated in the study. The PHEA-ETI was thus not new but in such cases could be termed more of a ‘redundant initiative’. A study on the effectiveness of sponsors in capacity building in challenged technology environment would provide much-needed insights.

This study is limited to the implementation process and initial use, known as implementation effectiveness, but did not investigate long term use. A further study that addresses innovation continued use after implementation, known as innovation effectiveness, is recommended. This study would specifically investigate how many of the innovations continued to be used by institutions and possible impact they had to the universities.

REFERENCES

Abrams, I., Leung, G., & Stevens, A. J. (2009). How are US technology transfer offices tasked and motivated – Is it all about the money? *Research Management Review*, 17(1), 1–34.

Achimugu, P., Oluwagbemi, O., & Oluwaranti, A. (2010). An evaluation of the impact of ICT diffusion in Nigeria's higher educational institutions. *Journal of Information Technology Impact,* 10(1), 25–34. Available online: http://www.jiti.com/v10 /jiti.v 10n1.025-034.pdf, last accessed 12th March 2013.

Ågerfalk, P. J. (2013). Embracing diversity through mixed methods research. *European Journal of Information Systems*, 22(3), 251–256. doi:10.1057/ejis.2013.6.

Aker, J. C., & Mbiti, I. M. (2010). Mobile Phones and Economic Development in Africa. *Journal of Economic Perspectives*, *24*(3), 207–232. doi:10.2139/ssrn.1629321 Available online on http://sites.tufts.edu/jennyaker/files/2010/09/akermobile africa.pdf , last accessed 2nd January 2014.

Ale, K. & Chib, A. (2011). Community factors in technology adoption in primary education: Perspectives from rural India. *Information Technologies & International Development*, 7(4).

Allard, S. L. (2003). Innovation in university social systems: The adoption of electronic theses and dissertations digital libraries. Unpublished PhD, University of Kentucky. Available online: http://uknowledge.uky.edu/cgi/viewcontent.cgi?article=1319& context=gradschool_diss, last accessed 12th July 2013.

Anderson, J. D. (2006). *Qualitative and quantitative research*. Available online: http://www.icoe.org/webfm_send/1936, last accessed 20th January 2013.

Anfara, V. A., Jr., & Mertz, N. T. (Eds.). (2006). *Theoretical frameworks in qualitative research*. Thousand Oaks, CA: Sage.

Antonacci, D. M. (2002). *Integrating technology into instruction in higher education*. Retrieved from: http://associations.missouristate.edu/assets/mohighedweb/IS-TechnologyIntegrationinHigherEducation.pdf. last accessed 15th March 2013.

Attridge, J. (2007). Innovation models in the biopharmaceutical sector. *International Journal of Innovation Management*, 11(2), 215–243.

Balasubramanian, K., Clark-Okah, W., Daniel, J., Fereira, F., Kanwar, A., Kwan, A., Lesperance, J., Mallet, J., Umar, A., & West, P. (2009). *ICTs for higher education: Background paper from the Commonwealth of Learning*. Paris: UNESCO. Available online: http://unesdoc.unesco.org/images/0018/001832/183207e.pdf , last accessed 24th June 2013.

Bertrand, W. E. (2010). Higher education and technology transfer: The effects of "Technosclerosis" on development. *Journal of International Affairs*, 64(1), 101–120. Retrieved from: http://web.ebscohost.com/ehost/pdfviewer/pdfviewer? vid=4 &sid=d7f8a782-8e2f-43de-838c-ab6561648fde%40sessionmgr115&hid=124. last accessed 12th July 2013.

Borrell, J. (2008). A thematic analysis identifying concepts of problem gambling agency: With preliminary exploration of discourses in selected industry and research documents. *Journal of Gambling Issues*, 22(22), 195–218.

Brewer, D. & Tierney, W. (2010). Barriers to Innovation in U.S. Higher Education , Prepared for the American Enterprise Institute conference, "Reinventing the American University: The Promise of Innovation in Higher Education," June 3.

Bryman, A. (2006). Integrating quantitative and qualitative research: How is it done? *Qualitative Research*, 6, 97–113. Available online: http://qrj.sagepub.com/content/ 6/1/97. full.pdf+html, last accessed 20th February 2013.

Bülbül, T. (2012). Developing a scale for innovation management at schools: A study of validity and reliability. *Educational Sciences: Theory and Practice*, 12(1), 168–176. Retrieved from: http://web.ebscohost.com/ehost/pdfviewer/pdfviewer? sid=b1fcc 440-4ce1-4284-b77a-27b1b990b8f4%40sessionmgr13&vid=1&hid=20.last accessed 12th March 2013.

Carlsson, S. (2005). A critical realist perspective on IS evaluation research. *ECIS 2005 Proceedings.* Paper 125. Retrieved from: http://aisel.aisnet.org/ecis2005/125. last accessed 12th March 2013.

Caruth, G. D. (2013). Demystifying mixed methods research design: A review of the literature. *Mevlana International Journal of Education*, 3(2), 112–122. doi:10.13054/mije.13.35.3.2.

Chigona, W. & Licker, P. (2008). Using diffusion of innovation framework to explain communal computing facilities adoption among the urban poor. *MIT Press*, 4(3), 57–73.

Chin, W.W. & Marcolin, B.W. (2001). The future of diffusion research. *The DATA BASE for Advances in Information Systems*, 32(3): 7–12.

Çokluk, Ö. (2011). The effects of methods of imputation for missing values on the validity and reliability of scales. *Educational Sciences: Theory and Practice*, 11(1), 303–310. Retrieved from: http://web.ebscohost.com/ehost/pdfviewer/ pdfviewer? sid=baf3fa4a-7280-47e5-aea8-1ce0a8e3ec1b%40sessionmgr13&vid=1&hid=20. last accessed 20th August March 2013.

Cook, D.A., & Beckman, T.J. (2006). Current Concepts in Validity and Reliability for Psychometric Instruments: Theory and Application. *American Journal of Medicine*, 119(2), 166.

Damanpour, F. & Marguerite, S. (2009). Characteristics of innovation and innovation adoption in public organizations: Assessing the role of managers. *Journal of Public Administration Research and Theory,* 19, 495–522.

Damodaran, L. (1996). User involvement in the systems design process: A practical guide for users. *Journal of Behaviour & Information Technology*, 15(6), 363–377.

De Veer, A. J., Fleuren, M. A., Bekkema, N., & Francke, A. L. (2011). Successful implementation of new technologies in nursing care: A questionnaire survey of nurse users. *BMC Medical Informatics and Decision Making*, 11(67). Available online: http://www.biomedcentral.com/content/pdf/1472-6947-11-67.pdf, last accessed 20th August 2013.

Demark, S. J. M. & Schout, H. (2008). Incorporating student-centred learning in innovation and entrepreneurship education. *European Journal of Education,* 43(4),

401–578. Available online: http://onlinelibrary.wiley.com/doi/10.1111/j.1465-3435.2008.00372.x/pdf, last accessed 22nd June 2013.

Dexter, S. & Anderson, R. E. (2002). USA: A model of implementation effectiveness. *In R.E. Anderson (Chair) Leading-Edge, Technology-Supported Teaching Practices around the World*. Symposium for annual meeting of the American Educational Research Association, New Orleans, Louisiana.

Dobson, P. (2010). The philosophy of critical realism: An opportunity for information systems research. In W. Olsen (Ed) *Realist methodology, Sage benchmarks in social research methods series*. London: Sage Publications Ltd, UK.

Dobson, P., Jackson, P. & Gengatharen, D. (2011). Examining rural adoption of broadband – Critical realist perspectives. *PACIS 2011 Proceedings*. Retrieved from: http://aisel.aisnet.org/pacis2011/56. last accessed 20th August March 2013.

Dobson, P., Myles, J., & Jackson, P. (2007). Making the case for critical realism: Examining the implementation of automated performance management systems. *Information Resources Management Journal*, 20(2), 140–152.

