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ADDIS ABABA UNIVERSITY
SCHOOL OF INFORMATION SCIENCE
MASTER OF SCIENCE IN INFORMATION SCIENCE

**Information System Adoption in Ethiopian Public Organizations:
A Theoretical Model**

By

Girmanesh Araya

September 2015

Addis Ababa, Ethiopia

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**A thesis submitted to the school of graduate studies of Addis
Ababa University in partial fulfillment of the requirements for the
degree of Master of Science in information science**

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ABSTRACT

In today's digital age information system (IS) is regarded as critical in enhancing the productivity and competitiveness of an organization. But the benefit of the technology can only be realized not only if IS is widely used but also if the overall implementation is successful. Hence, it is essential to understand the factors of successful IS adoption and implementation in organization. However, there is very limited number of local literatures on IS adoption and implementation models at the organizational level. In general, the aim of this research is identifying different factors that affect IS adoption in Ethiopian organizations and construct a theoretical model for successful IS adoption.

To meet the purpose of this study a quantitative and qualitative approach is used with questionnaire and interview as its primary research methodology. Accordingly, data were collected from five Ethiopian governmental organizations. The study utilized a modified constructs of DOI, TAM and TOE model to investigate IS adoption in an organization. Moreover, this study outlines the details of each construct and its relevance toward the research issue. The quantitative data analysis indicates that a statistically significant relationship exists between compatibility and complexity of DOI model with PEOU of TAM model and PEOU, PU with ATU of an IS. In addition, the user involvement in a specific IS implementation and his or her ATU of that system is tested. The qualitative data analysis result show that top management support, organizational readiness and competitive advantage have a positive influence on IS adoption, while organizational size have no effect.

The outcome of this study has important implications for the IS adoption studies, organizational adoption decision makers and system developers. The theoretical model that this study proposed can prove to be a useful tool when making IS adoption since informed decisions could decrease the risk of poor technology choices. This study can help organization IS adoption decision makers in planning, evaluating and implementing IS. Moreover, the theoretical model can help system developers determine and improve the adoption potential of their customer so that to improve the likelihood of adoption.

Keywords

Information system (IS), organizational IS innovation adoption, technology adoption model

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LIST OF ACRONYMS

ATU	Attitude towards usage
DOI	Diffusion of innovation
CASE	Computer-aided software engineering
ECSU	Ethiopian civil service University
EICTDA	Ethiopian information communication technology development agency
ICT	Information communication technology
IDT	Innovation Diffusion theory
IS	Information system
IT	Information technology
MCIT	Ministry of communication and information technology
PEOU	Perceived ease of use
PU	Perceived usefulness
SDLC	System development life cycle
SPSS	Statistical Package for the Social Sciences
SCT	Social Cognitive Theory
TAM	Technology acceptance model
TOE	Technology organization environment
TPB	Theory of planned behavior
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Many organizations specifically Ethiopian public organizations are using information technology (IT) to bring organizational change that is needed to achieve their goals and objectives. In different organizations, it is difficult to find two IS innovation, adoption and implementation process that are the same. This is partly because every IS project or implementation carried out by an organization is unique with its own unique set of objectives and challenges. So, due to complex nature of implementation activities and challenges associated with IS like restriction or constraints of budget, time and user requirement, every IS is unique. This fact shows the IS innovation, adoption and implementation process in different organizations or in an organization implemented for different purpose, is not the same and should not be the same since the requirement of every organization and every project differs. However, for the success of a specific IS implementation the basic framework towards innovating, adopting and implementing IS should be coherent so as to get the intended benefit and reduce failure. [1]

An IS study [3] stated like any other organizational activities, IS is part of a wider super-system of an organization and are also influenced by both internal and external forces in a super system. The external forces like government regulations, environmental forces, society, financial markets, labor markets, technology, customer influence, stakeholders are very dynamic and inconsistent. This dynamics is also seen in the organization's internal attributes like changes in operating processes, management, resources allocation and professional skills. Hence, for IS to be successful in this mix of dynamic factors a lot is required from IS implementation, which includes the IS adoption process.

As depicted by Mustonen-Ollila et al. [4] innovation is generally considered to be one of the key drivers of organizational success and organizations implement IS with the intention to improve performance and productivity. The significance of innovation for an organization is also stated in marketing research [5] by recognizing innovation as factor for an organization to be market-driven. Rogers and Lytinen [6, 7] define adoption as the decision of any individual or

organization to use an IS innovation. These researchers refer to adoption of IS as a “slow process that involve a sequence of implementation stages”. The researchers refer IS adoption as a slow process since the adoption is not going in a pace that it should be. The innovation and adoption of IS by individuals and organizations is part of the process of IS implementation. This implies the IS innovation, adoption and implementation are in a spectrum and the success of one plays major role in the success of the other. Talukder et al. [8] argue, the whole process of IS implementation is a process of organizational change. Hence, information system implementation can be expressed as the change in organization’s operation motivated by IS towards success.

In this research five Ethiopian governmental organizations are considered for the study. All of the organizations are under the support of MCIT directly or indirectly for IS implementation. So, preliminary this research chooses MCIT because as stated in MCIT’s organizational template [9] MCIT is the only Ethiopian organization with a vision of “every aspect of Ethiopians life to be ICT assisted”. To meet its vision the organization has operational rules with list of authorities and duties. The duties of the organization include but not limited to supporting the creation of institutional capacity and promoting the expansion of communication for the effective implementation of IS.

MCIT has five directorates which are E-government directorate, communication and IT capacity building directorate, communication and IT standardization and regulation directorate, telecommunication and postal development coordination office and private information communication technology (ICT) sector development directorate. Especially E-government directorate has number of initiatives to improve the internal efficiencies within the governmental organizations and to improve the access of governmental services. Accordingly, MCIT has deployed and implemented more than ten applications and services for different governmental organizations for example Unified billing system, governmental portal, tourism portal, online trade registration and licensing system, online exam registration and student placement system, integrated transport management information system. Among the organizations Ethiopian Broadcasting authority, Ethiopian Civil Service University, Ethiopian commodity exchange, Ethiopian Management, Institute and Ethiopian Telecommunications are selected for this study.

Previously, many researchers have focused on the concept of Information technology adoption. In this study, Various models and theories such as the Diffusion of Innovation theory (DOI) by Rogers [6], the Technology Acceptance Model (TAM) by Davis [10], and the Technology Organization Environment framework (TOE) by Tornatzky [11], have been examined to identify factors that drive IS adoption in organizations.

Hameed et al. and Lee et al. [12, 13] agree that the IS has positive impacts on organization's productivity, competitiveness, efficiency and effectiveness. The study of IS adoption in an organizational context is important to guide successful organizational IS adoption and improve productivity. The central focus of this research is on IS adoption by organizations and identifying the factors that have been found to influence organizational IS adoption process. The research proposes to address the issues of IS adoption and implementation by contributing a theoretical model towards the issues. In regard to IS, the study recognizes the difference in IT, IS and ICT but the objective of the research is in analyzing the innovation, adoption and implementation process of any automated information technology based practices. Hence, the study uses the term IS to any automated technological practice or projects unless where some other researchers are being quoted.

1.2. Statement of the Problem

Information system (IS) has the power to connect communities, share information and support economical development. Over the past few years, Ethiopia has taken encouraging steps in expanding the use of IS. According to MCIT [9] the Ethiopian Government has made the development of information and communications technology (ICT) one of its strategic priorities. MCIT states that “the endorsed and currently enforced IS policy is a demonstration of its commitment to the development of IS both as an industry and as an enabler of socio-economic transformation”. According to MCIT the policy is the result of governmental recognition of ICT as the key driver for transforming Ethiopia's agriculture based economy to information and knowledge based economy. The ICT sector in Ethiopia is shaped by sector regulation that was approved in 1996 to create a single national operator. The national ICT policy that governs the ICT sector was drafted in 2005. According to the MCIT website [14] in 2003, the government established the Ethiopian ICT Development Agency (EICTDA) with a mandate to support IT applications and capacity building within the government. The MCIT organizational mandate [9]

states that in an effort to implement the ICT policy, the government has launched a series of high profile projects. Various government institutions also launched several applications including a national web portal. But according to the 2013 International Telecommunication Unions' ICT Development Index [15] Ethiopia is still behind, ranking 162 out of 166 countries.

Since IS has significant role in organizations success, an organization has to pay more attention to technology innovation and implementation to gain a business advantage. To get an overall business advantage an organization may invest on different kind of technology, But the adopted technology is only beneficial if it's being utilized by its intended users and if it can provide its intended use. This is why it is important for IS research to identify the factors that influence technology usage and successful IS implementation process. In this regard, Venkatesh and Sichel [16, 17] agree that implementing a technology that is not accepted and willingly used by staffs can cause wastage of valuable organizational resources. Sichel [17] refers to this as "productivity paradox" which can be described as low usage of information systems that can cause low returns from organizational investment. Generally, investing a large amount of organizational resource on poor investment decisions can result in poor return on investment. This effect can boldly be seen on technology investments since technology require big investment. Simply acquiring or adopting a technology is not sufficient; in order to gain the intended benefits, IS must be deployed and used appropriately by the organization. For an IS implementation to be successful the adoption and general implementation process must be successful [1]. In many Ethiopian organizations there is no clear guideline for adopting and implementing IS. The existing guideline that most organization follows is under the influence of the traditional way of launching projects which has many down side especially for IS implementation [2].

Information system studies [8, 18] showed that understanding different factors that influence IS implementation in the organizational context is essential. There are studies that explore adoption procedure to implement successful IS practices. However, most of these studies [20, 21] are concerned with specific innovation or adoption factors and fail to include the overall implementation process. In addition, most researchers concerned with using only one specific innovation adoption model with a specific attribute. Sargent and Lee [18, 22] focus only on a specific organization and fail to include different organizations behavior and the effect of

different organizations behavior towards IS. Talukder et al. [8] focus on IS innovation, adoption and implementation on individual basis not on organizational basis, by focusing on individual behavior and neglecting organizational characteristics. Moreover, the studies neglect to include the effect of user involvement in the IS implementation towards IS adoption. Most importantly, organizational IS innovation and adoption researches [2] done on Ethiopian organizations focus on a specific organizational sectors and a specific type of IS and fail to address innovation, adoption and implementation of different type of IS in different type of organizations. Generally, the IS adoption researchers fail to include different technological, organizational and environmental attributes, different adoption models and different type of organizations. Failure to include the major organizational IS adoption factors, different adoption models, different type of organizations and effect of user involvement in IS implementation cause the studies to be limited in providing an overall IS adoption factors and implementation process.

The theoretical assumption of this research in general depicts the absence of an overall organizational IS adoption and implementation process as one of the major reasons for IS implementation failure. To this end, this study attempts to answer the following research questions:

- What are the major factors that affect successful IS adoption in the organizations.
- Does a relationship exist between different attributes of existing IS adoption model and successful adoption of IS.
- How can the factors can be categorized and arranged to create successful IS adoption process.

1.3. Objective of the Study

1.3.1 General Objective

The general objective of this research is identifying technological, organizational and environmental factors that affect organizational IS adoption and construct a theoretical model for successful IS adoption.

1.3.2 Specific Objectives

To achieve the general objective of the study the following specific objectives are identified as follows:

- To identify the technological, organizational and environmental IS adoption and implementation factors in the organizations selected for this study.
- To identify existing gaps and relationship of IS adoption models.
- To determine the relative importance of technological, organizational and environmental attributes on successful IS adoption.
- To investigate IS adoptions issues and propose a new theoretical model towards the issues.
- To rearrange the factors and attributes that determine IS adoption success and construct a theoretical model accordingly.
- To draw conclusions and forward recommendations for further study.

1.4. Scope and limitation

This study is intended to address the issue of organizational IS adoption and implementation process and contributes a theoretical model towards the issues. The study mainly uses the combination of three Innovation adoption models which are DOI, TAM and TOE with selected attribute from each model. This research is limited to the IS innovation, adoption and implementation in five Ethiopian governmental organizations that are under the support of MCIT. To get the wider perspective and variety of IS practices different organizations and different type of IS practices are included. But due to time constraints, the researcher limited the scope of the study to include only five Ethiopian governmental organizations.

1.5. Significance of the Study

The nature of the relationship between organizations IS adoption and implementation process and the IS success can bring significant cause and effect result. This study is believed to benefit researchers and practitioners by providing researchers a better understanding of IS adoption implementation in organization. The main purpose of this research project is to investigate the current IS adoption and implementation in Ethiopian organization and lay the

foundation towards a theoretical model for creating a successful IS adoption and implementation process. The theoretical model will contain the reasons for IS implementation failure, the factors of successful IS adoption in an organization and the responsibilities of the adoption decision makers in creating the success. The theoretical model could be used as a basis for defining, creating and delivering an overall process to adopt and implement successful IS in an organization and reduce risk of failure.

1.6. Organization of the Study

This study is organized into five chapters. The first chapter is about the background of the study, statement of the problem, objective of the study and scope and limitation of the study. The second chapter presents review of related literatures to IS adoption and discuss related works in that area. The third chapter discusses the methodologies and procedures followed for the data collection, analysis and interpretations. This chapter also presents the possible model that are important for IS adoption and implementation in organization. The fourth chapter presents the data analysis, study findings, presentation and discussion of the results. The fifth chapter brings to an end of this research with conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1. Overview

Chrisanthi [3] in her literature of identifying what sort of science an information system is, states the academic field of IS originated from applied computer science studies which aimed at automating data processing in organizations. Since then studies in IS field broadened in scope to study the effect of technology in organization and organizations effort to include technology in their operation. Several studies [26, 27] have found Knowledge and IS to be important in today's business activities. The researchers agreed, during the "information age", organizations have come to recognize that the importance of IS. In today's digital age recognizing the importance of IS as an organizational asset become necessity since it is difficult to imagine a business that does not in some way rely on IS. Christiani and Lee [3, 28] stated that technology not only provides information processing mechanism for organizations but technology also change the basic way of how an organization operate. This implies an IS is not only automating the organizational operational process but also changing the very base of the operation itself.

When the usefulness of IS get recognized by an organization it is more likely that IS will be included into an organizational strategic plan. To meet the IS strategic plan and the organizational strategic plan in general, it is important that organizations have a well thought procedure for the IS implementation. Apparently, there is no one definite source of IS implementation failure or success since organizations have limited knowledge of what contributes to the success or failure of IS practices. Although IS industries are capable of building systems, they often have difficulties building systems that meet end users needs and does not always deliver what business expects of them. In literature [26] this is referred to as the "IS/business gap" or the "expectation gap". According to business and information system researcher organizational leaders started expressing doubts about the benefits their organizations are getting from huge investments in IS. In general, to get the full benefit of IS and the success factors of a satisfactory system, one has to have a successful organizational IS practice starting from the initiation to the overall implementation.

2.2. Information system Innovation

Tornatzky and Prescott [11, 29] found that several organizational, technological and environmental factors affect the innovation of IS. However, empirical research on IS process innovations is still lacking which implies practitioners still know little about the exact factors that influence IS innovation. Failure to address these factors leads to wasted investments and failed implementation process in an organization. Fitzgerald [30] states “despite huge investments in system development methods and tools, some IS innovations are not widely used”. In organizations a specific IS has to facilitate the organizational work operation and meet its intended use. And for the IS to be useful the adoption and implementation process should be organized and planned.

Swanson [31] define IS innovation as “any new way of developing, implementing and maintaining IS in an organizational context”. IS innovations are expected to improve the quality and productivity of an IS. The IS from technical point of view can be defined as, collection of hardware and software capable of information storage, processing and communication that can serve some organizational functions. But IS innovations is not only technological changes like the use of new application or computerized systems, it is also organizational or administrative changes like new project management methods, communication mode, or new forms of organizational work operation. In Swanson’s [31] terminology “IS innovations cover technological process innovations and administrative process innovation”. In many situations the administrative change is not recognized and misunderstood as only technological change. Generally, IS innovation is not only about the “how” to do an operation but also “what” operation to do in organization. Thus, Basic attributes of IS innovation can be technological innovation changes like new computing platform and organizational operational identification of how to effectively use the new technological innovation.

IS innovation according to Mustonen-Ollila et al. [4], can be classified into four categories based on their scope and purposes. The four categories can be classified in to two depending on the content of the innovation being technological or administrative. Administrative innovation includes two innovations which are project management and control procedures and description methods. Innovations with technological contents include development tools and baseline technology innovations. The first category includes rules and administrative procedures

that help control, manage and co-ordinate development activities. Project management and control procedures innovation may include project management guidelines or organizational arrangements. Description methods Innovations include standardized modeling techniques like Data Flow Diagrams, methodologies like Unified Modeling Method and process modeling approaches like Capability Maturity Model. The third innovation category which is development tools include all productivity tools for systems development like CASE tools, documentation tools, data dictionaries, software configuration tools. The last category which is baseline technology consists of programming languages and database management systems. Based on an empirical analysis presented by Friedman [1], the more recent IS are more inclusive of the technological and administrative type of innovation rather than the older IS. This is because of the changes in the type of system being developed and the changes in type of user throughout the years.

2.2.1. IS Innovation Process

For IS to be successful in reaching out the organizations goal and its intended use, the organization should have a clear and successful IS innovation, adoption and implementation process. So before going through what an organization IS innovation process should look like one has to understand what IS innovation in an organization means. According to Zaltman [32] there are two general phases of the innovation process which are the initiation and implementation phases. This implies the innovation process require some sort of adoption process that bring the initiation to an implementation phase.

Organizational innovation process involves different organizational resources and goal. The innovator or the innovation decision maker has to set the objective and different organizational attributes that can influence the innovation. The evaluation of innovation in organization should take into consideration the users' requirement and overall value of the innovation to the organization. For IS innovation process in organizational context Thomas et al. [33] proposed a five step framework. The steps include identifying organizational operation, identifying change enablers, developing a business vision and objectives, understanding and measuring existing processes and designing a prototype. The five stages mainly focus on operational change that the IS bring to the organization. Different studies [4, 33] suggest IS innovation should become a key determinant of how business is conducted by including IS in the

strategic planning and encouraging management involvement in the innovation process to archive the desired result.

2.3. IS Adoption

An IS adoption is a decision to use an IS innovation. Adoptions are made by decision makers, who have resources and the decision rights to use resources and change operational practices. Roger [35] defined adoption as “Making full use of a new idea as the best course of action available”. Marketing studies [5] shows innovation research began as market research with the objective of identifying factors that can make people to buy more products. In relation to this, Rogers [6] define pro-innovation bias as a “tendency to assume that adoption of the innovation should be carried out by all possible adopters”. In his other work Rogers [36] states IS adoption decision making process goes through five steps. The first one is knowledge, which is explained as possessing enough information about innovation to decide to go to the next step which is persuasion. In Persuasion step, users form an attitude toward the innovation and the easiness or difficulty of adopting it. Then on the third step which is termed as “decision”, users decide to adopt or reject. The fourth and the fifth steps are implementation of the technology then confirmation of the decision. Other literatures [37] use different terms to explain the five stages of adoption decision making process which are Awareness, Assessment, Acceptance, Learning and usage. Even though the terms vary the meaning and the process behind each stage is the same as explained by the previous researchers.

