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**FRAMEWORK FOR EVALUATING ICT ADOPTION AND USAGE IN HIGHER  
INSTITUTIONS OF LEARNING IN SOMALIA: A CASE OF MOGADISHU  
UNIVERSITY MANAGEMENT SYSTEM (MUMS)**

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*A research project Submitted in partial fulfilment of the requirements of Masters of Science  
degree in Information Systems (IS) of the University of Nairobi.*

**August 2015**

**DECLARATION**

I declare that this research project is my original work and has not been presented for examination in any other university or higher institutions of learning.

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**SUPERVISOR'S APPROVAL**

This Research Project has been submitted for examination with my approval as the university supervisor

Signed.....Date.....

**DR. STEPHEN MBURU**

## **DEDICATION**

I sincerely dedicate this work to Mogadishu University and its management whose invaluable support enabled me pursue this course, cannot go unmentioned during my course and data collection exercise to obtain relevant and significant information. I will not forget my brothers, sisters and friends who supported me morally and financially to ensure that I cleared my studies at the University of Nairobi.

## **ACKNOWLEDGEMENT**

I would like to appreciate the support from my supervisor Dr. Stephen Mburu whose guidance and open door policy enabled me to seek help from him whenever I required during my research exercise. To Dr. Mburu, your stewardship and encouragement enabled me to think broadly and analyse critically on research issues beforehand.

Special thanks to all the members of the University of Nairobi School of computing and informatics whose comments, contributions and support enabled me enrich my research work. It may not be possible to mention all the names of encouraging panellists, but I am deeply indebted by your support and positive criticism.

Finally, I would like to thank Mogadishu University and its management whose moral guidance and support has enabled me reach this far. I also thank my brothers, sisters and friends whose support and encouragement from time to time enabled me finish my studies.

All errors, omissions, views and interpretations remain my personal responsibility and should not be attributed to the above acknowledged persons.

## Table of Contents

DECLARATION .....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT.....	iv
ABSTRACT .....	x
LIST OF FIGURES .....	xi
LIST OF TABLES .....	xii
ACRONYMS.....	xiii
CHAPTER ONE.....	1
INTRODUCTION .....	1
1.1 Background Statement.....	1
1.2 ICT Classification and Usage in Education.....	2
1.3 Education Sector and ICT Integration of in Somalia .....	3
1.4 Problem Statement .....	3
1.5 Study Objectives .....	4
1.6 Research Questions .....	5
1.7 Scope of the Study.....	5
1.8 Justification and Significance of the Study.....	5

CHAPTER TWO .....	6
LITERATURE REVIEW .....	6
2.1 Introduction.....	6
2.2 Theoretical Literature Review.....	6
2.2.1 The Technology Acceptance Model (TAM).....	6
2.2.2 Theory of Reasoned Action and Planned Behaviour.....	7
2.2.3 Theory of Diffusion of Innovation (DoI).....	8
2.2.4 The Unified Theory of Acceptance and Use of Technology (UTAUT).....	9
2.3 Empirical Literature Review .....	11
2.4 Summary of the Literature Review .....	12
2.5 Conceptual Framework.....	13
CHAPTER THREE.....	15
RESEACH METHODOLOGY .....	15
3.1 Introduction.....	15
3.2 Research Design.....	15
3.3 Target Population .....	15
3.4 Sample Size and Sampling Procedures .....	15
3.5 Data Collection Techniques and Procedures .....	16
3.6 Data Analysis Procedures and Hypothesis Testing.....	16

3.7 Model Estimation and Specification .....	18
3.8 Reliability and Validity.....	19
3.8.1 Reliability.....	19
3.8.2 Validity.....	19
CHAPTER FOUR.....	20
RESULTS.....	20
4.1. Introduction.....	20
4.2. Descriptive statistics (Demographic characteristics).....	21
4.2.1: Gender.....	21
4.2.2: Age.....	22
4.2.3: Education Levels .....	22
4.2.4: Marital status .....	23
4.2.5: Years stayed in the institution .....	23
4.2.6: Working Experience .....	25
4.2.7: Name of the current department .....	25
4.2.8: Gender Distribution per department .....	27
4.2.9: Education attainment per departments.....	27
4.2.10: Marital status per department .....	28
4.3. Reliability, Validity and Sampling Analysis .....	28