Dodds, T. (2007). *Information technology, A contribution to innovation in higher education*. Available online: http://www.mendeley.com/research/information-technology-contributor-innovation-higher-education/ and http://onlinelibrary.wiley.com/doi/10.1002/he.247/pdf, last accessed 22nd Feb 2012

Donalek, J.G. (2005). Demystifying nursing research: The interview in qualitative research. *Urologic Nursing,* 25(2), 124–125.

Dong, L., Neufeld, D., & Higgins, C. (2008).Testing Klein and Sorra's innovation implementation model: An empirical examination. *Journal of Engineering and Technology*, 25, 237–255.

Dutta, S., & Mia, I. (2011). *The global information technology report 2010–2011* (p. 435). Retrieved from http://www3.weforum.org/ docs/WEF_GITR_ Report_2011 .pdf. last accessed 20th August March 2013.

Dwivedi, Y. K., Choudrie, J., & Brinkman, W. P. (2006). Development of a survey instrument to examine consumer adoption of broadband. *Industrial Management & Data Systems*, 106(5), 700–718. Retrieved from: http://www.emeraldinsight.com /10.1108/02635570610666458. last accessed 20th August March 2013.

Dwivedi, Y., Lal, B., Irani, Z., & Williams, M. (2010). A logistic regression analysis to examine factors affecting broadband adoption in the UK. *International Journal of Business Information Systems*, *5*(4), 393–417.

Economist Intelligence Unit (2008). *How technology sectors grow: Benchmarking IT industry competitiveness 2008*. London: Economist Intelligence Unit. Available online: http://a330.g.akamai.net/7/330/25828/20080910172933/graphics.eiu.com/upload/BSA_2008.pdf, last accessed 2nd January 2012.

Economist Intelligence Unit (2010).*Digital economy rankings 2010 Beyond e-readiness* (p. 26). London: Economist Intelligence Unit. Retrieved from: http://www-935.ibm.com/services/us/gbs/bus/pdf/eiu_digital-economy-rankings-2010_final_ web .pdf. last accessed 20th August March 2013.

Fairhurst, G. & Sarr, R. (1996). *The art of framing*. San Francisco: Jossey-Bass.

Fillion, G., Limayem, M., Laferrière, T., & Mantha, R. (2009). Integrating information and communication technologies into higher education: Investigating onsite and online students. *Online Learning*, 24(3), 223–240. doi:10.1080/ 02680510903201649.

Fincham, J. E. (2008). Response rates and responsiveness for surveys, standards, and the *Journal*. *American Journal of Pharmaceutical Education*, 72(2), 43. Retrieved from: http://www.pubmedcentral.nih.gov/articlerender.fcgi? artid=2384218& tool =pmcentrez&rendertype=abstract. last accessed 16th March 2013.

First Tranche (2012). *Do strong monitoring and evaluation systems and high levels of staff supervision make World Bank projects more effective?* Available online: http://blog.aiddata.org/2012/01/do-strong-monitoring-and-evaluation.html, last accessed 27th Jan 2012.

Fitz-Gerald, L., & Carroll, J. (2003). *The role of governance in ERP system implementation*. Available online: http://www.inst-informatica.pt/v20/ersi/ 13_ersi/ documentos/The%20Role%20of%20Governance%20in%20ERP%20System%20Implementation.pdf, last accessed 24th Jan 2012.

Fogg, H. (2012). Tracing the links between absorptive capacity , university knowledge exchange and competitive advantage in SMEs. *The International Journal of Entrepreneurship and Innovation*, 13(1), 35–44. Retrieved from: http://dx.doi.org/10.5367/ijei.2012.0061. 16th March 2013.

Gelb, E., Auernhammer, H., Wagner, P., & Blackmore, S. (2009). Technological innovation adoption – Constraint commonalities, summary of the 2009 EFITA/JIAC plenary session. *Summary of the 2009 EFITA/JIAC* (pp. 1–3). Retrieved from: http://departments.agri.huji.ac.il/economics/gelb-adoption.pdf. 16th March 2013.

Gendall, P. (2000). Responding to the problem of nonresponse. *Australasian Journal of Market Research*, 8(1), 3–17.

Gichoya, D. (2005). Factors affecting the successful implementation of ICT projects in government. *The Electronic Journal of e-Government,* 3(4),175–184.

Glaser, B. G. (2008). *Qualitative and quantitative research*. Available online: http://groundedtheoryreview.com/2008/06/30/1052, last accessed 17th August 2013.

Golafshani, N. (2003). Understanding reliability and validity in qualitative research. *The Qualitative Report*, 8(4), 597–606. Retrieved from: http://www.nova.edu/ssss/QR/QR8-4/golafshani.pdf. 16th March 2013.

Gonçalves, A. M., & Pedro, N. (2012). Innovation, e-learning and higher education: An example of a university's LMS adoption process. *World Academy of Science, Engineering and Technology*, 66, 258–265. Retrieved from: http://www.waset.org/journals/waset/v66/v66-46.pdf. 16th March 2013.

Hamel, G. (2000). *Leading the revolution*. Boston, MA: Harvard Business School Press.

Hamre, L. & Vidgen, R. (2008). Using social networks and communities of practice to support information systems. *16th European Conference on Information Systems, ECIS 2008*. Retrieved from: http://is2.lse.ac.uk/asp/aspecis/20080177.pdf. 16th March 2013.

Han, W. S., Yusof, A. M., Ismail, S., & Aun, N. C. (2012). Reviewing the notions of construction project success. *International Journal of Business Management*, 7(1), 90–101.

Heeks, R. (2002). Information systems and developing countries: Failure, success and local improvisations. *The Information Society,* 18(2), 101–112. eScholarID:1b601 | DOI:10.1080/01972240290075039. Available online: http://www.elearning.jo/ datapool/books/824/6705439.pdf, last accessed 20th February 2012.

Heiss, M. & Jankowsky, M. (2001). The technology tree concept – An evolutionary approach to technology management in a rapidly changing market. *IEMC 2001 Proceedings from Change Management and the New Industrial Revolution* 1, 7–9 Oct, 37–43

Hsieh, J. Y. & Liao, P.-W. (2009). Measurement reliability, validity, and equivalence of Web-based and paper-and-pencil survey: Testing the measures of Internet-related and behavior-related from homogenous samples. *Ninth Survey Research and Application Conference, Academia Sinica, Taiwan, 9.11.* Retrieved from: http://survey.sinica.edu.tw/2009/4–2.pdf. 16th March 2013.

Ika, L. A., Diallo, A., & Thuillier, D. (2010). Project management in the international industry: The project coordinator's perspective. I*nternational Journal of Managing Projects in Business,* 3(1), 61–93.

Ika, L.A. (2009) Project success as a topic in project management journals. *Project Management Journal*, 40 (4), 6–19.

Indeje, W. G. & Zheng, Q. (2010). Organizational culture and information systems implementation: A structuration theory perspective. *Sprouts: Working Papers on Information Systems*, 10(27). Available online: http://sprouts.aisnet.org/10–27. 16th March 2013.

Jacob, R. T. & Jacob, B. A. (2012). Pre-notification, incentives and survey modality: An experimental test of methods to increase survey response rates of school principals. *Journal of Research on Educational Effectiveness,* 5(4): 401–420.

Jaffer, S., Ng'ambi, D., & Czerniewicz, L. (2007). The role of ICTs in higher education in South Africa: One strategy for addressing teaching and learning challenges. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 3(4), 131–142.

Javeri, M. & Persichitte, K. (2007). Measuring technology integration practices of higher education faculty with an innovation component configuration map (ICCM) Manisha Javeri. *International Journal of Technology in Teaching and Learning,* 3(1), 28–50.

Jhurree, V. (2005). Technology integration in education in developing countries: Guidelines to policy makers 1. *International Education Journal,*6(4), 467–483. Retrieved from: http://ehlt.flinders.edu.au/ education/iej/articles/v6n4/ jhurree/ paper.pdf, last accessed 23rd August 2013.

Johnson, J. D. (2000). Levels of success in implementing information technologies. *Innovative Higher Education*, 25(1), 59–76.