2.4. IS Adoption Model

Many researchers developed different models of technology innovation adoption. The most well-known and mostly researched frameworks are diffusion of innovation (DOI), Technology acceptance model TAM and technology organization environment (TOE). Roger [6] first developed DOI 1962, which is a well-known and widely cited model among technology adoption researchers. The model was further revised in 1972, 1995 and 2003 with a central point of individual adoption. The second popular technology adoption model is TAM, which was developed by Davis [10] in 1989 for users’ acceptance of information technology. TAM derived from TRA and has extension like TAM 2 and TAM 3. TAM measures users’ technology acceptance in terms of perceived ease of use, perceived usefulness of an IS. TAM 2 and TAM 3

consider social and organizational issues in addition to the TAM's technology acceptance measures. As explained by Venkatesh [38], who proposed TAM3, recognizing organizational issues like the effect of managers of an organization on adoption decision making can increase the acceptance and effectiveness of an IS. TOE model by Tornatzky and Fleisher [11] in 1990, considers three factors which are technological, organizational and environment attributes. Out of the three models TOE model considered organization adoption even though it has limited variables to measure the users' perception on the IS. Hence, this study focused on the DOI, TAM and TOE IS adoption models to select the most influential individual and organizational adoption factors. Accordingly, next paragraphs explain DOI, TAM and TOE model which are chosen for this study since the three adoption models are well researched, proved and used extensively by related research works.

2.4.1. Diffusion of Innovation

The IS adoption theory set by Rogers [6] states DOI is a theory that explains how technological innovations are taken by individuals in a population. An innovation is an idea, process or object that can bring a new component in the existing situation. Rogers define Diffusion as “the process by which an innovation is communicated thorough certain channels over time among the members of a social system”. According to this theory, there are different elements that influence the spread of IS innovation: the innovation, type of decision, communication channels, time and social system. for the innovation part DOI identifies five qualities or characteristics that determine adoption of new IS these are, relative advantage, compatibility with existing values and practices, simplicity and ease of use, trial-ability and observable result.

Innovation

The first component of DOI model is innovation, under innovation the DOI model defines five innovation characteristics that determine an innovation's likelihood of adoption. In past literatures specifically marketing studies [5], the influence of characteristics of people towards adopting an innovation has been studied by identifying different adopter's categories. But the characteristic of innovation has been neglected until Rogers [6] work. The reason to study the innovation characteristics is some technological innovation spread in much rate that the other. So,

identifying the characteristics of innovation is significant for it to be adopted successfully. The five innovation characteristics identified by Roger are relative-advantage, compatibility, complexity, observe-ability, and trial-ability. After Roger's the five innovation characteristics of have been used by a variety of adoption studies. The studies [20, 22] had shown the influence of the innovation characteristics on adoption by measuring the potential adopters' view of innovations using the specified characteristics. This shows that the five innovation characteristics are key components in the IS adoption study. Accordingly, this study mainly focuses on the innovation element of DOI model and the characteristics are explained below:

1. Relative advantage

Relative advantage is the characteristics of innovation, where IS adopter perceive an innovation as better or advantageous than the previous one. Relative advantage indicates the benefits and the costs resulting from adoption of an innovation. Since the needs and requirement of different users differ, there are no definite set of constitutes that make up "relative advantage". However, depending on a set of needs and requirements of an organization relative advantageousness of an IS can be expressed in terms of supportiveness in productivity, lower cost, efficiency and effectiveness. The greater the perceived relative advantage of an innovation, the more the innovation is likely to be adopted. Various recent researchers [20, 22] found relative advantage to have a positive impact on the successful IS adoption.

2. Compatibility

According to Rogers [36] compatibility of IS innovation is the tendency of an innovation to be consistent with the organizational values, past experiences, and needs of IS adopters. As Nancy and Huassain [20, 22] findings show an IS innovation that is incompatible with an organizational values, norms or practices will not be adopted as rapidly as an innovation that is compatible. For an adopter, be it individual or an organization the values, needs and requirements has to be known to be able to measure the compatibility of the IS innovation. Accordingly, IS innovation should align with the cultural value of an organization, the existing IS or operation and the current need and requirement of an organization.

3. Simplicity

This is the degree to which an innovation is perceived as difficult to understand and use. New IS innovation that are simpler to understand are adopted more quickly than innovation that are perceived as complex by the adopter. This is because complex IS innovations require the adopter to develop new skills and understandings. In this regard the researchers [20, 22] findings shows complexity of an IS has negative influence on the adoption rate. In addition the studies found more technical users in an organizational context have the tendency to be interested in a complex technology.

4. Trial-ability

This is the ability of IS innovation to be experimented and tried out by its adopters before deciding to adopt. Trial-ability help the adopters to make sure the IS fulfils their requirement and to be familiar with how it works. Further, in the process of evaluating the system the adopters may add more requirement since most adopters does not specify their requirement clearly. An innovation that is trial-able represents less risk to the individual who is considering it. The need to try out an IS can be influenced by time, that is how quickly the adopter want to apply the system and type of adopters, that is the adopters familiarity and previous knowledge on the IS. Generally, the empirical research [20, 22] done on DOI model shows positive relationship between trial-ability and IS adoption.

5. Observable results:

An innovation with easily visible result is more likely to be adopted. If people can easily see the results of an innovation they can easily discuss and inform about the benefit of the innovation with others which makes bring agreement on adoption of the innovation. Rogers [36] explains the effect of observe-ability using mobile phone, since mobile phone use was very observable in public places it helped adopters recognizing the benefit.

Type of Innovation Decision

Next to innovation another element included in DOI's model as a factor in IS adoption is type of decision. The type of the innovation adoption decision as stated by Rogers [36] can be optional, collective or authority depending on the number, willingness and responsibility

of people involved in the decision making process. The DOI model developer argued that organizational IS adoption is slower than individual adoption because the number adoption decision makers in organization level are higher than individual level. This shows the fewer the number of adoption decision makers, the faster the adoption process.

Communication

The third element in DOI model is Communication, as researchers [39] that study the effect of communication channels on the diffusion of innovation stated communication is information sharing to understand one another. A communication channel is the means by which messages get from one individual to another. The communication channels can be classified in to two as Mass media channels and interpersonal channel. Nilakanta et al. [39] found that mass media channels are more effective in creating knowledge about innovations, whereas interpersonal channels are more effective in creating attitudes toward the innovation. Accordingly, interpersonal channel have more power in influencing the decision to adopt or reject IS innovation. As depicted by the researches [35, 39] this is because, “most individuals evaluate an innovation, not on the basis of scientific research but through the subjective evaluations of near-peers who have adopted the innovation”. Moreover, the researchers found that the type of communication channels and the character of the innovation have relationship. The less complex the innovation is the more the mass media communication is satisfactory but if the innovation is complex interpersonal communication channel have been found to be more important.

Time

The other element of DOI model which is time, time have significant influence on peoples decision making. An individual passes different stages when making adoption decision. Rogers [36] termed these steps as knowledge, persuasion, implementation and confirmation. The five stages explains a person becoming aware of an innovation, creating attitude towards the innovation, making decision, using the innovation and evaluating the innovation. The second way in which time is involved in adoption is in the time an individual takes to adopt an innovation than another individual. The diffusion scholars [36, 40] believe any population or social network can be divided into five classifications depending on the time they

took to adopt an innovation. The five categories are innovators, early adopters, early majority, late majority and laggards. While the innovators are the people that make quick decision to adopt an innovation the last people in the last category which are laggards are very skeptical to adopt. Generally, time can be one factor in influencing adoption rate depending on the time an individual take to make decision and the timely available information.

Social System

Social system is another element in DOI model, in Rogers [36] word a social system is “set of interrelated units that are engaged in joint problem solving to accomplish a common goal”. The members of a social system can be individuals, informal groups, organizations and subsystems. Studies [8, 40] done on social system as a factor on the adoption process found social structure, norm and managements' opinion to be influential on the adoption decision making.

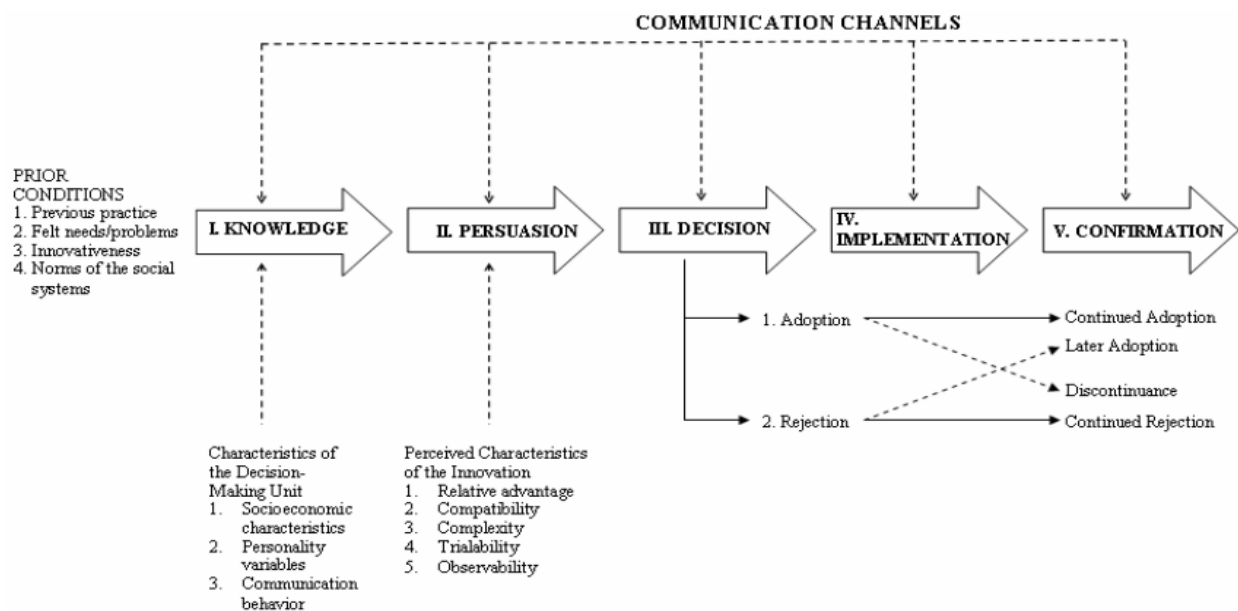


Figure 2.1 DOI innovation adoption decision model (adapted from [40])

2.4.2. Technology Acceptance Model

Another popular innovation adoption model is technology acceptance model (TAM) developed by Davis [10] in 1989. TAM is technology acceptance model that measures people perception towards using the technology. To measure user’s perception towards the technology

TAM use three main factors which are perceived ease of use, perceived usefulness and attitude towards using the system. The two most important component of TAM are perceived usefulness (PU) and perceived ease of use (PEOU), Perceived usefulness in relation to IS was defined by Davis as “the degree to which a person believes that using a particular system would enhance his or her job performance”. And perceived ease of use is defined as “the degree to which a person believes that using a particular system would be free from efforts”.

TAM is derived from TRA and has extension like TAM 3 which includes organizational factors and social influences on perceived usefulness and IS usage intentions. TAM first developed because there was a concern that users were not using the IT developed for them. The idea was by increasing the acceptance of a technology user’s satisfaction or usage will increase. Accordingly TAM adapted TRA, since TRA was used for understanding variety of behaviors in different aspects TAM revised it in accordance with IS usage by identifying the appropriate variables. Both TAM and TRA use user perception of the IS to determine peoples attitude toward using the IS, and the positive attitude towards using the IS will lead to actual system use which increase adoption of IS. The major difference between TAM and TRA is TAM reduces many of TRA perception measures with only two measures which are perceived ease of use and perceived usefulness. Moreover, TAM is more applicable to IS than TRA since it was specifically designed for technology acceptance measurement. Other than TRA there are many technology acceptance models that have been developed, including Theory of Planned Behavior (TPB), Innovation Diffusion Theory (IDT), and the Social Cognitive Theory (SCT). However, studies [41, 42] showed that the TAM is a better model than the others. In addition to this, Rogers and Venkatesh [16, 38] create extension of TAM like TAM2 and TAM3 by adding social factors, subjective norm and organizational factors to TAM attributes. Moreover, recent modification on TAM resulted in Unified Theory of Acceptance and Use of Technology (UTAUT) which in cooperate PEOU and social norm into different measurement types like performance, effort and social. Out of all types of technology acceptance models TAM is used for this study since TAM, is the most popular and proven model and the focus of this study in accordance with measuring technology acceptance is PEOU, PU and ATU.

Hu et al. [41] suggested that many factors influence initial acceptance of technology, but fundamental determinants like perceived ease of use and perceived usefulness play a

greater role in continued acceptance. TAM specifies PU, PEOU and attitude towards usage (ATU) as main factors for IS usage and acceptance. Davis [10] defined PU “the degree to which a person believes that using a particular system would enhance his or her performance”. He refers PEOU as “the degree to which a person believes that using a particular system would be free of effort”. ATU refers to the degree to which an individual evaluates and associates the target system with his or her job. Attitude towards usage has been identified as a factor that guides user’s decision of usage. In TAM, attitude towards usage is referred to as the measurement of positive or negative attitude of individuals in deciding to use the IS. PU, PEOU and ATU represent attributes of the systems such as overall design and features of the system, the user’s skills and capabilities and users attitude towards the system which is an important factor that determines whether users will actually utilize the system.

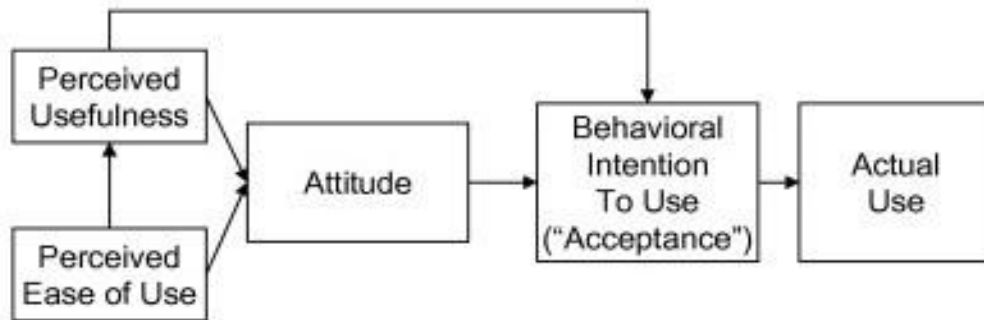


Figure 2.2 Technology Acceptance Model (adapted from [43])

2.4.3. Technology Organization Environment

The third IS adoption model, that this study reviewed is Technology-organization-environment framework (TOE) originally introduced by Tornatzky et al [11] in 1990. The main idea of the TOE framework is to help analyze innovation adoption decisions in organizational context. TOE explains IS adoption and implementation process that consists of technological context, the organizational context, and the environmental context. The technological context includes the internal and external technologies that are relevant to the organization. Internal and external technology can be equipment or administrative/operational change. The organizational context refers to the characteristics and resources of the organization such as organizational size and management procedures. The environmental context includes the organization’s competitors

and the governmental regulations. These three contexts influence an organizational IS adoption and implementation.

Technological Context

Technological context refers to the application or object of new IS, this context considers available technologies which can be important in improving the productivity of the organization. Numerous scholars have studied and confirmed the importance of a different attributes that affect the technological context. The studies [42, 44] stated the importance of the technology attributes like availability and characteristics for successful IS adoption.

The attributes of the technological context include the quality of the IS according to technical requirements like the hardware or software requirements or administrative requirements like the ability of the IS in reengineering the business operation in the organization. Another attribute of the technological context is the IS should be able to be integrated with the existing technical system and the effectiveness of the system. In addition, the influence of the system in supporting organizational integration by motivating communication is considered in the technological context.

Organizational Context

Organizational context refers to the effect of organizational characteristics on the decision to adopt IS. The organizational characteristics are explained in terms resources or organizational attributes available to support the adoption of IS which include but not limited to organization size, scope and management structure. Adoption literature [11] proposed that the organization's scope and size are important organizational factors for IS adoption. The researchers found that the greater the scope of the organization, the greater the demand for IS investment. Organization size has been also been found to be a factor for of IS adoption in organizations. In relation to organizational size Zhu et al. [45] indicated larger organizations have more resources, greater finance, and can take greater risks associated with innovation adoptions. But smaller organization, because of their resource constraints and the risk associated to the adoption failure are not willing to adopt IS. However, small firms are more agile and flexible than large firms. In addition to the size and scope of the organization management and

technological strategic planning support found to be positively related to IS adoption in organization.

Environmental Context

According to the TOE model the environmental context can refer to the competitive pressure, interaction or governmental regulation that an organization deals with. Competitive pressure has long been recognized as an adoption motivator in the innovation adoption literature. The studies [45, 46] found the influence of competitive pressure as an IT adoption driver. The studies suggested that by adopting information systems, organizations might be able to be better competitors and create increase their productivity. In addition, the studies state an organization might adopt IS to create smooth interaction with their partner organization so as to be able to exchange business deals. Governmental regulation can also enforce governments to deploy an IS.

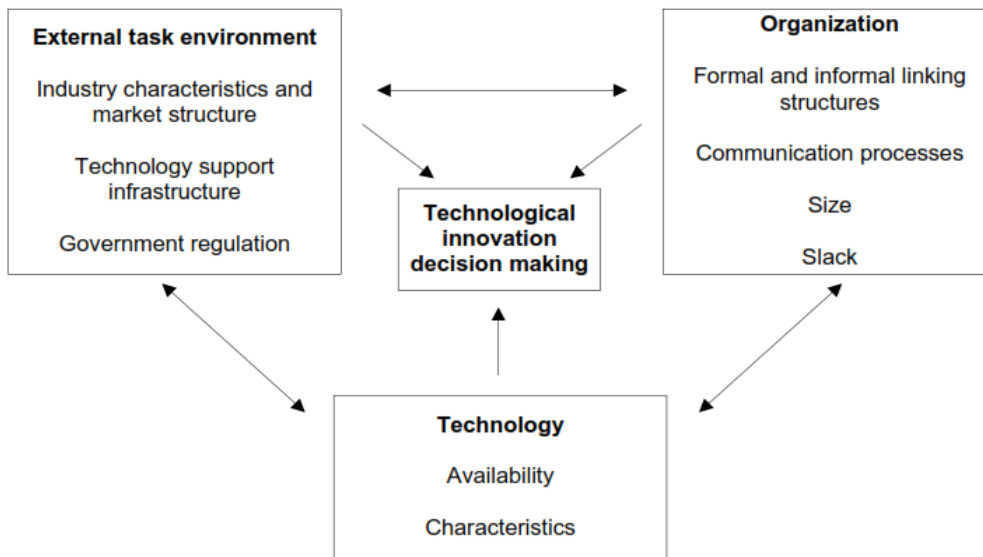


Figure 2.3 Technology-organization-environment Framework (adapted from [11]).

2.5. Factors: Organizational IS Adoption

Fitzgerald [30] stated that the in current business environment technological innovation that bring equipment and operational process has major importance and challenge for an organization success. IS has the capacity to influence organizational structure, organization strategy, communication, operational process, productivity and competitiveness. In this digital

age, IS has become so important in individual and organizational business operation which makes IS a basic requirement for doing business for surviving business competition and increase productivity.

