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Validating Organizational Implementation of Information Systems Innovations Framework in Kenyan Higher Education Institutions

BY

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DECLARATION

I, the undersigned, hereby declare that this research project is my original work and that it has not been presented to any other university for award of any academic qualification.

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APPROVAL

This research project has been submitted for examination to the University of Nairobi with my approval as the appointed supervisor.

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ABSTRACT

Organizational Implementation of Information Systems Innovations (OIISI) Framework was developed in the context of Universities in Kenya and can be used to understand the implementation of Information Systems (IS) Innovations in Higher Education Institutions (HEIs). The aim of this study was to determine the degree of associations and relationships in the OIISI framework in HEIs and, in so doing, provided researchers and practitioners with a valid and reliable instrument that covered all the key constructs identified by the framework. In this study, the framework was tested in the context of HEIs in Kenya. To do so, data was collected from identified respondents in some selected HEIs that have implemented IS or were in the implementation process, analyzed and the outcomes presented, thereby validating the relationships. Judgmental and convenience sampling design was used to select HEIs. A questionnaire based on a seven point Likert scale was administered to different participants and confirmatory factor analysis (CFA) used to determine regression coefficients between constructs of interest. The Chi-square goodness-of-fit test was used to test the model adequacy together with other goodness of fit statistics. The null hypothesis for this test was that the model adequately accounts for the data, while the alternative was that there is a significant amount of discrepancy. To test the hypothesis, correlation coefficients were found, hypothesis tested and coefficient of determination calculated for explanation purposes. Results of this study shows that OIISI framework is a valid application in the implementation of IS in HEIs on its entirety. The study recommends further research for 'Others' construct to expand it in the context of HEIs and suggests a possibility of other factors that determine Implementation Outcomes apart from Implementation Process.

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I acknowledge the power of belief in the word of God and His faithfulness. His promises are real. Without you, Oh dear Lord, I would not make it.

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Lastly but not least, I am deeply indebted to the wife of my youth, Stella Mweru, my three daughters: Joyce, Precious and Christine, for the time they missed my most needed company, as I was *'burning the midnight oil.'*

DEDICATION

I dedicate this research project in honour of my Mother, Clan Members and Sub-chief.

My mother, Joyce Muthoni Wambugu, simply loves academics. She has always given me her all: Morally and financially.

My clan members, *Mbari ya Mbogo*, showered me with financial support to and through secondary school and my undergraduate course.

My subchief, Mr Paul Gachoya Waweru, organized my clan members in support of secondary school education and he taught me how to be number one in secondary school, 'to keep the clan's morale high': "*You have to read more hours than the person ahead of you*", he used to tell me.

Bravo to all of you. God richly bless you.

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LIST OF ABBREVIATIONS

BOG – Board of Governor

CFI - Comparative Fit Index

D&M IS Success Model - Delone & McLean Information System Success Model

FIM - Fully Identified Model

GFI - Goodness of Fit Index

HOD - Heads of Department

HEIs – Higher Education Institutions

ICT – Information Communication Technology

IS – Information Systems

IT – Information Technology

KESSP - Kenya Education Sector Support Programme

NFI - Normed Fit Index

OIISI – Organizational Implementation of Information Systems Innovations

PPP – Public Private Partnership

RMSEA - Root Mean Square Error of Approximation

SDLC - Systems Development Life Cycle

SOM - Second order Model

TAM - Technology Acceptance Model

UTAUT - Unified theory of acceptance and use of technology

DEFINITION OF TERMS

An **Information System (IS)** is an arrangement of people, data, processes, communications, and information technology that interact to support and improve day-to-day operations in a business, as well as support the problem-solving and decision-making needs of management and users.

Information Communication Technology (ICT) is a contemporary term that describes the combination of computer technology (hardware and software) with telecommunications technology (data, image, and voice networks).

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 framework in this study also refers to a model, the two terms will be used interchangeably.

Context refers to the set of circumstances or facts that surround a particular event or situation or the general situation something happens which helps explain it.

HEI is a post secondary institution in Kenya including Universities and Middle level Colleges.

OIISI framework - Hybrid theoretical framework - Implementation Context, Process and Outcomes developed by Wausi(2009) PHD thesis.

Testing in this study also refers to Validation in the context of OIISI framework.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Within industry, there is a growing awareness of and concern about the complexity of introducing new information communication technology (ICT) in organizations. Experience shows that it is not so much technical issues that complicate matters, but rather organizational, social and psychological issues (Voor Mieke, 2003). Frameworks have been developed by researchers for the purpose of understanding and explaining implementation of Information Systems (IS) in organizations but many of the researchers do not necessarily go to the extent of validating the relationships indicated therein. Other researchers may take the task of validating such frameworks. For example, Perez-Mira (2010) validated Delone and Mclean's model of information systems success at the web site level of analysis. This study aimed at testing the Organizational Implementation of Information Systems Innovations (OIISI) framework in the context of Higher Education Institutions (HEIs) in Kenya. Wausi (2009) developed the OIISI framework for understanding the implementation of information systems, case of Kenyan universities. This study used selected HEIs in Kenya to test the relationships indicated in the framework. For the purpose of this study HEI is a post secondary institution in Kenya including Universities and Middle level Colleges.

As the complexity and dynamics of the business context and markets increase, the need for accurate, pertinent and immediate information will continue to grow (Shuliang Li, 2004). This supports the need for a continued use of IS to support planning, decision-making, operations and management in organizations. Farrell (2007) notes that Kenya has placed considerable emphasis on the importance of ICT in its Education Sector Support Programme as evidenced in the promulgation of the National ICT Strategy for Education and Training. Farrell (2007) continues to note that the Ministry of Education has taken steps to support the implementation of the strategy either by direct action or through the various institutions and agencies with which it works. In addition, there are many other organizations not involved directly with the Ministry of Education that continue to be active in implementing and supporting projects involving ICT in education. Most institutions of higher learning in Kenya have started computerizing. That is, there is rapid technological evolution. The government through the Ministry of Education is also educating government institution's stakeholders like Board of Governors (BOGs), Heads of Departments(HODs), Principals, Registrars and other stakeholders through workshops to ensure that they appreciate the role of IS in the much anticipated growth of a knowledge economy and the use of IS in management of the institutions.

Funding through the Kenya Education Sector Support Programme (KESSP) and other forms like Public Private Partnership (PPP) has been put into place to purchase computers and application programs including Management Information Systems (MIS).

On the strength of these efforts a framework for IS implementation for Higher Education Institutions (HEIs) is needed. Wausi(2009) developed a framework for a Kenyan University as a case study. This study validated the OIISI framework for HEIs.

1.2 Problem Statement

Magutu et al (2010) observed that despite numerous methodologies having been proposed, Kenyan parastatals still fail to effectively deal with ISs implementation and related challenges. Hackney, R. and Little, S. (1999), in Obara (2010) observed that, IS implementation in parastatals is significantly influenced by cultural, political and power behavioural situations within parastatals.

Many HEIs in Kenya like parastatals face numerous challenges in the implementation of IS. The main challenge is the lack of an appropriate framework of implementing IS in such organizations. Wausi (2009) suggested OIISI framework that can resolve this problem. However, the framework had not been validated to predict its suitability for application in HEIs. This study aimed at testing the framework for the purposes of application in HEIs.

Organizational Implementation of Information Systems Innovations (OIISI) Framework

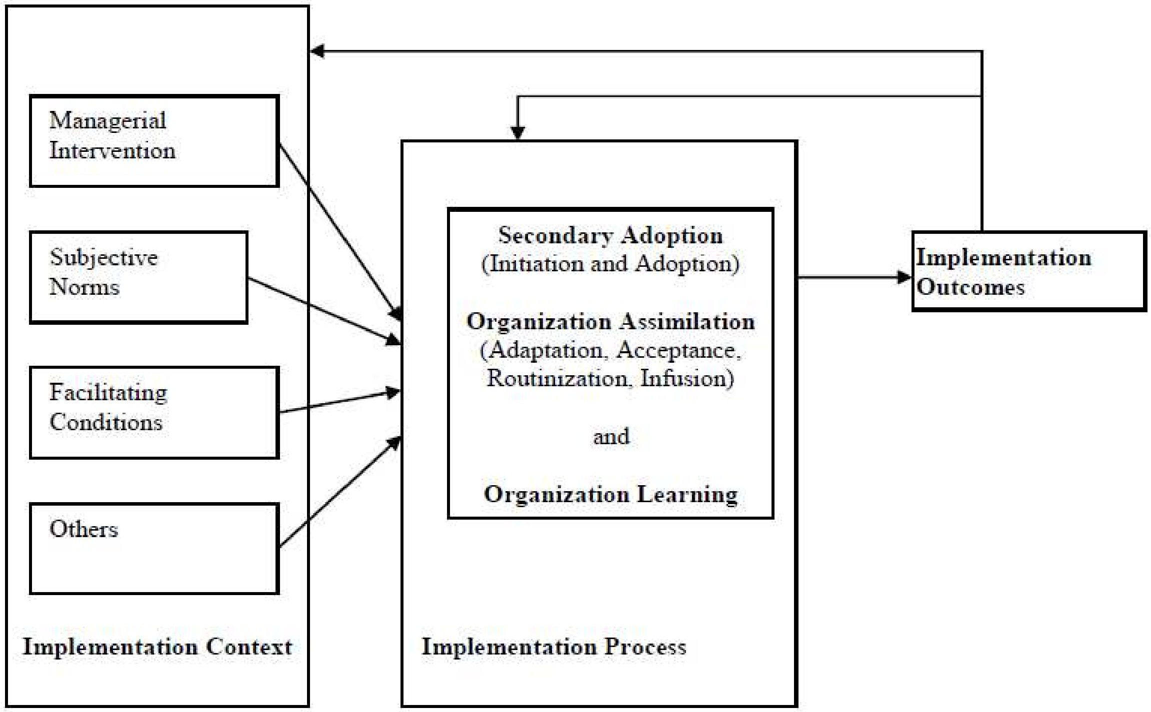

Figure1.1: Organizational Implementation of Information Systems Innovations (OIISI) Framework

Source: Wausi (2009): Organizational Implementation of Information Systems Innovations

The Implementation Context includes Managerial Intervention, Subjective Norms, Facilitating Conditions and Other factors. These are expected to influence the Implementation Process which includes Secondary Adoption, Organizational Assimilation and Organizational learning. The Implementation Process eventually leads to Implementation Outcomes. The feedback loops from Implementation Outcomes to the Implementation Process and Implementation Outcomes to Implementation Context serves to recognize a learning curve. According to Wausi (2009), immediate outputs, intermediate consequences and the wider organizational impacts of the process continually inform the ongoing implementation process and trigger adjustments to the context, thereby creating knowledge and change.

1.3 Objectives of the Study

1.3.1 General Objective

The main aim of this study was to test the OIISI framework for the implementation of IS in Higher Education Institutions. To achieve this objective, the study was guided by the following specific objectives, hypotheses and a research question.

1.3.2 Specific Objectives

i) To determine if the relationships indicated in the OIISI framework are valid

ii) To measure the degree of associations indicated on the OIISI framework

iii) To determine other factors influencing IS implementation process

1.4 Hypothesis of the Study

The study was guided by the following null hypotheses:

H1: There is no relationship between managerial intervention and implementation process.

H2: There is no relationship between subjective norms and the implementation process.

H3: There is no relationship between facilitating conditions and implementation process.

H4: There is no relationship between implementation process and Implementation outcomes.

H5: There is no relationship between implementation outcomes and implementation process.

H6: There is no relationship between implementation outcomes and implementation context.

1.5 Research Question

Are there other factors that influence IS implementation process?

1.6 Project Justification

This study aimed at determining the degree of associations and relationships in OIISI framework in HEIs and, in so doing, would provide researchers and practitioners with a valid and reliable instrument that covers all the key constructs identified in the framework. It also aimed at suggesting pointers towards any modifications of the framework based on results of the study.

1.7 Assumptions and Limitations of the Research

The research focused on some selected HEIs which had finished implementing or were in a stage of IS implementation. Due to time and resource limitations, the researcher carried out the study in fourteen institutions, investigating between 1 and 7 respondents in every visited HEI.

The researcher assumed that the variables under investigation are measurable and the instrument used was valid and reliable to measure the variables under consideration.

The results of this study were limited by the ability of the selected statistical procedure to find statistical significance and that the test had sufficient power to detect the framework relationships in the population.

The study assumed that the participants were representative of the population, willingly participated in the study and that they responded to questions honestly or participated without biasing the study results.

The study assumed that the results would be generalizable beyond the sample being studied and that the study would be relevant to stakeholders.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This section reviews and discusses relevant previous work and literature, under three subheadings: Role of frameworks in IS; Review of IS frameworks; Methods of validating frameworks and a summary presentation of the derived hypotheses.

2.2 Role of Frameworks in IS

According to Johansson (1999) in Gordana(nd), a model or framework is a simplified representation of a complex system or process developed for its understanding, control and prediction. It resembles the target system in some aspects while at the same time it differs in other aspects that are not considered essential.

Frameworks have been used to provide a profound basis for information systems development and evaluation for a long time (Rittgen, 2007). Contextual frameworks, for example, are frameworks for conceptualizing work practices (Goldkuhl & Röstlinger, 2003), business processes (Lind, 2002) and business interaction (Goldkuhl & Lind, 2004). An IS framework provides a taxonomy for relating the concepts that describe the real world to the concepts that describe an information system and its implementation (Sowa & Zachman, 1992).

Frameworks are therefore developed in order to make human life better. They provide ways of joining social action so as to promote useful description, explanation, critique, and change in situated human action; and emergence of new and better ways of doing things. Frameworks can also be used for planning. According to *Pant and Ravichandran (2001),* existing planning models can be broadly classified into impact and alignment models. Impact models focus on the potential impact of information technology on organizational tasks and processes and use this as the basis to identify opportunities for deploying information systems. Alignment models, on the other hand, focus on aligning the information system's plans and priorities with organizational strategy and business goals.

Frameworks should help us to see things, aspects, properties and relations which otherwise would be missed (Cronen, 2001). The constituents of a framework have lately been elaborated by Goldkuhl (2006). Goldkuhl (ibid.) emphasizes conceptualizations, patterns, normative criteria, design principles and models as (partially overlapping) such constituents of a framework.
Models are abstracted or constructed on the grounds that they potentially satisfy important constraints of the target domain. Daniel E. O'Leary(1998) says that validation ascertains accuracy and completeness. Researchers (for example, O'Leary 1987) have developed frameworks to help guide validation efforts. Frameworks act as a guide to fulfilling a task.

In a paper written by the Center for Technology in Government University at Albany, SUNY(1998), different methods and techniques used to direct the life cycle of a software development project are discussed. The paper notes that most real-world models are customized adaptations of the generic models. General frameworks can therefore be customized into a practical use.

The systems development life cycle (SDLC) is a conceptual model used in project management that describes the stages involved in an information system development project, from an initial feasibility study through maintenance of the completed application. Bender RBT Inc.(2003) notes that SDLC has three primary objectives: to ensure that high quality systems are delivered, provide strong management controls over the projects, and maximize the productivity of the systems staff. A SDLC methodology follows the following general steps:

i) The existing system is evaluated. Deficiencies are identified. This can be done by interviewing users of the system and consulting with support personnel.
ii) The new system requirements are defined. In particular, the deficiencies in the existing system must be addressed with specific proposals for improvement.
iii) The proposed system is designed. Plans are laid out concerning the physical construction, hardware, operating systems, programming, communications, and security issues.
iv) The new system is developed. The new components and programs must be obtained and installed. Users of the system must be trained in its use, and all aspects of performance must be tested. If necessary, adjustments must be made at this stage.

v) The system is put into use. This can be done in various ways. The new system can phased in, according to application or location, and the old system gradually replaced. In some cases, it may be more cost-effective to shut down the old system and implement the new system all at once.

vi) Once the new system is up and running for a while, it should be exhaustively evaluated. Maintenance must be kept up rigorously at all times. Users of the system should be kept up-to-date concerning the latest modifications and procedures.

SDLC therefore forms the framework for planning and controlling the creation of an information system.

2.3 Review of IS Frameworks

2.3.1 Technology Acceptance Model (TAM)

Davis et al. (1989) proposed, tested, and revised the Technology Acceptance Model (TAM), which attempts to explain and predict why users sometimes accept and sometimes reject information systems (IS). TAM has received extensive empirical support through validations, applications and replications. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it, notably: Perceived usefulness (PU) defined as "the degree to which a person believes that using a particular system would enhance his or her job performance"; Perceived ease-of-use (PEOU) defined as "the degree to which a person believes that using a particular system would be free from effort". Technology Acceptance Model(TAM) is presented in figure 2.1 below:

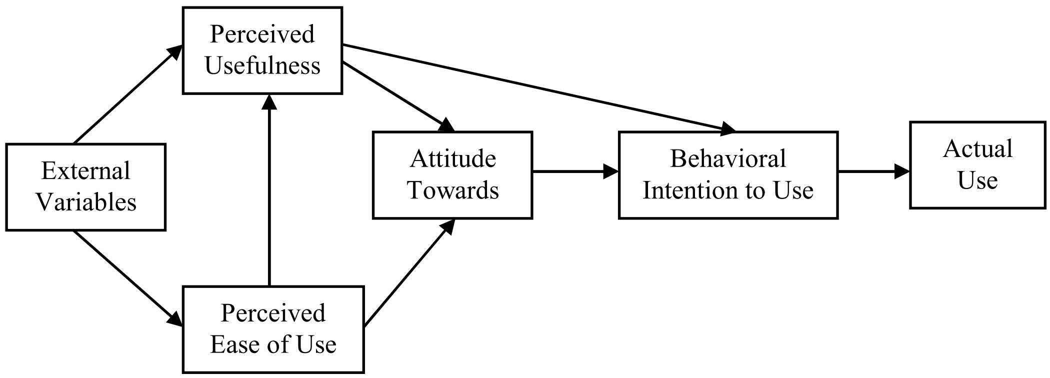

Figure 2.1 Technology Acceptance Model

Source: Park, S. Y. (2009) An Analysis of the Technology Acceptance Model in Understanding University Students' Behavioral Intention to Use e-Learning

TAM is an adaptation of the Theory of Reasoned Action (TRA) to the field of IS. TAM posits that perceived usefulness and perceived ease of use determine an individual's intention to use a system with intention to use serving as a mediator of actual system use. Perceived usefulness is also seen as being directly impacted by perceived ease of use. Researchers have simplified TAM by removing the attitude construct found in TRA from the current specification (Venkatesh et. al., 2003). Attempts to extend TAM have generally taken one of three approaches: by introducing factors from related models, by introducing additional or alternative belief factors, and by examining antecedents and moderators of perceived usefulness and perceived ease of use (Wixom and Todd, 2005).