Katz, R. (1999). *Dancing with the Devil: Information technology and the new competition in higher education.* Available online: http://net.educause.edu/ ir/library/ html/erm/erm99/erm9959.html, last accessed 22nd Feb 2012.

Ke, W. L. & Wei, K. K. (2006). Organizational learning process: Its antecedents and consequences in enterprise system implementation.. *Journal of Global Information Management*, 14(1), 1–22.

Kenyon S., Pike K., Jones D., *et al.* (2005). The effect of a monetary incentive on return of a postal health and development questionnaire: A randomised trial. *BioMed Central Health Services Research*, 5 (55).

King, P. (2002). The implementation of technology-based information systems: Analysing and influencing success (Doctoral dissertation submitted 2002).

Kirschner, P. A., Hendricks, M., Paas, F., Wopereis, I., & Cordewener, B. (2004). Determinants for failure and success of innovation projects: The road to sustainable educational innovation. Paper presented at the Association for Educational Communications and Technology Convention, 2007. Retrieved from: http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/ 80/1b/a7/36.pdf. last accessed16th March 2013.

Kizza J. M. (2009). Building the African ICT infrastructure for development: The role of the African universities – part 1. I*nternational Journal of Computing and ICT Research*, 3, 7–9. Available online: http://www.ijcir.org/vol 3 - number/article.pdf. last accessed16th March 2013.

Klein, K. J. & Knight, A. P. (2005). Overcoming the challenge. *American Psychologist Society*, 14(5), 5–8. Retrieved from: http://www-management.wharton.upenn.edu/klein/documents/New_Folder/Klein_Knight_Current_Directions_Implementation.pdf. last accessed 22nd October 2013

Klein, K. J., & Sorra, J. S. (1996). The challenge of innovation implementation. *Academy of Management Review,* 21(4), 1055–1079.

Klein, K., Conn, A. B., & Sorra, J. S. (2001). Implementing computerized technology: An organizational analysis. *Journal of Applied Psychology,* 86(5), *811– 824.*

Krippendorff, K. & Bock, M, A.(2007). *The content analysis reader*. Available online: http://www.asc.upenn.edu/usr/krippendorff/Krippendorff_Alpha.doc, last accessed 23rd March 2013.

Krizaj, D. (2001). *Innovation adoption case study – Introduction of 'learning management system' into Urism study programme: An outline for development and evaluation of innovations in teaching and learning*. Available online: http://www2.uiah.fi/~mmaenpaa/lectures/andreija/Istenic_Starcic_Innovation%20adoption%20case%20study.pdf, last accessed 20th June 2012.

Kukafka, R., Johnson, S. B., Linfante, A., & Allegrante, J. P. (2003). Grounding a new information technology implementation framework in behavioral science: A systematic analysis of the literature on IT use. *Journal of Biomedical Informatics,* 36(3): 218–27. doi:10.1016/j.jbi.2003.09.002 pmid: 14615230.

Kumar, R. (2007). Making E-Government Projects in Developing Countries More Successful and Sustainable: Some Case Studies from India. In CPRsouth : Research for Improving ICT governance in the Asia-Pacific (pp. 1–15). Manila. Retrieved from http://www.cprsouth.org/wp-content/uploads/drupal/Rajendra_Kumar_1.pdf. last accessed 22nd October 2013

Kwak, N. & Radler B. A. (2002). A comparison between mail and Web surveys: Response pattern, respondent profile, and data quality. *Journal of Official Statistics*, 18(2), 257–273.

Lewis, S., Friedman, J. & Schoneboom, J. (2010). *Accomplishments of the Partnership for Higher Education in Africa, 2000–2010*. New York: New York University. Available online: http://www.foundation-partnership.org/pubs_/pdf/accomplishments.pdf, last accessed 24th July 2012.

Limmanont, P. (2010). The determinants of organizational innovation management effectiveness in the Thai banking industry. Unpublished Ph.D thesis dissertation, p. 243.

Limthongchai, P. & Speece, M. W. (2003). The effect of perceived characteristics of innovation on ecommerce adoption by SMEs in Thailand. *Proceedings of the Seventh International Conference on Global Business and Economic Development*, 1573–1585.

Lin, W. & Shao, B. (2000). The relationship between user participation and system success: a simultaneous contingency approach. *Information & Management,* 37, 283–295.

Lindow, M. (2011). *Weaving success: Voices of change in African higher education*. New York: The Institute of International Education.

Liyanagunawardena, T. R., Adams, A. A., & Williams, S. A. (2013). MOOCs: A systematic study of the published literature 2008–2012. *The International Review of Research in Open and Distance Learning*. Available online: http://centaur.reading.ac.uk/33109/6/MOOCs_%20AsystematicStudyOfThePublishedLiterature2008–2012.pdf, last accessed 15th August 2013.

Lusinchi, D. (2007). Increasing response rates: Pre-notification & web survey format. *2007 Proceedings of the Federal Committee on Statistical Methodology Research*. Washington, D.C. Available online: http://www.fcsm.gov/07papers/Lusinchi.X-A.pdf. last accessed 22nd October 2013

Macharia J. & Nyakwende, E. (2010).Vice-chancellors' influence on academic staff intentions to use learning management systems (LMS) for teaching and learning. *The Journal of Language, Technology & Entrepreneurship in Africa,* 2(1).

Macharia, J & Nyakwende, E. (2009). Factors affecting the adoption and diffusion of Internet in higher educational institutions in Kenya. *Journal of Language, Technology and Entrepreneurship in Africa*, 1(2), 6–23.

Maditinos, D., Chatzoudes, D., & Tsairidis, C. (2012). Factors affecting ERP system implementation effectiveness. *Journal of Enterprise Information Management (JEIM),* 25(1), 60-78. ISSN 1741-0398, Emerald. doi:10.1108/ 17410391211192161. Electronic publication at: http://www.emeraldinsight.com /journals.htm?articleid=17004132&show=pdf, last accessed 20th June 2012.

McCabe, S., Diez, A., Boyd, C., Nelson, T., & Weitzman. E. (2006). Comparing web and mail responses in a mixed mode survey in college alcohol use research. *Addict Behav*. 2006 September, 31(9): 1619–1627. Available online: http://www.ncbi. nlm.nih.gov/ pmc/articles/PMC3156492/pdf/nihms275030.pdf. last accessed 22nd October 2013

McGregor, J. H. (2002). Flexible scheduling: How does a principal facilitate implementation? *School Libraries Worldwide*, 8(1), 71–84, available online on http://www.ala.org/aasl/aaslpubsandjournals/slmrb/slmrcontents/volume9/flexible# findings, last accessed 22nd August 2013.

Mirriahi, N., Dawson, S., & Hoven, D. (2012). Identifying key actors for technology adoption in higher education: A social network approach. *Acsilite 2012 future challenges, sustainable futures*. Retrieved from: http://www.ascilite2012.org /images/custom/mirriahi,_negin_-_identifying_key.pdf. last accessed 22nd October 2013

Montgomery, N. & Zint, M . (2010). Evaluation: *What is it and why do it*? Available online: http://meera.snre.umich.edu/plan-an-evaluation/evaluation-what-is-it-and-why-do-itc, last accessed 27th Jan 2012.

Net, F. P. (2009). *Combining Web-based and mail surveys improves response rates: A PBRN study,* 245–249. doi:10.1370/afm.944.

Ng'ethe (2003). *Higher education innovations in Sub-Saharan Africa: With specific reference to universities*. Available online: http://www.aau.org/ wghe/publications/ wghe_innovations_ref_univ.pdf. last accessed 22nd October 2013

Noor, H. M & Dzulkifli, B. (2013). Assessing leadership practices, organizational climate and its effect towards innovative work behaviour in R&D. *International Journal of Social Science and Humanity*, 3(2), 129–133. doi:10.7763/IJSSH.2013.V3.211

Noor, H. M. & Dzulkifli, B., (2012). Assessing the organizational climate towards developing innovative work behavior: A literature review. *3rd International Conference on Business and Economic Research (3rd Icber 2012) Proceeding 12–13 March 2012* (pp. 1487–1497). Retrieved from: http://www.international conference.com.my/proceeding/3rd_icber2012_proceeding/101_313_3rdICBER2012_Proceeding_PG1487_1497.pdf. last accessed 21st April 2013.