A variety of factors may affect an organizations decision to adopt and implement a particular technology. Kwon et al. [47] reviewed prior innovation research and classify variables that potentially influence technology adoption into five broad categories. These are individual, task-related, innovation-related, organizational, and environmental characteristics. The authors suggested that the importance of the five categories may differ depending the context or technology. For example, individual factors are more relevant with individual adoption of technology rather than organizational adoption where decisions are often made by committees. Since the focus of this study is identification of organization adoption factors the following paragraphs present technological, organizational and environmental attributes selected from DOI, TAM and TOE model.

In the technological context different researchers found the impact of the technological characteristics on the adoption decision. Different researchers used different attributes for measuring technological characteristics but most researchers used DOI's five innovation characteristics and TAM's PEOU and PU as a general guideline to select important attributes. For example Nancy [20] used five DOI's innovation characteristics to access organizational decision makers' perception towards Ehealth system. As a result, the study found relative advantage, simplicity, compatibility, trial-ability and observe-ability positively related to Ehealth system adoption. In relation to this another research [22] combined the five innovation characteristics with PEOU, PU and ATU and found all the measures to be important in the adoption process. Specifically the study found compatibility, complexity, relative advantage and trial-ability significant for PU while simplicity, relative advantage and trial-ability were significant on PEOU. In measuring the technological characteristics the Nancy and Lee [20, 22] used different attributes like the effect of the system on users' job performance, the familiarity of the user about the system and the general attitude of users towards the system.

A variety of organizational factors have been suggested to impact IS adoption. Organizational size is one of the organizational factors that have been found to be influential on IS adoption. Grover et al. [44, 48] stated that larger organizations have the financial and

infrastructural resources to invest in new technologies and handle the associated risk. Larger organizations have more capacity to dedicate adopt IS to gain productivity. The studies found result that shows organizational size positively correlates with technology adoption. These studies showed that organization size to be an important factor to the adoption decision of IS. So this shows organizational size is a factor for IS adoption. That is, the larger the organization, the more likely it will be to adopt IS.

Organizational structure in relation to user involvement is another researched important factor for IS Adoption in organization. Previous research show different results in the effect of organizational structure and user involvement on IS adoption. Some studies indicate positive effect of a centralized organizational structure that is, less user participation of decision making on IS adoption while others have shown negative relationships. The Grover [44] based on two theories, the first one states centralization of decision-making may reduce conflict between organizational units and promote IS adoption while the other theory states that organizations that have decentralized adopted more innovative IS in order to enhance the organizations service and productivity. The result shows that more decentralized adoption decision making with more user involvement is associated with adoption of new technologies and usage of the technology in the long run. While centralized adoption decision making with lower user involvement result in lower system usage and dissatisfaction. In general this factor shows the more decentralized the organization and the more users are involved, the more likely it will be to adopt IS.

The other organizational factor is management and Strategic planning support towards IS adoption. Studies suggest [5, 48] in order to succeed, organizations must align organizational structure and management processes to an organizational strategy [49]. The studies suggests the integration of IS strategy with the overall organizations strategy is crucial for achieving and maintaining the organization's success. As organizations realize the efficiencies gained from IS, management will begin to focus on IS strategy and incorporate it into overall Organization strategy. Rogers [43] found the presence of a formal logistics mission statement and strategic plan positively related to IS adoption. Thus, organizations that have integrated IS in organizations strategy and IS that have managerial support will be more likely to adopt IS.

Organizational readiness, which is the availability of sufficient organizational resource, is another issue in organizational IS adoption. The attributes of organizational readiness differs in

different literatures, but the attributes can be categorized as financial, professional human resource and infrastructure readiness. The financial readiness is the ability of an organization to invest money in an IS while professional human resource and infrastructure readiness are the availability of skilled personnel and technological infrastructure that is required to deploy an IS innovation in the organization. Accordingly studies [44, 54] show availability of money, enough IT professionals and IT infrastructure like network and communication positively related to IS adoption. The studies further showed that an organization with more financial capacity has can handle any investment risk associated with the adoption of IS which makes them more confident to invest. And the professional IT personnel and IT infrastructure facilitate the successful implementation of the IS and users satisfaction towards the system.

Various marketing and IS Rogers et al. [5, 45, 46] agree that competitive pressure highly affect organizational productivity by motivating organizations to change their operation including adopting and IS. Competitive pressure is expressed as an external pressure and can be an external influence like competitive pressure, partnership and governmental regulations. The researchers found that the external pressure motivate and pressure the organizations to adopt an IS for productivity and procedural reasons.

2.6. Related Work

The IS adoption by been studied by various IS researchers, studies based on different adoption model and different attributes. Recent studies focus on measuring the potential adopters' perception of the technology. The perceptions of adopting were initially based on the five characteristics of innovations from the DOI model. The adoption of IS by individuals and organizations is classified as part of the process of IS implementation. However, identifying factors and procedures on how to adopt and implement IS successfully is still a research area since there is no full understanding on the matter. A major focus IS adoption studies has been how users' perceptions of the technology innovation influence its adoption. One of the most popular and often cited innovation adoption theory literatures is that of Rogers [6], he identified five characteristics of an innovation which affect the rate of diffusion of an innovation. They are relative advantage, compatibility, complexity; observe ability, and trial ability. After the development of DOI model different scholars studied IS adoption using different attributes and different adoption models. the next paragraphs present some of literature works related to this

study and table 2.1 summarizes the related work according to objective, methodology, findings and recommendation.

Nancy [20] have done a research with the objective of designing a valid and reliable questionnaire to access perceived attributes of technology base health education innovation. The main purpose of the research was, to measure perceived attributes at time 0 (T0) in order to predict the rate of adoption for the innovation at time 1 (T1). For this purpose the study investigated the acceptability of an innovation in its pre diffusion stages for purpose of midcourse corrections. In addition the study examined perceived attributes over time to identify the reasons for implementation failure after decision to adopt.

The researcher used questionnaire as primary sources of data collections. The study was part of a beta test of a CD_ROM based health education application for undergraduate personal health course. So, college students in 12 personal health courses reviewed a prototype Ehealth intervention using a 30 item instrument based upon diffusion theory's perceived attributes of an innovation. In the questionnaire the students provided demographic information and were asked to report their perception of the innovation and their intention to adopt in the future. The questionnaires were prepared with items likely to fall into specific subscales for Roger's five perceived attributes. As a result, the research found the five factors to have 44.4% variance on adoption.

The study has limitations concerning instrumentation, sampling, and response rate, which affect the internal and external validity of the study. Regarding instrumentation, the use of a newly developed survey that was not pilot tested may have introduced error into the data and results from the data analysis. The study was also limited by the sampling strategy used in the primary data collection. Because determination can be made about students who chose to participate in the beta test compared to those who did not. Response rate limited the sample size to 193 out of 2000 students. This situation may have led to misleading results in the factor analysis.

Lee et al. [22] have done a research with the objective of investigating factors affecting business employees' behavioral intentions to use the e-learning system. The research hypothesized the five innovation characteristics of DOI has important effect on employees

perceived usefulness, perceived ease of use and intention to use. In this regard the study combined the DOI and TAM model as cause and effect relationship.

As a methodology the study utilized a web-based and mailed survey to collect data for quantitative testing of the research model. A non-random sampling that is convenience sampling was used to collect the sample data. The sample data was gathered from the five largest e-learning systems including manufacturing, finance, marketing and service, information technology, and government agencies in Taiwan, and randomly selected 15 firms that provide an e-learning training system for employees. The result of the study shows the five perceptions of innovation characteristics significantly influence employees' perceived usefulness and perceived ease of use. Specifically compatibility, complexity, relative advantage and trial ability found to be significant on PU while complexity, relative advantage, trial ability and complexity found to be significant on PEOU. However, the study is limited to individual technology adoption since it focus on identifying only individual behaviors towards the technology which makes it individual adoption rather than organizational adoption study.

Hussain [21] has done a research with the objective of studying user acceptance of mobile technology application within health care industry. The study's methodology design a quantitative approach based on the technology acceptance model questionnaire as its primary research methodology. It utilized a quantitative approach based a Technology Acceptance Model to evaluate the system mobile tracking Model. The related constructs for evaluation are: Perceived of Usefulness, Perceived Ease of Use, User Satisfaction and Attribute of Usability. In addition to questionnaire the study uses the Author's experience on mobile application and related literatures. The study aimed to evaluate and investigate usability test for Perceived of Usefulness, Perceived Ease of Use, User Satisfaction and Attribute of Usability as important for the user evaluation in the in Mobile Tracking on Patient Progress System but the key finding was not presented clearly.

Jeffrey [50] work on a research with the objective of identifying if a relationship exists between a users PU, PEOU and subjective norm on the users intention to operate a Radiography technology. The correlations of these variables were measured using a questionnaire relating to a newly implemented computed radiography system. The survey was administered to a sample of 21 radiographers randomly selected from a health care facility utilizing a computed

radiography system. As a result the analysis of the collected data indicates that a statistically significant relationship exists between perceived ease of use and perceived usefulness as well as perceived usefulness and intention to use the technology. A radiographer's perceived ease of use of the computed radiography system influences his or her perceived usefulness of the technology; how useful he or she perceives the system to be in regard to their job also influences his or her intention to use the technology. However Only 21 radiographers were surveyed, which make the sample size very small to make generalization.

In Ethiopia context the existence IS adoption works in organizational context is limited. Nebiyu [23] worked on a research with the objective of investigating the general nature of Hawassa university IS innovation adoption and diffusion considering its academic staff ICT usage and utilization for two core activities in higher learning institutions as indicator of the adoption and diffusion of IS innovation in the university. Roger's DOI theory was used and the five innovation characteristics and an external variable which is, ICT policy measured using a questionnaire and the survey was administered to a sample of 161 Hawassa university workers. As a result the analysis of the collected data confirmed that the Rogers's five innovation characteristics and the existence of ICT policy to have a positive impact on the use the technology in Hawassa University. However the research used only one model which is DOI with only the five innovation characteristics as attributes this limits the research on identifying the organizational and environmental factors that determine IS adoption.

Meseret [24] worked on a research with the objective of developing ICT adoption models for Ethiopian banking industry that could be used as a framework for enterprise level ICT policy. The strategy followed by the research incorporate both qualitative and quantitative approaches designed in a form of a case study mixed with descriptive research questions. The research findings state the major driving factors that influence the banks to implement ICT as corporate strategies, technical dynamics and organizational factors consecutively motivate banks to implement ICT in high level. At a medium level, environmental factors followed by management capacity and organizational factors are the drivers of ICT adoption. In addition, economic factors, task level factors, and environmental factors constitute the group that has a low level influence in ICT adoption. However the research only focus on one type of industry which is the banking industry which limits the research result to be applicable on other type of

industries with different operational activities and challenges.

Abinew [25] worked on a research with the objective of investigating the determinants of end-users' acceptance and use of electronic library services in Ethiopian higher education institution academic libraries (Addis Ababa University and Adama University libraries). Both quantitative and qualitative research method used with observation and survey research method as a data collection technique to measure questions formulated based on Service-Oriented UTAUT model (SO-UTAUT) model. The result states the SO-UTAUT model has been empirically tested and proved to fits to the existed study setting and can predict the acceptance and use of e-library services in Ethiopian universities. However the study has considered only two universities' academic staffs and postgraduate students and the study only considers one specific IS type which is E-Library. Therefore, generalizing the study results at national level might not have sufficient ground.

Fasil Alemayehu and Fekade Getahun [2] work on a research titled “a novel approach for cloud readiness assessment and recommendation”. The objective of the study was to propose cloud readiness assessment framework and an expert system that assesses cloud readiness and recommend which cloud deployment and service model to adopt. To meet the first objective which is, to propose cloud readiness assessment framework the study try to utilize questionnaire using online survey. The researchers generally distribute 50 questionnaires to capture opinions about cloud computing and factors influencing an organizations intentions to adopt. The number of questionnaires were limited because of the awareness level of employees towards cloud computing. Then to find any interesting patterns between variables predictive modeling using supervised machine learning method was used. As a result the researcher's found systems scalability, cost, portability and data security to be important factors for cloud adoption. However the researchers neglect to put the finding in a generalized descriptive way so as to show the flow of the proposed framework. In addition the type of IS the study interested in is only cloud computing which limit the number of attributes used as adoption factors since the researchers choose attributes that can be factors for cloud computing.

In general, earlier researches on IS adoption shows that different technological, organizational and environmental changes like cost reduction and increase in functionality and reliability of communication channels influence organizational IS adoptions. Even though

many researchers study IS adoptions there is still no one agreement on the way an IS adoption should take place, which shows the subject needs further study. In addition, Most of these studies are limited in terms of number of attributes studied, types and number of adoption models and types of factors included in the study.

The following table presents the summary of related works according to objective, methodologies, key findings, recommendation and limitations

Table 2.1: summary of Related works

Author, Title and Year	Objective/purpose	Approaches/Methodologies	Key findings	Recommendation and future work	Remark
Nancy L. Atkinson 2012 Developing Questionnaire to Measure Perceived Attributes of eHealth Innovations	designing a valid and reliable questionnaire to access perceived attributes of technology base health education innovation	Quantitative research design Questionnaire as primary data source	principal components analysis found the Rogers five perceived attributes as a factor accounted for 44.4% variance	To determine the instrument's usefulness in other situations and add to the literature on the diffusion potential of other health education innovations. The study recommended further study of multimedia applications for health education	Instrumentation : Newly developed survey that was not pilot tested may have introduced error Sampling, response rate: 193 out of 2000 students. May have led to misleading results in the factor analysis.

<p>- Lee, Y.H., Hsieh, Y.C., Hsu, C.N. -2011 Adding Innovation Diffusion Theory to the Technology Acceptance Model: Supporting Employees' Intentions to use E-Learning Systems</p>	<p>Investigating factors affecting business employees behavioral intentions to use the e-learning system</p>	<p>Quantitative research design Questionnaire as primary data source</p>	<p>The result confirmed the five perceptions of innovation characteristics significantly influence employees. Compatibility, complexity, relative advantage and trial-ability significant on PU Complexity, relative advantage, trail ability and complexity significant on PEOU</p>	<p>Further longitudinal research recommended: to evaluate the validity of the proposed model and the study's findings.</p>	<p>Sampling only based on willing respondents with no qualitative measure</p>
<p>- Hussain M. A. - 2013 A questionnaire approach based on the technology acceptance model for mobile tracking on patient progress applications.</p>	<p>Studying user acceptance of mobile technology application within health care industry.</p>	<p>Quantitative research design Questionnaire as primary data source also literatures and the Author's experience on mobile application used</p>	<p>The key finding was not presented clearly</p>	<p>Evaluation the mobile tracking solution in monitoring patients after implementation using the study's questionnaire design is recommended</p>	<p>TAM questionnaire The key findings are not well organized and presented There is no model presentation</p>

<p>Jeffrey B Cowen 2009 The Influence of Perceived Usefulness, Perceived Ease of Use, and Subjective Norm on the Use of Computed Radiography Systems: A Pilot Study.</p>	<p>Identifying if a relationship exists between a users PU, PEOU and subjective norm on the users intention to operate a Radiography technology.</p>	<p>Questionnaire relating to a newly implemented computed radiography system</p>	<p>The study confirmed significant relationship exists between perceived ease of use and perceived usefulness as well as perceived usefulness and intention to use the technology.</p>	<p>-</p>	<p>Tam questionnaire 3 Only 21 radiographers were surveyed. Small sample size makes the study less reliable to the population of interest</p>
<p>Nebiyu Getahun 2010 Information system innovation adoption and diffusion in Ethiopian higher learning institutions: the case of hawassa university</p>	<p>Investigating the general nature of Hawassa university IS innovation adoption and diffusion</p>	<p>five innovation characteristics and ICT policy measured using a questionnaire and the survey was administered to a sample of 161 Hawassa university workers</p>	<p>The result confirmed that the Rogers's five innovation characteristics and the existence of ICT policy to have a positive impact on the use the technology in Hawassa University</p>	<p>To study IS innovation and adoption in Ethiopian governmental institutions such as ministry offices</p>	<p>only DOI model used with only the five innovation characteristics as attributes this limits the research on identifying the organizational and environmental factors that determine IS adoption</p>
<p>Meseret Yohannes 2010 ICT adoption model for Ethiopian banking industry</p>	<p>Developing ICT adoption models for Ethiopian banking industry that could be used as a framework for enterprise level ICT policy</p>	<p>Both qualitative and quantitative approaches designed in a form of a case study mixed with descriptive research questions</p>	<p>The research findings state the major driving factors that influence the banks to implement ICT as corporate strategies, technical dynamics and organizational factors consecutively motivate banks to implement ICT in high level</p>	<p>Researchers interested in assessing the influence of ICT on the banking industry could do exploration by changing scope or sample population.</p>	<p>Only focus on one type of industry, banking industry which limits the research result to be applicable on other type of industries with different operation</p>

<p>Abinew Ali 2011 Acceptance and use of E-library services in Ethiopian universities: the case of Addis Ababa and Adama universities</p>	<p>Investigating the determinants of end-users' acceptance and use of electronic library services in Ethiopian higher education institution academic libraries</p>	<p>Both quantitative and qualitative research method used with observation and survey research method as a data collection technique to measure questions formulated based on Service-Oriented UTAUT model (SO-UTAUT) model</p>	<p>SO-UTAUT model has been empirically tested and proved to fits to the existed study setting and can predict the acceptance and use of e-library services in Ethiopian universities</p>	<p>Conduct longitudinal study using the SO-UTAUT model and Conduct research considering different factors from different TAM models and come up with a new technology acceptance model for Ethiopia.</p>	<p>The study has considered only two universities' academic staffs and postgraduate students and the study only considers one specific IS type which is E-Library. Therefore, generalizing the study results at national level might not have sufficient ground.</p>
<p>Fasil Alemayehu and Fekade Getahun 2015 A novel approach for cloud readiness assessment and recommendation</p>	<p>The objective of the study was to propose cloud readiness assessment framework and an expert system that assesses cloud readiness and recommend which cloud deployment and service model to adopt</p>	<p>Distribute 50 questionnaires to capture opinions about cloud computing and factors influencing an organizations intentions to adopt.</p>	<p>As a result the researcher's found systems scalability, cost, portability and data security to be important factors for cloud adoption.</p>	<p>-</p>	<p>Limited number of attribute that can apply only to cloud computing. Limited number of sample size which were aware of cloud computing.</p>

CHAPTER THREE

RESEARCH METHODOLOGY

The research method is the significant part of a research because it helps researchers to decide how to achieve the specified objective, what data to collect, how to collect and analyse the data in order to solve the problem area. Therefore, it needs much attention on choosing the appropriate methods which can provide the desired outputs.

In this chapter the research approach and sample used to achieve the study's objective and data collection methods is covered. The general objective of this research is identifying technological, organizational and environmental factors that affect IS adoption in organization and construct a theoretical model for successful IS adoption. The methodology includes conceptual model, research design, study population, sample design and data collection methods. After the data collection method data processing, reliability and validity testing mechanisms are presented.