TRA and TAM, both of which have strong behavioural elements, assume that when someone forms an intention to act, that they will be free to act without limitation. In practice constraints such as limited ability, time, environmental or organisational limits, and unconscious habits will limit the freedom to act

TAM has been continuously studied and expanded, the result of which is two major upgrades which are the TAM 2 (Venkatesh & Davis 2000 & Venkatesh 2000) and the Unified Theory of Acceptance and Use of Technology (UTAUT), in Venkatesh et al. (2003). Recently, (Venkatesh & Bala 2008), have proposed a further modification, thereby developing TAM 3.

TAM 2 was suggested after a review of user acceptance literature followed by a discussion and empirical comparison of eight prominent models and their extensions. A unified model that integrates elements across the eight models was formulated and validated. The eight models reviewed are the theory of reasoned action, the technology acceptance model, the motivational model, the theory of planned behavior, a model combining the technology acceptance model and the theory of planned behavior, the model of PC utilization, the innovation diffusion theory, and the social cognitive theory.

According to Venkatesh & Davis(2000), empirical studies had found that TAM consistently explained a substantial proportion of variance of user acceptance of information technology at work(typically 40%). Venkatesh and Davis (2000) presented and tested theoretical extensions to the technology Acceptance Model (TAM) (Davis, 1986, 1989) that explained perceived usefulness and usage intentions in terms of social influence and cognitive instrumental processes. Their new model, TAM2, explains perceived usefulness in terms of cognitive and social influence processes. They suggested job relevance, one of the cognitive processes that demonstrated a statistically significant relationship with perceptions of usefulness of technology and suggested that this construct may be analogous to construct of person-job-fit (Meyer & Allen, 1997). TAM 2 is presented in figure 2.2 below:

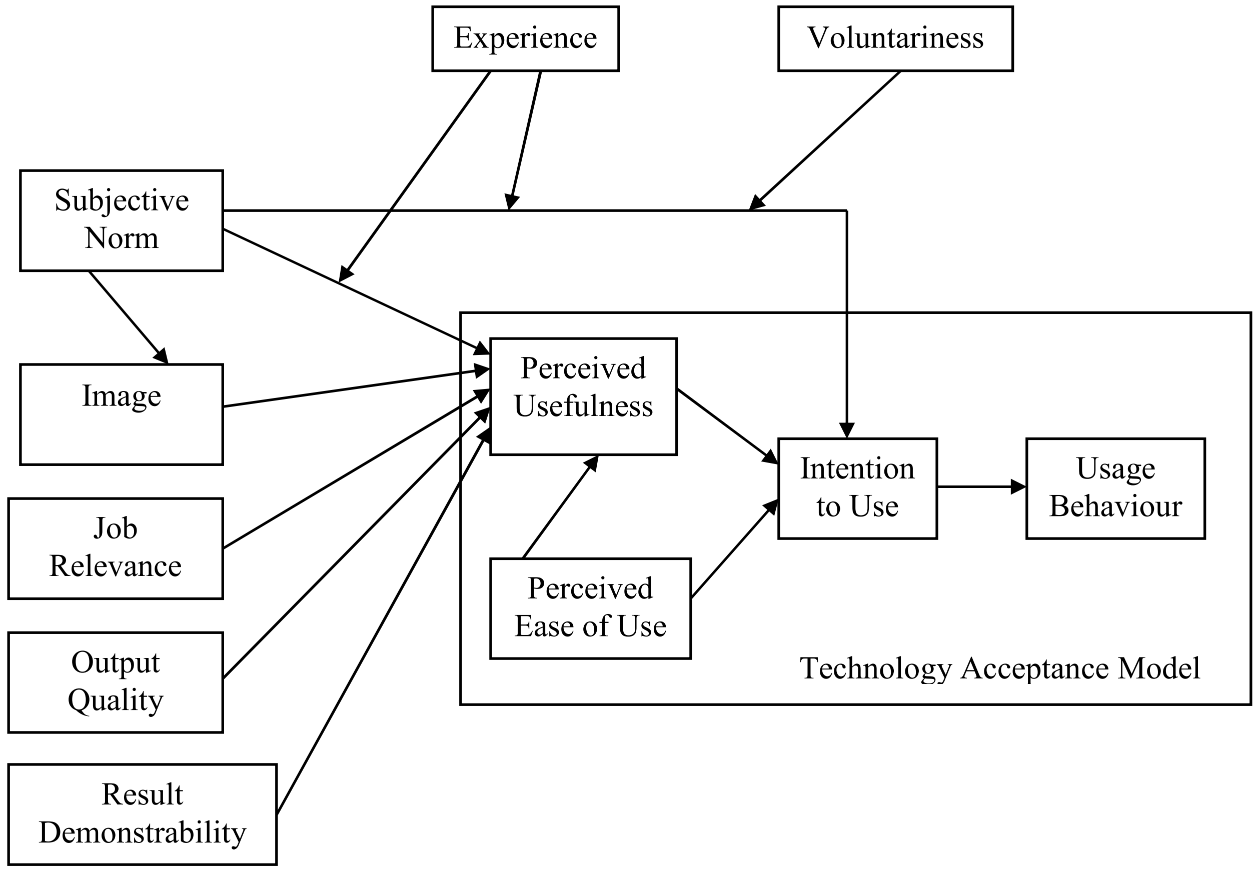

Figure 2.2 Technology Acceptance Model 2 (TAM2)

Source: Venkatesh, V. and Davis, F.D.(2000)

As discussed above the Unified Theory of Acceptance and Use of Technology (UTAUT) model was another modification of TAM. UTAUT is a technology acceptance model formulated by Venkatesh et al (2003) in "User acceptance of information technology: Toward a unified view" with four core determinants of intention and usage, and up to four moderators of key relationships. The UTAUT aims to explain user intentions to use an information system and subsequent usage behavior. The theory holds that four key constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions) are direct determinants of usage intention and behaviour. Gender, age, experience, and voluntariness of use are posited to mediate the impact of the four key constructs on usage intention and behavior.

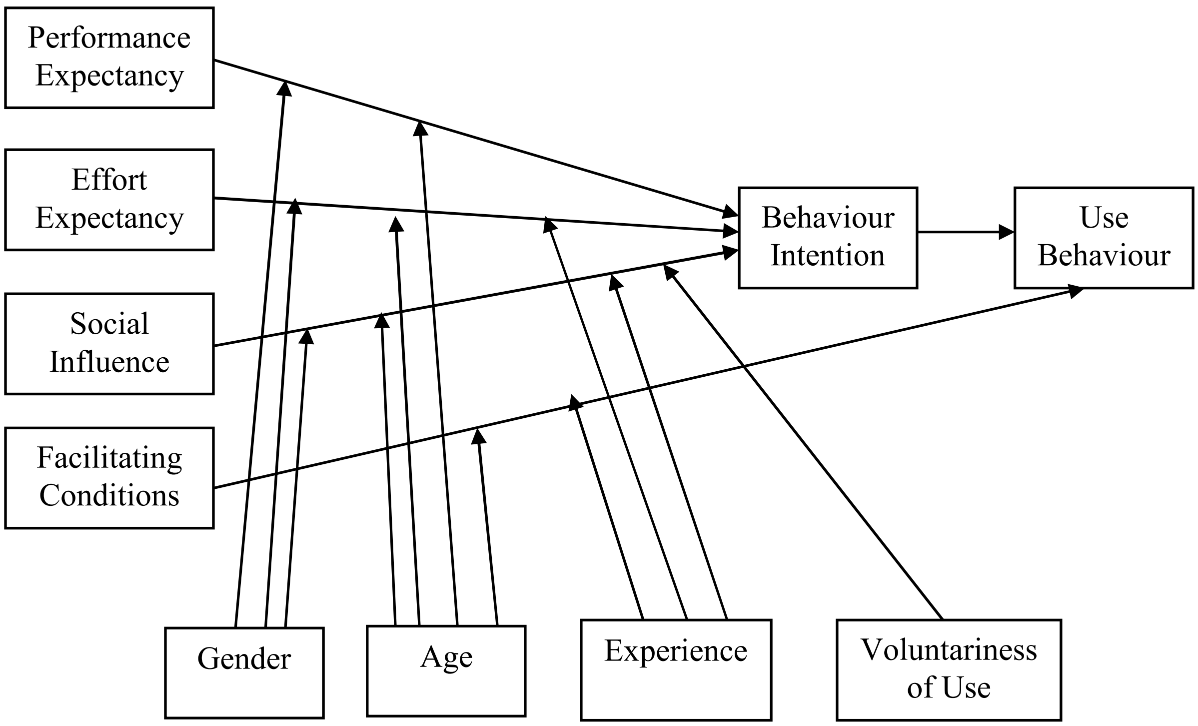

Figure 2.3 Unified Theory of Acceptance and Use of Technology(UTAUT)

Source: Venkatesh et al. (2003)

The theory was developed through a review and consolidation of the constructs of eight models that earlier research had employed to explain information systems usage behaviour (theory of reasoned action, technology acceptance model, motivational model, theory of planned behavior, a combined theory of planned behavior/technology acceptance model, model of personal computer use, diffusion of innovations theory, and social cognitive theory). Venkatesh et al (2003) tested UTAUT and found to account for 70% of the variance. UTAUT thus provides a useful tool for managers needing to assess the likelihood of success for new technology introductions and helps them understand the drivers of acceptance in order to proactively design interventions targeted at populations of users that may be less inclined to adopt and use new systems.

Model testing and validation therefore is important to both the researcher and practitioner in the following respects: It makes the model receive support as a tool of utilization, other researchers through validation and testing provide criticism which is important for model expansion, it may suggest further studies depending on the outcomes of the test and it helps practitioners have confidence in the model.

2.3.2 Information Systems Success Model

"The DeLone and McLean Model of Information Systems (IS) Success is one of the most cited and commonly-used models in the IS literature." Perez-Mira(2010). In the Proceedings of the 35th Hawaii International Conference on System Sciences, McLean & Delone presented a paper which had reviewed over 150 articles which have referenced the model. Again in a ten year update article in 2003, McLean & Delone reviewed over 300 articles in refereed journals. There is a lot more literature on the D&M(DeLone & McLean) IS Success Model and this confirms that D&M IS Success Model is an authority in the assessment of IS success. Stacie et al (2008) suggested that the D&M model has been found to be a useful framework for organizing IS success measurements. That the model has been widely used by IS researchers for understanding and measuring the dimensions of IS success.

This therefore suggests that every successful model must be consistent with the six major success dimensions of the updated D&M model.

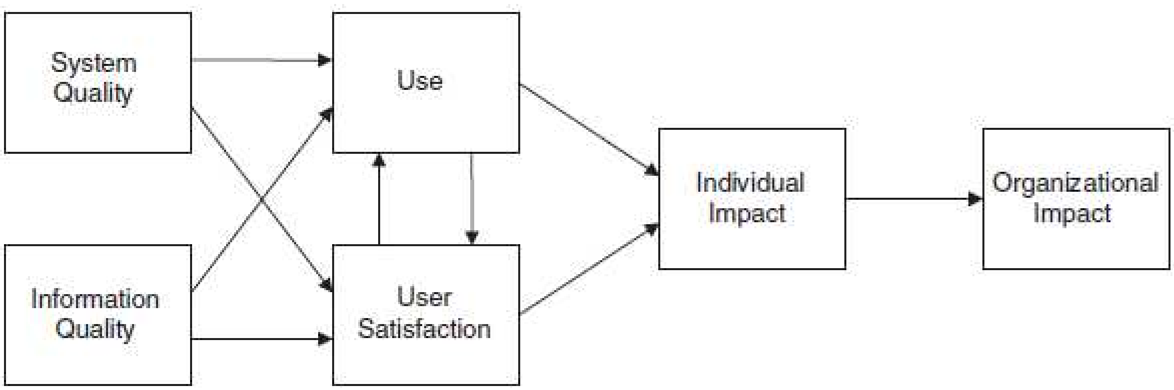

Figure 2.4 DeLone and McLean IS success model

Adapted from: Measuring information systems success Stacie Petter et al 237 European Journal of Information Systems (2008)

The D&M success model received the attention of IS researchers some of them proposing modifications to this model. Recognizing these proposed modifications to their model, D&M, in a follow-up work, reviewed empirical studies that had been performed during the years since

1992 and revised the original model accordingly (DeLone & McLean, 2002, 2003). The updated model is shown in figure 2.3 below:

2.3.3 Updated DeLone and McLean IS success model

The DeLone and McLean IS success model (1992) was reviewed based on IS research contributions that had been done in application and validation, and those that challenged or proposed enhancements to the original model. Minor refinements were proposed to the model which formed the updated DeLone and McLean IS Success Model. This refinement increased the utility of the model like where it is used for measuring e-commerce system success. The validation also would help to make a series of recommendations regarding current and future measurement of IS success.

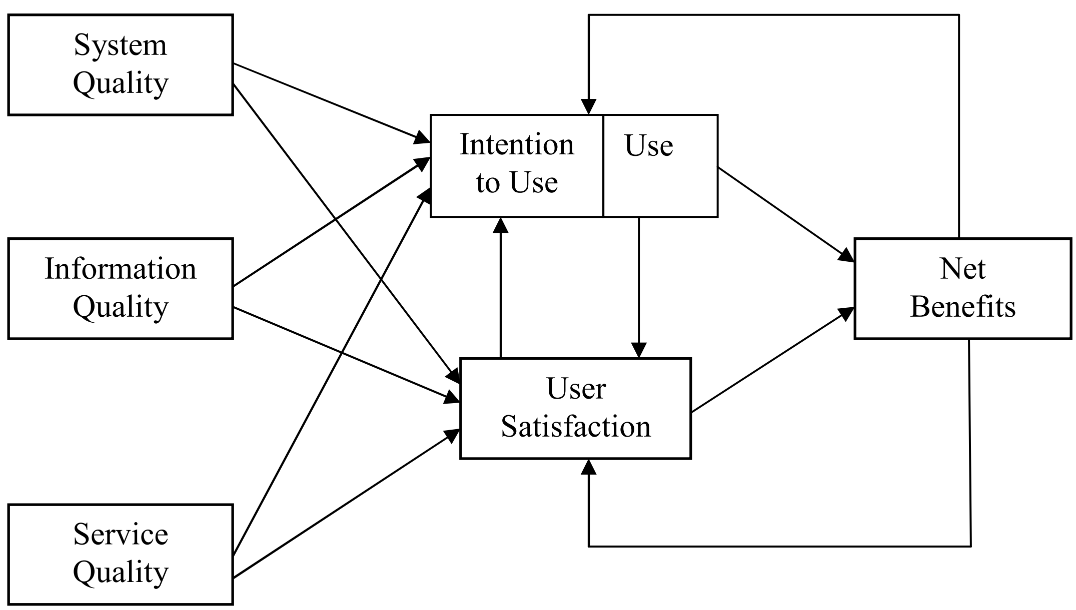

Figure 2.5 Updated DeLone and McLean IS success model

Source: Updated Information Systems Success Model (DeLone & McLean 2002, 2003)

According to this updated model, the six major success dimensions are:

i) System quality – the desirable characteristics of an information system. For example: ease of use, system flexibility, system reliability, and ease of learning, as well as system features of intuitiveness, sophistication, flexibility, and response times.

ii) Information quality – the desirable characteristics of the system outputs; that is, management reports and Web pages. For example: relevance, understandability, accuracy, conciseness, completeness, understandability, currency, timeliness, and usability.

iii) Service quality – the quality of the support that system users receive from the IS department and IT support personnel. For example: responsiveness, accuracy, reliability, technical competence, and empathy of the personnel staff. SERVQUAL, adapted from the field of marketing, is a popular instrument for measuring IS service quality (Pitt et al., 1995).

iv) System use – the degree and manner in which staff and customers utilize the capabilities of an information system. For example: amount of use, frequency of use, nature of use, appropriateness of use, extent of use, and purpose of use.

v) User satisfaction – users' level of satisfaction with reports, Web sites, and support services. For example, the most widely used multi-attribute instrument for measuring user information satisfaction can be found in Ives et al. (1983).

vi) Net benefits – the extent to which IS are contributing to the success of individuals, groups, organizations, industries, and nations. For example: improved decision making, improved productivity, increased sales, cost reductions, improved profits, market efficiency, consumer welfare, creation of jobs, and economic development. Brynjolfsson et al. (2002) have used production economics to measure the positive impact of IT investments on firm-level productivity.