Nulty, D. D. (2008). The adequacy of response rates to online and paper surveys: What can be done? *Assessment & Evaluation in Higher Education*, 33(3), 301–314. doi:10.1080/02602930701293231

Nystrom, P. C., Ramamurthy, K., & Wilson, A. L. (2002). Organizational context, climate and innovativeness: Adoption of imaging technology. *Journal of Engineering and Technology Management,* 19(3,4), 221.

Obijiofor, L., Inayatullah, S., & Stevenson, T. (2005). Impact of new information and communication technologies (ICTs) on the socio-economic and educational development of Africa and the Asia-Pacific region. In *Third working conference on Information and Communications Technology solutions for government operations, e-government and national development, an African Regional WSIS PrepCom Pre-Event, Accra International Conference Centre, Accra, Ghana*. Retrieved from: http://www.academia.edu/665191/Impact_of_new_information_and_communication_technologies_ICTs_on_the_socioeconomic_and_educational_development_of_Africa_and_the_Asia-Pacific_region.

Oliver, R. (2002). The role of ICT in higher education for the 21st century: ICT as a change agent for education. *Proceedings of the Higher Education for the 21st Century Conference*. Miri, Sarawak: Curtin University.

Orlikowski, W. J. (2009). The sociomateriality of organisational life: Considering technology in management research. *Cambridge Journal of Economics*, 34(1), 125–141. doi:10.1093/cje/bep058

Osei-Bryson, K., Dong, L., & Ngwenyama, O. (2008). Exploring managerial factors affecting ERP implementation: An investigation of the Klein-Sorra model using regression splines. *Information Systems Journal*, 18, 499–527.

Parker, S. (2010). *Lessons from a ten-year funder collaborative: A case study of the Partnership for Higher Education in Africa*. Carnegie Corporation of New York. ISBN: 978-0-9827746-1-8. Pages: 46.

Patomaki, H. (2006). Realist ontology for futures studies. *Journal of Critical Realism*, 5(1), 1–31.

Patrick, D. L., Burke, L., Gwaltney, C. J. *et al.* (2011). Content validity – Establishing and reporting the evidence in newly developed patient-reported outcomes (PRO) instruments for medical product evaluation: ISPOR PRO good research practices task force report: Part 2 – Assessing respondent understanding. *Value Health,*14(8), 978–988.

Patterson, M. G., West, M. A., Shackleton, V. J., Dawson, J. F., Lawthom, R., Maitlis, S., Robinson, D. L., *et al.* (2005). Validating the organizational climate measure: Links to managerial practices, productivity and innovation. *Journal of Organizational Behavior*, 26(4), 379–408. doi:10.1002/job.312.

Peansupap, V and Walker, D. (2005), Factors enabling information and communication technology diffusion and actual implementation in construction organisations, *Electronic Journal of Information Technology in Construction*, 10(14), 193-218

Peansupap, V. & Walker, D. H. T. (2005). Factors enabling information and communication technology diffusion and actual implementation in construction organisations. *Information Technology and Communication*, 10 (July), 193–218.

Pedró, F. (2012). *Is technology transforming higher education? Evidence and policy implications.* Retrieved from: http://forovalparaiso2012. files.wordpress.com /2012/04/francesc-pedrc3b3.pdf. last accessed 21st April 2013.

Peng, C.-Y. J., Lee, K. L., & Ingersoll, G. M. (2002). An introduction to logistic regression analysis and reporting. *The Journal of Educational Research,* 96(1), 3–14. doi:10.1080/00220670209598786

Peng, F. & Kurnia, S. (2010). Understanding hospital information systems adoption in China (2010). Pacific Asia Conference on Information Systems 2010 Proceedings. *Paper 66.*

Pinto J. K. & Slevin, D. P. (1987). Critical factors in successful project implementation. *IEEE Transactions on Engineering Management ,* 4(1), 22–28.

Pratt, M. (2009). For the lack of a boilerplate: Tips on writing up (and reviewing) qualitative research. *Academy of Management* Journal, Oct, 52(5), 856.

Republic of Kenya (2007). *Kenya Vision 2030.* Available online: http://www.ku.ac.ke/images/stories/docs/kenya_vision_2030_abridged_version.pdf, last accessed 2nd June 2012.

Rivard, S., Lapointe, L., & Kappos, A. (2011). An organizational culture-based theory of clinical information systems implementation in hospitals. *Journal of the Association for Information Systems,* 12(2).

Roberts, C. (2008). Implementing educational technology in higher education: A strategic approach. *The Journal of Educators Online*, 5(1), 1–16. Retrieved from: http://www.thejeo.com/Archives/Volume5Number1/RobertsPaper.pdf.last accessed 21st April 2013.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Saak, M. (2007). *The role and impact of the project sponsor*. Retrieved from: http://gradworks.umi.com/3278606.pdf. Last accessed 21st April 2013.

Safiul, S. & Corresponding, H. (2010). The role of information and communication technologies (ICTs) in delivering higher education – A case of Bangladesh. *International Education Studies*, 3(2), 97–106. Retrieved from: http://www. bdresearch.org/home/attachments/article/nArt/370_role_of_information_in_educati on.pdf. Last accessed 21st April 2013.

Sanchez-Franco, M. & Rondan-Cataluña, F. J. (2010). Connection between customer emotions and relationship quality in online music services. *Behaviour & Information Technology*, 29(6), 633–651.doi:10.1080/01449290903235343.

Saunders, M. N. K. (2012). Web versus mail: The influence of survey distribution mode on employees' response. *Field Methods*, 24(1), 56–73.

Sawang, S. & Unsworth, K. (2007). Innovation implementation effectiveness: A multiorganizational test of Klein, Conn and Sorra's model. Paper presented at the Academy of Management Conference, 3–8 August, Philadelphia.

Sawang, S. & Unsworth, K. (2011). A model of organizational innovation implementation effectiveness in small to medium firms. *International Journal of Innovation Management,*15(5), 1–22. Available online: http://ssrn.com/abstract =2168595 or http://dx.doi.org/10.2139/ssrn.2168595, last accessed 15th Aug 2012.

Sawang, S., Unsworth, K., & Sorbello, T. (2006). An exploratory study of innovation effectiveness measurement in Australian and Thai SMEs. *International Journal of Organisational Behaviour*, 12(1), 110–125.

Schafer, R. R. (2007). Ten tips for writing better Web-based survey questions. *Intercom*, 54(4), 25–27. Retrieved from: http://www.academia.edu/266904/Ten_Tips_to_ Write_Better_WebBased_Survey_Questions, last accessed 25th April 2013.

Schmid, M., Steinlein, C., Bogart, J. P., Feichtinger, W., Haaf, T., Nanda, I., Del Pino, E. M., *et al.* (2012). Introduction. *Cytogenetic and Genome Research*, 138(2–4), 85–156. doi:10.1159/000207355.

Schmidt M., Hellwig B., Hammad S., Othman A., Lohr M., Chen Z., *et al.* (2012) A comprehensive analysis of human gene expression profiles identifies stromal immunoglobulin kappa c as a compatible prognostic marker in human solid tumors. *Clin Cancer Res*. 18: 2695–2703

Schoen, J., Mason, T. W., Kline, W. A., & Bunch, R. M. (2005). The innovation cycle: A new model and case study for the invention to innovation process. *Engineering Management Journal,* 17(3), 3–10.

Shapley, K. S., Sheehan, D., Maloney, C., & Caranikas-walker, F. (2010). Evaluating the implementation fidelity of technology immersion and its relationship with student achievement. *Journal of Technology, Learning, and Assessment*, 9(4).

Shea, P., Pickett, A., & Li, C. S. (2005). Increasing access to higher education: A study of the diffusion of online teaching among 913 college faculty. *The International Review in Open and Distance Learning,* 6(2).

Smith, J., Bekker, H., & Cheater, F. (2011). Theoretical versus pragmatic design in qualitative research. *Nurse Researcher*, 18(2), 39–51. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/21319483. Last accessed 21st April 2013.