4.3.1: Reliability and Validity Analysis .....	28
4.3.2. Sampling Adequacy .....	30
4.4. Characteristics of job related outcomes .....	30
4.4.1: Performance Expectancy.....	31
4.4.2: Effort Expectancy .....	31
4.4.3: Social Influence .....	31
4.4.4: Facilitating Conditions.....	32
4.4.5: Behavioural intention to use the system .....	33
4.5: Moderating factors .....	33
4.5.1: Attitude towards use of technology .....	33
4.5.2: Self- Efficacy.....	34
4.5.3: Anxiety.....	35
4.6. Factor Loadings and Uniqueness .....	35
4.6.1: Root Constructs .....	35
4.6.2. Moderating Factors.....	36
4.7. Structural Modelling and Framework Validation .....	37
4.7.1: Introduction.....	37
4.7.2: Path Analysis.....	37
4.7.3. Summary of the study findings.....	45



CHAPTER FIVE .....	48
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS .....	48
5.1: Introduction.....	48
5.2: Summary of the study findings .....	48
5.3: Conclusions of the study findings .....	49
5.4: Recommendations of the study findings .....	50
5.5: Areas of further study .....	50
REFERENCES .....	51
APPENDICES .....	54
ANNEX 1: SCHEDULE FOR RESEARCH PROJECT (FEB-AUGUST, 2015) .....	54
ANNEX 2: BUDGET.....	55
ANNEX 3: QUESTIONNAIRE .....	56

## **ABSTRACT**

The lack of inquiry and detailed knowledge regarding the existing structures within which the application of new information and communication technologies mostly in the management system is of concern more especially on the guarantee of a sustained process of adoption and usage in higher institutions of learning. This study has therefore been conducted with the main objective of customizing existing framework in order to evaluate ICT adoption and usage in higher institutions of learning in Somalia. The study specifically sought to investigate the pattern of usage of ICTs among various departments, choose appropriate model for investigating ICT adoption and usage in Mogadishu University and finally to use the model in a case study to measure the adoption and usage of ICT in Mogadishu University Management System (MUMS). The study considered four root constructs in the structural model adopted from the Unified Theory of Acceptance and Use of Technology (UTAUT) framework. They include performance expectancy, effort expectancy, social influence and facilitating conditions with three moderating factors that is attitude towards use, anxiety and self-efficacy. Primary data was collected through well-structured questionnaires enhancing validity and reliability. The paper considers various confidence intervals (99%, 95% and 90%) in evaluating the proposed framework based on the collected data. The study reveals that effort expectancy, social influence and facilitating conditions significantly influence behavioural intention to use the system whereas; anxiety and attitude towards use are shown to be significant moderators between social influence and behavioural intention to use the system. Also the study showed years stayed in current institution, marital status and working experience as significant moderators between the three main constructs and behavioural intention to use the system. Further, university education is found to be significant factor in moderating between behavioural intention to use the system and adoption and usage of Mogadishu University management system. based on the results, the study suggests for need by the ministries to developing right policies of attracting or influencing the potential users of ICT through relevant competitions and other subsidies while establishing more ICT centres and/or institutions which will boost acquisition of the knowledge of using the facility while making available relevant ICT systems thus facilitate the use of the technology. There is also a need for more systems with user friendly interface which may increase the behaviour towards usage of the system and consequential usage of the same system.

## LIST OF FIGURES

Figure 1: TAM Framework for ICT adoption and Usage .....	7
Figure 2: TRA and TRB Framework for ICT adoption and usage .....	8
Figure 3: UTAUT Framework for ICT Acceptance and Usage .....	10
Figure 4: Conceptual Framework on ICT adoption and usage .....	14
Figure 5: Operationalized model through hypothesis testing .....	17
Figure 6: Highest academic levels .....	23
Figure 7: Years in current institution .....	24
Figure 8: Name of the current department .....	26
Figure 9: Path Coefficients for Root Constructs.....	41
Figure 10: Framework with path coefficients for moderating factors .....	45
Figure 11: Validated framework for evaluating adoption and usage of ICT in higher institutions of learning in Somalia .....	46