2.3.4 Organizational Implementation of Information Systems Innovations(OIISI) Framework

Wausi(2009) developed a framework for IS implementation in HEIs (see figure 2.4 below)

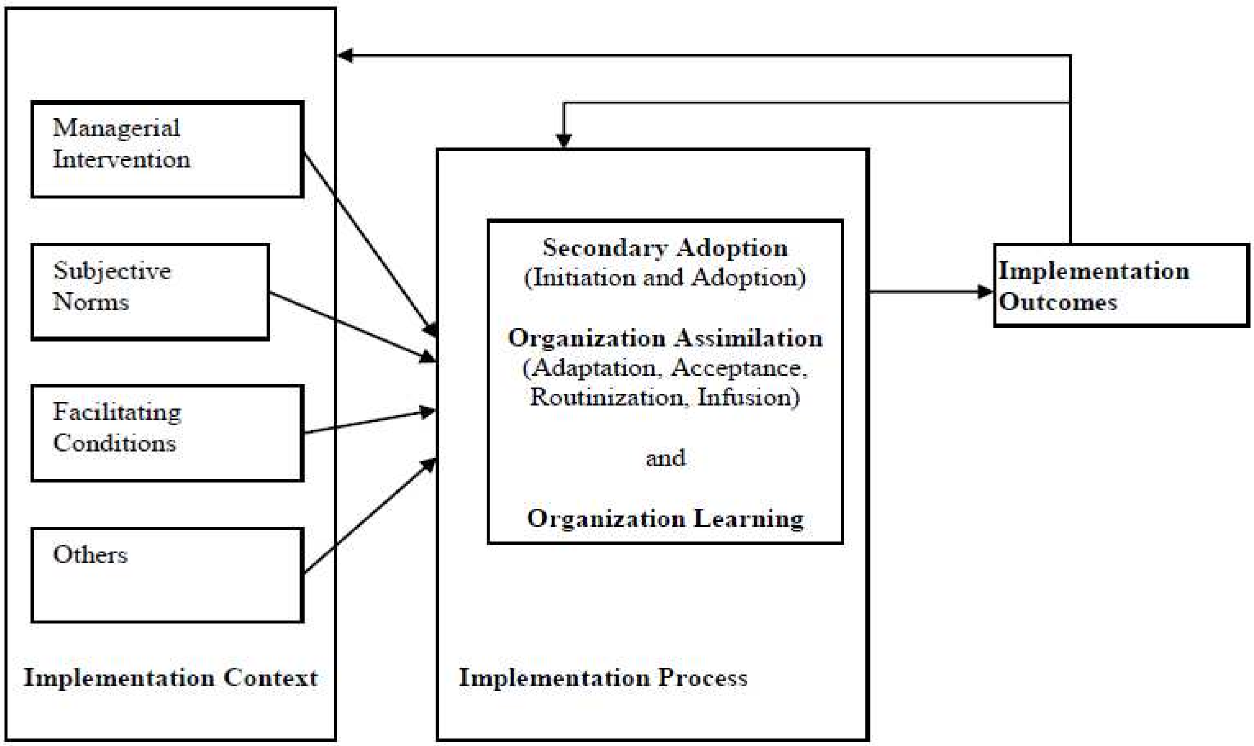

Figure 2.6 Hybrid theoretical framework - Implementation Context, Process and Outcomes

Source: Wausi (2009): Organizational Implementation of Information Systems Innovations

Wausi(2009) conceptualizes a theoretical framework for the organizational implementation process as consisting of a secondary adoption process , an organizational assimilation process and a continuous organizational learning process requiring continuous change management interventions.

Wausi(2009) further suggests that organizational implementation process happens in an organizational context and that the context influences the process. The notion of implementation contexts for IS concerns an identification of various systems and structures in an organization that influence the implementation process [Walsham 1993 in Wausi and Waema 2010].

According to this framework, Organisational implementation of information systems is a product of: Implementation Context; Implementation Process and Implementation Outcomes.

Implementation Context

The enabling factors in the implementation context are identified as: Managerial intervention; Subjective norms; facilitating conditions and *Others*. *Others* is a construct that was introduced by Wausi(2009) aimed at capturing factors or issues that emerged from the case studies not covered by other key constructs. Apart from others, Wausi(2009) introduced change management in managerial intervention and organizational learning in the implementation process. A feedback loop is included to recognize the learning curve associated with the implementation process, Wausi (2009).

The constructs included in the OIISI framework are explained in table 2.1 below.

Table 2.1 Theory of Constructs

Framework Contructs	**Contruct Categories**	**Explanation**	**Operational Definitions**
Implementation Context	Managerial Interventions	a) Managerial actions that are geared for creating an enabling environment	Actions and events that • Indicate the provision, acquisition, allocation and enhancements of human and computing resources. These involve financial resources implicitly • Indicate actions towards mandating, motivating or negotiating use of computerized application systems • Infer to monitoring and evaluation process

Framework Contructs	Contruct Categories	Explanation	Operational Definitions
		b) Change management strategies and actions taken to counter resistance and enhance the adoption and assimilation of computerized application system at unit and organizational level.	Strategies and actions taken by implementers and the organization • To enhance anticipated changes in response to the implementation process • To respond to user experiences from use of the computer application system • To respond to opportunities provided by the implementation process
	Subjective Norms	The social influence to adopting computerized application systems	• Perceived beliefs of users about peers, supervisors, clients and surbodinates concerning their behavior
	Facilitating Conditions	Factors that may enhance or hinder the implementation process	Factors that include • Computer application attributes such as quality • Organizational aspects such as history, culture, leadership, top management, information flow, policies and procedures of an organization

Framework Contructs	Contruct Categories	Explanation	Operational Definitions
	Others	Aimed at capturing factors or issues that may emerge from the case studies	• Other factors or issues that may emerge from the case studies and have not been covered by the three key constructs
Implementation process	Secondary Adoption	Events at the unit level that lead to the adoption of the computer application system	Activities and actions that indicate the initiation and decisions to adopt and use the computer application system at the unit level
	Organizational assimilation	The degree of the penetration and use of the IS in the various units within an organization	Activities and events that leads to adaption, acceptance, routinization and use of computer application system; they include • Actions to install/customize IS innovation, train members and facilitate use of IS innovation • Actions that point to inducing user to commit to use IS innovation • Indication of routine use • Continued and emergent use to increase effectiveness

Framework Contructs	Contruct Categories	Explanation	Operational Definitions
	Organizational Learning	Key experiences of the implementation process that inform the process and the context of implementation	Reflection of experiences from process that lead to • Alternative and/or modifications of the implementation context such as policies, procedures, capabilities and structures to improve performance of computer application system
Outcomes	Outputs and impacts	Planned and unplanned intermediate consequences and results of the implementation process	Consequences of the process • Anticipated outcomes at unit and organizational levels. These are expected outcomes planned for ahead of time • Unanticipated outcomes at the unit and the organizational levels. These are unexpected outcomes that are not planned for, or foreseen ahead of time

Source: Wausi (2009) – Organizational Implementation of Information Systems Innovation

2.4 Methods of Validating Frameworks

Framework validation is important in research. The DeLone and McLean (2003), which is a ten-year update since the introduction of their first model, is a good illustration. The researchers focused on research efforts that had applied, validated, challenged, and proposed enhancements to their original model. Based on their evaluation of those contributions, they made refinements to the model and proposed an updated DeLone and McLean IS Success Model. Framework validation can therefore help updating a framework.

In a study to test the Technology Acceptance Model (TAM) in the Case of Cellular Telephone Adoption, Hyosun and Laku (2000) surveyed one hundred and seventy-six cellular telephone users about their patterns of usage, demographic and socioeconomic characteristics, perceptions about the technology, and their motivations to use cellular services. The methodology of this study designed a questionnaire with each question representing a component of the research model. Virtually all the constructs in the research model were operationalized using standard scales from the literature. Prior to the distribution of the actual survey, a pilot study involving a sample of 27 people was conducted to validate the content of the questionnaire in terms of relevance, accuracy and wording. The lessons learned from the pilot suggested some changes with respect to the instrument. The appropriate changes were made to the final questionnaire. Individuals were asked to indicate the extent of agreement or disagreement with various statements concerning cellular telephones on a seven-point Likerttype scale ranging from (1) strongly disagree to (7) strongly agree for perceived ease of use, apprehensiveness, extrinsic motivations, intrinsic motivations, and social pressure. The respondents' scores for each construct were obtained by summing across all the item scores of the individual variables. The hypothesized relationships among the study variables depicted in the model were tested using multiple regressions and path analyses.

Pérez-Mira(2010) in a research titled “Validity of Delone and Mclean’s model of information systems success at the web site level of analysis” aimed to attempt to fill the gap in the IS literature that had been there since DeLone and McLean proposed their model. The Pérez-Mira (2010) further attempt to categorize determinants of IS success, formulating hypothesis that the researcher further validates

In the methodology, Pérez-Mira(2010) analyses from literature the measurements associated with the six dimensions of DeLone and McLean's model. In the data collection possible measures for this particular study are identified and data collected using the Internet Retailer Top 500 Guide for the year 2008. In analysis the structural equation modeling process is used which focuses on two different steps: first, a validation of the measurement model, and second, a fitting of the structural model. For the first step, the researcher conducts a measurement model analysis, and for the second step, the researcher performs a path analysis. In this study, an already theoretically-specified model is used, the DeLone and McLean Model of IS Success. Each construct or latent variable is conceptualized by the use of measured indicators. In this study, the majority of the indicators refer to website features such as absence or presence of an RSS (Rich Site Summary) feed or absence or presence of 360-degree spin for product images. For these features, only two values are possible, yes or no.

Creswell & Miller (2000) in a study titled "Determining Validity in Qualitative Inquiry" defines validity as how accurately the account represents participants' realities of the social phenomena and is credible to them (Schwandt, 1997). That procedures for validity include those strategies used by researchers to establish the credibility of their study. The study compares qualitative and quantitative research by noting that, "In quantitative research, investigators are most concerned about the specific inferences made from test scores on psychometric instruments (i.e., the construct, criterion, and content validity of interpretations of scores) (AERA, APA, & NCME, 1982) and the internal and external validity of experimental and quasi-experimental designs (Campbell & Stanley, 1966). In contrast, qualitative researchers use a lens not based on scores, instruments, or research designs but a lens established using the views of people who conduct, participate in, or read and review a study."

Wausi(2009) OIISI framework involved qualitative relations that can be validated using similar techniques as applied by Hyosun and Laku(2000) in testing TAM. Hyosun and Laku(2000) approach involved the use of questionnaires to collect data using a seven-point Likerttype scale ranging from (1) strongly disagree to (7) strongly agree for perceived constructs and testing the statistical inferences. This approach was used in the study since it allowed variables to be measured with a variety of check-off, filling, and scaled-response items. Virtually all the constructs in the research model (except others) were operationalized using standard scales from the literature.

Thus we present our research hypothesis in figure 2.5 below:

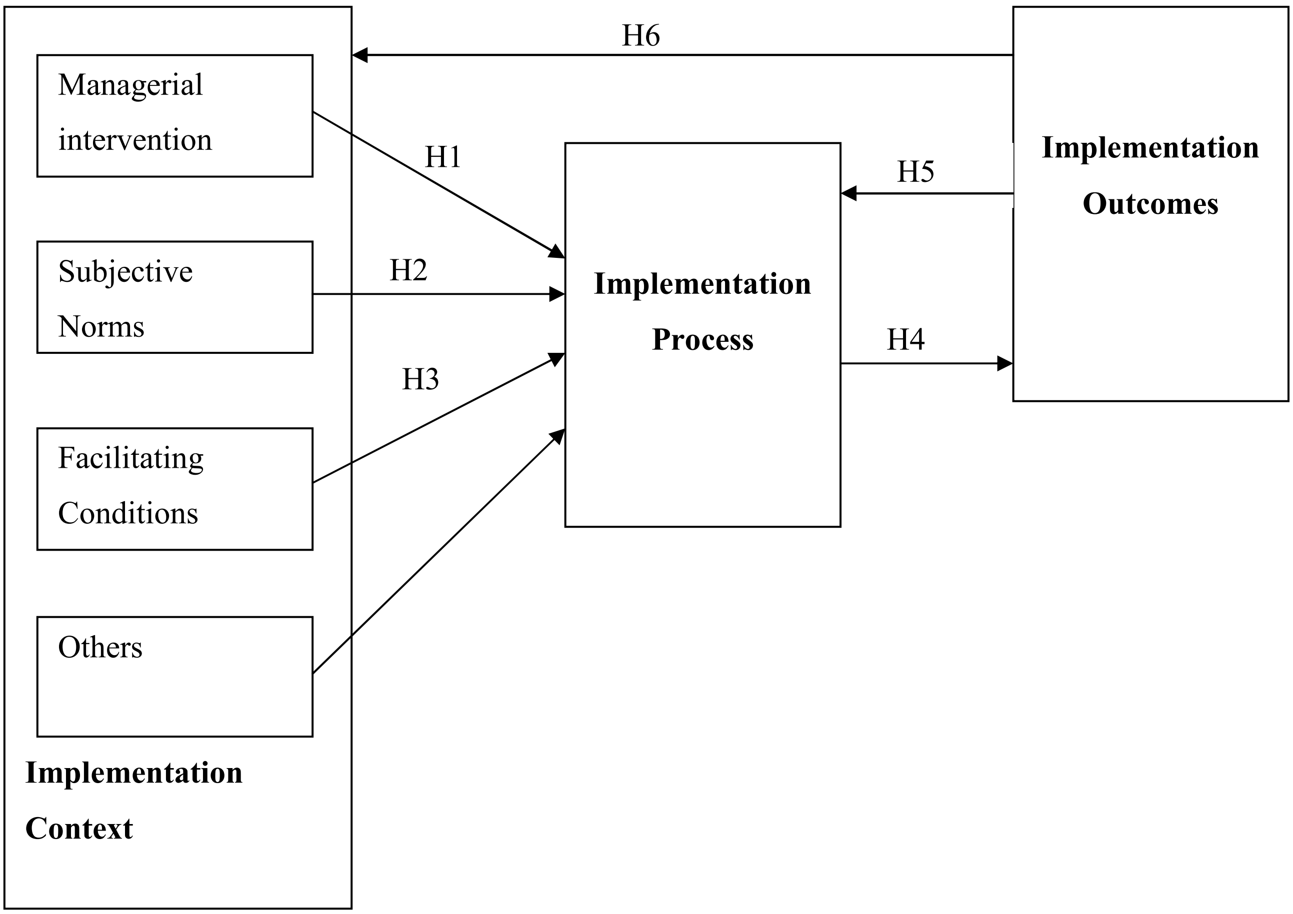

Figure 2.7 Conceptual Framework

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

There are two basic approaches to research: quantitative and qualitative. Kothari (2004) pointed out that quantitative approach involves the generation of data in quantitative form which can be subjected to rigorous quantitative analysis in a formal and rigid fashion. On the other hand, qualitative approach to research is concerned with subjective assessment of attitudes, opinions and behaviour. Qualitative research is subjective to the researchers' judgement and insights. Bryman and Bell (2003) pointed out that the connection between theory and research, epistemological considerations and ontological considerations, quantitative and qualitative research can be considered as two distinctive clusters of research strategy. This study mainly constituted quantitative research though there were also some aspects of qualitative analysis. Creswell & Miller (2000) says that qualitative researchers can use a lens based on the researcher's viewpoint or the participants viewpoint. A third lens may be the credibility of an account by individuals external to the study. Reviewers not affiliated with the project may help establish validity as well as various readers for whom the account is written. To determine validity of the instrument, individuals external to the study were given the questionnaire and asked to provide comments and corrections. The corrected instrument was then administered to the actual respondents.

3.2 Target Population

The total population consisted of registered HEIs in Kenya. The target population included IS implementation representatives and practitioners in selected HEIs within Kenya that have undertaken implementation of IS. The source of data was the key personnel in management, in charge of implementation, head of ICT, specialists in the implementation process, technicians and users.

3.3 Research Design and its Justification

Judgmental sampling was used to obtain HEIs which have adopted IS and have finished implementation process or are in the process to consist elements in the sample. The researcher established an informal relationship with key personnel to determine if the HEI had started or completed IS implementation and decided therefore whether to include the HEI in the sample or not. Convenient sampling was used in the study to obtain easily accessible samples.

This study gathered information using a well designed questionnaire which covered all the aspects of the OIISI framework. Individuals were asked to indicate the extent of agreement or disagreement with various statements concerning the OIISI framework on a seven-point Likerttype scale ranging from (1) strongly disagree to (7) strongly agree for various factors in the implementation process. After the questionnaire was developed, a trial test was administered to three subjects. This was to confirm the instrument.

The hypothesized relationships among the study variables depicted in the framework were tested using confirmatory factor analysis (CFA) and correlation coefficients. The primary objective of a CFA is to determine the ability of a predefined factor model to fit an observed set of data, DeCoster(1998). CFA was used since the study involved validating an existing framework. It was used to determine regression coefficients which were interpreted accordingly. Correlation coefficients were used to determine the strength of the relationships hence test the hypothesis of the study and to calculate coefficient of determination which is used in statistical model analysis to assess how well a model explains and predicts future outcomes.

3.4 Sampling Plan

The study took a sample from the population using judgmental and convenient sampling. Fourteen HEIs were considered which had finished implementation of IS or were at a stage of implementation. In each HEI, the following implementers, believed to have a significant role were selected to fill the questionnaire:

a) One management representative. This was an employee in the financial and operational decision making of the HEI not necessarily an IT person.
b) Head of ICT department
c) Head/in charge of implementation. If the head of ICT department is the same as incharge of implementation, the researcher interviewed a senior officer in the ICT department
d) One system user.

The research interviewed 51 participants from 13 selected HEIs. This constituted the sample for the study. The researcher choose the sample of HEIs based on accessibility and ease of accessing key persons identified above.

3.5 Data Collection Procedure and Instruments

Data for our study was collected from respondents using a self administered questionnaire. Respondents were asked to provide scores on various issues on a seven point Likert scale. An interview schedule was used to collect views from one senior manager in the institution, preferably the CEO or a representative. Likert-type scale is easy to construct in comparison to Thurstone-type scale and can be performed without a panel of judges. Likert type is also considered more reliable because the respondents answer all indicated questions. It requires less time to construct and time here was of essence.

An interview schedule was used to personally interview senior management staff to gather qualitative data on opinions and to explain *others* variable in the Wausi(2009) framework. It was also used to confirm responses from the questionnaire. This ensured reliability and validity of collected data.

3.6 Data Analysis

The study used Analysis of Moment Structure (abbreviated as AMOS) software version 18.0 to draw paths in a designed confirmatory factor analysis (CFA) diagram, called the fully identified model and the second order model, to determine regression coefficients between variables of interest and found Pearson Correlation Coefficient for purposes of establishing the strength of the relationships and calculating coefficient of determination to aid in further interpretation of the relationship.