3.1. Conceptual Model

In this study literature review is conducted to assess IS adoption concept and models. Various books, journals, articles, proceeding literatures, manuals and Internet is checked to understand concept and method of IS adoption individual and organizational level. Since this research is interested in the IS organizational adoption, the focus is limited to key technological, organizational and environmental factors and issues that affect IS adoption in organization. To identify the major factors in each context (technological, organizational and environmental) the conceptual similarity of the attributes and pioneers relationship analysis findings on different models and attributes is used.

Some studies used the TOE framework with other theories to understand technology adoption. For example Thong [51] Joined characteristics from DOI to the TOE framework, Chong [52] add innovation attributes (relative advantage, compatibility, and complexity) from DOI and an additional new factor in the adoption study called information sharing culture characteristics to the TOE framework. Zhu [53] combined relative advantage, compatibility, cost, and security concern from DOI with the TOE framework. Wang [54] add

relative advantage, complexity, and compatibility from DOI to the TOE framework. In relation to this study combines DOI, TAM and TOE model and reconstruct the different attributes.

After extensive literature review major organizational IS adoption Models, factors, issues and attributes identified. Accordingly, the researcher used the combination of the three innovation adoption models which are Roger's DOI, Davis's TAM and Tornatzky's TOE. The three models are adopted from previous researchers and important factors were selected according to their influence on organizational IS adoption in the previous literatures. Then the models and attributes rearranged under the three main attributes of TOE model, which are organizational, technological and environmental attributes. Under the 3 attributes different DOI, TAM and TOE sub attributes are categorized to construct the conceptual model.

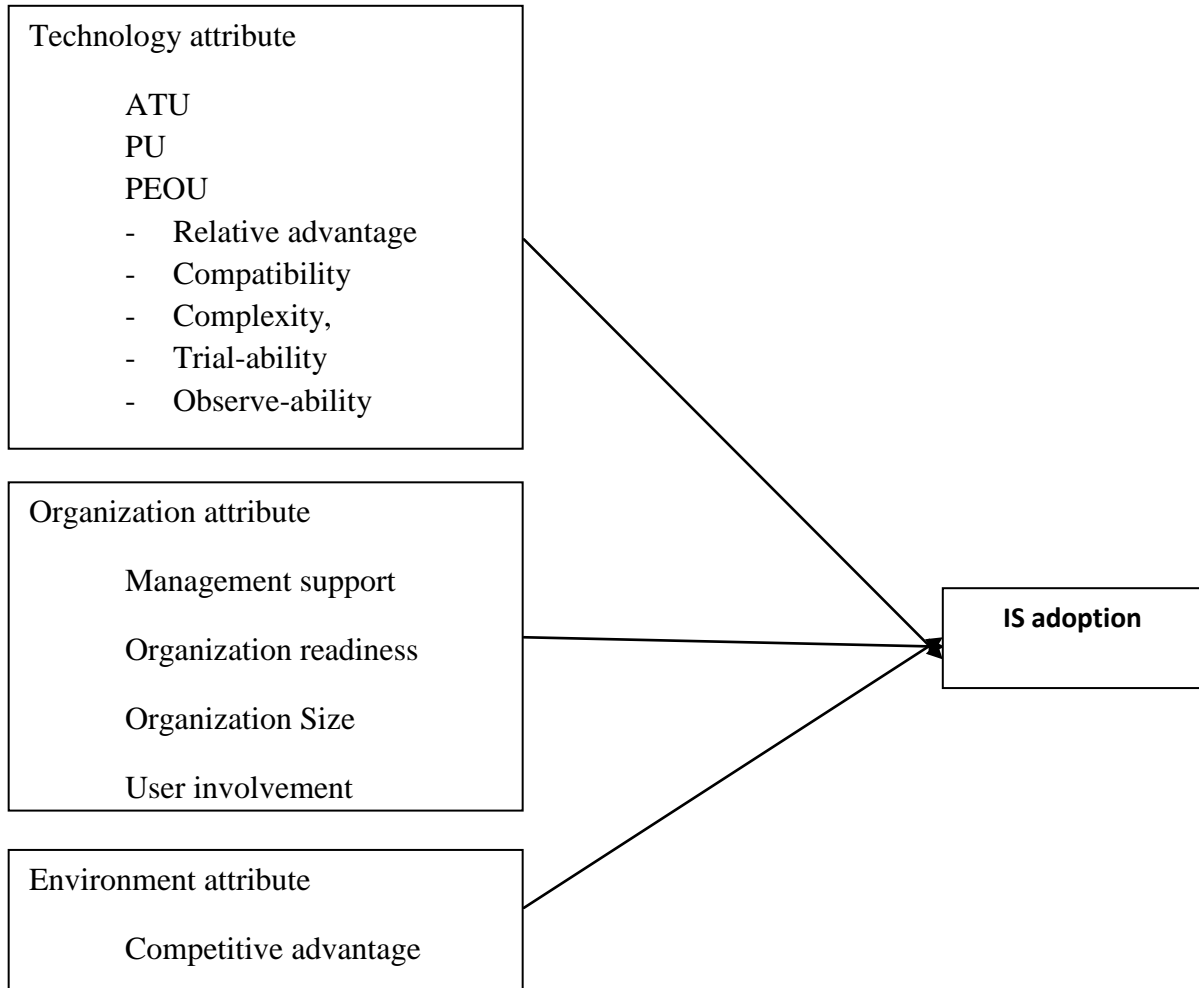


Figure 3.1. Conceptual Model

The organizational, technological and environmental context with the selected attributes is discussed below. In addition the data collection instrument used for each attributes is presented.

Organization Context

Innovation can bring different types of changes to the existing technology; the changes can be the result of adding features to the existing innovation or creating new innovation. As various studies [4, 12] indicated an IS innovation can enhance the efficiency and effectiveness of business processes in organization. Various studies [11, 45] stated the importance of different organizational attribute to IS adoption. For this study, the major attribute included in the organizational context are organization readiness, management support, organization's size and users involvement. In regard to the organizational context all the attributes except users involvement, were addressed by interviewing the departmental managers working in five organizations selected for this study.

Top Management Support: Wang et al. [54] suggest the adoption of new technologies in an organization or a company requires a smooth integration between the new systems and the existing ones. Therefore, supports from top management are critical for creating positive environment and making sure that the necessary organizational resources including technology, financial, and IT experts, are available to help the IS adoption. Some studies [54, 55] have pointed top management support as the important factor which may influence the intention to adopt IT innovations in organizations. The researchers found final decision-makers to be top management team, such as the owner of a company, IT director, IT manager, or IT supervisor. Hence, top management support and commitment are essential to convince an entire organization about the importance of the innovation technology and influence the internal users to participate in the adoption processes.

Organizational Readiness: Organizational readiness consists of financial, IT professional, and IT infrastructure aspects. Insufficient funding has been identified as a major factor that holds back IT adoption in organizations. The IT professional aspect relates to the existence of employees who have knowledge and skills on certain IT innovations. The IT infrastructure

aspect refers to the installed network technologies and enterprise systems that provide a platform on which the innovation can be built. Studies [54] showed that it comes IS, many companies delay and tend to wait the adoption decision making until they have all the required organizational resources.

Organization Size: Organization size is an important factor that influences the adoption of technology innovation. As studies [46] shows larger organizations have the resources IS adoption the capacity for any failure or risk associated with the IS implementation. While relatively smaller organizations tend to for the IS to be tested by others before deciding to adopt it to because of fear of associated risk. Consequently, the size of the organization is expected to have a impact on IS adoption. Some empirical studies [44, 48] have shown that organizational size positively affects organizations' willingness to adopt IS innovations. In general, larger organizations tend to adopt more IS innovations because they have the required resources readiness and flexibility to take risks.

User Involvement: researches [36, 44] shows the importance of involving users in the IS adoption process for the success of the IS adoption. Jeffrey [50] investigates users' involvement and categorized users' participation depending on their role. Accordingly, Users' participation or role in the adoption process is expressed as being project leader, participating in the selection of the IS, having responsibility in the overall implementation of IS and participation in giving training about the IS. Accordingly, part III questionnaire is used (see Appendix I) to investigate users involvement in the IS adoption.

Technological context

In this study the technological context includes ATU, PU and PEOU of TAM model and the five innovation characteristics of DOI model. The conceptual model holds that the five innovative characteristics (compatibility, complexity, relative advantage, trial-ability to try and observe-ability) apply an important effect on the employees' PU, PEU and intention to use IS. For the technological context questionnaire is used in general. To measure ATU specifically, question 22-24 of part II questionnaire is used (see Appendix I).

PU: According to Davis [10] PU is the “degree to which an individual believes that a particular system would enhance his or her job performance within an organizational context”. Information system Venkatesh and Davis [16] have investigated TAM, and stated that PU was valid in measuring the individual’s acceptance of various systems. The specified studies discovered that PU positively affected the users’ behavioral intention to use systems. In this regard the researcher used question 16-18 from part II of the questionnaire to measure the PU effect on IS adoption (see Appendix I).

PEOU: Davis [10] defined PEOU as “the degree to which an individual believes that using a particular system would be free of effort”. Information system Hussain and Jeffrey [21, 50] have indicated that PEOU has a positive effect on the end-users’ attitude and PU to use the systems. In this regard, the questions 19-21 in questionnaire part II used to measure PEOU of the respondents (see Appendix I).

Compatibility: Researchers stated a positive relationship between an individual’s prior compatible experiences and the new information technology acceptance. They found that the extent of prior experience with similar technologies was positively associated with an ease of use belief about an IS. Compatibility had a significant positive and direct effect on PU and the attitude of usage. In this regard, prior studies [22, 54] have investigated compatibility from different aspects, resulting in support for its impact on PU, PEOU and ATU. For measuring compatibility the question 13-15 are used of part II questionnaire used (see Appendix I).

Complexity: Empirical studies provided evidence indicating that complexity had a significantly negative effect on the attitude to use an IS. Additionally, a negative relationship between complexity and PU was also revealed in the studies. The studies [22, 54] shown the end users perceived the system as complex, the lower the users’ intention to use the system which, ultimately affected the adoption rate and success. For measuring complexity the question 4-6 of questionnaire part II are used (see Appendix I).

Relative Advantages: Researchers [22, 54, 56] that study the IS adoption using combination of different models found that the perceived relative advantages positively affected the users’ attitude to use the system. For measuring relative advantage the question 1-3 are used of questionnaire part II are used (see Appendix I).

Trial-ability: Some studies [22, 56] have tested the association between trial-ability and the attitude to use the system. They found that trial-ability had a positive effect on the intention to use the system. The research reported that when the users perceived higher trial-ability, they perceived higher levels of usefulness and ease of use of the system. For measuring trail-ability the question 7-9 are used of questionnaire part II are used (see Appendix I).

Observe-ability: Using different methodologies and involving different participants from, Lee et al. [22] found that observe-ability had a positive impact on the users' attitude toward using the system. Furthermore other Yang [56] showed when the employees perceived the systems as being easier to be observed or described, they tended to perceive the systems more useful and easier to use. Therefore, observe-ability found to have a positive effect on PU, PEU, and ATU of an IS. For measuring compatibility the question 10-12 are used of questionnaire part II are used (see Appendix I).

Environmental Context

Competitive Advantage: The relationship between IT innovations and competitive pressure or environmental influence on an organization has been found to be significantly related. Studies [45, 46] showed that IS innovations are often adopted in situations of competitive pressure because IS is seen as one way that organizations can become more productive and competitor. Similarly, the effect of environmental influence like governmental regulation shows positive relation in IS adoption rate. For the environmental context interview data collection method is used.

3.2. Research Design

3.2.1. Research Approach

Research methods or research design can be classified in various ways. One of the most common distinctions is between qualitative and quantitative research methods. Qualitative and quantitative approaches have been distinguished depending on different factors like the type of data used, the type of investigation and the method of analysis.

Qualitative research as explained by Creswell [57] is one of the main approaches of research methodology. It studies about experiences, behaviors and attitudes from the respondents. Qualitative methods include interview, participant observation, case study and content analysis. As compared to quantitative research approach, it does not use mathematical and statistical methods. However, qualitative research method uses logic to interpret gathered data. A research that uses qualitative method predominantly requires the researcher to work closely with research participants.

Quantitative research approach uses survey and questionnaire. Information dealing with numbers and anything that is measurable, statistics, tables and graphs are used to present the results of the study. In relative to the quantitative research method, Greenfield [58] states the qualitative methods is based on smaller sample sizes and are often not representative of the population, which makes it difficult to achieve reliability and validity. In addition the quantitative researcher can function independently of the participants of the research to a major degree, although some interaction is inevitable.

Creswell and John explain [57] Mixed research design as a research design that combines both qualitative and quantitative research approach. Hence to achieve the aim of this study both quantitative and qualitative methods are used. The quantitative method is used to collect and analyze the data. In this regard, the questionnaires were concerned to investigate IS adoption process in the selected organizations. For the qualitative study, interview was used to provide more details about how the selected organizations perform their activities. The interview aims to get clear understanding and interpretation of the organizational and environmental attributes.

Research Population

The primary aim of this study is identifying technological, organizational and environmental factors that affect IS adoption in five Ethiopian governmental organizations. The five governmental organizations are selected for this study according to the availability of IS in the organizations and the organizations relation to MCIT. When choosing organizations the starting point of this study was MCIT, since it is the only organization that has a general mission of developing and implementing IS for different organizations in

Ethiopia. Thus, this study focuses on only the five Ethiopian governmental organizations which are engaged in different sectors so as to make the population a representative of different kind of organizations.

There are a number of governmental organizations under the support of MCIT for IS implementation but depending on the availability of current IS and organizations willingness to participate on the data collection five organization are selected. These are: Ethiopian Broad casting authority, Ethiopian civil service university (ECSU), Ethiopian commodity exchange (ECX), Ethiopian Management Institute and Ethio-telecom network operation and maintenance department. The population includes employees of each organization working on an already developed and implemented IS which includes human resource, finance, archive, library and Trouble ticket report systems. So, the respondent of the survey are employees of the specified organizations using IS for their day to day work operation. In addition, for the interview the managers, team leaders and supervisors in the five organizations and MCIT E-government department workers are included.

3.2.2. Sample Design

It is necessary to take sample from the population because the researcher does not investigate by taking the whole population. Due to limitation like cost and time limitation associated with the inclusion of all the target population sampling method is used. In addition studies suggest [58] considering the issue of quality and feasibility; concentration of effort on a sample can increase the quality of the research, which leads to results that are more accurate. This show designing the sampling process of the research is essential to achieve the objective of the research. Accordingly, the following sample design of the research is undertaken.

3.2.2.1. Sampling Method

This study gathered sample data from five organizations working on different sectors that are media and communication, commercial, educational, administrative and telecommunication. Based on the data collection mechanism and type of organization proportional Stratified sampling and purposive sampling technique is used. For the quantitative study stratified proportional sampling technique is used, considering each five

organization selected for this study as one stratum. The advantage of stratified sampling in this case is to ensure that the resulting sample would be distributed in the same way as the population in terms of the stratifying criteria. For the qualitative study Purposive sampling method used, which helps the researcher to select the departmental managers, supervisors and IT managers for collecting the required data. The researcher purposely selected departmental managers, supervisors and IT managers since managers and team leaders were considered as the key persons involved in the adoption decision-making process and considered to have more in-depth knowledge about the overall IS implementation.

3.2.2.2. Sample Size

The goal of sample size in a study is to make conclusion about the population. Larger Sample size calculation is concerned with how much data we require to make correct decision on particular research. If we have more data, then our decision will be more accurate, but Greenfield et al. stated [58] this does not necessarily mean that more is always best in sample size calculation. For this study, the samples are selected from the five organizations that are under the support of MCIT for IS implementation.

For the quantitative study the population size, that is the number of employees in each organizations using an IS to do their work operation identified. The population size identification was done by communicating to IT managers in the five organizations, the managers extracted active accounts that are used by the staffs. Accordingly, a total of 285 population size identified then using sample size calculator (see appendix 6 for the formula) sample size of 170 determined. Since the population size differs in each organization the population was organized in a stratum then, percentage of each stratum in regard to population size which is, 170 calculated and stratified proportional method used to calculate sample size for each organization. The population size is limited on the basis of the number of IS used in the organizations and the number of active staffs that had the privilege to use the IS in the five organizations. Table 3.1. Shows the number of active staffs using an IS, percentage of each stratum and sample size. Accordingly data from 170 numbers of employees in five organizations that use IS for doing their day to day work activity were collected. Of the 170 distributed questionnaires, 139 were completed and

returned. The Sample demographic information is depicted in Table 4.1.

Strata sample size calculation: $n_h = (N_h / N) * n$

where n_h is the sample size for stratum h , N_h is the population size for stratum h , N is total population size, and n is total sample size.

Table 3.1. Sample size calculation

No.	Name of the organization	Number of Questioners		
		population	Percentage (%)	Strata sample sizes
1	Ethiopian Broad casting authority	34	11	20
2	Ethiopian civil service university	75	26	44
3	Ethiopian commodity exchange	51	18	30
4	Ethio-telecom network operation and maintenance department	76	28	45
5	Ethiopian management institute	49	18	29
Total		285	100	170

3.2.3. Data Collection Methods

There are different types of data collection methods used for research studies. The selection of the data collection methods will depend on the research objective and research design. Studies suggest [59] that data collected from two or more sources will help to support and improve the quality of the research result. The goal of data collection is to gain enough data that help to achieve the research objective. Generally, there are two types of data sources: primary data sources that are the data collected by the researcher from original sources. On the other hand, secondary source of data that is the data collected and compiled by others.

It has been stated that collection of data from different sources helps to solve the limitation of individual data collection method and yields data that are more valid for the output of the research. Accordingly, this study is used primary data collection methods through questionnaire and interview to gather information from the respondents. The use of questionnaires (quantitative), interviews (qualitative) employed in this study allowed for the

collection of data from groups of employees. The primary data for this study is collected from employees, managers and team leaders of the five organizations using questionnaire. Then, interview was held to get detailed information about organizational and environmental attributes of IS adoption and to clarify whenever there are doubt and unclear situations faced. For the interview the department managers, team leaders and supervisors of the five organizations including MCIT E-Government department staffs participated.

3.2.3.1. Questionnaires

Questionnaire is an appropriate method of data collection in case of large sample size, which can be prepared in close and open-ended format [58]. Close-ended questions limit respondents answer by forcing them to choose from pre-existing set of answers, such as yes/no, true/false, multiple choice, ranking scale and Likert scale. The other format of questionnaire is open-ended format in which respondents are encouraged to explain their answers to the question by writing sentences or paragraphs. Questionnaire allow for the explorations of patterns and trends which help to describe what is happening in a specific environment and provide a measure of respondents' opinions, attitudes, feelings and perceptions about issues of particular concern to the researcher. Accordingly, the questionnaire is used to measure respondents perception towards the attributes of technological context of the IS adoption.