## LIST OF TABLES

Table 1: Date of interview .....	21
Table 2: Gender Distribution .....	21
Table 3: Age categories .....	22
Table 4: Marital Status .....	23
Table 5: Duration of stay in the institution.....	24
Table 6: Years in current position.....	25
Table 7: Current Department .....	26
Table 8: Gender distribution across departments .....	27
Table 9: Distribution across the departments by Education levels .....	27
Table 10: Distribution across the departments by marital status .....	28
Table 11: Cronbach's Alpha Index and KMO.....	29
Table 12: Job related outcomes (%).....	32
Table 13: Moderating Factors (%).....	34
Table 14: Factor loadings and Uniqueness of the Root Constructs .....	36
Table 15: Factor loading and Uniqueness of moderating factors .....	36
Table 16: Regression results for factors determining behavioural intention to use the system ....	39
Table 17: Regression results for factors influencing ICT usage.....	40
Table 18: Summary of Hypothesized root constructs and the Decision .....	41
Table 19: Performance Expectance and Behavioural intention to use the system .....	42
Table 20: Effort expectance and behavioral intention to use the system .....	43
Table 21: Social Influence and Behavioral Intention to use the system .....	43
Table 22: Facilitating conditions and behavioral intention to use the system.....	44
Table 23: Summary of Hypothesised Moderating factors and the Decision.....	44

## ACRONYMS

<b>ATTUT</b>	Attitude Towards Use of the System
<b>AX</b>	Anxiety
<b>EE</b>	Effort Expectancy
<b>FC</b>	Facilitating Conditions
<b>HIPS</b>	Heritage Institute for Policy Studies
<b>ICT</b>	Information and Communication Technology
<b>KMO</b>	Kaiser-Meyer-Olkin (KMO)
<b>MUMS</b>	Mogadishu University Management System
<b>PE</b>	Performance Expectancy
<b>SE</b>	Self-Efficacy
<b>SI</b>	Social Influence
<b>TVET</b>	Technical and Vocational
<b>UTAUT</b>	Unified Theory of Acceptance and Use of Technology

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background Statement

The world is in a period of rapid technological developments and different continuing information revolution. According to (Adeya, 2001) this era is characterised by two of the main characteristics of globalization and the information economy. ICT can significantly improve the efficiency and effectiveness of the public services provision. This has made many Governments and private services in both developed and developing countries to undergo transformation using information and communication technologies through development and implementation of relevant strategies,(Mutuku, 2013). However, this transformation embodies social, economic, political, technical and cultural processes which affect nearly all economies and creating tremendous challenges and opportunities in its presence(Adeya, 2001).

ICT is defined differently by various institutions and authors. For example, (Chua, Chen, & Wong, 1999) defined ICT as a system including electronic networks that is embodying complex hardware and software which are linked by a vast array of technical protocols. The networks and services which ICT is anchored or embedded on, affect the local and global accumulation and flows of public and private knowledge. On the other hand, United Nations Economic Commission for Africa (UN-ECA), which concentrates on investigating ICT trends and policy in Africa views ICTs as a system involving internet service provision, telecommunications equipment and services, information technology equipment and services, media and broadcasting, libraries and documentation centres, commercial information providers, network-based information services, and other related information and communication activities,(King & He, 2006).

However, other definitions of ICT are more of Information technology (IT). Some of those who never separated such clearly include(Drew & Foster, 1994) who showed ICT as the group of technologies that is revolutionizing the handling of information and embody a convergence of interest between electronics, computing and communication which was later simplified by (Duncombe & Heeks, 1999) who described ICTs as an electronic means of capturing, processing, storing and disseminating information.

## **1.2 ICT Classification and Usage in Education**

Communication is indicated as a fundamental act of the education process, (Richardson & Tapia, 2006). Since technology is borne out of specific cultural contexts, time and place, (Oye, Salleh, & Iahad, 2011) emphasizes that quality distant education can be enhanced by ICT which is viewed as usage of digital equipment to all aspects of teaching and learning. In this respect (Usluel, As\_Kar, & Bas, 2008) shows that ICT usage is getting more and more widespread in higher levels of education. Members of the faculty are indicated to make use of ICT mostly as a means of communication and for doing research about the course through the Internet. Also publication of lecture notes and information sharing concerning the courses enhanced through the technology (Internet). Studies have made diverse attempts to group or classify ICT in education especially in relation to usage. Therefore, ICT is classified as integration of technologies involving collection, storage, processing, and communication and delivering of information related to teaching and learning processes.