Confirmatory factor analysis is a suitable method since data was collected using Likert scale. Five basic steps are followed in performing a CFA:

i) Define the factor model. In the case of this study, the framework was already defined. The researcher needed to understand the framework and the factors which were to be tested.
ii) Collect measurements. This involved collecting data from the respondents.

iii) Obtain the correlation matrix and regression coefficients. The next step involved obtaining the correlations (or co-variances) between each of the factors in the model and regression coefficients in the relationships.

iv) Fit the model to the data. The study choose Maximum likelihood estimation in AMOS 18.0 to fit the model.

v) Evaluate model adequacy. The factor loadings were chosen to minimize the discrepancy between the correlation matrix implied by the model and the actual observed matrix. The amount of discrepancy after the best parameters are chosen were used as a measure of how consistent the model was with the data. The X^2 goodness-of-fit test was used test model adequacy. The null hypothesis for this test was that the model adequately accounts for the data, while the alternative was that there is a significant amount of discrepancy.

3.7 Limitations of Methodology and how they were overcome

One of the limitations of the questionnaire is misinterpretation of the questions or lack of clear understanding of what is needed. This limitation was overcome by self administering the questionnaires so that explanations were provided when they were needed.

3.8 Research Design

For purposes of research design, data presentation and data analysis, the following coding for variables was used:

MI - Managerial Intervention: MI.i - Managerial Intervention i^{th} factor, where i=1, 2, 3,4,5,6 for MI.

SN - Subjective Norms: SN.i - Subjective Norms i^{th} factor, where i=1,2 for SN.

FC - Facilitating Conditions: FC.i - Facilitating Conditions i^{th} factor, where i=1,2,3,4 for FC.

OT - Others: OT.i - Others i^{th} factor, where i=1 for OT.

IP - Implementation Process: IP.i - Implementation Process i^{th} factor, where i=1,2,3,4,5,6,7 for IP.

IO - Implementation Outcomes: IO.i - Implementation Outcomes i^{th} factor, where i=1,2 for IO.

MNG - Average for the Managerial Intervention construct.

SubNorm	-	Average for the Managerial Intervention construct.
FacCond	-	Average for the Facilitating Condition construct.
ImpProc	-	Average for the Implementation Process construct.
ImpOut	-	Average for the Implementation Outcome construct.

Based on Wausi(2009) framework, a theoretical model was developed. Figure 3.1 and 3.2 represents the theoretical models which were to be tested and analyzed.

3.9 Research Model

The relationships under study can be summarized in figure 3.1 and figure 3.2 below:

3.9.1 Design of Fully Identified Model

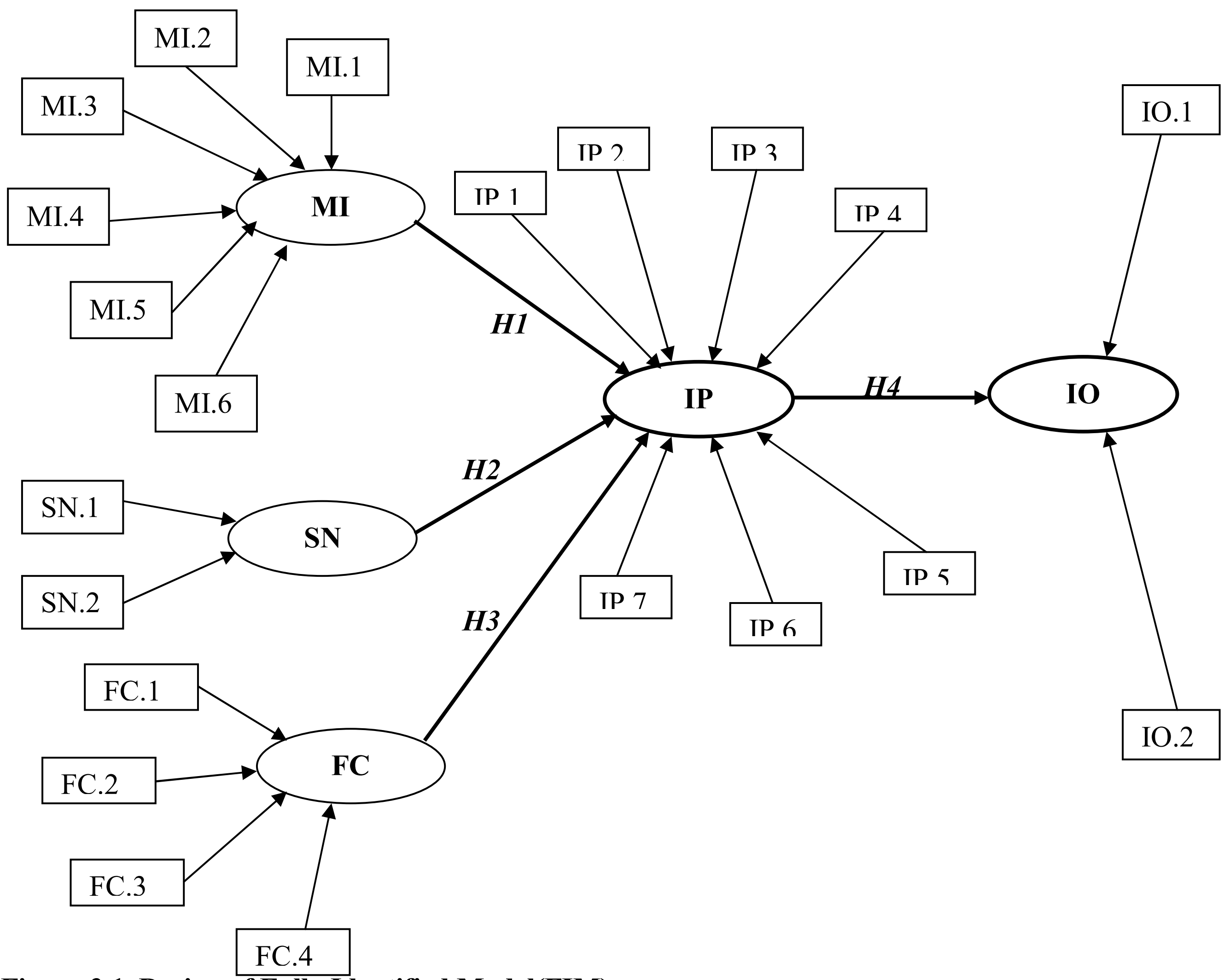

Figure 3.1 Design of Fully Identified Model(FIM)

The arrows linking indicators (observed variables) and their constructs (latent variables) are of a formative nature and hence the direction of the arrows. The indicators are: MI.i; SN.i; FC.i; IP.i; IO.i , i=1,2,…n where n<8 for the model.

3.9.2 Design of Second Order Model

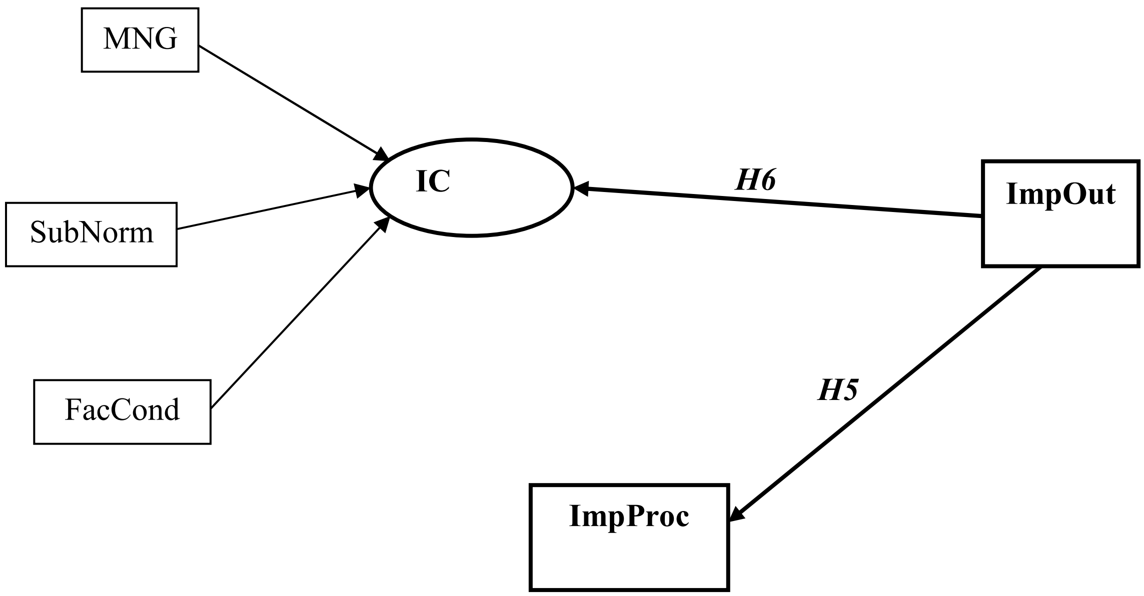

Figure 3.2 Design of Second Order Model

CHAPTER FOUR: RESULTS AND FINDINGS

4.1 Introduction

The results and findings of the study are presented under four subheadings: Descriptive statistics; Confirmatory factor analysis; Correlation Coefficients and Hypotheses test results and discussions of research findings. This study used SPSS (v.11.5) to perform descriptive statistics and to find correlation coefficient and used AMOS (v. 18) for Confirmatory Factor Analysis to find regression coefficients. Data collected by the questionnaire were coded and recorded first in an MS Excel program. They were later transferred to SPSS and AMOS.

For purposes of Statistical analysis, the following qualitative measures were assigned numerical values in the likert scale used in the research instrument.

Likert Measure	**Number Equivalent**
Strongly Disagree (SD)	1
Disagree (D)	2
Disagree Somehow (DS)	3
Neutral (N)	4
Agree Somehow (AS)	5
Agree (A)	6
Somehow Agree (SA)	7

Table 4.1 Numerical Values Assignment to Likert Scale

4.2 Descriptive Statistics

4.2.1 Raw Respondents Designation

SN	DESIGNATION	FREQUENCY	PERCENTAGE
1.	Computer Attendant	1	2.0%
2.	Computer Technologist(Technician)	4	7.8%
3.	ICT Officer	13	25.5%
4.	ICT Lecturer	6	11.8%
5.	HOD Computer	6	11.8%
6.	Webmaster	3	5.9%
7.	Director of ICT	1	2.0%
8.	MIS Officer	1	2.0%
9.	System Adminstrator	7	13.7%
10.	Systems Trainer	2	3.9%
11.	Programmes Coordinator	1	2.0%
12.	General Users	5	9.8%
13.	IT Manager	1	2.0%
	TOTAL	**51**	**100.0%**

Table 4.2 Raw Respondents Designation

Based on the job description of the respondents above, the designations were brought together for better presentation, as follows:

a) Computer Technician to include: Computer Technician; Computer Technologist; Computer Attendant.
b) ICT Officer to include MIS officer.
c) System Administrator included System Developers, Database Administrator, Network Specialist or Network Administrator and Webmaster.
d) Head of Computer Department to include: Director of ICT; Coordinator and IT Manager.
e) ICT Lecturer to include Systems Trainer.
f) The class of general users include: Accountant; Finance Officers and Dean of students.

Based on this grouping, the following table was used to draw a pie chart:

4.2.2 Respondent's Designation

SN	DESIGNATION	FREQUENCY	PERCENTAGE
1.	Computer Technician	5	9.8%
2.	ICT Officer	14	27.5%
3.	ICT Lecturer	8	15.7%
4.	HOD Computer	9	17.6%
5.	System Administrator	10	19.6%
6.	General Users	5	9.8%
	Total	**51**	**100.0%**

Table 4.3 Respondents by Designation

The following pie chart is used to represent respondent designation by designation

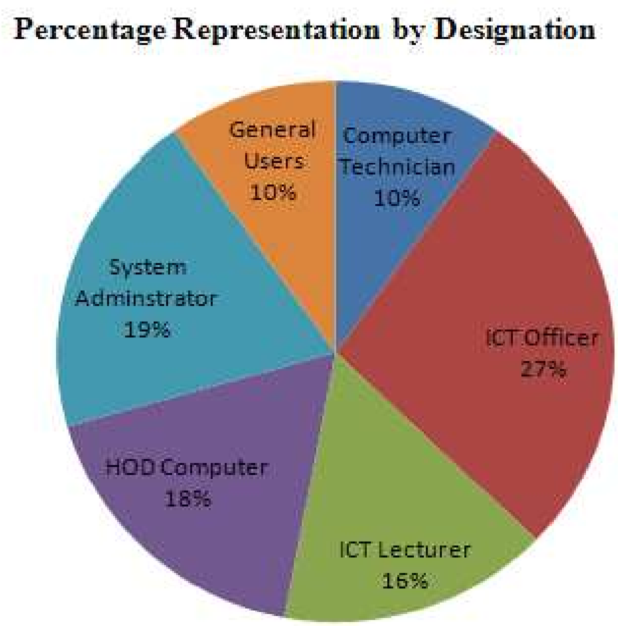

Figure 4.1 Respondents by Designation

The pie chart shows that ICT Officers had the highest percentage (27%) of inclusion in the sample of respondents. This is because most IS implementers in HEIs are ICT officers which includes MIS officer as the case may be. General users and computer technicians had the lowest percentage of representation at 10% each.

4.2.3 Categories of HEIs in the Study

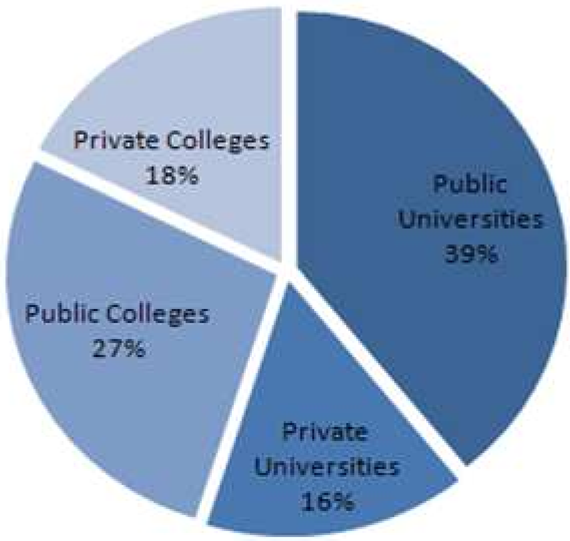

Figure 4.2 Categories of HEIs in the Study

Public universities had a highest percentage (39%) of representation while private colleges had the lowest percentage(18%) of representation. This is because public universities were more accessible to the researcher. The researcher had more lead persons in public HEIs. Most of them have also implemented IS. Most private HEIs were also hesitant to fill and return questionnaires.

100% of the targeted HEIs had either began IS implementation process or had already implemented IS in all or part of their operations.

4.2.4 Number of years worked in HEIs and in the Current HEI

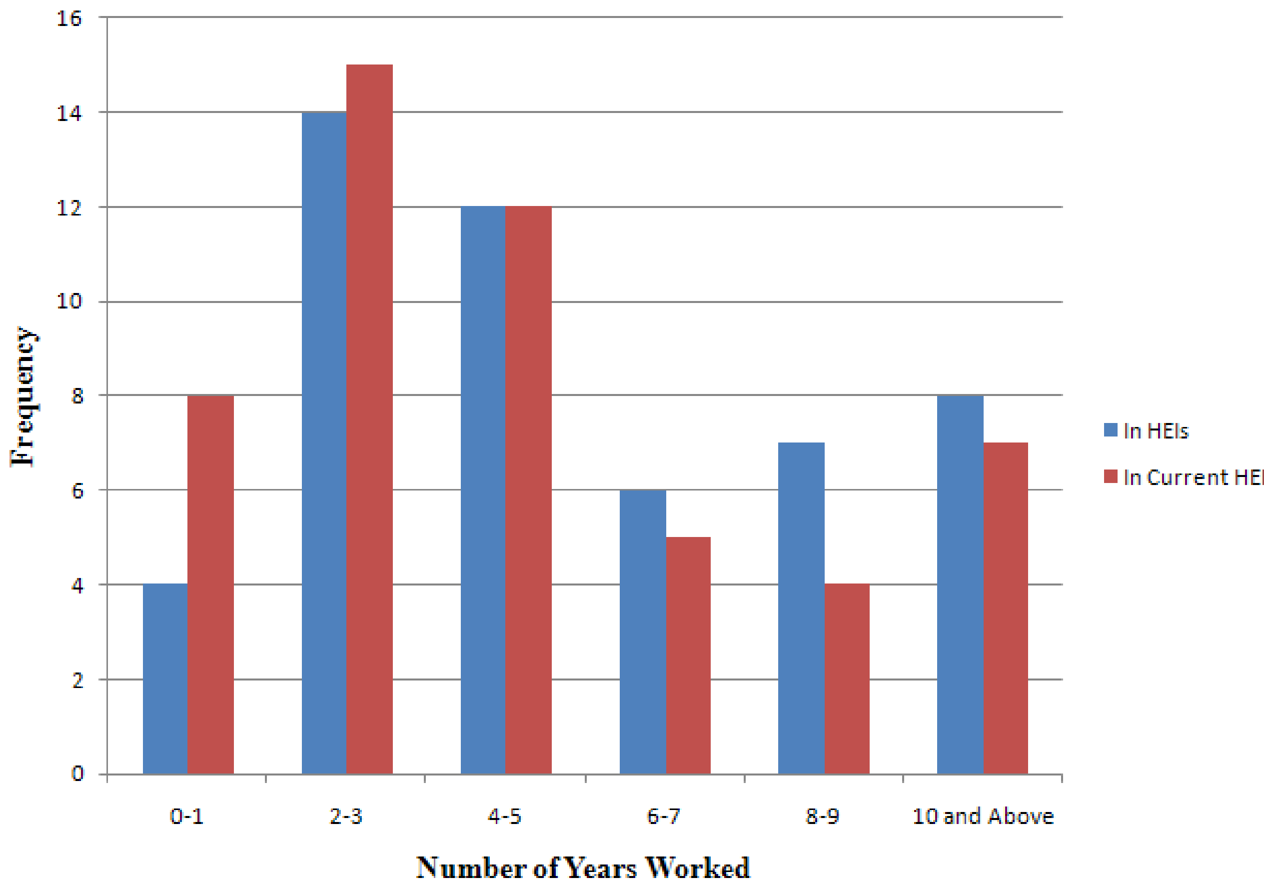

Figure 4.3 Number of years worked in HEIs and in the Current HEI

The bar chart shows that most respondents have served between 2 and 5 years both in HEIs and Current HEIs.