For this study questionnaire generally contains close-ended questions. The Questionnaire is prepared after extensive review of literatures in this field, the questionnaire items focused on the research problems objective and questions rose in the statement of the problem. Thus, to ensure content validity of the scales, the items chosen for the constructs were adapted from previous research to ensure content validity. The questionnaire has three parts: part I contains the demographic characteristics of the respondents that is; gender, positions, experiences and departments. The questions in Section II were based on prior studies [10, 60] with modifications to fit the specific context of the IS usage. The questionnaire consisted of 24 items (see Appendix 1) that measured the five innovation characteristics, PEOU, PU and ATU. The response scale for all items was a five-point, Likert scale coded as, 5: Strongly agree; 4: agree; 3: Neutral; 2: disagree; 1: Strongly

disagree. The questions in part III are yes or no question to identify user's participation in IS adoption and overall implementation.

For the data collection paper based survey was conducted. Before distributing the questionnaires the researcher communicated with each of the five organizations IT department team leaders. This helped to discuss if the organizations have any internal online survey collection mechanism and the tendency of the employees on using online mechanism. But the availability of online survey and capability of respondent on using the online survey were limited. Thus, the researcher distributed the paper based questionnaire in person to all the five organizations. At the time of the data distribution respondents email address and phone number, if they had any and willing to give, was collected. So, in organization where the response rate was low the respondents were contacted through phone and email to get their feedback and increase the response rate.

3.2.3.2. Interview

Interviewing is one of the major primary data collection methods from people. Any person-to-person interaction between two or more individuals with a specific purpose in mind is interview. Kumar and Ranjit [59] defined interview as a “two-way systematic conversation between an investigator and an informant, initiated for obtaining information relevant to a specific study”. Interview formats can be structured, semi-structured or unstructured. In structured interview, the investigator asks a pre-determined set of questions, using the same wording and order of question as specified in the interview list of questions in open ended or close-ended format. Semi-structured or unstructured interviews also known as in-depth interview, takes place by developing interview guide. The more unstructured the interview, the more it is expected issues will emerge from the interviewee, rather than being forced by the structure of the interview.

For this research, semi-structured interview were used for qualitative data analysis. Personal interviews with management officials, department team leaders of the five organizations and MCIT's four department leaders and E-government staffs is undertaken to support the data collection method. Total of 14 individual participated in the interview, the

interviewees were considered as the key persons involved in the adoption decision-making process. The interview outline was organized in regard to each organizations profile, number of implemented IS in each organizations and the organizational and environmental attributes. The interview was taken in the respondents office by scheduling the time and date in prior so that the respondents will be free to express their ideas. In addition, the interview was taken before and after the collection of the questionnaire so as to clarify some issues that were vague in questionnaire analysis.

Before starting the interview sessions, the interviewer first introduced herself and then continued by explaining the aims of the study and how the interview would be carried out. The interview topics included the company's background, the awareness level of the interviewee on IS in use, and the impact of the organizational factors on IS adoption. The interviewer assured the informants that all information would be treated confidentiality. Accordingly, the name of the organizations could not be mentioned in this research therefore, represented in the initials of Org1 (Organization 1) until Org 5. In order to avoid bias, the interviewee was given the opportunity to discuss concrete examples and stories rather than directing or suggesting them how they should answer. As soon as the interviewer finished the interview sessions, the results were transcribed the sent to the respondents for refinement if needed.

3.3. Data Analysis and Presentation Method

Data processing is an intermediary stage of work between data collection and data analysis. Studies [58, 59] explain data processing involves classification and summarization of data in order to make it ready for analysis. Accordingly, for this study the collected questionnaires and interview verified carefully for the completeness and clarity of the responses. Out of the entire attributes used 6 attribute found with missing value. Table 3.1 shows the list of questions with missing value and the percentage of the missing data. First the missing attribute were identified using frequency distribution analysis then for each attribute with missing value replacement was done. The missing values where replaced by choosing the series mean or median depending on the data type then the series mean replaces the missing value with the mean or median of that attribute. The missing value replacement is done for all

attribute with missing value except for question number two on questionnaire part II, since the question was conditional.

For data analysis, SPSS (statistical package for social science) version 20 software used to code all the required variables. Accordingly, the questionnaire items were coded and the data imported to SPSS tool. To summarize the collected data Descriptive statistics methods such as frequency distribution, mean and median, cross tabulation and graphical representation methods are used. For examining relationship, association and generalization inferential statistics such as chi-square, Kendall's tau-b, and spearman bivariate correlation, multiple regression and principal component analysis are used depending on the data type and SPSS association rule. Accordingly, the data summarized and arranged in a compact form for further analysis. For combining the different attributes that represent the same idea attribute reduction technique is used. Especially for question that measure user's agreement on the technology theme, compute transform mechanism with the median function is used. The reason for taking the median value is because for Likert scale or interval or ordinal data type taking the median value is statistically correct. Before combining the attribute the factor analysis is done to test construct validity. Factor analysis more specifically principal component analysis is a data reduction technique which reduces variable or items to one or few component of factors that explains the relationship about the variables.

A qualitative data analysis method is used to find common structures and themes from qualitative data. And coding activity refers to gathering all data materials and linking them to each theme. For this study, qualitative data is analyzed using closed coding with narrative analysis. There were four themes involved on the analysis stage which based on the list of the conceptual model: Top management support, Organizational readiness, Organizational size and competitive advantage. Accordingly data was labeled and categorized based on their properties. Then using narrative analysis the researcher sort out, enhance and presented the revised data.

Table 3.2. Research Variables with missing value

Missing value	
Attribute	Percentage
I have a general favorable attitude toward using the current automation system	2.2
I have no difficulty understanding how the current automated system worked technically	0.7
Have you ever used similar automated system to do your job? If YES , The current automated system is interesting than previous ones	14%
I do my job more quickly and easily because of using the current automated system.	1.4
I have no difficulty understanding how to perform the current automated system	0.7
I have no difficulty understanding how the current automated system worked technically	0.7

3.4. Quality of Research

Reliability and validity are mostly raised in conducting quantitative research. While preparing the questionnaire ambiguous or vague wording was avoided to ensure that respondents would read and answer the question consistently on different occasions in the same context. Moreover, reliability and validity of the study is acquired through analyzing data from different sources. The data from different sources can help for crosschecking the information obtained. At the same time, the reliability was gained during the analysis part when those proved information would interpret in consistent manner.

3.4.1. Reliability of the Research

Research method Greenfield et al. [58] defined Reliability as “the consistency or repeatability of the measure”. Reliability is especially important if the measure used for an on-going basis to detect change. Purposive sampling such as timing of data collection, structure of interviews and data triangulation makes this research reliable. On the other hand, unstructured interview held by the researcher gives strength on the reliability of the information collected from the respondents than structured interview.

The Internal consistency of this study checked with the Cronbach's alpha. This is a single correlation coefficient is an estimate of the average of all the correlation coefficients of the items within a test. The SPSS statistics manual [61] states if alpha is high (0.70 or higher), then this suggests that all of the items are reliable and the entire test is internally consistent. In this regard, the Cronbach's alpha for this study is 0.910 this shows the items are reliable and the entire test or questions are internally consistent.

3.4.2. Validity of the research

Validity as it has been stated by Greenfield [58] is a way of checking that the study is "measuring what was intended to measure". There are different types of validity measurements including content validity and construct validity. The content validity was assured when the questionnaire was prepared based on extensive reading of literature review. Moreover, before the process of combining the attributes depending on their categories factor analysis test was done to test construct validity. As stated by Kumar [59] Construct validity is a data reduction technique and principal component analysis method which explains the relationship between variables.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

This chapter presents, analyze and discuss the data obtained from the data collection instruments. To assess the issues of IS adoption in the five organizations questionnaires are distributed to employees at each organization. The responses obtained through questionnaires are supplemented with interview. In this chapter, the first section presents quantitative data analysis using SPSS version 20.0. Accordingly, for data summarization Frequency, percentage, means and standard deviation value is used. In addition, different statistical methods are used to find the relationship between different factors in organizational IS adoption. The second section presents the qualitative data narrative analysis. The last section of this chapter presents discussion of findings of quantitative and qualitative data analysis.

Table 4.1 shows the total number questioners distributed and collected from five organizations. Questionnaires are distributed across Ethiopian Civil Service College, Ethio-telecom network operation and maintenance department, Ethiopian management institute, Ethiopian commodity exchange, Ethiopian Broad casting authority. The number of questionnaires distributed depends on the number of departments and users that use an automated IS to do their business operation. Interview also held with the organization department team leaders and managers to clear ambiguity during data analysis.

Table 4.1 Number of distributed and collected questionnaire

No.	Name of the organization	Number of Questioners		
		Distributed	Collected	Percentage (%)
1	Ethiopian Broad casting authority	20	13	86.7
2	Ethiopian civil service university	45	34	97.1
3	Ethiopian commodity exchange	30	22	88
4	Ethio-telecom network operation and maintenance department	45	42	93.3
5	Ethiopian management institute	30	28	93.3
Total		170	139	81.76

In general, the total number of questionnaires distributed was 170 and the returned questionnaires are 139 with a response rate of 81.76%. Initially the questionnaire response rate was 69.3% to increase this response rate redistribution of the questionnaire is undertaken which helps to improve the response rate by 12.46%. the frequency of the data collected from each organization is presented in table 4.2

Table 4.2 Organization frequency

	Frequency	Percent	Valid Percent	Cumulative Percent
BROADCAST	13	9.4	9.4	9.4
ECSU	34	24.5	24.5	33.8
ECX	22	15.8	15.8	49.6
ET	42	30.2	30.2	79.9
MGMTINST	28	20.1	20.1	100.0
Total	139	100.0	100.0	

4.1. Quantitative Data Presentation and Analysis

4.1.1. Demographic Presentation

This portion of the survey is concerned with background of the respondents to understand the employees or respondents who participate in filling the questionnaire for this research. Respondents are requested to fill their sex, age, their level of education and their present work position in the organization and year of work experience. The profile of respondents is presented in table 4.3.

When we look the respondent gender wise, 73.4% of the respondents are males where as only 26.6% of the respondents are females. This shows that more of the respondents are male.

When we see the respondent by age range 48.9% respondents are categorized in age range between 21 - 30 years, 44.6% in the age range 31 – 40. 5.8% of the respondents are

found in the age range of 41-50 years. Only 0.7% accounted for the age more than 50 years old. This shows that more than 90% of the respondents are below the age range of 40 years.

Education level wise, the majority of the respondents are first degree holders with the percentage of 72.7. Whereas 23% of the samples are from employees with educational level more than maters degree. 2.9% of the respondents have diploma and only 1.4% are certificate level employees.

Job position wise, the majority of the respondents are comprised from technical staffs of the organizations, which accounts 41.7%. Whereas 25.2% of the samples are from employees in different positions categorized as “others” on the questionnaire. 14.4% of the respondents account for supervisory position whereas 15.1% are middle class managers. Only 3.6% of the respondents are top level managers. This shows that most of the respondents are Technical staffs. This shows that the survey more staffs that are directly communicated with the IS to do their work operation. Moreover, the survey includes all level of positions which help to investigate the impact of work positions on IS implementation.

Table 4.3 Respondents characteristics

	Measure	Frequency	Percent
Gender	Male	102	73.4
	Female	37	26.6
Age	21 - 30	68	48.9
	31 - 40	62	44.6
	41 - 50	8	5.8
	> 50	1	.7
	Total	139	100.0
Education level	Masters	32	23.0
	Degree	101	72.7
	Diploma	4	2.9
	Certificate	2	1.4
	Total	139	100.0
Job position	Top management	5	3.6
	Middle management	21	15.1
	Supervisory	20	14.4
	technical	58	41.7
	Other	35	25.2
	Total	139	100.0

Years of Job experience of respondents that participate in this study is depicted in Figure 4.1.

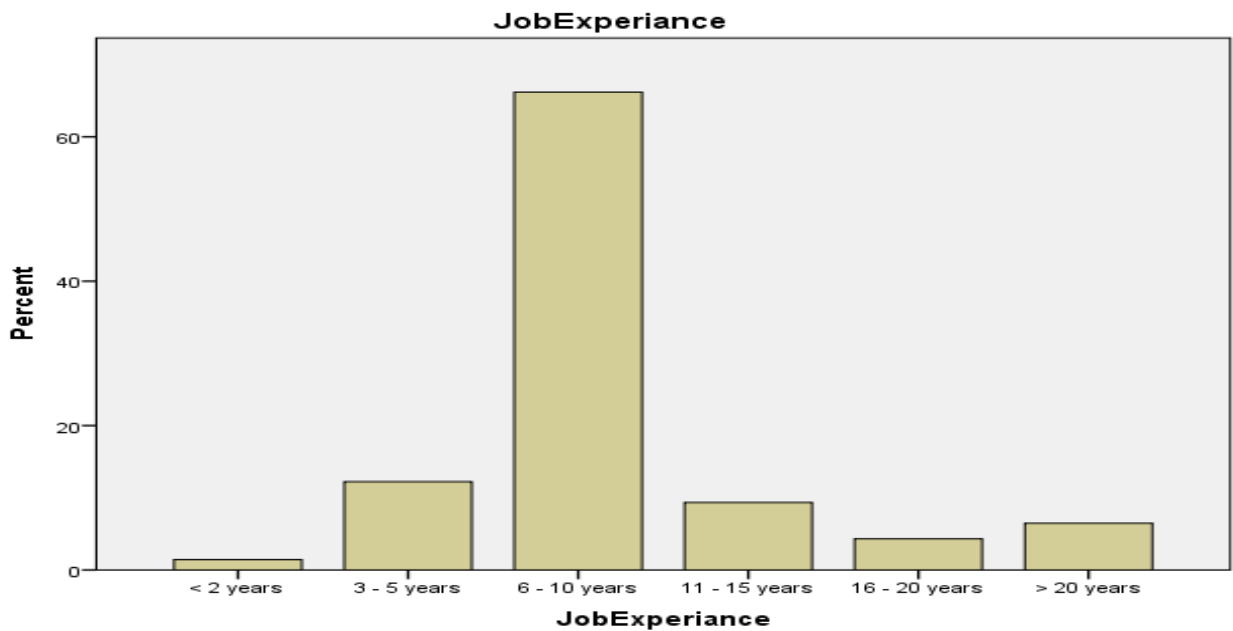


Figure 4.1 Respondents years of experience in the organizations

The job experience of the respondent is included in the questionnaire since It can show how familiar the respondents are with their work operation and how experienced they are with different systems. As it is depicted in figure 4.1, about 66.2% of the respondents are with 6-10 years of experience. 13.7% of the respondents have work experience between 11-to-20 years and 12.2% have an experience of 3 to 5 years. 12.7% of the respondents are in the range of 11 to 15 and 16 to 20. Other respondents' accounts 7.9% of the respondents are with above 20 years and below 2 years of experiences. This shows that more than 86.4% of the respondents of this study are above 5 years experience, which shows further that participants of this study are experienced employees.

Respondents are also categorized by their level of education into 2nd degree, 1st degree, diploma and certificate holders. Figure 4.2 shows the details about respondent's level of education.

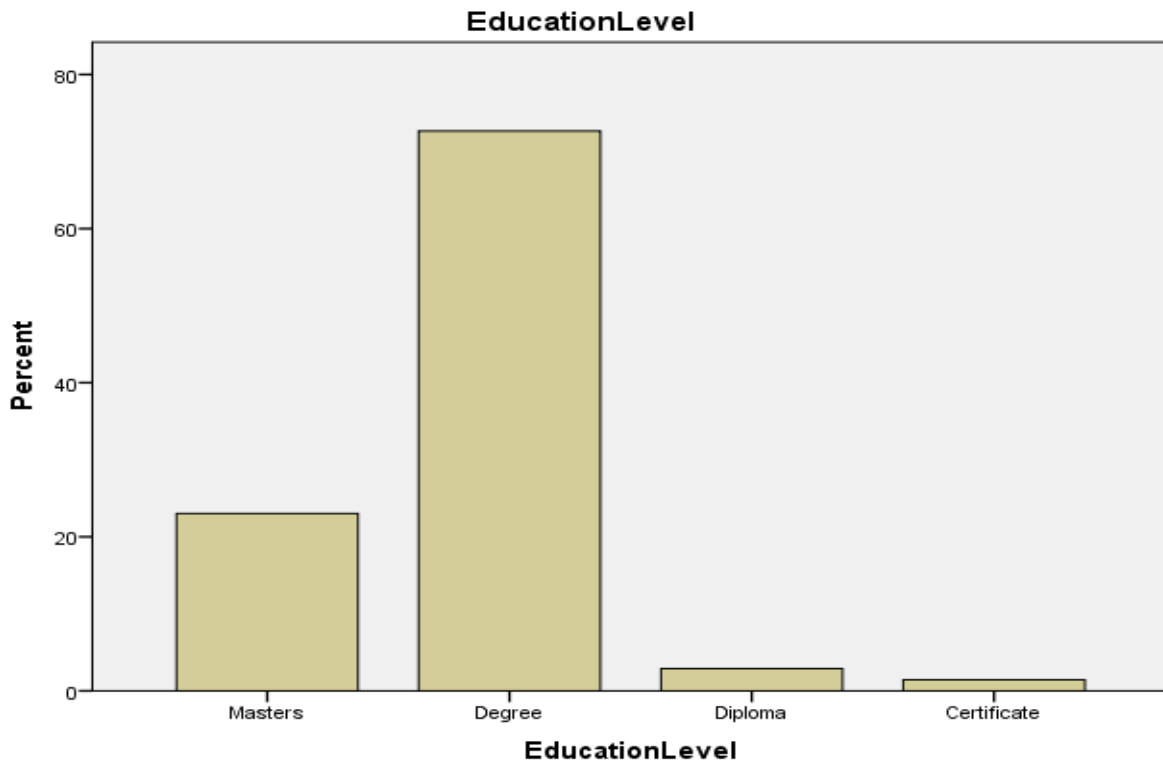


Figure 4.2 Respondents by their level of education

As it is depicted in, figure 4.2 the distribution of respondents by the level of education showed that 95.7% of the respondents are first-degree and masters degree holders. Only 4.3% of respondents are diploma and certificate holders. This shows that the majority of the staffs of the organization participated in this study are first-degree holders and masters degree holders.

4.1.2. Organizational IS Adoption : Technological Theme

IS adoption of the organizations is examined based on the combination of DOI, TAM and TOE model. The questions are presented in categorical form to answer the selected attributes of organizational, technological and environmental context.

As indicated in the conceptual model, there are 8 constructs that are investigated in relation with technological theme of IS adoption. These are ATU, PU, PEOU and the five IS adoption characteristics which are relative advantage, compatibility, complexity, trial-ability and observe-ability. The attributes in the technological theme is the result of the combination of two IS innovation model, DOI and TAM. Since the attributes are investigated as a cause effect relationship first the five IS adoption characteristics are analyzed.

4.1.2.1. IS Innovation Characteristics in Organization

The five IS innovation characteristics are investigated though a likert scale questionnaire. Each of the five IS innovation characteristics are expressed through 3 questions which was interpreted as a variable on SPSS. Then the three questions for each characteristic are represented through one variable by combining each of the three variables. But before combining the variables construct validity using factor analysis is done to analyze the correlation or relationship between variable. It should be noted that Roger's [6] definitions of the five IS adoption are based on perceptions of the innovation itself, and not on perceptions of actually using the innovation. But in this study the five characteristics are studied according to perception of actually using the innovation. Summary of the response of the employees of the five different organizations is presented in table 4.4.