Studer, M. (2005). The effect of organizational factors on the effectiveness of EMR system implementation – What have we learned? *Electronic Healthcare Journal*, 4(2), 92–98. Available online: http://www.medicexchange.com/pdf/EMR/effect-of-organizational-factors-on-the-effectiveness-of-emr-system-implementation.pdf, last accessed 27th Jan 2012.

Thapa, A. K., Dhungana, A. R., Tripathi, Y. R., Engineering, S., Tripathi, Y. R., & Aryal, B. (2014). Determinants of Poverty in Rural Parts of Nepal: A Study of Western Development Region. *Arth Prabhand: A Journal of Economics and Management*, *3*(1), 88–96. Retrieved from http://prj.co.in/setup/business/paper 169.pdf

Then, K. A. & Amaria, P. (2013). Factors related to the adoption of IT emerging technologies by research and non-research based higher education institutions. *Research in Higher Education Journal*, *19*. Retrieved from: http://www.aabri.com/LV2012Manuscripts/LV12009.pdf. Last accessed 21st April 2013.

Tinio,V. L. (2002). *ICT in education*.Available online: http://www.apdip.net/ publications/iespprimers/eprimer-edu.pdf, last accessed 20th May 2013.

Vaughan, P. (2001). *System implementation success factors: It is not just the technology*. Retrieved from:

http://www.docjax.com/document/view.shtml?id=860464&title=System%20Implementation%20Success%20Factors:%20It%20Is%20Not%20Just%20the%20Technology, last accessed 14th June 2012.

Veletsianos, G. (2010). A definition of emerging technologies for education. In G. Veletsianos (Ed.). *Emerging technologies in distance education* (pp. 3-22). Edmonton: Athabasca University Press.

Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the qualitative–quantitative divide: Guidelines for conducting mixed methods Research in information systems. *MIS Quarterly*, 37(1), 21–54. Retrieved from: http://vvenkatesh.com/ Downloads/ Papers/fulltext/pdf/Venkatesh_Brown_Bala_MISQ_forthcoming.pdf. Last accessed 21st April 2013.

Vise, D. (2005). *The Google story*. New York: MacMillan.

Wagner, K. D., Davidson, P. J., Pollini, R. A., Strathdee, S. A., Washburn, R., & Palinkas, L. A. (2013). Reconciling incongruous qualitative and quantitative findings in mixed methods research: Exemplars from research with drug using populations. *International Journal of Drug Policy*, 23(1), 54–61. doi:10.1016/j.drugpo.2011.05.009.

Wagner, N., Hassanein, K., & Head, M. (2008). Who is responsible for e-learning success in higher education? A stakeholders' analysis. *Educational Technology & Society*, 11(3), 26–36.

Walter, A., Parboteeah, K. P., Riesenhuber, F., & Hoegl, M. (2011). Championship behaviors and innovations success: An empirical investigation of university spin-offs. *Journal of Product Innovation Management*, 28(4), 586–598. doi:10.1111/j.1540-5885.2011.00826.x. Available online: accessed 12th July 2013.

Weiner, B. J. (2009). A thhttp://facstaff.uww.edu/ parbotek/files/JPIM.pdf, lasteory of organizational readiness for change. *Implementation Science: IS*, 4(67), 67–76. doi:10.1186/1748-5908-4-67.

Weiner, B., Lewis, M. & Linnan, L. (2009).Using organization theory to understand the determinants of effective implementation of worksite health promotion programs. *Health Education Research,* 24(2), 292–305.

Weldon, E. (2000). The development of product and process improvements in work groups. *Group & Organization Management*, 25(3), 244.

Werlinger, R., Hawkey, K., & Beznosov, K. (2009).Human, organizational and technological challenges of implementing IT security in organizations. *Information Management & Computer Security*, 1(17), 4–49. Retrieved from http://lersse-dl.ece.ubc.ca/record/153/files/153.pdf. Last accessed 21st April 2013.

Wiechetek, Ł. (2012). Effectiveness of information systems implementation: The case of the Polish small and medium enterprises. *Management, Knowledge and Learning, International Conference 2012,* 193–202.

World Economic Forum & INSEAD (2013). *The global information technology report 2013: Growth and jobs in a hyperconnected world*. B. Bilbao-Osorio, S. Dutta, & B. Lanvin (Eds.), 2013 ed., p. 409. Geneva: World Economic Forum.

Wunderlich, P. & Größler, A. (2011). Raising implementation effectiveness of innovations by considering structural aspects of organizations. *29th International System Dynamics Conference, Washington*, July 24–28.

Yil, Y., & Yil, Y. (2009). Usage of factor scores for determining relationships among body weight and some body measurements. *Bulgarian Journal of Agricultural Science,*, *15*(4), 373–377. Retrieved from http://www.agrojournal.org/15/04-15-09.pdf. Last accessed 21st Julyl 2013.

Yuan, L., & Powell, S. (2013). *MOOCs and disruptive innovation: Implications for higher education*. eLearning Papers. Retrieved from: http://elearningeuropa.info /sites/default/files/asset/In-depth_33_2.pdf last accessed 15th August 2013.

Zachariadis, M, S., Scott, S., & Barrett, M. (2001). *Exploring CR as the theoretical foundation of mixed-method research: Evidence from the economics of IS innovations*. Working Paper Series of Cambridge Judge Business School, University of Cambridge. Available online: http://www.jbs.cam.ac.uk /research/ working_papers/2010/wp1003.pdf, last accessed 22nd May 2013.

APPENDICES

Appendix A: Variables

Table A1: Definition and measurement of variables

Variable	Parameters to be measured/ Indicators/ Factors	Operational-ization	Instrument to use	Scale of Measurement (Ordinal/ Nominal)	Analysis Tool
Implementation Effectiveness *(Dependent)*	Implementation Effectiveness (Y)	Whether main project output was realized. Whether at least 60% of other outputs were realised	- Questionnaire - Document review the SAIDE evaluation report)	- Nominal Scale where 1 represents effective and; 0 represents not effective.	- Average of user feedback
Organizational culture *(Predictor)* Implementation climate *(Composite Predictor variable)*	Rewards and incentives (X_1)	Any payment made or recognition for participating in project	- Interview guide - Questionnaire	Average of user responses from Likert scale	- Factor Analysis - Wald's chi-square - P-value
	Workflow/ workload changes (X_2)	Employees participating in project given less work load in normal workplace	Questionnaire	Sum of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value
	New reporting systems (X_3)	Project members had a different/ another person to report to (not normal supervisor)	-Interview Guide - Questionnaires	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value

	Provide feedback (X_4)	Feedback provided on project activities	- Interview Guide - Questionnaires	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value
Monitoring and evaluation *(Composite predictor variable)*	Held project workshop (X_5)	Hold workshop with leaders Feedback on progress	- Interview Guide - Questionnaire -Document review (SAIDE evaluation reports for each project)	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P – Value
	Milestones(X_6)	That there were clear outputs at each stage that were assessed	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value
	Evaluator feedback (X_6)	On evaluation, the evaluators provided feedback	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value
	Lobby(X_7)	Assist where misalignment found: for example,avail funds; lobby with top	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value

		leadership; assist in project planning; evaluate project against success			
Financial motivation *(Composite Predictor variable)*	Availability of money when needed (X_8)	Money made available for project tasks on time	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P – Value -
	Compensation (X_9)	Whether those who participated in project were compensated for their time	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value
Project leadership *(Composite Predictor variable)*	Knowledge of project management (X_9)	Having knowledge of project management including having participated in projects prior to current project	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale -	- Factor Analysis - Wald's chi-square - P – Value -
	Commitment (X_{10})	How frequent were meetings and if the project leadershowed concern for project success	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value

	ICT knowledge(X_{11})	Whether team leader is ICT literate or not	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value
User Involvement *(Composite Predictor variable)*	Individual belief(X_{12})	Users believe that their role in project would lead to success	- Interview Guide - Questionnaire - Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P – Value
	Assistance in use(X_{13})	That assistance on project was forthcoming	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value
	Perceived benefits(X_{14})	Users believe system beneficial to them	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value
	Training(X_{15})	Training on requisite skills to run tasks	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value