4.2.5 Year of IS Implementation Initiation

YEAR	2000	2002	2003	2005	2006	2007	2008	2009	2010	2011
FREQUENCY	1	1	1	2	2	7	3	14	7	8
PERCENTAGE	2.2%	2.2%	2.2%	4.3%	4.3%	15.2%	6.5%	30.4%	15.2%	17.4%

Table 4.4 Year of IS Implementation Initiation

This information is presented in a bar graph(see figure 4.4)

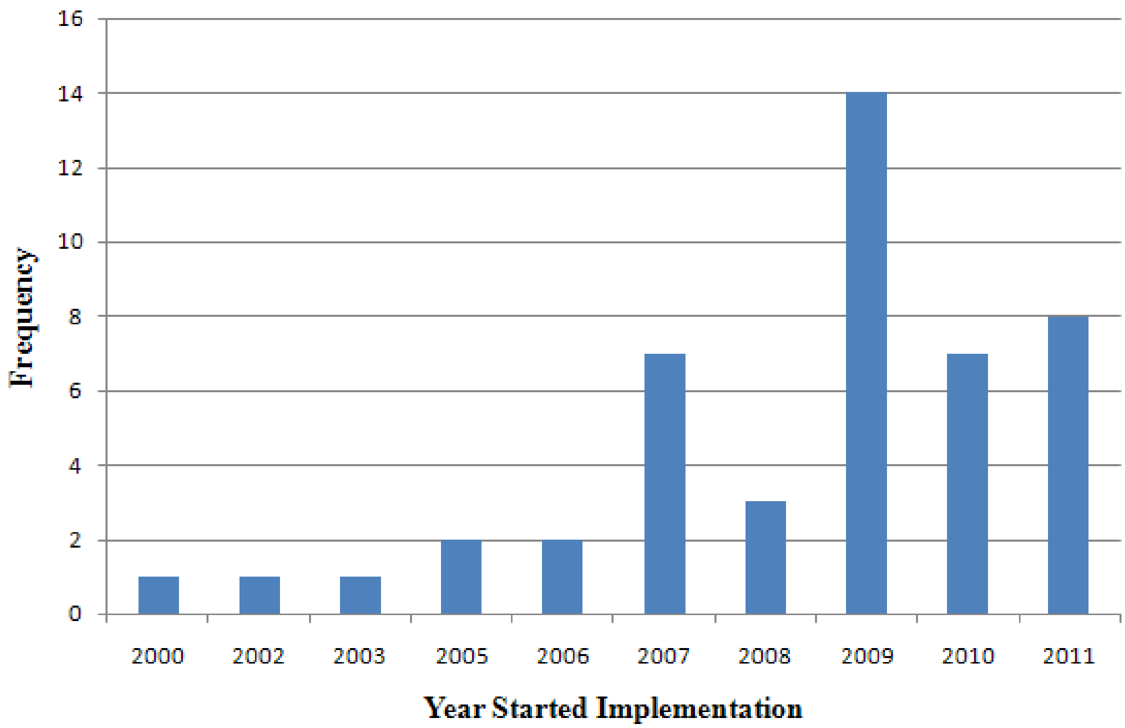

Figure 4.4 Year of IS Implementation Initiation

Most of IS implementations started in the year 2007 with 2009 recording the highest.

4.2.6 Proportion of Respondents reporting IS Implementation Difficulties

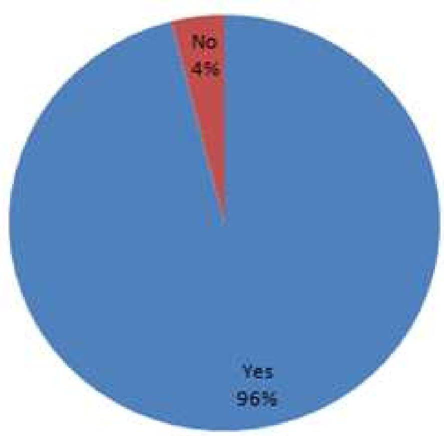

Figure 4.5 Proportion of Respondents reporting IS Implementation Difficulties

96% of respondents agreed that there were difficulties in IS implementation process while 4% disagreed.

4.2.7 Difficulties associated with IS Implementation Process

List of difficulties/ Challenges	**Frequency**	**Percentage**
Challenges of network/Internet connectivity and reliability	5	5.5%
Inadequate resources	8	8.8%
Users had low ICT skills and there were challenges of training: coordination of training and user manual development.	24	26.4%
Resistance to change. Change management strategies needed.	24	26.4%
Incomplete modules from designers, system errors and suitability of modules to applications	8	8.8%
Lack of experience and skills for development and few personnel	4	4.4%
Challenges associated with system changeover	3	3.3%
Lack of detailed specification signed b the users and changing user demands(new requirements) management.	2	2.2%
Wide scope of definition	3	3.3%
Inappropriate implementation methodology	3	3.3%
Design and configuration challenges and System security	2	2.2%
Administration acceptance and lack of support	3	3.3%
Lack of proper sensitization to users	2	2.2%

Table 4.5 Difficulties associated with IS Implementation Process

52.8 % of the respondents felt that the major challenges associated with IS implementation process include training of users and Resistance to change. Only 6.6% of the respondents felt that lack of detailed specification, design and configuration and lack of proper sensitization to users were major challenges of IS implementation process.

4.2.8 Respondents indicating Other Factors Influencing Implementation Process

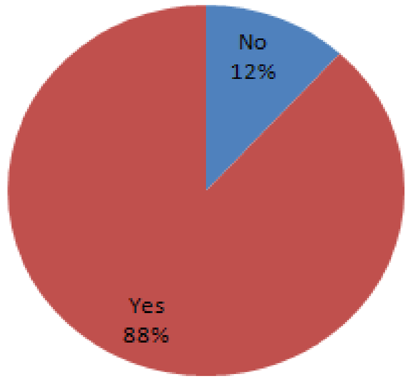

Figure 4.6 Respondents indicating Other Factors Influencing Implementation Process

88% of the respondents indicated that there are other factors apart from Managerial intervention, subjective norms and facilitating conditions that influence IS implementation process. Other factors are detailed in table 4.6 below.

4.2.9 Other Factors influencing Implementation Process

Respondents were allowed to give more than one factor.

S/N	Other Factor	Frequency	Percentage
1	User Training and Knowledge	8	17.4%
2	Attitude of users	7	15.2%
3	Resistance to Change	5	10.9%
4	Speedy provision of Infrastructure & Infrastructural Changes	5	10.9%
5	Lack of framework	4	8.7%
6	Lack of an implementation policy	2	4.3%
7	Lack of process ownership and encouragement	2	4.3%
8	Enforcement in Quality Standards like ISO	1	2.2%
9	User level of Education	1	2.2%
10	Relationship between administration and users	1	2.2%
11	Understaffing	1	2.2%
12	Lack of incentives	1	2.2%
13	Lack of user involvement	1	2.2%
14	Fear of job loss leading to sabotage	1	2.2%
15	Cultural shift	1	2.2%
16	Historical experiences	1	2.2%
17	Lack of management support	1	2.2%
18	Understanding of user role	1	2.2%
19	User preparation before commencement	1	2.2%
20	Integration with other systems	1	2.2%

Table 4.6 Other Factors influencing Implementation Process

User Training and Knowledge, Attitude of users, Resistance to Change, Speedy provision of Infrastructure & Infrastructural Changes, Lack of framework, Lack of an implementation policy, Lack of process ownership and encouragement were factors with a frequency of two and above.

4.2.10 Managerial Intervention Indicators Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
MI.1	51	1.00	7.00	4.1176	1.86169
MI.2	51	1.00	7.00	4.5098	1.65375
MI.3	51	1.00	7.00	3.9804	1.80544
MI.4	51	1.00	7.00	4.5294	1.82596
MI.5	51	1.00	6.00	3.8431	1.67777
MI.6	51	1.00	7.00	4.3529	1.61026
Valid N (listwise)	51				

Table 4.7 Managerial Intervention Indicators Statistics

The indicator with the highest mean was management has sponsored training for staff in usage of Information systems with a mean of 4.5294, while the one with the lowest mean of 3.8431 was management has established a monitoring and evaluation system. This means that majority of the respondents are happy that their institutions have put in place training programs for their staff in usage of IS. They also do not feel like the institutions have done much in implementing monitoring and evaluation systems.

4.2.11 Subjective Norms Indicators Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
SN.1	51	1	7	4.67	1.705
SN.2	51	1	7	4.90	1.330
Valid N (listwise)	51				

Table 4.8 Subjective Norms Indicators Statistics

Subjective norms has only two indicators with a close mean. The factor with the higher mean was Users imitate, discover or conform to the usage of IS with a mean of 4.9.

4.2.12 Facilitating Conditions Indicators Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
FC.1	51	1	7	4.80	1.414
FC.2	51	1	7	4.35	1.718
FC.3	51	1	7	4.43	1.814
FC.4	51	1	7	5.25	1.585
Valid N (listwise)	51				

Table 4.9 Facilitating Conditions Indicators Statistics

The indicator with the highest mean was availability of computers and other infrastructure near users have greatly helped the implementation process with a mean of 5.25, while the one with the lowest mean of 4.35 was Organizational, previous IS innovations history and culture have helped in the implementation of IS. The average of the Likert scale is at 4^{th} point which corresponds to neutral(N). All the means are above 4 and therefore the respondents agree with all the statements. However, a majority of the respondents notes that availability of computers and other infrastructure near users greatly helps the implementation process.

4.2.13 Implementation Process Indicators Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
IP.1	51	1	7	5.80	1.200
IP.2	51	1	7	5.41	1.388
IP.3	51	1	7	5.20	1.778
IP.4	51	1	7	4.78	1.653
IP.5	51	1	7	4.88	1.519
IP.6	51	1	7	5.61	1.372
IP.7	51	1	7	5.41	1.458
Valid N (listwise)	51				

Table 4.10 Implementation Process Indicators Statistics

Respondents agree with all the statements since all the means are above 4.0. That is, the respondents agree that:

During the implementation process:

- there were problems that users encountered which lead to adoption of IS (mean = 5.80)
- there was a decision to invest resources at the unit level to facilitate the use of IS innovation (mean = 5.41)
- there were actions to install/customize IS innovation, train members and facilitate use of IS innovation (mean = 5.20)
- there were plans, strategies and events that indicated user participation and commitment in the process (mean = 4.78)
- users have cut old ways of doing things and have made use of IS a routine (mean = 4.88)

After the implementation process, there was increased effectiveness and integration of IS use (mean = 5.61) and that since the implementation of IS, there was a change of policy, procedures, capabilities and structures in the institution (mean = 5.41).

The highest mean of 5.8 among the factors indicate that there were problems that users encountered which lead to adoption of IS. It also had the lowest SD of 1.2 meaning that values were closely clustered around the mean.

4.2.14 Implementation Outcomes Indicators Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
IO.1	51	1	7	5.37	1.341
IO.2	51	2	7	4.96	1.264
Valid N (listwise)	51				

Table 4.11 Implementation Outcomes Indicators Statistics

4.3 Confirmatory Factor Analysis

The data structure for the study consisted of 21 observed variables which were used to construct the fully identified model and make composite variables (MNG, SubNorm, FacCond, ImpProc and ImpOut) for the second order model.

Confirmatory Factor Analysis was used to determine if the number of factors and the loadings of measured (indicator) variables on them conform to what is expected on the basis of the framework being tested. Apriori analysis was used to fit the data in the model/construct and interpret the results of the path coefficients.

To accomplish this task, a number of fit indices were used to give the goodness-of-fit indices of the model that best fits the data. The goodness of fit tests helps to determine if the model being tested should be accepted or rejected. The overall fit tests do not establish if particular paths within the model are significant. While there are no golden rules for assessment of model fit, reporting a variety of indices is necessary (Crowley and Fan 1997) because different indices reflect a different aspect of model fit. There is no single evaluation rule on which everyone agrees, Jeremy and Hun (2009). Hu and Bentler (1999) provide rules of thumb for deciding which statistics to report and choosing cut-off values for declaring significance. Jaccard and Wan (1996 87) recommend use of at least three fit tests. Suki and Ramayah(2011) in their paper titled Modelling Customer's Attitude Towards E-Government Services and available at http://www.waset.org/journals/ijhss/v6/v6-1-4.pdf on page 20 and 21 identifies the benchmark criteria for model fit summary statistics as follows:

Model fit Summary for Research Model

Fit Indices	**Recommended Value**
Absolute fit measures	
CMIN ($\chi 2$)/DF	< 3
GFI (Goodness of Fit Index)	> 0.9
RMSEA (Root Mean Square Error of Approximation)	<= 0.08
Incremental fit measures	
AGFI (Adjusted Goodness of Fit Index)	> 0.80
NFI (Normed Fit Index)	>= 0.90
CFI (Comparative Fit Index)	> 0.90
IFI (Incremental Fit Index)	> 0.90
RFI (Relative Fit Index)	0.90
Parsimony fit measures	
PCFI (Parsimony Comparative of Fit Index)	0.50
PNFI (Parsimony Normed Fit Index)	0.50

Table 4.12 Model Fit Summary for Research Model

Below is discussion of the goodness of fit statistics used to validate the indices obtained from the model.

4.3.1 Model Chi-Square, (CMIN).

This is also called the Discrepancy or the discrepancy function. The chi-square should not be significant if there is a good model fit, while the reverse is true. Relative chi-square is the chi-square fit index divided by the degrees of freedom i.e CMIN/DF. (Carmines and McIver, 1981; 80), state that the relative chi-square should be in the 2:1 or 3:1 for an acceptable model. (Kline, 1998) says 3 or less is acceptable

4.3.2 Goodness-of-Fit Index, GFI

This deals with the error in reproducing the variance-covariance matrix. By convention, GFI should be greater or equal to 0.80 to accept a model.

4.3.3 Comparative Fit Index, CFI

This is also known as the Bentler Comparative fit Index. This compares the existing model fit with the null model which assumes that the latent variables in the model are uncorrelated.

Conventionally. CFI should be equal to or greater than 0.80 to accept the model, indicating that 80% of the covariation in the data can be reproduced by the given model.

4.3.4 Root Mean Square Error of Approximation, RMSEA

This is the discrepancy per degree of freedom. By convention, there is good model if RMSEA is less than or equal to 0.05. There is adequate fit if the RMSEA is less than or equal to 0.8. (Hu and Bentler 1999) have suggested RMSEA <=0.6 as the cutoff for a good model fit.

RMSEA does not require comparison with null model and thus does not require the author to posit as plausible a model in which there is complete independence of the latent variables as does, CFI.

4.3.5 Fully Identified Model (FIM)

The Fully Identified Model and its associated statistics is presented in Appendix IV. To simplify the diagram for easier readability, the design diagram was adopted and only paths of interest indicated. The diagram below shows the standardized regression coefficients between the paths of interest.

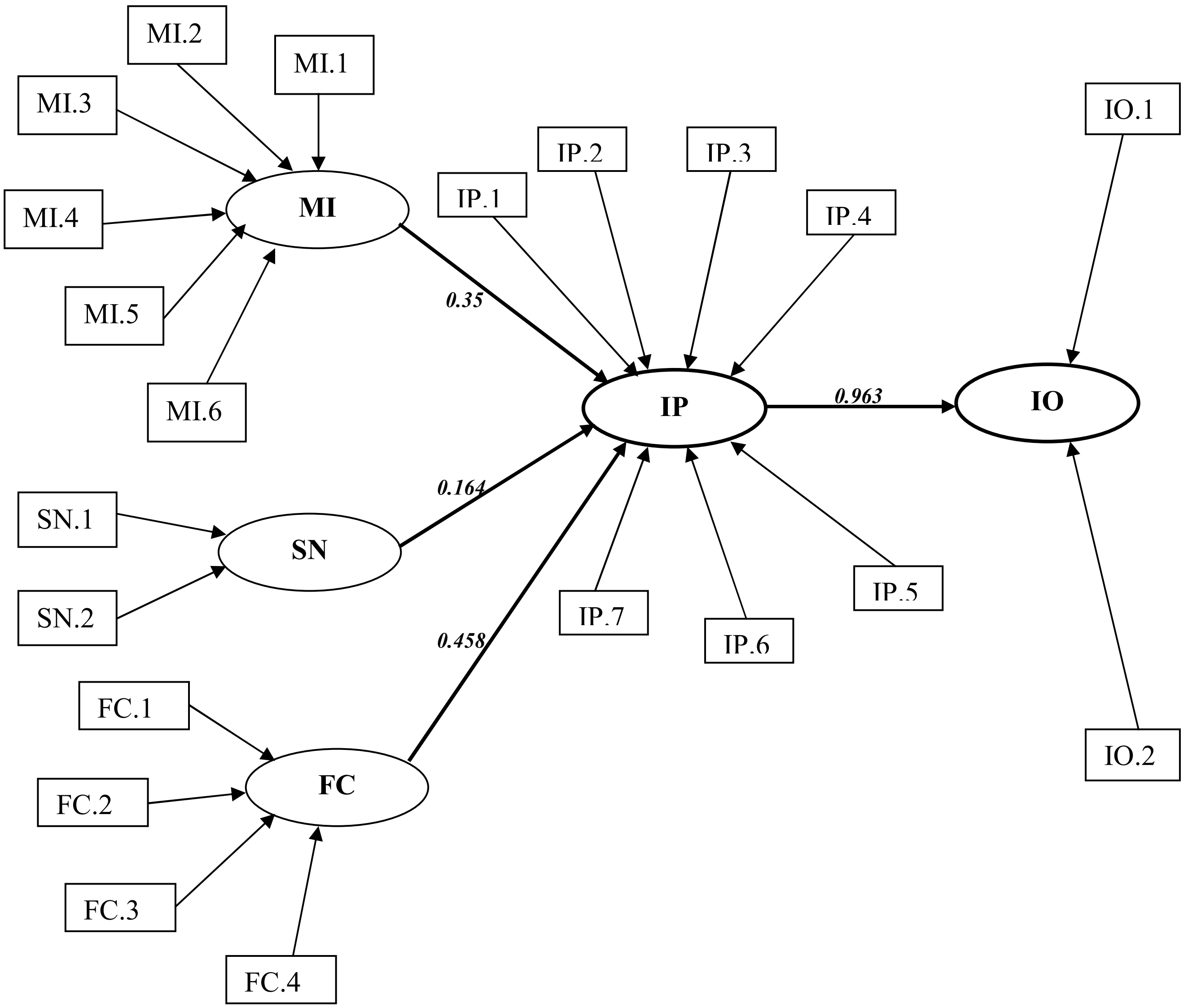

Figure 4.7 Standardized Regression Coefficients for the FIM

4.3.6 Model Fit Summary for the Fully Identified Model

Fit Indices	**Recommended Value**	**Model Results**
Absolute fit measures		
CMIN		214.057
DF		162
P Value		0.004
CMIN (χ2)/DF	< 3	1.321
GFI (Goodness of Fit Index)	> 0.9	0.732
RMSEA (Root Mean Square Error of Approximation)	<= 0.10	0.08
Incremental fit measures		
AGFI (Adjusted Goodness of Fit Index)	> 0.80	0.618
NFI (Normed Fit Index)	>= 0.90	0.683
CFI (Comparative Fit Index)	>= 0.90	0.888 = 0.9 (2 dp)
IFI (Incremental Fit Index)	>= 0.90	0.899 = 0.9 (2 dp)
RFI (Relative Fit Index)	>= 0.90	0.589
Parsimony fit measures		
PCFI (Parsimony Comparative of Fit Index)	>= 0.50	0.685
PNFI (Parsimony Normed Fit Index)	>= 0.50	0.527

Table 4.13 Model Fit Indices for the Fully Identified Model (FIM)

The X^2 =214.06 which evaluated through 162 degrees of freedom is significant with a p-value=0.004, thus we do not reject the null hypothesis that the above construct will fit the data.