Table 4.4. IS innovation characteristics (percentage distribution and mean)

Attribute	Strongly disagree	Disagree	Normal	Agree	Strongly agree	Mean
Relative advantage	0.7	2.2	13.7	45.3	38.1	4.18
Compatibility	0	7.2	11.5	61.9	19.4	3.93
Complexity (simplicity)	0	7.9	23	46.8	22.3	3.83
Trial-ability	2.9	10.8	27.3	36	23	3.65
Observe-ability	0.7	3.6	33.1	42.4	20.1	3.78

The first three questions in the part II of the questionnaire is concerning the relative advantage characteristics of the current IS in the employees use. Relative advantage is the degree to which an innovation is perceived as being better than its precursor. The precursor can be a manual system or a previous IS system, to differential this question number to part II questions is used. And 88.5% of the respondent use similar IS to operate their work operation. Out of the 85% respondent who used a different IS 69.1% think the current IS more interesting than the previous one while 5.7 % prefer the pervious system. On the combined attribute of relative advantage 83.4% of the respondents replied that they agree and strongly agree with this idea. In addition, 13.7% of the respondents are with normal attitude. The rest 2.9% of the respondents are disagree and strongly disagree. From this, we can say that most of the employees of the organization believe the current system is relatively advantageous for day to day work operation. The system advantageous character is expressed by its being useful in doing one's job more easily and quickly.

The second IS innovation characteristics is compatibility, which shows the degree to which an innovation is perceived as being consistent with the existing values. Compatibility needs and past experiences of potential adopters. And as table 4.4 shows most of the respondents are experienced staffs with more than 5 years of experience. About 81.3% of the respondents replied that they strongly agree and agree with the combatable behavior of the system. 11.5% of the respondents have normal attitude with the compatibility of the system.

Only 7.2% of the respondent replied their disagreement on the consistency of the system with the existing values. From this, we can conclude that the system is highly perceived to be compatible and help the employees of the organization to be more clear and effective on their job operation.

The third characteristic is regarding the complexity of the system, which can be explained as the degree to which an innovation is perceived as being difficult to use. To analyze this, the questions presented investigate the simplicity of the system. About 69.1% of employees strongly agree and agree with the system being simple to use. 23% of the employee responded a normal attitude on the simplicity of the system while 7.9 % disagreed. This shows most of the respondents have no difficulty performing their work operation on the system and they also have no difficulty on understanding how the system work technically.

The fourth IS innovation characteristics is regarding trial-ability which is, the degree to which an innovation may be experimented before adoption. Out of all the five IS innovation characteristics trial-ability has the minimum positive response with the percentage of 59. In addition, trial-ability is the only characteristics with the highest response of strongly disagree with the amount of 2.9 percentages. 27.3% of respondents have a normal attitude whereas 10.8% of them disagreed on being able to test the system before usage and on trial-ability having any significance on future use. From this can we can say even though, more than half of the employees want to try out the system before their organization decides to implement it. Significant amount of respondent have no interest on testing the system or believing on the difference a test can cause on their future interest of the system usage.

The survey also investigate observe-ability or the degree to which the results of an innovation are observable to others. In this regard, even though 62.5 % of the respondents agree and strongly agree that the system is observable a significant amount of employees have normal attitude towards it with the percentage of 33.1. In addition, 4.3 % of the respondents have strongly disagreed and disagreed on the system being noticeably useful for other colleagues. From this, we can understand that there is communication problem among staffs about the system in use since more than 35% have no idea about what others think and disagreed on systems observe-ability.

The IS innovation characteristics significantly impacts the IS adoption and implementation success. The cumulative mean result of IS innovation attribute is found to be 3.9 which is in agreement category. Table 4.5 shows the mean and standard deviation of IS innovation characteristics, among the five innovation characteristics relative advantage has highest high mean value while trail-ability has lowest mean value. This indicates that majority of the respondent has agreed on the system’s advantageousness in regard to operating ones job quickly and efficiently. Moreover, significant amount of respondent do not agree on the significance of trying out a specific system before using it.

Table 4.5 . Mean and standard deviation of IS innovation characteristics

Report					
	Relative Advantage	Compatibility	Complexity	Trial_ability	Observ_ability
Mean	4.1799	3.9353	3.8345	3.6547	3.7770
N	139	139	139	139	139
Std. Deviation	.80083	.77280	.86475	1.04057	.83443

4.1.2.2. Information System PU, PEOU and ATU in Organization

For investigating the IS adoption the TAM model attributes is also used. For TAM attribute respondents perceived usefulness, perceived ease of use and attitude towards usage is investigated and analyzed. The same as the five innovation characteristics three question presented for each PU, PEOU and ATU. Then the three questions were combined in to one for dimension reduction using compute method. But before doing the dimension reduction the construct validity of each question on the same category were tested.

Table 4.6. IS PEOU, PU and ATU (percentage distribution and mean)

Attribute	Strongly disagree	Disagree	Normal	Agree	Strongly agree	Mean
PEOU	4.3	4.3	26.5	51.8	23.8	3.85
PU	0	3.6	10.1	57.6	28.8	4.12
ATU	0	1.4	11.5	66.2	20.9	4.1

Regarding the PEOU a total of 75.6% of respondent have replied strongly agree and agree about the system being easy and understandable to use and operate. About 26.5% of the respondents are normal response and about 8.6% of them are disagreed and strongly disagreed on the systems nature of being easy to use. However, out of the three technology acceptance measures PEOU has the highest disagreement and moderate response with the total percentage of 35.1. In addition only PEOU out of the three technology acceptance measures have strongly disagree response. From this, we can conclude that even though the majority of the staffs have positive response on the systems easiness on usage. Significant amounts of respondent disagree or have normal view on the system being easy to use.

For PU measurement, 86.4% of respondents agreed and strongly agreed that the system help them to accomplish their work operation effectively, efficiently and with high quality. However, 13.7% respondents replied that they are disagreeing or have neutral attitude on it. From this, we can say that majority of the staffs perceive the system as useful.

ATU has been identified as a factor that guides future behavior that ultimately leads to a adopting the technology. For measuring ATU the question whether the respondents have general favorable attitude and overall interest on the system is presented. Accordingly, out of three TAM measures ATU have the highest agreement response with the percentage of 87.1 with a total of strongly agree and agree response. Moreover, no one strongly disagreed on ATU questions and only 3.6% of them respond disagree. However, 11.5% of the respondents replied that neutral attitude with this issue. From this, we can conclude that most of the staffs have a general favorable attitude towards the system.

Additionally, the mean value is calculated for each of the technology acceptance measures, table 4.6 depicts the mean values of PEOU, PU and ATU. From the table 4.6, we can see that the highest mean value is 4.12 and 4.1, which is for the perceived usefulness and attitude towards usage. The aggregated mean value is 4.0 which the overall technology acceptance model measures are in agreement category.

4.1.3. User Involvement in IS Adoption

The third section was used to assess the user's involvement regarding the implementation of the technology. In the conceptual model user involvement is constructed under the organizational theme since user involvement shows an organizational structure which make it organizational attribute. For the sake structural presentation using SPSS the result is presented here. Analyzing the user involvement in the IS implementation the percentage distribution and mean result of the respondents involvement is depicted in table 4.7 .

Table 4.7 response in user involvement (percentage distribution and mean)

Involvement	Yes	No	Mean
Leader of the project	29.5	70.5	1.7
Responsible for selecting the system	45.3	54.7	1.5
participate in the system implementation	69.1	30.9	1.3
Give user training	55.4	44.6	1.4

The user involvement is examined through respondents participation on the general IS implementation. The involvement can be by being the leader of the project team that implemented the IS, participating on the selection process of the system, participating in any phase of the implementation and having responsibility on giving user training. In this regard, 69% staffs categorized themselves as having responsibility on the overall implementation process. While 55% of the respondents participated in giving training, 45% responsible for selecting the system and only 29% are the leader of the project.

4.1.4. Relationship Analysis

The association test between respondent's demographic characteristics (age, work experience, education level and job position) and PU is tested to find if there is any significant relationship. Since the variables under the test involve ranked data kendall's tau-b and Spearman's Bivariate correlation coefficients test used. The result in table 4.8 shows out of all the demographic characteristics of respondent job position has the relationship with PU. As depicted in the table the study fails to reject the null hypotheses that state no correlation between PU and age, year of experience or education level.

Table 4.8. correlation between Respondent's characteristics and PU

Correlations			
			PU
Kendall's tau_b	Age	Correlation Coefficient	-.093
		Sig. (2-tailed)	.241
		N	139
	EducationLevel	Correlation Coefficient	.090
		Sig. (2-tailed)	.260
		N	139
	JobExperiance	Correlation Coefficient	-.128
		Sig. (2-tailed)	.095
		N	139
	JobPosition	Correlation Coefficient	.165*
		Sig. (2-tailed)	.027
		N	139
Spearman's rho	Age	Correlation Coefficient	-.100
		Sig. (2-tailed)	.240
		N	139
	EducationLevel	Correlation Coefficient	.097
		Sig. (2-tailed)	.258
		N	139
	JobExperiance	Correlation Coefficient	-.143
		Sig. (2-tailed)	.094
		N	139
	JobPosition	Correlation Coefficient	.187*
		Sig. (2-tailed)	.027
		N	139
*. Correlation is significant at the 0.05 level (2-tailed).			
**. Correlation is significant at the 0.01 level (2-tailed).			

For the relationship analysis between job position of respondent and his or her PU towards the system, shows job position and PU has significant relationship with P value of 0.027. To view the strength of the relationship cramer's V symmetric measure with chi-squared test is presented in table Table 4.10 and table 4.9 respectively.

Table 4.9 Chi-squared test between Job position and PU

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	149.381 ^a	12	.000
Likelihood Ratio	53.204	12	.000
Linear-by-Linear Association	16.836	1	.000
N of Valid Cases	139		

a. 11 cells (55.0%) have expected count less than 5. The minimum expected count is .18.

The below table shows symmetric measure with cramer's V value 0.599 which is moderate relationship between job position of staff and PU.

Table 4.10 cramer's V symmetric measure for job position of staff and PU.

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	1.037	.000
	Cramer's V	.599	.000
N of Valid Cases		139	

4.1.4.1. The Effect of IS Innovation Characteristics on PEOU

For analyzing the relationship between attributes in technological theme multiple regressions is analyzed. The correlation test shows the relationship between the five innovation characteristics with PEOU and the relationship between PEOU, PU and ATU. A multiple regression allows us to look at several factors that affect a dependent variable and determine what factors exert a greater influence on the dependent variable. For example, we may suspect the PEOU of a specific IS is determined by the five IS innovation characteristics. An IS with a greater percentage of IS innovation characteristics quality will have more PEOU than IS with lower IS innovation characteristics. To analyze this, the multiple regression test is taken.

Table 4.11 : multiple regression for IS innovation characteristics with PEOU

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48.489	5	9.698	15.857	.000 ^b
	Residual	81.338	133	.612		
	Total	129.827	138			
a. Dependent Variable: PEOU						
b. Predictors: (Constant), Observ_ability, Trial_ability, Complexity, Relative_Advantage, Compatability						

Under table 4.11 of ANOVA table the “Sig.” column. The number is 0.000, this shows the relationship between the independent variables (the five IS innovation characteristics) and the dependent variable (PEOU) is not due to chance.

Table 4.12 depicts how much influence each independent variable (relative advantage, compatibility, complexity, trial-ability and observe-ability) exerts on the depend variable (PEOU). Accordingly, we can analyze coefficients table “sig.” column to find any significant relation and the “Standardized Coefficients, Beta” column for identifying the strength of the relationship. In this case, compatibility and complexity are significantly related to PEOU with sig. value of 0.000 and 0.016 respectively. And compatibility has more influence on PEOU than complexity with beta value of 0.453.

Table 4.12: multiple regression coefficients for IS innovation characteristics with PEOU

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.007	.462		.016	.987
	Relative Advantage	.173	.096	.143	1.809	.073
	Compatibility	.569	.109	.453	5.207	.000
	Complexity	.205	.084	.182	2.429	.016

	Trial ability	.086	.068	.092	1.258	.211
	Observ_ability	-.058	.106	-.050	-.550	.583
a. Dependent Variable: PEOU						

4.1.4.2. The Effect of PEOU and PU on ATU

For analyzing the relationship between PEOU, PU and ATU the multiple regressions test is presented. For this test the independent variables are PEOU and PU while the dependent variable is ATU. This means the test is done to find if there is any significant relation between PEOU, PU and ATU and make sure the relationship is not by chance.

Table 4.13 and table 4.14 shows the relationship between PEOU, PU and ATU does in fact exists and the more relevant influence is caused by PU.

Table 4.13 : multiple regression for PEOU and PU with PEOU

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.818	2	5.409	17.684	.000 ^b
	Residual	41.599	136	.306		
	Total	52.417	138			
a. Dependent Variable: ATU						
b. Predictors: (Constant), PU, PEOU						

Table 4.14. Multiple regression coefficients for PEOU and PU with ATU

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.473	.274		9.019	.000
	PEOU	.094	.060	.148	1.558	.122
	PU	.299	.081	.351	3.696	.000
a. Dependent Variable: ATU						

4.1.4.3. The Effect of User Involvement on ATU

Cross Tabulation between user Involvement and ATU

Table 4.15 shown below indicates whether there is association between respondents' involvement and their attitude towards system usage. For user involvement the users' involvement as a project leader, user involvement in selecting the system and user involvement in overall system implementation is included. This analysis will help to understand the effect of user involvement in different level of system implementation and their attitude towards the usage of the system. The response in user involvement shows that out of four type of user involvement the involvement type labeled as leader of project team has lowest involvement percentage. So, cross tabulation for user involvement under as leader of project team and ATU is not done. For the rest user involvement categories which are, responsible for selecting the system, participate in the system implementation and give user training, the association test is presented.

For the user involvement type as having responsibility in selecting the IS the cross tabulation done to find if there is any association exist between user involvement on selection the IS and ATU. Table 4.15 and table 4.16 shows the cross tabulation and the chi-squared test, the null hypothesis is there is no statistically supportive relationship between user involvement in selecting the system and his or her ATU. When we look at the table 4.16, of chi-squared test it states 2 cells (25.0%) have expected count less than 5 and the minimum expected count is .91. This means since the test violates the assumption so instead of looking at pearson's chi-square the likelihood ratio result is analyzed. The assumption is all the expected counts not less than 5 or 20% of the cell have expected count greater than 5. The likelihood ratio shows the result 0.232 which is much bigger than the level of significance which is 0.05. This implies that, the data fails to indicate staffs involvement in selecting the IS has no significance in ATU.

Table 4.15: cross tabulation between respondent's user involvement in selecting the IS and ATU

User involvement in selecting the IS * ATU							
			ATU				Total
			Disagree	Normal	Agree	Strongly Agree	
User involvement in selecting the IS	Yes	Count	0	5	43	15	63
		Expected Count	0.9	7.3	41.7	13.1	63
	No	Count	2	11	49	14	76
		Expected Count	1.1	8.7	50.3	15.9	76
Total		Count	2	16	92	29	139
		Expected Count	2	16	92	29	139

Table 4.16 chi-square test between respondent's user involvement in selecting the IS and ATU

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.490 ^a	3	.322
Likelihood Ratio	4.287	3	.232
Linear-by-Linear Association	2.679	1	.102
N of Valid Cases	139		
2 cells (25.0%) have expected count less than 5. The minimum expected count is .91.			

For the user involvement type as involving in the overall IS implementation the cross tabulation and chi-squared test is presented in table 4.17. the table shows that there is no statistically significant correlation between users implementation involvement and ATU with with the likelihood ratio result of 0.092 which is greater than 0.05.

Table 4.17: cross tabulation between respondent's User involvement in overall IS implementation and ATU

User involvement in overall IS implementation * ATU						
		ATU				Total
		Disagree	Normal	Agree	Strongly Agree	
	Count					
	Expected Count					

User involvement in overall IS implementation	Yes	Count	1	7	69	19	96
		Expected Count	1.4	11.1	63.5	20.0	96.0
	No	Count	1	9	23	10	43
		Expected Count	.6	4.9	28.5	9.0	43.0
Total	Count	2	16	92	29	139	
	Expected Count	2.0	16.0	92.0	29.0	139.0	

Table 4.18 chi-square test between respondent's user involvement in overall IS implementation and ATU

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.827 ^a	3	.078
Likelihood Ratio	6.431	3	.092
Linear-by-Linear Association	1.269	1	.260
N of Valid Cases	139		
a. 3 cells (37.5%) have expected count less than 5. The minimum expected count is .62.			

For the association test between users's involving in user training and the users ATU the result shows the null hypothesis is not accepted and proves the relative hypothesis is right. The relative hypothesis in this case is, ATU is dependent in user's involvement in giving training. The chi-square test presented in table 4.20 shows 0.001 is which is less than 0.05 this implies there is statically significant correlation between the two variables.

Once the dependency relationship between user's involvement in user training and ATU is found the strength of the relationship was tested using cramers V symmetric measure. The result of cramer's V symmetric measure presented in table 4.21 depicts how strong is the relationship between the independent variable (user involvement in giving training) and the dependent variable (ATU). Cramer's V value is 0.334 which is translated as a moderate level of relationship.

Table 4.19: cross tabulation between respondent's User involvement in user training and ATU

User involvement in user training * ATU							
			ATU				Total
			Disagree	Normal	Agree	Strongly Agree	
User involvement in user training	Yes	Count	1	2	53	21	77
		Expected Count	1.1	8.9	51.0	16.1	77.0
	No	Count	1	14	39	8	62
		Expected Count	.9	7.1	41.0	12.9	62.0
Total		Count	2	16	92	29	139
		Expected Count	2.0	16.0	92.0	29.0	139.0

Table 4.20: chi-square test between respondent's User involvement in user training and ATU

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.520 ^a	3	.001
Likelihood Ratio	16.681	3	.001
Linear-by-Linear Association	11.065	1	.001
N of Valid Cases	139		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is .89.			

Table 4.21 : symmetric measure respondent's User involvement in user training and ATU

Symmetric Measures			
		Value	Approx. Sig.
Nominal by Nominal	Phi	.334	.001
	Cramer's V	.334	.001
N of Valid Cases		139	

4.2. Qualitative Data Analysis

In addition to the quantitative study, qualitative data analysis is conducted to analyze the organization and environmental theme of the IS adoption model. In addition the interview used to clarify the findings obtained from the survey. Interviews have been conducted with the five organization top management leaders, department team leaders and the MCIT E-government sector staffs; including IT supervisors, IT managers, IT directors, and owners of some companies. These informant were considered as the key persons involved in the IS adoption decision-making process.

Table 4.22. The Characteristics of the five organizations.

Companies' Information			Interviewee's Information	
Industry	Size	IT Staff	Job Position	Education background
media and communication	Relatively smaller	6	IT manager	IT
educational	Relatively smaller	23	IT Supervisor	IT
commercial	Relatively larger	47	IT supervisor	IT
Administration and educational	Relatively smaller	11	IT Manager	IT
Telecommunication	relatively Larger	> 50	IT Manager	IT

4.2.1. IS Adoption : Organizational and Environmental Theme

The interview focuses on the factors in organizational and environmental theme, which include top management support, organizational readiness, and organizational size and competition. Accordingly the qualitative study will help to identify how do the factors of organizational size, top management support and organizational readiness influence the adoption IS in the organizations.