	Awareness of system(X_{16})	Communication on project	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value
	Involvement in decision making (X_{17})	Was involved in coming up with some outputs for example manuals etc.	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value
	Using the system (X_{18})	Users are actively using system	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value
Top management *(Composite Predictor variable)*	Appoint leaders (X_{19})	- Appoint and come up with terms of reference for team	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P – Value
	Appoint internal monitoring team(X_{20})	Work closely with monitoring team	- Interview Guide - Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's chi-square - P-value

	Provide resources (time, financial and human) (X_{21})	Ensure funds available for project	Interview Guide Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's Chi-square - P-value
Innovation efficacy	Users perceive it as beneficial	Users believe innovation is important to them	Interview Guide Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's Chi-square - P-value
	Value fit	Innovation of importance to section	Interview Guide Questionnaire	Average of user responses on a scale of 1-5 on Likert scale	- Factor Analysis - Wald's Chi-square - P-value

Table A2: Total target population

UNIVERSITY	Project	Team Members	Others **	TOTAL
Makerere University	Project 1 - e-Content Project	5	8	13
	Project 2 - Gender Research Project	4	3	7
	Project 3 - e-Portfolio Project	3	5	8
Kenyatta University (KU)	Project 1 - Digitization of Past Examination Papers	5	5	10
	Project 2 - Postgraduate Research Methods Course	3	11	14
	Project 3 - Online eMBA Programme	4	10	14
	Project 4 - Creation of Chemistry and Communications Skills Modules	2	10	12
	Project 5 - Executive Information Systems Specification	2	0	2
	Project 6 - Digitization of Theses and Dissertations	1	0	1
University of Dar es Salaam (UDSM)	Project 1 - Online Course Migration and Improvement	5	10	15
	Project 2 - Computer Science Interactive Courses	0	10	10
Universidade Católica de Moçambique (UCM – Catholic University of Mozambique)	Project 1 - ICT Policy, Use Policy and Strategy Development	2	5	7
	Project 2 - e-Learning Project	0	6	6
	Project 3 - CED Electronic Support Project	0	0	0
	Project 4 - OER Health Sciences Project	0		0
	Project 5 - Research Project	0	5	5
University of Education, Winneba (UEW)	Project 1 - Base Line Study on e-Readiness of UEW	0	0	0
	Project 2 - Enhancing Quality of Teaching and Learning using an LMS	0	11	11

	Team Leader & Project 3 - Monitoring of Staff Behaviours in Moodle	2	2	4
University of Jos (UJ)	Project 1 - Departmental Educational Technology Initiative (LMS)	2	3	5
	Team Leader & Project 2 - Educational Multimedia and Simulations Project	0	5	5
	Project 3 - e-Learning Fellowship Project	0	3	3
University of Ibadan (UI)	Team Leader & Project 1 - Capacity Building and Digital Content	2	4	6
	Project 2 - Open Courseware for Science and Technology	0	5	5
	Project 3 - Tele-Classroom for General Studies	0	5	5
	Project 4 - Educational Radio and Mobile Phones for Distance Education	0	5	5
	Duplicated team leaders and team members			10
TOTAL				**163**
*** "Others" means other persons involved in project implementation, for example, lecturers in e-content development.				

Appendix B: Survey Questionnaire

KENYATTA UNIVERSITY

My name is John M. Kandiri. I am pursuing my PhD in Management Information Systems from Kenyatta University. My research is on Determinants of Technology Innovation Implementation Effectiveness in Higher Education Institutions. The survey is based on the PHEA-ETI projects run in six (6) African countries between 2008-2012. You have been picked as respondent because you participated in a PHEA-ETI project in your university.

This study is neither and an audit nor an evaluation of the project, rather is an academic work .The study outputs will be of significance to project teams in technology based project implementation. It will also guide funders in decision making in future. University management will also find the findings important in rolling out technology based initiatives.

For sections where you selecting from a scale, the range is as follows: 1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree nor Disagree; 4 = Agree 5 = Strongly Agree

The survey will about TWENTY FIVE (25) minutes to fill, where your response will go a long way in making me fulfill my academic dream! I therefore thank you immensely for taking time fill the questionnaire.

Section A: Personal /demographic details

Demographic details and General information ((In any section if there is a question you are not the intended recipient, please select NEITHER AGREE NOR DISAGREE OR OTHERS as applicable. This is because all sections are compulsory))

Your names (OPTIONAL) Type your surname then other names

Email address *If you have more than one, please separate with a comma

Your sex *Select male or Female

- ☐ Male
- ☐ Female

What is your age *Select where applicable

- ☐ Less than 30
- ☐ 31 - 35

- ☐ 36 - 40
- ☐ 41 - 45
- ☐ 46 - 50
- ☐ 51 - 55
- ☐ 56 - 60
- ☐ More than 60

Your university *Enter university where you based
Role in the university *This is any official position you hold
Grade/Level in University *This is work related

- ☐ Lecturer
- ☐ Librarian
- ☐ Technician
- ☐ Other: _____

Highest education level *Level of Education
How would you rate your ICT skills? *Level of knowledge of ICT

- ☐ Basic - application only in my area
- ☐ Moderate - Can develop simple applications
- ☐ Advanced - can do programming and application development
- ☐ I understand ICT requirements clearly
- ☐ Other: _____

Role in the PHEA ETI project in your university *Enter role you played in the project

- ☐ Overall coordinator
- ☐ Team Leader
- ☐ Team Member
- ☐ Project Assistant
- ☐ Other: _____

Section B: User involvement

Your knowledge on the project and how you were involved

Which PHEA ETI project were you involved in - To be filled by all *_____
Your involvement in project and availability of time for the project *Look at the time factor during project implementation

	1. Strongly Disagree	2. Disagree	3. Neither Agree nor Disagree	4. Agree	5. strongly Agree
I came to this project after I got a letter appointing me to be in it	☐	☐	☐	☐	☐
I had time to do my work and learn technology skills required for the project	☐	☐	☐	☐	☐
Most people here are so busy that they had little time to dedicate to this project	☐	☐	☐	☐	☐
Staff were encouraged to take time off from regular tasjs and attend this project's meetings and training	☐	☐	☐	☐	☐
I came to this project because it was of interest to me	☐	☐	☐	☐	☐
I came to this project because i was the originator of idea /proposal	☐	☐	☐	☐	☐

Do you think the project you were involved in went as originally planned and met the expected goals? This is as per your perception of inital project plan on what you believed would come out

- ☐ Yes
- ☐ No
- ☐ Other:

If your answer to above question is No, explain your expectation from project

Section C: Financial availability

Section looked at availability of finances for the project and implementers
Project initiative and financing *This question looks at the origin of an initiative (project) and to what extent availability of finance affected its realisation, where applicable

	1. Strongly Disagree	2. Disagree	3. Neither Agree Nor Disagree	4. Agree	5. Strongly Agree

	1. Strongly Disagree	2. Disagree	3. Neither Agree Nor Disagree	4. Agree	5. Strongly Agree
We wanted to do this project before but financial constraints made it difficult to start off	☐	☐	☐	☐	☐
Because of the project providing finances, project implementation team members have been able to devote as much time as needed to the implementation of the project(s)	☐	☐	☐	☐	☐
In this project, money has been readily available to support activities related to the implementation	☐	☐	☐	☐	☐
We have had to implement the project on a tight budget	☐	☐	☐	☐	☐
We had enough project money to pay for all the project consulting and education needed to implement effectively	☐	☐	☐	☐	☐
Financial motivation has made this project be a priority to all who were involved	☐	☐	☐	☐	☐
When there was delay in release of finances, project progress was delayed	☐	☐	☐	☐	☐
Adequate funds were available for the implemenation of the project	☐	☐	☐	☐	☐

Section D: Team leadership

In picking team members, the following were considered – (tick as appropriate) *This shows process of picking team members