The Modification Indices, showed that no further co-variances (for the residual terms/errors), no further variances and regression weights within observed variables.

Assuming a perfect linear regression, the above findings can be interpreted as follows:

$$IP = 0.35MI + b_0$$

That is $\frac{dIP}{dMI} = 0.35$

This means that a unit change in the independent variable (MI) causes a change of 0.35 in the dependent variable (IP).

A similar interpretation would mean that a unit change in Subjective Norms leads to a change of 0. 16 in the Implementation Process (IP);

A unit change in Facilitating Conditions leads to a change of 0.46 in the Implementation Process (IP) and a unit change of Implementation Process leads to a change of 0.96 in the Implementation outcomes.

4.3.7 Second Order Model

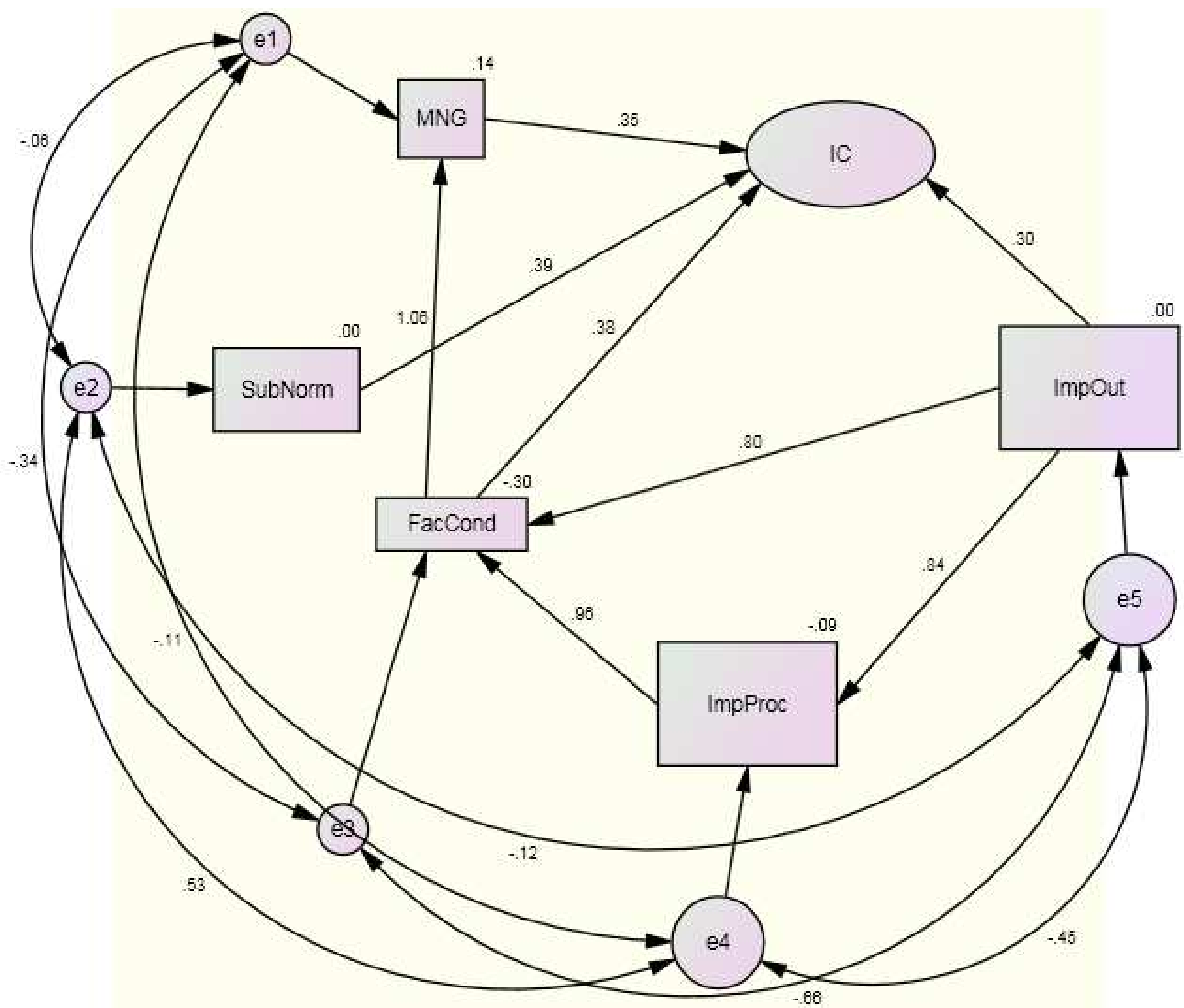

Figure 4.8 Second Order Model(SOM)

4.3.8 Model Fit Summary for the Second Order Model

Fit Indices	Recommended Value	Model Results
Absolute fit measures		
CMIN		7.323
DF		3
P Value		0.062
CMIN ($\chi 2$)/DF	< 3	2.441
GFI (Goodness of Fit Index)	> 0.9	0.948
RMSEA (Root Mean Square Error of Approximation)	<= 0.08	0.170
Incremental fit measures		
AGFI (Adjusted Goodness of Fit Index)	> 0.80	0.742
NFI (Normed Fit Index)	>= 0.90	0.915
CFI (Comparative Fit Index)	> 0.90	0.943
IFI (Incremental Fit Index)	> 0.90	0.948
RFI (Relative Fit Index)	0.90	0.716
Parsimony fit measures		
PCFI (Parsimony Comparative of Fit Index)	0.50	0.283
PNFI (Parsimony Normed Fit Index)	0.50	.274

Table 4.14 Model fit Summary for the Second Order Model (SOM)

The $\chi 2$ =7.092 which evaluated through 3 degrees of freedom is significant with a p-value of 0.062(>0.05), thus we do not reject the null hypothesis that the above construct will fit the data.
A similar interpretation of findings can be borrowed from section 4.3.6 above as follows:
A unit change in the Implementation Outcomes leads to a change of 0.84 in the Implementation process and a unit change in Implementation Outcomes leads to a change of 0.30 in the Implementation Context.

4.3.9 Validity and Reliability

Validity has two distinct fields of application. The first involves test validity, the degree to which a test measures what it was designed to measure. The second involves research design. Here the term refers to the degree to which a study supports the intended conclusion drawn from the results. In the Campbellian tradition, this latter sense divides into four aspects: Support for the conclusion that the causal variable caused the effect variable in the specific study (internal validity), support that the same effect generalizes to the population from which the sample was drawn (statistical conclusion validity), support for the intended interpretation of the variables (construct validity), and support for the generalization of the results beyond the studied population (external validity). Discriminant validity analysis refers to testing statistically whether two constructs differ; Convergent validity test through measuring the internal consistency within one construct, as Cronbach's alpha does.

In statistics, reliability is the consistency of a set of measurements or measuring instrument, often used to describe a test. This can either be whether the measurements of the same instrument give or are likely to give the same measurement (test-retest), or in the case of more subjective instruments, such as personality or trait inventories, whether two independent assessors give similar scores (inter-rater reliability). Reliability is inversely related to random error.

Reliability does not imply validity. That is, a reliable measure is measuring something consistently, but not necessarily what it is supposed to be measuring. For example, while there are many reliable tests of specific abilities, not all of them would be valid for predicting, say, job performance. In terms of accuracy and precision, reliability is precision, while validity is accuracy.

In experimental sciences, reliability is the extent to which the measurements of a test remain consistent over repeated tests of the same subject under identical conditions. An experiment is reliable if it yields consistent results of the same measure. It is unreliable if repeated measurements give different results. It can also be interpreted as the lack of random error in measurement.

The null hypothesis that the study tested is that the model fits the data well.

Reliability and validity in the construct was established using the Cronbach's alpha. Cronbach's alpha shows the reliability score (which is the percent of the variance of the observed scale would explain in hypothetical true scale). The overall Cronbach's Alpha=0.744 which is greater than 0.5 and also it approaches 1 depicting high internal reliability of the factors within the dataset.

4.3.10 Cronbach's Alpha Reliability Statistics

Variable	Cronbach's Alpha	Expected Cronbach's Alpha
Managerial Intervention	0.761	>0.5
Subjective Norm	0.618	>0.5
Facilitating conditions	0.773	>0.5
Implementation process	0.829	>0.5
Implementation outcome	0.648	>0.5
Overall model	0.744	>0.5

Table 4.15 Cronbach's Alpha Reliability Statistics

The Cronbach's alphas of these variables are quite high. This depicts that there is high internal consistency within the tested variables.

4.4 Correlation Coefficient

Correlation Coefficient is one of the most common and most useful statistics. A correlation is a single number that describes the degree of relationship between two variables and is used for purposes of testing hypothesis in this study.

The table below shows a summary of this study's correlation results as obtained from SPSS and detailed in Appendix vi: Correlation Data.

4.4.1 Summary of Correlation Results for the Study

Variable X	Variable Y	Pearson Correlation Coefficient(r)	Coefficient of Determination(r^2)
MI	IP	0.6	0.36
SN	IP	0.5	0.25
FC	IP	0.7	0.49
IP	IO	0.3	0.09
IO	IP	0.3	0.09
IO	IC	0.3	0.09

Table 4.16 Summary of Correlation Results

4.4.2 Interpretation of Correlation Coefficients

According to MathBits.com(2000-2012) http://www.mathbits.com/mathbits/tisection/statistics2/correlation.htm visited on 4th March 2012, the value of r is such that $-1 \leq r \leq +1$. The + and – signs are used for positive linear correlations and negative linear correlations, respectively. *Positive correlation:* If *x* and *y* have a strong positive linear correlation, *r* is close to +1. An *r* value of exactly +1 indicates a perfect positive fit. Positive values indicate a relationship between *x* and *y* variables such that as values for *x* increases, values for *y* also increase. *Negative correlation:* If *x* and *y* have a strong negative linear correlation, *r* is close to -1. An *r* value of exactly -1 indicates a perfect negative fit. Negative values indicate a relationship between *x* and *y* such that as values for *x* increase, values for *y* decrease. *No correlation:* If there is no linear correlation or a weak linear correlation, *r* is close to 0. A value near zero means that there is a random, nonlinear relationship between the two variables. The reference further notes that *r* is a dimensionless quantity; that is, it does not depend on the units employed. A *perfect* correlation of ± 1 occurs only when the data points all lie exactly on a straight line. If $r = +1$, the slope of this line is positive. If $r = -1$, the slope of this line is negative.

This criterion can be summarized in the table below:

Range of coefficient(r)	Interpretation
1.0	Perfect positive correlation
0.5 < r < 1.0	High positive correlation
0 < r < 0.5	Low positive correlation
0	No correlation
0 > r > - 0.5	Low negative correlation
-0.5 > r > -1.0	High negative correlation
-1.0	Perfect negative correlation

Table 4.17 Interpretation of Correlation Coefficients

4.4.3 Interpretation of Coefficient of Determination

According to MathBits.com(2000-2012) http://www.mathbits.com/mathbits/tisection/statistics2/correlation.htm, coefficient of determination is a measure used in statistical model analysis to assess how well a model explains and predicts future outcomes. It is indicative of the level of explained variablity in the model. The measure gives the proportion of the variance (fluctuation) of one variable that is predictable from the other variable. It is a measure that allows us to determine how certain one can be in making predictions from a certain model/graph. The coefficient of determination is the ratio of the explained variation to the total variation. The coefficient of determination is such that $0 < r^2 < 1$, and denotes the strength of the linear association between x and y.

The results above indicates that the coefficient of determination between MI and IP is 0.36. This means that 36% of the variation in Implementation Process can be explained by Managerial Intervention, 25% of the variation in Implementation Process can be explained by Subjective Norms, 49% of the variation in Implementation Process can be explained by Facilitating Conditions, 9% of the variation in Implementation Outcomes can be explained by Implementation Process, 9% of the variation in Implementation Process can be explained by Implementation Outcomes and 9% of the variation in Implementation Context can be explained by Implementation Outcomes.

These results indicate a possibility of other factors that influence Implementation Outcomes (IO) apart from Implementation Process. These factors can explain at least 91% of the remaining variation in Implementation Outcomes and such factors provide a basis for further study.

4.5 Results of Hypotheses Test

From the values of correlation coefficients, results are as follows:

H1: The results indicate a Correlation coefficient of 0.6 between Managerial Intervention and Implementation Process is positive and significant at the 0.01 level. We therefore reject the null hypothesis that there is no relationship between Managerial Intervention and Implementation Process.

H2: The results indicate a Correlation coefficient of 0.5 between Subjective Norms and Implementation Process is positive and significant at the 0.01 level. We therefore reject the null hypothesis that there is no relationship between Subjective Norms and Implementation Process.

H3: The results indicate a Correlation coefficient of 0.7 between Facilitating Conditions and Implementation Process is positive and significant at the 0.01 level. We therefore reject the null hypothesis that there is no relationship between Facilitating Conditions and Implementation Process.

H4: The results indicate a Correlation coefficient of 0.3 between Implementation Process and Implementation Outcomes is positive and significant at the 0.05 level. We therefore reject the null hypothesis that there is no relationship between Implementation Process and Implementation Outcomes.

H5: The results indicate a Correlation coefficient of 0.3 between Implementation Outcomes and Implementation Process is positive and significant at the 0.05 level. We therefore reject the null hypothesis that there is no relationship between Implementation Outcomes and Implementation Process.

H6: The results indicate a Correlation coefficient of 0.3 between Implementation Outcomes and Implementation Context is positive and significant at the 0.05 level. We therefore reject the null hypothesis that there is no relationship between Implementation Outcomes and Implementation Context.

4.6 Discussion of Research Findings

4.6.1 Discussion of Paths in OIISI Framework

The results suggest that the relationships indicated in Wausi(2009) OIISI framework are valid. According to findings there is a statistical correlation between Managerial Intervention and Implementation Process. This means that Managerial Intervention indicators such as Recruitment of adequate Human resources, provision of adequate Computing Infrastructure, encouragement, persuasion and provision of incentives to staff for using IS, staff sponsored training, establishment of a monitoring and evaluation system and being responsive to user experiences during IS implementation contributes to implementation process of IS Innovations.

Similarly, a statistical relationship between subjective norms and implementation process means that indicators such as users believing that peers, clients, supervisors and surbodinates support adoption and usage of IS and users imitating, discovering or conforming to the usage of IS contributes to the IS implementation process.

A relationship between Facilitating Conditions and Implementation Process shows that indicators such as users finding usage of IS fun, enjoyable, user friendly, secure to use, previous IS innovations history and culture, presence of policies and procedures and availability of Computers and other infrastructure near users greatly contribute to the implementation process.

The results also shows that there is a relationship between Implementation Process and Implementation Outcomes. This means that problems that users encounter, facilitation, installation and training of IS usage, users making usage a routine, increased effectiveness and change of policy, procedures, capabilities and structures all contribute to the Implementation Outcomes.

The feedback loop from Implementation Outcomes and Implementation Process is positive and statistically significant. This means that the occurrence of anticipated outcomes informs the Implementation Process.

A relationship between Implementation Outcomes and Implementation Context is positive and statistically significant. This means that implementation outcomes informs the implementation context.