Majority of the interviewees indicated that the intention to adopt IS had a strong

relationship with the current needs of the organizations. This was pointed out by organizations which argued that IS adoption complied with their needs to replace their previous operation with new ones in order to support their business activities:

“We decided to use this application since it complies with our current need that is to replace our traditional system to a new information system.” (Org.2 to Org. 5).

“The use of an archive application in our company is very crucial, mainly to support the collaboration process between our business partners and internal users. But, since the current archive system could not fulfill the requirement of our stakeholders, we experienced an inconvenient situation. This triggered us to adopt a new system which is going to be implemented in the next few months” (Org1).

Some of the case companies mentioned that they did not encounter any problems with their existing information systems that they have been using since the system was developed. So, they would rather develop new functionalities to their existing system than adopting a new IS, as is illustrated by the following quotes:

“Since the transformation of the manual system to the automated system, we have been using this online commercial System; hence, we know the pattern of this information system to find out what our customers want. Currently, we put our focus more on the development of business intelligence functionality in this system which may help in increasing customer satisfaction.” (Org 3)

“The Academic Information System that we have now has already been using since 2013 in order to successfully manage the whole academic processes in our institution. Therefore, we don't think that we need to adopt a new IS at this moment.” (Org 2).

The following paragraphs present detailed results of interviews in terms of the influence of top management support, organizational readiness, and organizational size in triggering the intention of IS adoption.

Top Management Support

In this study, top management refers to someone or a group of people who make a decision to adopt or not to adopt IS and/or to allocate the necessary organizational resources to support the adoption process. A decision to adopt or reject IS can be made by the managers of the company, the IT director or the IT manager, as we can see from the comments below.

“...decision to adopt this Information System was made by the Managers of the organization...since I am currently IT team leader and have sufficient knowledge about IT, the decision was taken by myself and the managers of different level.” (Org 4).

Top management may also refer to someone who has a key role to influence all decisions taken by a decision maker. In one of the organizations, even though the IT team leader has no power to make any decision regarding adoption of a new IT innovation, he has a power to influence the decision makers in his company to adopt certain IT innovations.

“We have just purchased our new student registration System, hence, I do not think that we will adopt IS within the next few years. The decision is on the board of senate, I am just giving them some suggestions on IT implementation.” (Org. 2).

Two of the organizations, decisions made by the top management were not merely based on recommendations from the internal users of the organization, such as from the IT department staff, but also influenced by the suggestions from the external organization, such as the government policies and the professional community. In this study, the organizations which are under the control of MCIT were influenced by MCIT and INSA to adopt an IS. MCIT and INSA have obligation to support organizations in accordance to the Ethiopian GTP technological goal. This is generally confirmed below by all of the organizations.

"As a governmental organization, each new IT innovation that is to be adopted must comply with the regulations made by the government, such as by MCIT which has the authority in supporting and suggesting all IT related activities.” (org1 and Org 4).

In another case, some of the interviewee explained that their top management sometime takes suggestions from their professional community as considerations before deciding to adopt a new innovation and this also applies in IS. The following comments support this idea.

“The decisions are taken by the organization management with considering the IT department recommendations. However, they also sometime consider the suggestions from their colleagues from other organization engaged in similar sector.” (Org1, Org 2 and Org3).

But in relation to top management support some organization presented the down side of top management initiating an IS which is presented below:

“We have a system that was initiated by our top management, and in our organization any innovation initiated by our top management is more likely to be adopted. But this has a down side since the departmental staffs are not highly involved on the requirement process. Most of the systems adopted because of top management initiation have low user satisfaction which in turn leads to replacement of the IS.” (Org 4)

“We had an IS that was requested by our top management to be implemented because the top management had suggestion from a related sector. But since that specific system was not applicable for our specific environment it had to be replaced without even being used.”

Accordingly, this study concluded that top management support has a strong association with IS adoption.

Organizational Readiness

The readiness of a company to adopt new IT innovations can be considered in three aspects of organizational resources including financial, IT infrastructure, and IT professional. The absence of one or all of these resources is likely to prevent the company’s intention to adopt the innovations. Of the five organizations in this study, two of them are relatively larger organization and have been assumed as having sufficient resources to support the adoption of new IT innovations in their companies.

One of the two larger organization indicated that because of the high skilled professional staff availability, they preferred to develop the system themselves, as is illustrated by the following quote. But because of financial problem some IT infrastructures are not ready which ultimately affect the development of IS by themselves.

“Since we have high number of competent IT professionals more system are developed by ourselves and until now more than half of the overall system that the organization put in use is developed by our IT staffs. But because of financial problem there is some IT infrastructure issues which affect IS development and adoption.” (Org3).

“Because there is low number of staffs it is hard to develop system but since there is no financial and infrastructure problem IS packages are usually purchased and functionally improvement is done by own staff whenever possible”

In contrary to the above statement another response from a different organization states because of IT professional shortage it is impossible to develop an IS by ourselves. In addition because of financial problem it takes time to purchase an IS. The below argument indicates because of their insufficient organizational resources to develop or purchase an IS, the option to adopt any IS on the decision of higher government officials or organizations.

"For our organization, it seems quite difficult to adopt a new IS by developing it inside since we have very low number of IT professional. It is also quite difficult since only a small financial budget is assign for the IT development. The only way of adopting an IS to follow a standard system set by the principal of MCIT. We should have an initiation from MCIT or higher organization first to adopt any new IT innovations." (Org1).

When we take a look on one of the organization, the intention to adopt is related to the efficiency of its resources utilization. Thus, the company can be more focused on running its core business activities.

"Since our organization deals with high number of customer national wise, we believe that it is efficient to spend more budgets to choose a better trouble reporting system. We have one big department that is allocated for maintaining the trouble reporting system. The department controls if the system is forwarding any problem for the operation and maintenance department. This helped us to be more focused on our core business activities.” (Org 5).

Therefore, according to the aforementioned arguments, the presence of enough financial allocation, good IT infrastructure, and IT-skilled professional, seems to be positively associated with the adoption of IS.

Organizational Size

The other organizational factor that this study explored was organizational size. As shown in Table 4.22, of the five organizations that participated in this study, two were relatively larger in accordance with number of staffs functionally level and the others were relatively smaller. Two of the large companies have adopted relatively large number of IS than the rest but the arguments in the organizational readiness shows this is because of availability of resources. Moreover the organization adopt more IS so as to get customer satisfaction and increase income. Consequently, this study concluded that organizational size has an inverse relationship with IS adoption.

Competitive Advantage

The environmental factor selected for this study is competitive advantage. Similar to the organizational readiness and top management support, competitive advantage has positive relation for IS adoption.

"Not competitive but partnership affects online commercial system was adopted to gain competitive advantage and partnership with international commercial organization" (Org. 3 and Org 5)

"Since higher governmental officials are the customers of the institution the organization tend to be the best accordingly most IS are adopted to gain competitive advantage" (Org. 2 and Org. 4)

4.3. Discussion of the Findings

The assessment of IS adoption in the five governmental organizations using the reconstructed combination of DOI, TAM and TOE model reveals findings that are crucial to improve a successful IS adoption and implementation. This study comes up with the valid finding that help to reconstruct the conceptual model and propose a theoretical model for successful IS adoption.

The five IS innovation characteristics, PEOU, PU and ATU are examined in technological theme of the conceptual model. The result reveals that the five innovation characteristics have cumulative mean of 3.9 which is in agreement category. Out of the five

characteristics relative advantage has highest mean value while trail-ability has lowest mean value. This shows majority of the respondents agree on the systems advantageousness and a significant number of respondent don not agree on the significance of trying out a specific system prior to usage. For PEOU, PU and ATU the aggregated mean value is 4.0. The result shows that majority of the respondent perceive the system as useful and have a positive attitude towards using it.

The inferential analysis between respondents' characteristics and his or her PU of the IS resulted in a significant relationship between an employee's job position and his or her PU of the IS. Accordingly, to investigate specific job position of respondent and his or her system's PU agreement level cross tabulation analysis is done. According to the cross tabulation result (see Appendix 3), of those who agree and strongly agree on the system's usefulness 91.3 % are technical staffs. This shows the more the staff works in technical position the more he or she perceives the system as being useful.

Similar to that of job position and PU a significant relationship found between two of IS innovation characteristics and PEOU using regression analysis. The significant factors among the five characteristics are compatibility and complexity with compatibility having more significant value. To find the agreement level and percentage crosstab between compatibility, complexity and PEOU is used. The result shows (see Appendix 4) more than 70% of respondent that agree on the system's PEOU also agree on systems compatibility. This shows the more people think a system is compatible the more they will perceive the system as easy to use. Moreover, the less people think the system is complex the more they will perceive the system as easy to use.

The multiple regression analysis between PEOU and PU with ATU shows both PEOU and PU has significant relationship with ATU. To see the agreement level the crosstab analysis is performed (see Appendix 5). Accordingly, 62% of respondent that agree on having a positive attitude towards system usage perceived the system as easy to use. And 72% the respondent that agree on ATU perceived the system as useful. Relatively PU has more strong relation to ATU than that of PEOU. Therefore, the more employees perceived the system as useful the more they will agree on usage of the system.

For user involvement relationship analysis with users ATU of a specific system the result shows for different type of user involvement on IS implementation there is different relation with ATU. In this regard user involvement as: IS implementation project leader, having responsibility in IS selection, participant in general implementation and as trainer are included. Out of the four involvement type only user participated in giving system training has significant relation with systems ATU. The cross tab presented on Table 4.19 show 72.4 % off people that strongly agree on having attitude towards using the system are involved in the system's implementation process as a trainer.

The qualitative data analysis investigate the influence of organizational and environmental theme of the conceptual model with factors on IS adoption. In organizational theme three attribute specifically top management support, organizational readiness and organizational size have been analyzed. Accordingly, top management support and organizational readiness has a positive impact on IS adoption while organizational size has no relation with the adoption process. For the environmental theme the analysis shows competitive advantage has positive relation with the adoption process.

Four Top management two important factors have been identified: strategic planning attention and managerial position support. For the strategic planning attention whenever the IS is included in the organizations or national wide strategic plan there is a very high probability of IS adoption. The second factor identified in the top management support is managerial position support. This show if a higher management or and organization in the hierarchy initiates or support the IS then it is more likely that the IS will be adopted.

Organizational readiness can be explained in terms of financial, IT infrastructure, and IT professional. The three measures of organizational readiness have a positive influence on the IS adoption. While having all the three readiness measure has a more influence combination of two factors proved to be effective in the adoption process. In addition, for environmental context competitive advantage is examined and the analysis shows competitive advantage has positive influence on IS adoption. The competitiveness nature varies between trying to be the best and trying to create partnership. This is because some of the organizations have no competition inside the country. But to be compatible with international organizations some Ethiopian organizations update their technology in accordance with their partners.

4.4. Proposed Theoretical model

The aim of this research was identifying different factors that affect IS adoption in Ethiopian organizations and construct a theoretical model for successful IS adoption. After extensive literature review organizational IS adoption factors and issues identified. Then using three prominent IS adoption models (DOI, TAM and TOE) the conceptual model constructed to guide the overall data collection mechanism and research direction. The IS adoption factors found from previous researchers selected from each model and categorized in to the three themes of TOE model. Accordingly, the first aspect of TOE model which is, technological theme includes the attribute of DOI and TAM. The five innovation characteristics of DOI and TAM user's motivation factors measures: perceived PEOU, PU and ATU are used in the technology theme. And for TOE organizational theme organization size, users involvement, top management support and organization readiness are included. And the last theme which is environmental theme includes competitive advantage.

Using the conceptual model, the data collected from the five Ethiopian Governmental organizations analyzed with different statistical methods. Accordingly the analysis resulted in finding compatibility, simplicity, PEOU, PU and ATU to be importance factors on the Technological theme. In the organizational theme user involvement, top management support and organizational readiness found to be influential on organizational successful IS adoption. and in the environmental theme competitive advantage is included. Depending on these findings the conceptual model is modified and a theoretical model proposed in Figure 4.3 for successful organizational IS adoption implementation. The diagram depicts the factors and relationships between each factors for successful IS adoption in organization.

The three themes in the proposed theoretical model, which are technological, organizational and environmental are important factors for successful IS adoption. Hence, the organizational IS adoption should follow all the three themes and the attributes in each theme. The next paragraphs explain the relationship between each theme and attributes in the theoretical model so as to be able to identify what an overall organizational IS adoption implementation should look like.

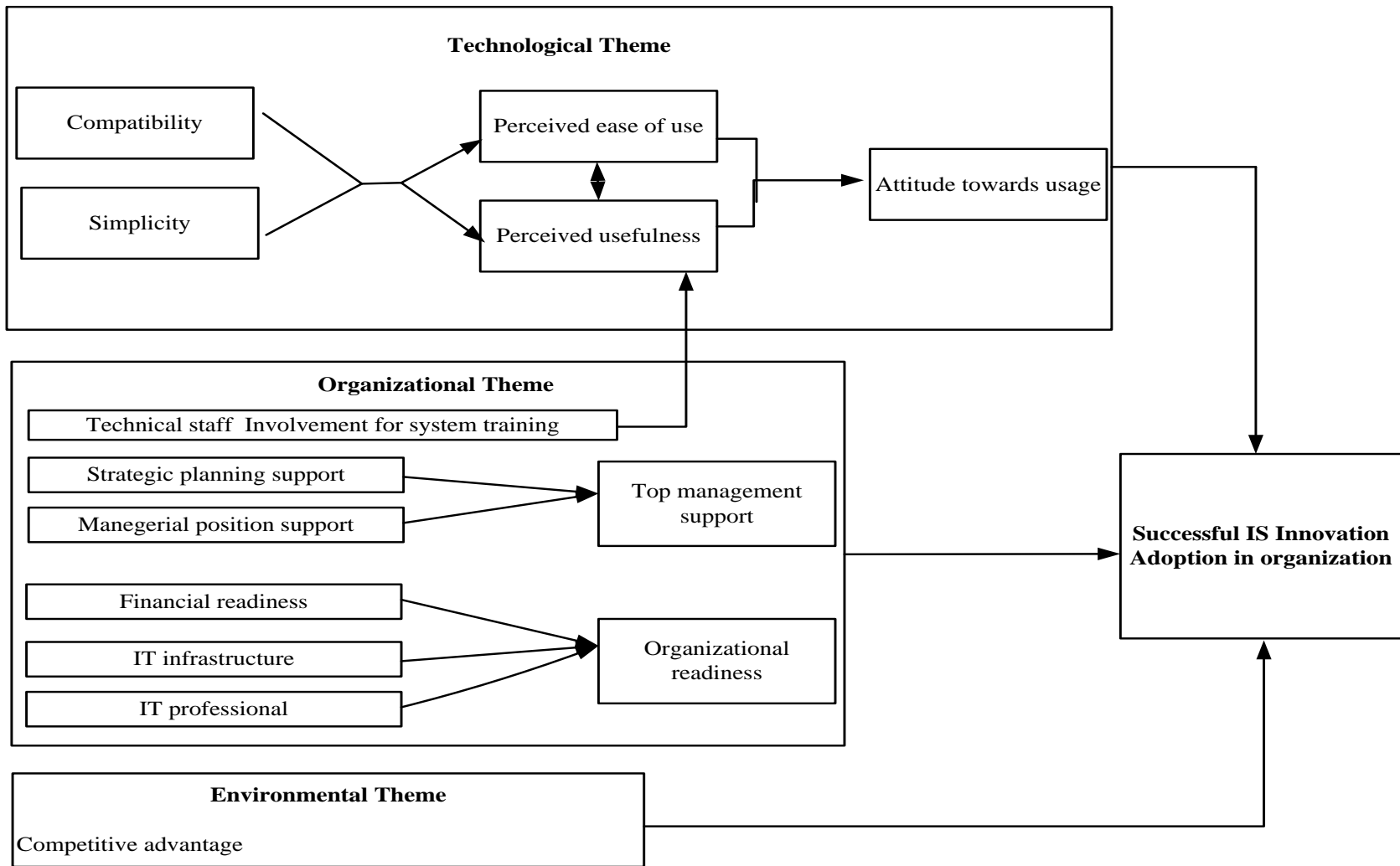


Figure 4.3. IS adoption proposed theoretical model.

Technological Theme

In the technological theme, the technology to be adopted should have characteristics of compatibility and simplicity. These characteristics will help users' perceive the system, as easy to use and as useful, in their work operation. Users' positive perception on the technology in regard to PEOU and PU will make positive impact on users' attitude towards usage of the system, which is the ultimate goal of the technological attribute. To get positive PEOU or PU both the IS innovation must have both compatibility and simplicity character. The theoretical model also shows PEOU and PU are both dependent on each other while ATU is the result of both PEOU and PU.

Organizational Theme

In the organizational theme, three major factors have been identified as influential for successful IS adoption, these are user involvement, top management support and organizational readiness. User involvement is found to be important when technical staff's participate in giving system training for other users. The job position as technical staff and the user involvement type as a trainer are important factors for the majority of staffs' positive perception on PU which is the technological attribute in the proposed theoretical model. So, a technical staff participated in giving IS training for users will have positive perception towards system's usefulness.

The second attribute for organizational themes is found to be top management support. In this study, the important factors that make up top management support are strategic planning support and managerial position support. Strategic planning support in the proposed theoretical model is, recognizing IS in the overall organizational strategic planning. Meanwhile for managerial position support, top management in hierarchical structure should have the understanding about the advantage of IS to meet organizational goal. This study found for the successful IS adoption and implementation, top management support should based on strategic plan unless and otherwise the support can be biased and lead to adoption of IS that does not meet users requirement.

The third organizational attribute is organizational readiness, which is expressed in terms of financial support, IT infrastructure readiness and skilled human resource allocation. The three factors makeup organizational readiness and have cause and effect relationship. The relationship

can be expressed as an organization with dedicated investment for IS can facilitate the infrastructure and skilled human resource allocation which help making the organization ready for IS adoption.

Environmental Theme

The last theme of the proposed theoretical model is environmental theme which indicates the competitiveness of an organization. An organization with a competitive or/and partnership sense has more probability in IS adoption. For most Ethiopian governmental organizations there is no local competitor organization since one major organization work a specific sector, example Ethio-telecom, ECX. So, in this case competitiveness is expressed in a sense of coping up with an international partner organization. So, to be able to work with their partners that are more advanced in the technology Ethiopian organizations tend to adopt IS.

4.5. Comparative Analysis

Comparative analysis is done for comparing the theoretical model proposed in this study with previous IS adoption models. For the comparison UTAUT Model is selected since UTAUT was proposed as a theoretical advancement over existing theories which shows that UTAUT being the latest IS adoption model and it's representativeness of the previous models.