	1. Strongly Disagree	2. Disagree	3. Neither Agree Nor Disagree	4. Agree	5. Strongly Agree
Member works in the section	☐	☐	☐	☐	☐
Staff who managed previous	☐	☐	☐	☐	☐

	1. Strongly Disagree	2. Disagree	3. Neither Agree Nor Disagree	4. Agree	5. Strongly Agree
projects effectively					
Initiator of the proposal	☐	☐	☐	☐	☐
Staff with skills we needed to complete project	☐	☐	☐	☐	☐
Represented the management	☐	☐	☐	☐	☐
Staff working in section affected by project	☐	☐	☐	☐	☐
A team player	☐	☐	☐	☐	☐
Any person who showed interest and had time for the project	☐	☐	☐	☐	☐

How would you evaluate the training received during the project progress? Tick as appropriate *Where you are not sure of the response, please tick 3 (Neither Agree Nor Disagree)

	1. Strongly Disagree	2. Disagree	3. Neither Agree Nor Disagree	4. Agree	5. Strongly Agree
I was given enough information during project training	☐	☐	☐	☐	☐
Project training was not very helpful	☐	☐	☐	☐	☐
Project training taught me what I need to know about Projects	☐	☐	☐	☐	☐
The Project training I received was inadequate	☐	☐	☐	☐	☐
I learned a lot in project training	☐	☐	☐	☐	☐
The quality of the project training I received was very good.	☐	☐	☐	☐	☐
Training was readily available to employees who want to learn more about Project	☐	☐	☐	☐	☐

Section E: Organizational culture and ICTs

This section looks at the culture of organization and use of ICTs

What re-organization took place in-course of project for its success? *This question addresses how your university adjusted to ensure the project succeeded

	1. Strongly Disagree	2. Disagree	3. Neither Agree Nor Disagree	4. Agree	5. Strongly Agree
There was workload changes for those who were involved in project	☐	☐	☐	☐	☐
There were new reporting structures	☐	☐	☐	☐	☐
We were adequately trained on new system Technical assistance was readily available from university	☐	☐	☐	☐	☐
User departments were part of the project team or were consulted frequently	☐	☐	☐	☐	☐
On participating in a task, there was compensation	☐	☐	☐	☐	☐
Some work processes had to be redesigned to accommodate the project	☐	☐	☐	☐	☐
I found myself reporting to a different person on this project not normal supervisor	☐	☐	☐	☐	☐
All team members (and those directly involved in project) came from same department /Unit	☐	☐	☐	☐	☐

On the ICTs skill and artifacts in the University *

	1. Strongly Disagree	2. Disagree	3. Neither Agree Nor Disagree	4. Agree	5. Strongly Agree
Having been involved in previous ICT-based projects played a big role in project progress	☐	☐	☐	☐	☐
The project team leader knowledge of ICT was a big contributor to project success	☐	☐	☐	☐	☐

Availability of ICT in our project area prior to this project played a big role to project progress	☐	☐	☐	☐	☐
Availability of ICT technical persons in university facilitated project progress	☐	☐	☐	☐	☐
Team members prior ICT skills facilitated project progress	☐	☐	☐	☐	☐
Having other ICT-based systems in the university was a big boost in project progress	☐	☐	☐	☐	☐
Having a strong ICT directorate /e-learning support centre played a positive role in project progress	☐	☐	☐	☐	☐

On implementation of technology in the university *This question addresses how your university readiness to adopt technology

	1. Strongly Disagree	2. Disagree	3. Neither Agree Nor Disagree	4. Agree	5. Strongly Agree
Use of technology is a priority in this university	☐	☐	☐	☐	☐
This project was a priority in this university	☐	☐	☐	☐	☐
This projects took a back seat to other university projects	☐	☐	☐	☐	☐
One of the university main goals was to see success of this projects	☐	☐	☐	☐	☐
Staff in the affected sections of the University thought implementation of this project was important	☐	☐	☐	☐	☐
Staff in the affected sections did not look to care whether the project succeded or not	☐	☐	☐	☐	☐
Staff and students in the affected sections were encouraged to make the most from this project	☐	☐	☐	☐	☐

Section F: Top management role and project implementation

What is your perception on how top university management, overall team leader and project team supported the project *Note, if you are not sure of any item, please click 3. (Neither Agree Nor Disagree) . This is because all sections must be filled

	1. Strongly Disagree	2. Disagree	3. Neither Agree Nor Disagree	4. Agree	5. Strongly Agree
University management have actively pushed to make project a success	☐	☐	☐	☐	☐
university management are strongly committed to the successful implementation of project(s)	☐	☐	☐	☐	☐
Team leader showed a lot of enthusiasm in the project	☐	☐	☐	☐	☐
University management and team leaders stressed the importance of project to this university	☐	☐	☐	☐	☐
The project goals were clearly stipulated by management and team leaders	☐	☐	☐	☐	☐
Management intervened if any bottleneck was encountered like in procurement	☐	☐	☐	☐	☐
Those members in projects that were successful were rewarded	☐	☐	☐	☐	☐
E-learning team (overall PHEA-ETI) expressed doubt on success of this project	☐	☐	☐	☐	☐
Team leader showed interest in project's success and problems	☐	☐	☐	☐	☐
Team leader called meetings regularly	☐	☐	☐	☐	☐
E-learning team (overall PHEA-ETI) team leadership showed interest in projects' success problems	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

Section G: Monitoring and evaluation

This section looks at the role the SAIDE team played in project implementation
what contribution did the SAIDE team (the PHEA-ETI overall managers) made in the project? *

- ☐ Team ensured we were on course
- ☐ Team lobbied for us with team management
- ☐ Ensured funds were available when required
- ☐ Provided technical support
- ☐ Provided targets fro each milestone
- ☐ Ensured fund were available on meeting expected goals
- ☐ Other: [ ]

Section H: Product/developed from the project and user interaction

This section looks at role users and the system quality played in implementation
What effects has the system developed from the project (the e-content, e-portfolio, digitized exams etc) had on users and staff working with system? *

	1. Interested and committed	2. Assertive and proactive	3. Laid back	4. Disinterested	5. Can ’t tell
Increased productivity	☐	☐	☐	☐	☐
Accuracy of data	☐	☐	☐	☐	☐
Availability of information or records when needed	☐	☐	☐	☐	☐
Ability to run and execute outputs when needed by users	☐	☐	☐	☐	☐
Boosted morale of staff and students working with it	☐	☐	☐	☐	☐
Performance ohas gone up	☐	☐	☐	☐	☐
On-time delivery of user requirements	☐	☐	☐	☐	☐
Cost of service provision has gone down	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

If you were a team leader, please indicate as best as possible, %age level of success of each project output Identify each output and percentage of success eg having 20 units online 70%. Enter each in its line. If you were not a team leader indicate also as best as you know one output.

Staff use and acceptance of developed systems from projects: As a result of the system developed from project ... This applies to all those who been using the systems developed from project for example, e-content, e-portfolio , digital past papers.