4.6.2 Other Factors Influencing the Implementation Process

On the question of whether there are other factors influencing the implementation process apart from Managerial Intervention, Subjective Norms and Facilitating Conditions, the respondents listed many factors which were grouped together for purposes of analysis. 88% of the respondents indicated that there are other factors whereas 12% indicated there are no other factors. Respondents listed the following other factors influencing the implementation process including the percentage of respondents: User Training and Knowledge(17.4%); Attitude of users(15.2%); Resistance to Change(10.9%); Speedy provision of Infrastructure & Infrastructural Changes(10.9%); Lack of framework(8.7%); Lack of an implementation policy(4.3%); Lack of process ownership and encouragement(4.3%); Enforcement in Quality Standards like ISO(2.2%); User level of Education(2.2%); Relationship between administration and users(2.2%); Understaffing(2.2%); Lack of incentives(2.2%); Lack of user involvement(2.2%); Fear of job loss leading to sabotage(2.2%); Cultural shift(2.2%); Historical experiences(2.2%); Lack of management support(2.2%); Understanding of user role(2.2%); User preparation before commencement(2.2%); Integration with other systems(2.2%). Most of the other observed factors revolve around the constructs (Managerial Interventions, Subjective Norms and Facilitating Conditions) by Wausi (2009). Only a few issues remained outstanding as per observations by respondents, these may not qualify as new constructs due to their subjectivity.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

This section gives a summary of the results, research limitations, statement of the conclusions and recommendations for further studies. The study confirmed the Organizational Implementation of Information Systems Innovations (OIISI) framework to be a useful theoretical model in helping to understand and explain implementation of IS in organizations. The study has advanced research in the IS field by providing support for using the OIISI framework in the implementation of IS in HEIs on its entirety.

5.1 Summary of Results

The first chapter of the study described the state of knowledge, statement of hypothesis, aims of the work and the context in which the work appears. The chapter noted that frameworks have been developed by researchers for the purpose of understanding and explaining implementation of Information Systems (IS) in organizations but many of the researchers do not necessarily go to the extent of validating the relationships indicated therein. A statement of the problem followed, stating that Wausi(2009) developed a framework to resolve the challenges of implementing IS in HEIs which had not been validated previously for purposes of application. This proceeded to the general objective, specific objectives and research hypothesis.

Chapter two discussed relevant previous work and any appropriate literature. It is divided into three main subheadings: Role of frameworks in IS; Review of IS frameworks and Methods of validating frameworks. Outlined role of frameworks in IS can be summarized as: Frameworks are a basis for system development and evaluation. Example: the SDLC; They help in conceptualization of work practices; They promote useful description, explanation, critique and leads to better ways of doing things; They are applied in planning and setting goals and priorities; They help practitioners to see things, aspects, properties and relations which would otherwise be missed and finally they serve as a guide to fulfilling a task. To inform the study, some of the most widely used and researched IS frameworks were reviewed. These are: Davis (1989): Technology Acceptance Model (TAM); DeLone and McLean (1992): Information Systems Success; Updated DeLone and McLean IS success model (2003). The framework under study, Wausi (2009): Organizational Implementation of Information Systems Innovations framework was also reviewed. The constructs of the framework were outlined as defined in Wausi(2009). These definitions were used to construct the research instrument and the interview schedule. On methods of validating frameworks, the literature was very scanty. The study outlined the importance of framework validation and reviewed literature of research that attempted to validate frameworks. Reviewed studies included: Hyosun and Laku (2000) which provided the methodology for this study, Pérez-Mira(2010) that helped in guiding the analysis and layout and John W. Creswell & Dana L. Miller (2000) which informed on the validity of a study.

The methodology was outlined in Chapter three. It records a description of Target population; Research design and its justification; Sampling plan; Data collection procedure and instruments; Data analysis; Limitations of methodology and how they were overcome and Research design. The target population was defined as those HEIs that have implemented or are implementing IS. The instrument designed was a seven point Likerttype scale which was analyzed using confirmatory factor analysis (CFA) to test the hypothesized relationships. The sampling plan involved an identification of the implementers eligible to be included in the sample. In the research design a conceptualization of the models to be tested was done and these models were presented at the end of the chapter. A code of variables under study was done to aid data presentation and analysis.

Chapter four contains a full account of the results obtained and findings. They are presented and analyzed under four headings: Descriptive statistics; Confirmatory factor analysis; Correlation Coefficients and Results of Tested Hypothesis. Descriptive Statistics mainly presented Section A (respondent information) and Section B of the questionnaire. Information about the current respondent designation, Institution under consideration and experience of work in HEIs are all presented using suitable methods. Section B is mainly about the implementation process. The year it began, how long it has taken, difficulties experienced and whether the HEI used a framework or not. The question of whether there are other factors apart from managerial intervention, subjective norms and facilitating conditions that influence implementation process, was also discussed and a list of the other factors in a descending order of frequency.

Confirmatory factor analysis presented the results of regression coefficient. This was done using AMOS(v. 18) and the results interpreted.

The results of the correlation coefficient provide significant support for the relationships between Managerial Intervention, subjective norms, facilitating conditions and implementation process. The results also provide significant support for positive relationships between implementation process and implementation outcomes.

The results also confirm the backward loop between Implementation Outcomes and Implementation Process and also Implementation Outcomes and Implementation Context. Finally for the chapter, a test of hypothesis is done.

Chapter five has summarized the study and concludes by giving suggestions for further work.

5.2 Research Limitations

The research was limited by time and financial resources. The researcher would have wished to collect data from all HEIs in Kenya.

The sampling design was non-probability which limits generalization of result findings to other HEIs except those in the category used in the study.

5.3 Conclusion

Motivated by the need of a validated framework to utilize in the implementation of information systems innovations in higher education institutions, this study was an attempt to test the relationships in OIISI framework. The first objective, “To determine if the relationships indicated on the framework are valid” was addressed by testing hypotheses. The results indicated that there were significant relationships among the constructs in the OIISI framework. This means that the framework is applicable for HEIs as well as Universities as suggested by Wausi(2009). The framework can be modified further into an actual model of implementing IS.
The second objective, “To measure the degree of associations indicated on the OIISI framework” was addressed by finding correlation coefficient, coefficient of determination and standardized

regression coefficients. Correlation coefficient and coefficient of determination were measured and interpreted as follows:

Variable X	Variable Y	Pearson Correlation Coefficient(r)	Interpretation of r	Coefficient of Determination (r^2)	Interpretation of r^2
MI	IP	0.6	High positive correlation	0.36	36% of the variation in IP can be explained by MI.
SN	IP	0.5	High positive correlation	0.25	25% of the variation in IP can be explained by SN.
FC	IP	0.7	High positive correlation	0.49	49% of the variation in IP can be explained by FC.
IP	IO	0.3	Low positive correlation	0.09	9% of the variation in IO can be explained by IP.
IO	IP	0.3	Low positive correlation	0.09	9% of the variation in IP can be explained by IO.
IO	IC	0.3	Low positive correlation	0.09	9% of the variation in IC can be explained by IO.

Table 5.1 Conclusion on Correlation Coefficient and Coefficient of Determination

The last objective which sought to determine what other factors influence the implementation process was addressed by identifying the percentage of respondents who answered yes to the question of whether there are other factors apart from MI, FC and SN. A list of the other factors was also obtained from the respondents who said there are other factors. The results showed that 88% of the respondents indicated that there are other factors against 12%. This is a clear indication that there are other factors that influence the Implementation Process. Some of the factors listed include: User training and knowledge; Attitude of users; Resistance to change; Speedy provision of infrastructure and infrastructural changes which touch on mainly Managerial Intervention (MI) and Subjective Norms(SN). There are others like lack of a framework, lack of an implementation policy and Lack of process ownership and encouragement which have a frequency of 2 and above. Others listed are: Enforcement in Quality Standards like

ISO; User level of Education; Relationship between administration and users; Understaffing; Lack of incentives; Lack of user involvement; Fear of job loss leading to sabotage; Cultural shift; Historical experiences; Historical experiences; Lack of management support; Understanding of user role; User preparation before commencement and Integration with other systems.

5.4 Recommendations for Further Studies

In the process of conducting the research, some challenges were observed in IS implementation within HEIs. These challenges require further research.

Wausi(2009) OIISI framework introduced 'Others' construct among other modifications made to other related frameworks. Since Wausi (2009) OIISI framework was developed in the context of University in Kenya, further research is needed to expand this construct in the context of HEIs.

The results of the study suggest that there is a possibility of other factors that determine Implementation Outcomes apart from Implementation Process. This can be researched further.

A backward loop between Implementation Process and Implementation context also needs further research.

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APPENDIX I: LETTER TO RESPONDENTS

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NAKURU

RE: LETTER OF INTRODUCTION

I am a student of the University of Nairobi in the School of Computing and Informatics pursuing a Master of Science in Information Systems degree course. I am undertaking a study titled **"Testing Wausi(2009) Organizational Implementation of Information Systems Innovations Framework"**

For this purpose then, you are humbly requested to fill in the attached questionnaire by ticking the appropriate boxes and explanations as the case may be.

I would want to assure you that the information given will remain confidential and it will be used for the purposes of this research only.

Thanks in advance and may God almighty bless you.

Yours Faithfully,

Geoffrey Mariga Wambugu
P56/71224/2008

APPENDIX II: RESEARCH QUESTIONNAIRE

SECTION A: RESPONDENT INFORMATION

1. Name of respondent (Optional)____
2. Current Designation ____
3. Institution ____
4. Kind of Institution eg Private College____
5. Years worked in HEIs____
6. Years worked in the current institution____

SECTION B:

1. Have you implemented or started implementing an IS in your institution?

   Yes (   )   No (   )

   If yes, kindly answer (a).

   a) When was the implementation started? (Year) _____________

2. If the implementation is complete, how long did it take to complete the implementation process? (Months) __________________
3. Were there any difficulties in the implementation process?   Yes (   )   No (   )
4. If yes, list some of the difficulties.

   ____

   ____

   ____

   ____

   ____

5. Did you use or are you using as the case may apply any framework in the implementation process?   Yes (   )   No (   )

SECTION C:

Please indicate your level of agreement with the following statements by ticking the appropriate box: Key: Strongly Disagree(SD); Disagree(D); Disagree Somewhat(DS); Neutral(N); Agree Somewhat(AS); Agree(A); Strongly Agree(SA)

1. Managerial Intervention

No.	Statement	SD	D	DS	N	AS	A	SA
i)	Management has recruited adequate Human resources for IS implementation							
ii)	Management has provided adequate Computing Infrastructure for IS implementation							
iii)	Management has encouraged, persuaded and provided incentives to staff for using IS							
iv)	Management has sponsored training for staff in usage of IS							
v)	Management has established a monitoring and evaluation system							
vi)	Management is responsive to user experiences during IS implementation							

2. Subjective Norms

No.	Statement	SD	D	DS	N	AS	A	SA
i)	Users believe that peers, clients, supervisors and subordinates support adoption and usage of IS							
ii)	Users either imitate, discover or conform to the usage of IS							

3. Facilitating Conditions

No.	Statement	SD	D	DS	N	AS	A	SA
i)	The IS that we are using is fun, enjoyable, user friendly and secure to use							
ii)	Organizational, previous IS innovations history and culture have helped in the implementation of IS							
iii)	We have policies and procedures that have helped in the implementation of IS							
iv)	Availability of Computers and other infrastructure near users have greatly helped the implementation process							

4. Others

No.	Statement	Yes	No
i)	There are other factors apart from Managerial intervention, subjective norms and facilitating conditions that influence implementation process		

5. Implementation Process

No.	Statement	SD	D	DS	N	AS	A	SA
i)	During the implementation process there were problems that users encountered which lead to adoption of IS							
ii)	During the implementation process there was a decision to invest resources at the unit level to facilitate the use of IS innovation							
iii)	During the implementation process, there were actions to install/customize IS innovation, train members and facilitate use of IS innovation							

No.	Statement	SD	D	DS	N	AS	A	SA
iv)	During the implementation process, there were plans, strategies and events that indicated user participation and commitment in the process							
v)	During the implementation process, users have cut old ways of doing things and have made use of IS a routine							
vi)	After the implementation process, there have been increased effectiveness and integration of IS use							
vii)	Since the implementation of IS, there has been a change of policy, procedures, capabilities and structures							

6. Implementation Outcomes

No.	Statement	SD	D	DS	N	AS	A	SA
i)	There was occurrence of anticipated outcomes at departmental and organizational level							
ii)	There was occurrence of unanticipated outcomes at unit and organizational level							

7. Based on your answer in section C question 4 (i) explain your answer and where applicable list other factors that influence the implementation of IS.

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APPENDIX III: INTERVIEW SCHEDULE

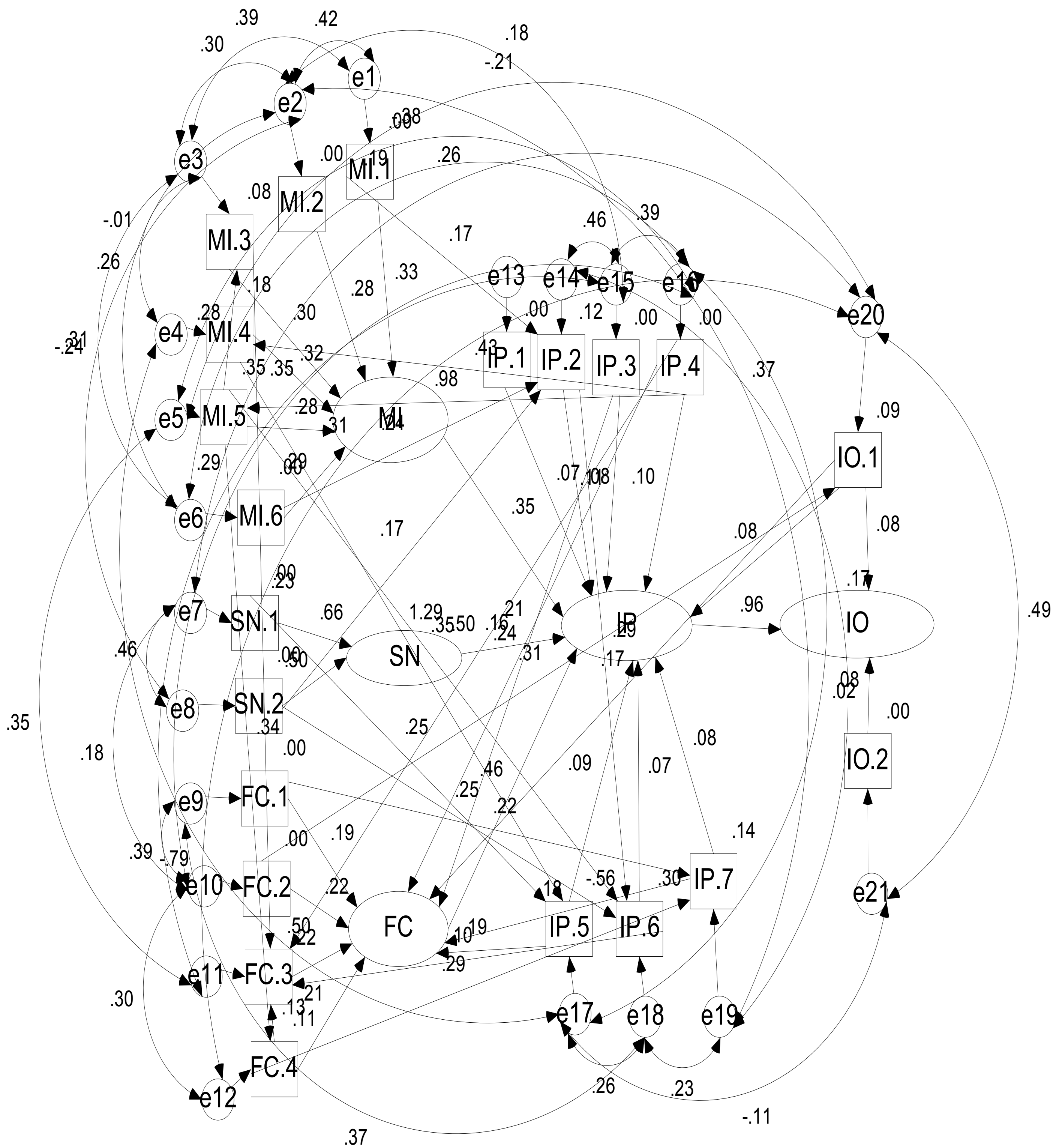
Based on your experience, involvement in IS implementation and level of agreement in section C of the questionnaire, question 4 (i) explain your answer and where applicable list other factors that influence the implementation of IS.

- Guide the interviewee in the following aspects: Mutual dependency; trust.
- Let the interviewee state the others.
- Have they influenced the implementation process positively?
- Explain your answer

From your perspective, do you think top management; Subjective norms and facilitating conditions play any role in the IS implementation process?

- Depending on the answers probe for the role(s) played by each.

APPENDIX IV: FULLY IDENTIFIED MODEL AND STATISTIC



Analysis Summary

Date and Time Date: Saturday, January 07, 2012

Time: 2:37:23 PM

Title model3: Saturday, January 07, 2012 02:37 PM

Groups

Group number 1 (Group number 1)

Notes for Group (Group number 1)

The model is recursive.

Sample size = 51

Variable Summary (Group number 1)

Your model contains the following variables (Group number 1)

Observed, endogenous variables

MI.1; MI.2; MI.3; MI.4; MI.5; MI.6; SN.1; SN.2; FC.1; FC.2; FC.3; FC.4; IP.1; IP.2; IP.3; IP.4; IP.5; IP.6; IP.7; IO.1; IO.2.