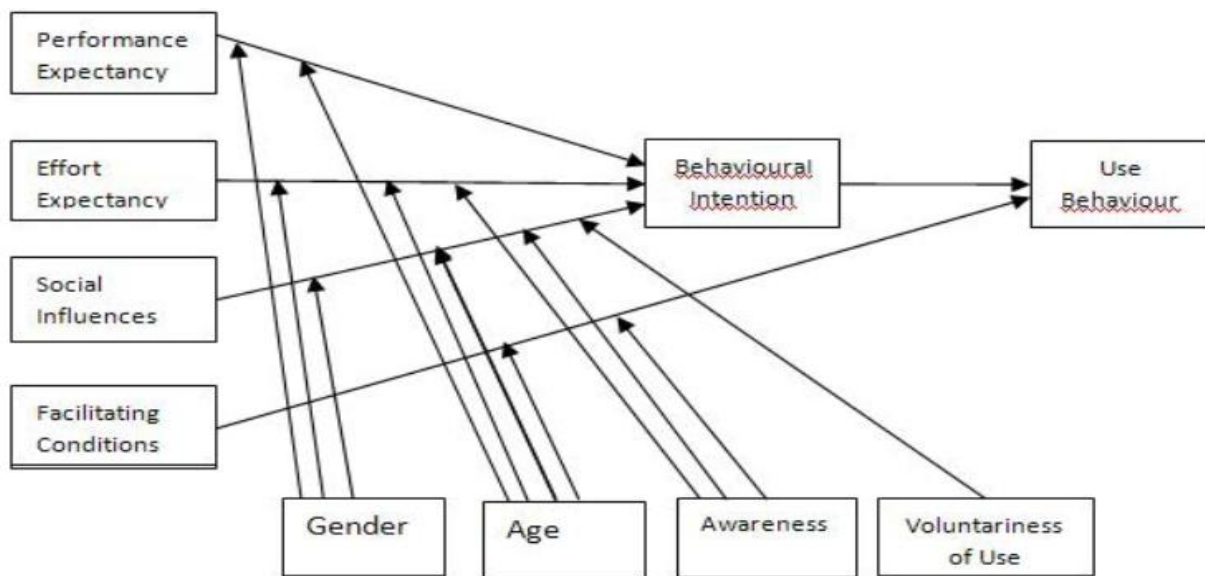


Figure 4.4 UTAUT innovation adoption model (adapted from [38])

As stated by Venkatesh et al. [38] UTAUT study user's intentions to use an IS and the intention of usage measured using four constructs which are, performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). While the Theoretical model proposed in this study has three main constructs which are Technological, organizational and environmental theme. Two of the constructs of UTAUT model are similar to the attributes in the technological theme, PE similar to perceived usefulness (PU) whereas EE similar to perceived ease of use (PEOU). UTAUT model states the four major construct which are PE, EE, SI and FC are direct determinants of IS usage while Gender, age, awareness and voluntariness of use are variables that affect the four constructs. Venkatesh et al. [38] states Performance expectancy (PE) of UTAUT model is shown when an individual believes that using the system will enhance their job performance. Effort expectancy (EE) is the degree of ease associated with the use of the system. Social influence (SI) is the degree to which an individual perceive that other believe he or she should use the system while Facilitating condition states the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.

The theoretical model proposed in this study has similarities with UTAUT model in regard of some attributes like PU and PEOU to PE and EE of UTAUT model. But the exact factors that leads to PU and PEOU is stated as compatibility and simplicity while there is no exact factors for PE and EE stated on the UTAUT model. In addition social influence (SI) of UTAUT model is similar with environmental factors of the proposed theoretical model. However, for the proposed theoretical model the attributes of the environmental theme is stated as competitive advantage specifically competitive advantage in regard to facilitating partnership relationship with other organizations and higher governmental force to make a specific organization competitor according to the national ICT policy. The fourth major construct of UTAUT model is facilitating condition (FC) which is similar with organizational theme in regard to organizational readiness. However, the organizational theme of the proposed theoretical model is composed of three attribute which are user involvement, top management support and organizational readiness. Among these major attributes of organizational theme organizational readiness is similar with that of FC but in the proposed theoretical the factors that make up organizational readiness are specifically stated as financial readiness, IT infrastructure and IT professional availability according to the findings in the Ethiopian public organization context.

For the organizational theme the proposed attribute includes top management support and user involvement in addition to the organizational readiness. For each the three major attributes in the organizational theme the factors that make up the attributes are specifically stated according to the findings done on the Ethiopian public organizations. In UTAUT model four factors which are gender, age, awareness and voluntariness of use stated as factors that affect the four major constructs however in the proposed theoretical model the analysis resulted in no relationship between the individual demographic characteristics like age and gender to IS usage except for job position of the individual. On further analysis done on the job position of the individual with that of his or her involvement on the IS implementation shows technical user participated in giving training about the IS has a positive effect.

In general there are conceptual similarities between the major construct of UTAUT model and the theoretical model proposed in this study. However the structural and categorical involvement of each constructs differs and for the proposed model the exact factors that make up a specific attributes are stated according to the findings of the analysis. In addition the number of attributes stated in each three themes differs from that of UTAUT model.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1. Conclusion

In an era of innovative developments in information system, IS innovation in its employment among organizations is increasingly crucial to the survival and success of an organization. The adoption and use of IS innovation to achieve an organizational goal has received a great deal of attention in recent IS literature. However, thus far no local researchers have set forth to apply the findings the three prominent innovation adoption models theories in into a theoretical model that can help guide organizational IS adoption.

Ethiopian economy is based primarily on agriculture, much of it subsistence farming, which has been disrupted by conflict and famine. For this situation to change, Ethiopia has to take a bold decision to invest in a knowledge-based economy and take the advantage of opportunities offered by technology. While investing in a technology is significant there are two major factors that need attention. The first one is the investment process should be accelerated to meet the sense of urgency by increasing the adoption process. The second one is the technology should meet its objectives and transforms each organization to a better place. To do so, the IS adoption process has to be systematic and successful. Accordingly, this study focuses on identifying influential factors for successful IS adoption process on governmental organization engaged in different sectors.

In general, the objective of the study is identifying technological, organizational and environmental factors that affect IS adoption in organization and construct a theoretical model for successful IS adoption. In relation to the objective, three research questions were raised.

- What are the major factors that affect successful IS adoption in the organizations.
- Does a relationship exist between different attributes of existing IS adoption model and successful adoption of IS.
- How can the factors can be categorized and arranged to create successful IS adoption process.

To achieve the objective of the study and answer the research question, three IS adoption models were combined, reconstructed and investigated to identify factors for successful IS adoption model. By carrying out quantitative and qualitative research the study was able to shed light on the underlying factors of a successful IS adoption in Ethiopian organizations.

According to the findings, the two system's innovative characteristics which are compatibility and simplicity and the three measures in the technology acceptance which are PEOU, PU and ATU found to be important factors for successful IS adoption. Moreover, user involvement, top management support, organizational readiness and competitive advantage have been identified as organizational and environmental factors. Accordingly, the study provides a theoretical model for successful IS adoption in organization.

Primarily the findings of this study have important implications for the research community on innovation adoption studies, organizational adoption decision makers and system developers.

Recommendation for IS researchers, adoption decision makers and system developers

- Information system researchers: This study can be a reference to other researchers mainly who have interest on IS adoption in Ethiopian organizations which remains very limited in the number of publication.
- Organizational adoption decision makers: The outcome of the study represents series of approaches that will apply for checking the suitability of a IS for organization and how well it achieves the aims and objectives of the design. It can help organization IS adoption decision makers in planning, evaluation and executing the use of a system. Generally, The Information that this study provides can prove to be a useful tool when making IS adoption since informed decisions could decrease the risk of poor technology choices.
- System developers: This study can be used to obtain more understanding on current situation of IS adoption, thus they can formulate better strategies to increase the level of successful IS adoption in Ethiopian organizations. They need to have a good relationship with prospective adopters, in order to measure the acceptance level of their customers and sharing features that fit the needs of the end users. Generally, the theoretical model can help system developers

determine and improve the adoption potential of their system so that to improve the likelihood of adoption.

5.2. Recommendation

Recommendation for Future Research

- In this study, sample was limited to five governmental organizations. Future research can involve a larger number of organizations which are governmental and nongovernmental and more participants per organizations. Doing so, can better represent trends within each sector and allow for more reliable comparisons.
- This study is undertaken in innovation of IS, the IS or the technology for this study is not directed to a specific kind of IS or application. Therefore, further studies should be directed towards examining one or more system used by different organization to make the type of IS a controlled variable.
- Future research can be based on this study by considering personal characteristics of a top management. Top management plays a major role in business since he or she is the main decision maker and shapes the future of the business. Personal characteristics of a top management may include innovativeness, attitude toward IT innovation, IT knowledge, and cultural background. Investigating the effect of IT innovation type in differentiating the factors that trigger IT innovation adoption in a form of meta-analysis research method, could also be carried out for future studies
- An Empirical study can be made on the proposed theoretical model to provide an empirical evidences of the applicability of this theoretical model in IS adoption.

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APPENDICES

Appendix 1 – Questionnaire

The researcher would like to thank you for taking your time in order to fill this questionnaire. Your response is confidential and is not given for any third party.

Please place an “X” in the appropriate box to rate the following question from part I up to part III

Part I – personal Data

1	Gender	Male		Female				
2	Level of education	Masters/Higher		Degree	Diploma	high school		
3	Age	< 20		21-30	31-40	41-50	> 50	
4	Position	top management		Middle management	Supervisory	Technical	Other	
5	Job experience (in years)	< 2		3-May	6-Oct	Nov-15	16 - 20	> 20

PART II

No	Question	Strongly disagree	Disagree	Normal	Agree	Strongly agree
1	Using the current automated system is better than using manual system for my job					
2	Have you ever used similar automated system to do your job? If YES , The current automated system is interesting than previous ones					
3	I do my job more quickly and easily					

	because of using the current automated system.					
4	I have no difficulty performing my job using the current automated system					
5	I have no difficulty understanding how to perform the current automated system					
6	I have no difficulty understanding how the current automated system worked technically					
7	I should be able to try any automated system before the organization decide to apply the system					
8	I will be more likely to want to use any automated system if I was part of the test team before applying it to the organization					
9	I want to be able to try out any automated system before deciding weather I like it or not					
10	Other colleagues (staffs) seemed interested in the current automated system when they saw me using it					
11	People can tell that I do my job more efficiently since I have used the current automated system					
12	I have no difficulty teaching colleagues (staffs) how to use the current automated system					

13	Using current automated system made what I was doing in my job seem more clear					
14	Using current automated system helped me learn more about technology while also doing my job more efficeintly					
15	The current automated system fits right into the way I want to do my job operation					
16	The current automated system enables me to accomplish tasks more quickly.					
17	The current automated system has improved my quality of work.					
18	The current automated system enhances my effectiveness on the job.					
19	My interaction with current automated system has been clear and understandable.					
20	Overall, the current automated system is easy to use.					
21	Learning to operate the current automated system was easy for me.					
22	I have a general favorable attitude toward using the current automation system					
23	I believe it is a good idea to use current automated system for my work					

24	Over all I like using the current automated system					
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PART III

No	Question	Yes	No
1	Were you a leader of the project team regarding adoption of the the current automated system you are using?		
2	Did you have responsibility for selecting the current automated system you are using?		
3	Did you have responsibility for the successful implementation of the current automated system you are using?		
4	Did you have responsibility for user training of the current automated system you are using?		

Appendix 2 – Semi-structured interview questions presented for departmental managers and team leaders.

1. What is the industry type of your company?
2. What is your position title in this company?
3. IS top management support a factor in the adoption process at your organization?
4. Is technological readiness seen as a factor or limitation when you made the decision to adopt any technology?
5. Do you think the firm size could impact the adoption decision?
6. What other organizational factors considered before making a final decision to adopt any technology?
7. Did competitive pressure or partner pressure make an impact on your decision to adopt a technology?
8. What other environmental factors considered before making a final decision to adopt any technology?

Appendix 3. Crosstab between respondents job postion and PU

JobPosition * PU Crosstabulation

		PU				Total
		Disagree	Normal	Agree	Strongly Agree	
Top management	Count	5	0	0	0	5
	% within JobPosition	100.0%	0.0%	0.0%	0.0%	100.0%
	% within PU	100.0%	0.0%	0.0%	0.0%	3.6%
Middle management	Count	0	5	14	2	21
	% within JobPosition	0.0%	23.8%	66.7%	9.5%	100.0%
	% within PU	0.0%	35.7%	17.5%	5.0%	15.1%
Supervisory	Count	0	1	10	9	20
	% within JobPosition	0.0%	5.0%	50.0%	45.0%	100.0%
	% within PU	0.0%	7.1%	12.5%	22.5%	14.4%
technical	Count	0	4	35	19	58
	% within JobPosition	0.0%	6.9%	60.3%	32.8%	100.0%
	% within PU	0.0%	28.6%	43.8%	47.5%	41.7%
Other	Count	0	4	21	10	35
	% within JobPosition	0.0%	11.4%	60.0%	28.6%	100.0%
	% within PU	0.0%	28.6%	26.2%	25.0%	25.2%
Total	Count	5	14	80	40	139
	% within JobPosition	3.6%	10.1%	57.6%	28.8%	100.0%
	% within PU	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix 4. Crosstab between compatibility and complexity with PEOU

compatibility * PEOU

		Crosstab					Total
		PEOU					
		Strongly Disagree	Disagree	Normal	Agree	Strongly Agree	
Compatibility	Count	5	0	0	5	0	10
	% within Disagree	50.0%	0.0%	0.0%	50.0%	0.0%	100.0%
	% within PEOU	83.3%	0.0%	0.0%	6.9%	0.0%	7.2%
	Count	1	0	9	6	0	16
	% within Normal	6.2%	0.0%	56.2%	37.5%	0.0%	100.0%
	% within PEOU	16.7%	0.0%	39.1%	8.3%	0.0%	11.5%
	Count	0	6	14	51	15	86
	% within Agree	0.0%	7.0%	16.3%	59.3%	17.4%	100.0%
	% within PEOU	0.0%	100.0%	60.9%	70.8%	46.9%	61.9%
	Count	0	0	0	10	17	27
	% within Strongly Agree	0.0%	0.0%	0.0%	37.0%	63.0%	100.0%
	% within PEOU	0.0%	0.0%	0.0%	13.9%	53.1%	19.4%
Count	6	6	23	72	32	139	
% within Total	4.3%	4.3%	16.5%	51.8%	23.0%	100.0%	
% within PEOU	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

complexity * PEOU

		Crosstab					Total
		PEOU					
		Strongly Disagree	Disagree	Normal	Agree	Strongly Agree	
Complexity Disagree	Count	0	1	2	8	0	11
	% within Complexity	0.0%	9.1%	18.2%	72.7%	0.0%	100.0%

	% within PEOU	0.0%	16.7%	8.7%	11.1%	0.0%	7.9%
	Count	0	5	9	18	0	32
Normal	% within Complexity	0.0%	15.6%	28.1%	56.2%	0.0%	100.0%
	% within PEOU	0.0%	83.3%	39.1%	25.0%	0.0%	23.0%
	Count	5	0	11	36	13	65
Agree	% within Complexity	7.7%	0.0%	16.9%	55.4%	20.0%	100.0%
	% within PEOU	83.3%	0.0%	47.8%	50.0%	40.6%	46.8%
	Count	1	0	1	10	19	31
Strongly Agree	% within Complexity	3.2%	0.0%	3.2%	32.3%	61.3%	100.0%
	% within PEOU	16.7%	0.0%	4.3%	13.9%	59.4%	22.3%
	Count	6	6	23	72	32	139
Total	% within Complexity	4.3%	4.3%	16.5%	51.8%	23.0%	100.0%
	% within PEOU	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix 5. Crosstab between PEOU and PU with ATU

PEOU * ATU

		Crosstab				Total	
		ATU					
		Disagree	Normal	Agree	Strongly Agree		
PEOU	Count	1	0	5	0	6	
	Strongly Disagree	% within PEOU	16.7%	0.0%	83.3%	0.0%	100.0%
		% within ATU	50.0%	0.0%	5.4%	0.0%	4.3%
	Count	0	1	5	0	6	
	Disagree	% within PEOU	0.0%	16.7%	83.3%	0.0%	100.0%
		% within ATU	0.0%	6.2%	5.4%	0.0%	4.3%
	Count	0	6	14	3	23	
	Normal	% within PEOU	0.0%	26.1%	60.9%	13.0%	100.0%
		% within ATU	0.0%	37.5%	15.2%	10.3%	16.5%
	Count	1	7	57	7	72	
	Agree	% within PEOU	1.4%	9.7%	79.2%	9.7%	100.0%
		% within ATU	50.0%	43.8%	62.0%	24.1%	51.8%

	Count	0	2	11	19	32
Strongly Agree	% within PEOU	0.0%	6.2%	34.4%	59.4%	100.0%
	% within ATU	0.0%	12.5%	12.0%	65.5%	23.0%
Total	Count	2	16	92	29	139
	% within PEOU	1.4%	11.5%	66.2%	20.9%	100.0%
	% within ATU	100.0%	100.0%	100.0%	100.0%	100.0%

PU * ATU

Crosstab

		ATU				Total	
		Disagree	Normal	Agree	Strongly Agree		
PU	Count	0	0	5	0	5	
	Disagree	% within PU	0.0%	0.0%	100.0%	0.0%	100.0%
		% within ATU	0.0%	0.0%	5.4%	0.0%	3.6%
		Count	0	9	4	1	14
	Normal	% within PU	0.0%	64.3%	28.6%	7.1%	100.0%
		% within ATU	0.0%	56.2%	4.3%	3.4%	10.1%
		Count	2	5	67	6	80
	Agree	% within PU	2.5%	6.2%	83.8%	7.5%	100.0%
		% within ATU	100.0%	31.2%	72.8%	20.7%	57.6%
		Count	0	2	16	22	40
	Strongly Agree	% within PU	0.0%	5.0%	40.0%	55.0%	100.0%
		% within ATU	0.0%	12.5%	17.4%	75.9%	28.8%
Total	Count	2	16	92	29	139	
	% within PU	1.4%	11.5%	66.2%	20.9%	100.0%	
	% within ATU	100.0%	100.0%	100.0%	100.0%	100.0%	

Appendix 6. Sample size calculation

In the sample size calculator the following formulas used

$$ss = \frac{Z^2 * (p) * (1-p)}{c^2}$$

Where:

Z = Z value (e.g. 1.96 for 95% confidence level)

p = percentage picking a choice, expressed as decimal

(.5 used for sample size needed)

c = confidence interval, expressed as decimal

(e.g., .04 = ±4)

The confidence interval (also called margin of error) is the plus-or-minus figure usually reported in newspaper or television opinion poll results. For example, for this study confidence interval of 4.7 used which means if 47% percent of the sample picks an answer it can be generalized that if the entire relevant population were asked the question between 43% (47-4) and 51% (47+4) would have picked that answer.

The confidence level tells how sure one can be. It is expressed as a percentage and represents how often the true percentage of the population who would pick an answer lies within the confidence interval. The 95% confidence level means one can be 95% certain; the 99% confidence level means you can be 99% certain. For this study 95% is used since most researchers use the 95% confidence level.

Declaration

I declare that the thesis is my original work and has not been presented for a degree in any other university.

Oct. 2015

This thesis has been submitted for examination with my approval as a university advisor.

Tibebe Beshah (PhD)

Oct. 2015