	1. Strongly Disagree	2. Disagree	3. Neither Agree nor Disagree	4. Agree	5. Strongly Agree
My work is more time-consuming	☐	☐	☐	☐	☐
The project has made it more physically uncomfortable for me to perform my work tasks.	☐	☐	☐	☐	☐
I do not have enough time to get my work done	☐	☐	☐	☐	☐
Has made my job a lot more frustrating than it was before the project	☐	☐	☐	☐	☐
Has made my work more enjoyable.	☐	☐	☐	☐	☐
Has made my delivery of service more enjoyable in my section	☐	☐	☐	☐	☐

How has the reception of system been by targeted users *

	1. Strongly Disagree	2. Disagree	3. Neither Agree Nor Disagree	4. Agree	5. Strongly Agree
I think project is a waste of time and money for this university	☐	☐	☐	☐	☐
I am happy to do my part to make project effective at this project	☐	☐	☐	☐	☐
I do not really care whether project succeeds or fails	☐	☐	☐	☐	☐
I think this university made a good decision in getting to this PHEA ETI project	☐	☐	☐	☐	☐

If I had my way, this plant would go back to the old way and forget this project	☐	☐	☐	☐	☐
I think the project is an improvement over the system(s) that we used to use	☐	☐	☐	☐	☐
The system developed from this project is more cumbersome to use than the manual processes	☐	☐	☐	☐	☐
Poor access to computers and Internet derails the system use	☐	☐	☐	☐	☐
The system is not user friendly and some requirements not integrated	☐	☐	☐	☐	☐
System produced from project is too slow to commands	☐	☐	☐	☐	☐

Section I: System success

Some variables must have contributed to success of your project. To what extent to you believe the following attributes contributed? tick as appropriate *This question targets those who were not team leaders or team members but were incorporated either as technical staff of brought in to realise project success

	1. Strongly Disagree	2. Disagree	3. Neither Agree Nor Disagree	4. Agree	5. Strongly Agree
Enthusiasm by team leader	☐	☐	☐	☐	☐
Commitment of team members and participating section/implementers	☐	☐	☐	☐	☐
Push from top management	☐	☐	☐	☐	☐
Fear of repercussions/ backlash incase project failed	☐	☐	☐	☐	☐
Milestones set by SAIDE and evaluator	☐	☐	☐	☐	☐
Support from SAIDE	☐	☐	☐	☐	☐
Focus project received from our university	☐	☐	☐	☐	☐
Financial motivation for	☐	☐	☐	☐	☐

participants in project					
Nature of the project we were undertaking meant had high propensity to succeed	☐	☐	☐	☐	☐

Overall, how would you rate the project use by targeted users is (tick all that apply): *

- ☐ 70% - 100%
- ☐ 50% - 70%
- ☐ 30% - 50%
- ☐ Below 30%
- ☐ Am not sure if users are accessing it or not

If the system is up and use is below 50%, what could be the reason? (please tick all that apply)? *If system use is more than 50% , please tick others and indicate NA (Not Applicable)

- ☐ Users not aware of the project
- ☐ Those who should popularize it are yet to be trained
- ☐ Users/students dont seem excited by the new system
- ☐ Users/students find it more cumbersome to use and prefer to remain to their old ways of doing things
- ☐ Other:

If the use is more than 50% , what would you attribute the high % of usage to? (please tick all that apply) *If system use is less than 50% , please tick others and indicate NA (Not Applicable)

- ☐ We are all excited by the project
- ☐ Project has been well popularized
- ☐ Project relieved us from tedious work we were doing before
- ☐ The technology is exciting to users
- ☐ User/students knew about it and were excited
- ☐ The system is very important to the user section and students thus easily identify with it
- ☐ Other:

THE END

THANK YOU. I APPRECIATE TIME YOU HAVE TAKEN TO PROVIDE THIS FEEDBACK. GOD BLESS YOU

Appendix C

Interview Guide

1. Please explain how you got involved in the PHEA-ETI.
2. What is your position in the university?
3. The projects that were run in your university, how would you rate each project success in achieving desired outputs? Further, what method(s) were you using to track progress of each project?
4. How were the different projects identified? Was it by user departments or management?
5. How were team leaders and team members picked?
6. The finances in the project were used for : Acquiring hardware? Training ? Paying team members? Paying those involved in team after producing a project out put?
7. Was money readily available to support the project?
8. Was money available to pay for all consultancy required in the project?
9. Were team members compensated for their time and involvement in the project? If so how?
10. Was there time for team members for the project?
11. Were team members or affected staff allowed time off to participate in project training or other activities?
12. Was there any reward system for those team members/users whose projects were on course? explain
13. Did users get support when they needed it in project? For example was there a project help desk?
14. Do you believe the project(s) was a top priority?
15. Was there a push for people to make use of the project outputs? If so, how?
16. How important were the SAIDE evaluation reports that i) You wrote; ii) Were sent to you?
17. Apart from the reports you were sending/receiving from SAIDE, how elsedid SAIDE monitoring and evaluation team influence the projects success?
18. Did you involve user departments in the project?
19. Was there any incentives to users to participate in project?
20. Are users using system?
21. Do you have any feedback system from users? If Yes how to you elicit the feedback

Appendix D

Sample hot link URL sent via email to potential respondents

John Kandiri <jkandiri@gmail.com> 12/15/12

to **Wisdon**, **Ngoni**, **cpempe**, **acribawe**, **kavatosi**, **sadrachambisso**, **fmonteiro**, **belminobely**, **bbeli**, **Solomon**, **hermen-m**, **ibraimo.mussagy**

Hi UCM PHEA-ETI fraternity

Once again My name is John M. Kandiri. I am pursuing my PhD in Management Information Systems from Kenyatta University. My research is on Determinants of Technology Innovation Implementation Effectiveness in Higher Education Institutions. The survey is based on the PHEA-ETI projects run in six (6) African countries between 2008-2012.

You have been picked as respondent because you participated in a PHEA-ETI project in your university.

Kindly ask them to fill in so that I have feedback if possible early 24th Dec 2012

Also let them know no one will be able to access the data they provide only the researcher (myself). The password in gmail ensures confidentiality because for one to access data they need log-in to my account.

Give me about 25 minutes of your time please, **CLICK LINK BELOW**

https://docs.google.com/spreadsheet/viewform?formkey=dFhrbDZJcXVWTm9LMlhfUUNXNTRKcXc6MQ

Kindly forward the link to all members who participated in implementation of the PHEA-ETI projects

Thank you so much for support.

--

John M. Kandiri
Lecturer, Department of Computing and Information Technology (CIT)
Kenyatta University
+254 722 376 553
other contacts
Email:kandiri.john@ku.ac.ke;
Skype:kandy.john,

Appendix E

Factor loading - Rotated Component Matrix

Table A3: Factor loading

	1	2	3	4	5	6	7	8
FIN01			0.370			0.337		
FIN02						0.637		
FIN03						0.652		
FIN04						0.636	0.319	
FIN05	0.412						0.489	
FIN06	0.503						0.431	
FIN07							0.555	
TIM01					0.632			
TIM02					0.498			-0.484
TIM03					0.728			
TIM04					0.826			
TIM05			0.324		0.604			
TIM06					0.611			
TIM07				0.389				
TIM08			0.318					
TIM09		0.308	0.400	0.447			-0.346	
TIM10							-0.350	
TIM11		0.418		0.381		0.352		
TM01	0.767							
TM02	0.817							
TM03	0.569			0.399				
TM04	0.794							
TM05	0.605							
TR01				0.621				
TR02				0.694				
TR03				0.811				
TR04				0.722				
TR05		0.354		0.647				
TR06	0.325	0.318					0.472	
M&E								0.291
EF01		0.749						
EF02		0.757						
EF03		0.705						
EF04		0.759						-0.338
EF05		0.595						
EF06		0.616						
CU01			0.717					
CU02		0.303	0.580					

CU03			0.671					-0.306
CU04			0.752					
CU05			0.584					
CU06			0.332					
CU07			0.298					
CU08			0.441					
CU09			0.413				0.373	
CU10			0.288					
CU11						0.537		
CU12	0.469							-0.331
CU13	0.606							
CU14	-0.493						0.313	
CU15	0.797							
CU16	0.439			0.300				
CU18	0.527							
LE02	0.533		0.415	0.322				
LE03	0.331		0.431	0.326				
LE04	0.362		0.398					0.342
LE05		0.659						
LE06		0.604						
LE08	0.686		0.302					
LE09			0.594					
LE10			0.566					

Key

FIN02 - FIN03, FIN05, FIN07, FIN08, FIN09, FIN10, TIM01, TIM03, TIM04, TIM05, TIM06, TIM07, TIM08, TIM09, TIM12, TIM14, TIM16, TM01, TM02, TM03, TM04, TM06, TR01, TR03, TR05, TR06, TR07, TR08, M&E, EF01, EF02, EF03, EF04, EF05, EF06, CU01, CU02, CU03, CU04, CU05, CU06, CU07, CU08, CU09, CU10, CU11, CU12, CU13, CU14, CU15, CU16, CU18, LE02, LE03, LE04, LE05, LE06, LE08, LE09, LE10