Unobserved, endogenous variables

IO; IP; MI; SN; FC

Unobserved, exogenous variables

e1; e2; e3; e4; e5; e6; e7; e8; e9; e10; e11; e12; e13; e14; e15; e16; e17; e18; e19; e20; e21

Variable counts (Group number 1)

Number of variables in your model: 47

Number of observed variables: 21

Number of unobserved variables: 26

Number of exogenous variables: 21

Number of endogenous variables: 26

Parameter summary (Group number 1)

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	54	0	0	0	0	54
Labeled	0	0	0	0	0	0
Unlabeled	17	31	21	0	0	69
Total	71	31	21	0	0	123

Models

Default model (Default model)

Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments:	231
Number of distinct parameters to be estimated:	69
Degrees of freedom (231 - 69):	162

Result (Default model)

Minimum was achieved

Chi-square = 214.057

Degrees of freedom = 162

Probability level = .004

Group number 1 (Group number 1 - Default model)

Estimates (Group number 1 - Default model)

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
MI.5	<---	IP.4	1.000				
IP.2	<---	MI.6	.189	.087	2.171	.030	
IP.2	<---	MI.1	.111	.073	1.524	.128	
IP.2	<---	SN.2	.159	.102	1.562	.118	
MI.4	<---	IP.4	.511	.099	5.147	***	
IP.6	<---	IP.2	.269	.087	3.089	.002	
IP.6	<---	SN.2	.220	.082	2.681	.007	
MI.3	<---	MI.5	.303	.128	2.365	.018	
IP.6	<---	MI.5	.255	.071	3.594	***	
FC.4	<---	MI.5	.335	.122	2.755	.006	
IP.5	<---	MI.4	1.000				
FC.3	<---	IP.4	.522	.108	4.840	***	

			Estimate	S.E.	C.R.	P	Label
FC.3	<---	IP.6	.144	.130	1.110	.267	
FC.3	<---	MI.3	.217	.087	2.494	.013	
FC.3	<---	FC.4	.136	.096	1.419	.156	
IP.7	<---	FC.1	.216	.104	2.073	.038	
IP.7	<---	FC.4	.253	.089	2.832	.005	
IP.5	<---	SN.1	.206	.076	2.709	.007	
IO.1	<---	FC.2	.238	.082	2.886	.004	
MI	<---	MI.1	1.000				
MI	<---	MI.2	1.000				
MI	<---	MI.3	1.000				
MI	<---	MI.4	1.000				
MI	<---	MI.5	1.000				
MI	<---	MI.6	1.000				
SN	<---	SN.1	1.000				
SN	<---	SN.2	1.000				
FC	<---	FC.1	1.000				
FC	<---	FC.2	1.000				
FC	<---	FC.3	1.000				
FC	<---	FC.4	1.000				
FC	<---	IP.7	1.000				
FC	<---	IP.3	1.000				
FC	<---	IP.5	1.000				
FC	<---	IO.1	1.000				
FC	<---	IP.4	1.000				
IP	<---	IP.1	1.000				
IP	<---	IP.2	1.000				
IP	<---	IP.3	1.000				
IP	<---	IP.4	1.000				

			Estimate	S.E.	C.R.	P	Label
IP	<---	IP.5	1.000				
IP	<---	IP.6	1.000				
IP	<---	IP.7	1.000				
IP	<---	MI	1.000				
IP	<---	SN	1.000				
IP	<---	FC	1.000				
IP	<---	IO.1	1.000				
IO	<---	IP	1.000				
IO	<---	IO.1	1.000				
IO	<---	IO.2	1.000				

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
MI.5	<---	IP.4	.976
IP.2	<---	MI.6	.245
IP.2	<---	MI.1	.167
IP.2	<---	SN.2	.169
MI.4	<---	IP.4	.430
IP.6	<---	IP.2	.290
IP.6	<---	SN.2	.252
MI.3	<---	MI.5	.284
IP.6	<---	MI.5	.349
FC.4	<---	MI.5	.339
IP.5	<---	MI.4	1.290
FC.3	<---	IP.4	.499
FC.3	<---	IP.6	.104
FC.3	<---	MI.3	.227
FC.3	<---	FC.4	.131
IP.7	<---	FC.1	.224

			Estimate
IP.7	<---	FC.4	.295
IP.5	<---	SN.1	.254
IO.1	<---	FC.2	.306
MI	<---	MI.1	.331
MI	<---	MI.2	.277
MI	<---	MI.3	.299
MI	<---	MI.4	.324
MI	<---	MI.5	.280
MI	<---	MI.6	.286
SN	<---	SN.1	.663
SN	<---	SN.2	.501
FC	<---	FC.1	.187
FC	<---	FC.2	.220
FC	<---	FC.3	.219
FC	<---	FC.4	.212
FC	<---	IP.7	.181
FC	<---	IP.3	.237
FC	<---	IP.5	.192
FC	<---	IO.1	.171
FC	<---	IP.4	.209
IP	<---	IP.1	.075
IP	<---	IP.2	.077
IP	<---	IP.3	.108
IP	<---	IP.4	.096
IP	<---	IP.5	.088
IP	<---	IP.6	.072
IP	<---	IP.7	.083
IP	<---	MI	.350

			Estimate
IP	<---	SN	.164
IP	<---	FC	.458
IP	<---	IO.1	.078
IO	<---	IP	.963
IO	<---	IO.1	.075
IO	<---	IO.2	.076

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
e6	<-->	e16	.461	.241	1.917	.055	
e5	<-->	e16	-.732	.214	-3.419	***	
e7	<-->	e10	.485	.251	1.930	.054	
e10	<-->	e12	.690	.262	2.630	.009	
e7	<-->	e8	1.050	.309	3.402	***	
e9	<-->	e10	.848	.257	3.300	***	
e3	<-->	e1	1.141	.425	2.684	.007	
e3	<-->	e6	.801	.339	2.364	.018	
e3	<-->	e4	-.029	.172	-.168	.866	
e10	<-->	e16	.858	.251	3.426	***	
e9	<-->	e18	.476	.159	2.988	.003	
e11	<-->	e5	.490	.184	2.669	.008	
e17	<-->	e16	.047	.155	.303	.762	
e15	<-->	e14	.918	.262	3.499	***	
e19	<-->	e18	.268	.116	2.319	.020	
e2	<-->	e3	.734	.297	2.468	.014	
e20	<-->	e12	.529	.193	2.746	.006	
e20	<-->	e7	.534	.207	2.580	.010	
e2	<-->	e19	.709	.224	3.164	.002	
e17	<-->	e18	.435	.136	3.189	.001	

			Estimate	S.E.	C.R.	P	Label
e15	<-->	e16	1.010	.285	3.547	***	
e2	<-->	e1	1.193	.364	3.278	.001	
e2	<-->	e6	.650	.270	2.405	.016	
e2	<-->	e15	.473	.218	2.171	.030	
e17	<-->	e4	-2.269	.498	-4.559	***	
e20	<-->	e5	-.306	.138	-2.208	.027	
e11	<-->	e15	.566	.195	2.902	.004	
e19	<-->	e14	.246	.158	1.555	.120	
e2	<-->	e8	-.489	.191	-2.561	.010	
e21	<-->	e20	.730	.205	3.567	***	
e21	<-->	e17	-.247	.140	-1.768	.077	

Correlations: (Group number 1 - Default model)

			Estimate
e6	<-->	e16	.190
e5	<-->	e16	-.383
e7	<-->	e10	.175
e10	<-->	e12	.298
e7	<-->	e8	.465
e9	<-->	e10	.388
e3	<-->	e1	.388
e3	<-->	e6	.315
e3	<-->	e4	-.011
e10	<-->	e16	.353
e9	<-->	e18	.366
e11	<-->	e5	.347
e17	<-->	e16	.018
e15	<-->	e14	.461
e19	<-->	e18	.230

			Estimate
e2	<-->	e3	.298
e20	<-->	e12	.308
e20	<-->	e7	.260
e2	<-->	e19	.375
e17	<-->	e18	.261
e15	<-->	e16	.385
e2	<-->	e1	.419
e2	<-->	e6	.264
e2	<-->	e15	.178
e17	<-->	e4	-.795
e20	<-->	e5	-.205
e11	<-->	e15	.292
e19	<-->	e14	.173
e2	<-->	e8	-.243
e21	<-->	e20	.491
e21	<-->	e17	-.112

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
e1	3.398	.680	5.000	***	
e6	2.544	.504	5.052	***	
e8	1.706	.331	5.158	***	
e16	2.314	.402	5.750	***	
e5	1.578	.307	5.139	***	
e14	1.336	.264	5.053	***	
e3	2.549	.502	5.082	***	
e4	2.662	.532	5.001	***	
e7	2.989	.570	5.243	***	
e9	1.863	.358	5.207	***	

	Estimate	S.E.	C.R.	P	Label
e10	2.557	.468	5.462	***	
e12	2.100	.417	5.039	***	
e18	.908	.172	5.268	***	
e2	2.385	.422	5.650	***	
e11	1.266	.254	4.979	***	
e15	2.969	.530	5.603	***	
e17	3.059	.566	5.405	***	
e19	1.502	.291	5.154	***	
e20	1.406	.256	5.484	***	
e13	1.413	.283	5.000	***	
e21	1.575	.310	5.076	***	

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
IP.4	.000
SN.2	.000
MI.6	.000
MI.1	.000
IP.2	.116
MI.5	.350
IP.6	.303
FC.4	.115
FC.2	.000
FC.1	.000
SN.1	.000
MI.4	.185
MI.3	.080
IO.1	.093
IP.7	.137

	Estimate
IP.5	-.559
IP.3	.000
FC.3	.500
MI.2	.000
IP.1	.000
IO.2	.000

Modification Indices (Group number 1 - Default model)

Covariances: (Group number 1 - Default model)

	M.I.	Par Change

Variances: (Group number 1 - Default model)

	M.I.	Par Change

Regression Weights: (Group number 1 - Default model)

	M.I.	Par Change

Minimization History (Default model)

Iteration		Negative eigenvalues	Condition #	Smallest eigenvalue	Diameter	F	NTries	Ratio
0	e	15		-.391	9999.000	618.213	0	9999.000
1	e*	0	228.300		1.664	273.956	18	1.033
2	e	0	155.961		.414	243.317	4	.000
3	e	0	356.873		.585	229.879	1	.501
4	e	0	302.196		.308	216.865	1	1.207
5	e	0	262.585		.116	214.30	1	1.164

Iteration		Negative eigenvalues	Condition #	Smallest eigenvalue	Diameter	F	NTries	Ratio
						7		
6	e	0	233.799		.030	214.061	1	1.080
7	e	0	232.224		.004	214.057	1	1.014
8	e	0	233.348		.000	214.057	1	1.000

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	69	214.057	162	.004	1.321
Saturated model	231	.000	0		
Independence model	21	675.749	210	.000	3.218

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.538	.732	.618	.513
Saturated model	.000	1.000		
Independence model	.826	.301	.231	.274

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.683	.589	.899	.855	.888
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI

Model	PRATIO	PNFI	PCFI
Default model	.771	.527	.685
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	52.057	18.112	94.099
Saturated model	.000	.000	.000
Independence model	465.749	390.923	548.180

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	4.281	1.041	.362	1.882
Saturated model	.000	.000	.000	.000
Independence model	13.515	9.315	7.818	10.964

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.080	.047	.108	.063
Independence model	.211	.193	.228	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	352.057	460.486	485.353	554.353
Saturated model	462.000	825.000	908.252	1139.252
Independence model	717.749	750.749	758.317	779.317

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	7.041	6.362	7.882	9.210
Saturated model	9.240	9.240	9.240	16.500
Independence model	14.355	12.858	16.004	15.015

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	46	49
Independence model	19	20

Execution time summary

Minimization: .187

Miscellaneous: .343

Bootstrap: .000

Total: .530

APPENDIX V: SECOND ORDER MODEL STATISTIC

Analysis Summary

Date and Time

Date: Sunday, February 05, 2012

Time: 7:35:27 AM

Title

Second order model: Sunday, February 05, 2012 7:35 AM

Notes for Group (Group number 1)

The model is recursive.

Sample size = 51

Variable Summary (Group number 1)

<u>Your model contains the following variables (Group number 1)</u>

Observed, endogenous variables

MNG; SubNorm; FacCond; ImpOut; ImpProc

Unobserved, endogenous variables

IC

Unobserved, exogenous variables

e1; e3; e4; e5; e2

Variable counts (Group number 1)

Number of variables in your model: 11

Number of observed variables: 5

Number of unobserved variables: 6

Number of exogenous variables: 5

Number of endogenous variables: 6

Parameter summary (Group number 1)

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	13	0	0	0	0	13
Labeled	0	0	0	0	0	0
Unlabeled	0	7	5	0	0	12
Total	13	7	5	0	0	25

Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments: 15

Number of distinct parameters to be estimated: 12

Degrees of freedom (15 - 12): 3

Result (Default model)

Minimum was achieved

Chi-square = 7.323

Degrees of freedom = 3

Probability level = .062

Estimates (Group number 1 - Default model)

Scalar Estimates (Group number 1 - Default model)

Maximum Likelihood Estimates

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
ImpProc	<---	ImpOut	1.000				
FacCond	<---	ImpOut	1.000				
FacCond	<---	ImpProc	1.000				
MNG	<---	FacCond	1.000				
IC	<---	MNG	1.000				
IC	<---	SubNorm	1.000				
IC	<---	FacCond	1.000				
IC	<---	ImpOut	1.000				

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate
ImpProc	<---	ImpOut	.837
FacCond	<---	ImpOut	.803
FacCond	<---	ImpProc	.959
MNG	<---	FacCond	1.059

			Estimate
IC	<---	MNG	.355
IC	<---	SubNorm	.389
IC	<---	FacCond	.376
IC	<---	ImpOut	.302

Covariances: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
e4	<-->	e5	-.563	.154	-3.657	***	
e3	<-->	e5	-.943	.217	-4.354	***	
e2	<-->	e4	.847	.257	3.304	***	
e1	<-->	e2	-.079	.186	-.423	.673	
e2	<-->	e5	-.156	.138	-1.132	.258	
e1	<-->	e4	-.152	.166	-.911	.362	
e1	<-->	e3	-.528	.180	-2.935	.003	

Correlations: (Group number 1 - Default model)

			Estimate
e4	<-->	e5	-.451
e3	<-->	e5	-.663
e2	<-->	e4	.528
e1	<-->	e2	-.056
e2	<-->	e5	-.121
e1	<-->	e4	-.112
e1	<-->	e3	-.341

Variances: (Group number 1 - Default model)

	Estimate	S.E.	C.R.	P	Label
e5	1.001	.178	5.616	***	
e4	1.553	.310	5.013	***	
e3	2.020	.381	5.294	***	
e1	1.191	.238	5.008	***	

	Estimate	S.E.	C.R.	P	Label
e2	1.659	.332	5.000	***	

Squared Multiple Correlations: (Group number 1 - Default model)

	Estimate
ImpOut	.000
ImpProc	-.087
FacCond	-.302
SubNorm	.000
MNG	.138

Modification Indices (Group number 1 - Default model)

Covariances: (Group number 1 - Default model)

	M.I.	Par Change

Variances: (Group number 1 - Default model)

	M.I.	Par Change

Regression Weights: (Group number 1 - Default model)

	M.I.	Par Change

Minimization History (Default model)

Iteration		Negative eigenvalues	Condition #	Smallest eigenvalue	Diameter	F	NTries	Ratio
0	e	2		-.371	9999.000	117.444	0	9999.000
1	e*	1		-1.302	.599	46.811	17	1.129
2	e	0	46.247		.160	25.335	6	.935
3	e	0	94.230		.226	15.539	3	.000
4	e	0	187.559		.384	8.646	1	1.197
5	e	0	286.989		.254	7.399	1	1.137

Iteration		Negative eigenvalues	Condition #	Smallest eigenvalue	Diameter	F	NTries	Ratio
6	e	0	337.340		.083	7.324	1	1.052
7	e	0	347.751		.008	7.323	1	1.006
8	e	0	347.840		.000	7.323	1	1.000

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	12	7.323	3	.062	2.441
Saturated model	15	.000	0		
Independence model	5	86.020	10	.000	8.602

RMR, GFI

Model	RMR	GFI	AGFI	PGFI
Default model	.119	.948	.742	.190
Saturated model	.000	1.000		
Independence model	.479	.568	.352	.379

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.915	.716	.948	.810	.943
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.300	.274	.283
Saturated model	.000	.000	.000

Model	PRATIO	PNFI	PCFI
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	4.323	.000	16.367
Saturated model	.000	.000	.000
Independence model	76.020	50.057	109.457

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.146	.086	.000	.327
Saturated model	.000	.000	.000	.000
Independence model	1.720	1.520	1.001	2.189

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.170	.000	.330	.089
Independence model	.390	.316	.468	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	31.323	34.596	54.505	66.505
Saturated model	30.000	34.091	58.977	73.977
Independence model	96.020	97.384	105.680	110.680

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.626	.540	.867	.692
Saturated model	.600	.600	.600	.682
Independence model	1.920	1.401	2.589	1.948

HOELTER

Model	HOELTER .05	HOELTER .01
Default model	54	78
Independence model	11	14

Execution time summary

Minimization: .016

Miscellaneous: .297

Bootstrap: .000

Total: .313

APPENDIX VI: CORRELATION DATA

MI and IP

		MI	IP
MI	Pearson Correlation	1	.552(**)
	Sig. (2-tailed)	.	.000
	N	51	51
IP	Pearson Correlation	.552(**)	1
	Sig. (2-tailed)	.000	.
	N	51	51

** Correlation is significant at the 0.01 level (2-tailed).

SN and IP

		IP	SN
IP	Pearson Correlation	1	.459(**)
	Sig. (2-tailed)	.	.001
	N	51	51
SN	Pearson Correlation	.459(**)	1
	Sig. (2-tailed)	.001	.
	N	51	51

** Correlation is significant at the 0.01 level (2-tailed).

FC and IP

		IP	FC
IP	Pearson Correlation	1	.683(**)
	Sig. (2-tailed)	.	.000
	N	51	51
FC	Pearson Correlation	.683(**)	1
	Sig. (2-tailed)	.000	.
	N	51	51

** Correlation is significant at the 0.01 level (2-tailed).

IP and IO

		IP	IO
IP	Pearson Correlation	1	.328(*)
	Sig. (2-tailed)	.	.019
	N	51	51
IO	Pearson Correlation	.328(*)	1
	Sig. (2-tailed)	.019	.
	N	51	51

* Correlation is significant at the 0.05 level (2-tailed).

IC and IO

		IC	IO
IC	Pearson Correlation	1	.303(*)
	Sig. (2-tailed)	.	.031
	N	51	51
IO	Pearson Correlation	.303(*)	1
	Sig. (2-tailed)	.031	.
	N	51	51

* Correlation is significant at the 0.05 level (2-tailed).