Evidence reveals that most developed or technologically advanced nations are experiencing the rapid rise of the information sector as the main contributor to the national income. Contrary, in Africa, there have been relatively few studies with which to assess the effect of the information sector on the national income,(Adeya, 2001).

According to (Farrell & Shafika, 2007), Africa has largely not seen the influx of for-profit, ICT-based foreign providers of higher education as can be seen in others parts of the world. However the interactions, collaborations, and partnerships between African and foreign universities are increasing many of them enabled by ICT and by a resurgence of donor interest in higher education. Both private and Government users decide whether it is worthwhile to adopt ICTs in their day to day work. They associate ICT with benefits and losses that come as costs either directly such as cost of buying computers and internet access installation or indirectly as an opportunity cost associated with lower resources available for a user's satisfaction. It is further claimed that the choice may also be made based on the level of literacy in ICT by their workers, quality of the services offered, poor infrastructure and insufficient legal and regulation framework in these institutions of learning.

### **1.3 Education Sector and ICT Integration of in Somalia**

For the majority of Somalis, education has been considered as an informal community affair involving the interaction between elders and youth over clan history, religion, battle and other knowledge and skills essential for survival, (Richardson & Tapia, 2006). After a long period of challenges in establishing the formal education sector, some progress were made in establishing educational infrastructure, particularly during the immediate year's prior Somalia independence in 1960, (The Heritage Institute for Policy Studies (HIPS), 2013).

According to the report, the progress made was however slow. The inability of the new government to reform and expand the education system was attributed to various challenges. This involved integrating two educational systems developed by very different colonial powers, Britain and Italy characterised with different languages of instruction, syllabuses and management styles.

In this study, the term higher education shall refer to both universities as well as post-secondary institutions that provide Technical and Vocational (TVET) programmes. Compared to Universities, TVET institutions have little application of ICTs as either a teaching tool or a tool enhancing access to programmes, (The Heritage Institute for Policy Studies (HIPS), 2013). Similarly, to some extent in general, the capacity of African universities in embracing the process of integrating ICT in education in developing countries is miserably insufficient. This is as a result of lack access to infrastructure, affordable and sufficient bandwidth and the human resource capacity to exploit the technology,(Hussein, 2012).

However, higher institutions of learning in Somalia face great challenges which are more specific, ranging from insecurity, institutional weakness, poor capacity of staff and infrastructure, limited resources and a lack of teaching materials, (Cummings & Tonningen, 2003). These challenges amount to the greatest threats in which is the quality of their education offered and thus contributing to low adoption and utilization of ICT.

### **1.4 Problem Statement**

Africa continent compared to other continents is confronted with presence of the acute basic data and factual information relevant to policy-making hence inadequate ICT policy environment (Richardson & Tapia, 2006). Nevertheless, in African countries, Somalia unexceptional, there is a considerable interest in exploiting ICTs in all sectors, (Adeya, 2001). Similarly, (Farrell & Shafika, 2007) believes that ICTs can be important potential



levers to introduce and sustain effort in education reform in Africa while addressing the issues of digital divide.

Although the expansion of the higher education sector is evident throughout the Republic of Somalia, there still remains vivid information on the activities of higher institutions of learning in terms of producing and utilizing ICT services. For instance, a large number of these institutions operate without a library, IT facilities or a science laboratory. Approximately 63.6% of the surveyed institutions reported having a library while 72.7% of institutions reported having a computer laboratory with printing facilities, (The Heritage Institute for Policy Studies (HIPS), 2013). This kind of awareness and sensitivity leads to a proper understanding of economic and social realities in Somalia. However, they cannot in themselves compensate for the fundamental lack of information. There is also lack of analysis of and detailed knowledge about, the existing structures within which the application of new information and communication technologies is presently being attempted especially in the management system and the guarantee of a sustained process of adoption and usage in higher institutions of learning. What trigger this study are the findings presented by (Farrell & Shafika, 2007) who revealed that the republic of Somalia remained among the group of countries that were plagued with internal conflict and political instability that make progress on ICT adoption for education impossible. It's from this imperative that the study explores possible model for evaluating ICT adoption and usage in higher institutions of learning in Somalia.

### **1.5 Study Objectives**

The overall goal of this study is to customize existing framework in order to evaluate ICT adoption and usage in higher institutions of learning in Somalia.

The specific objectives include;

- i. To investigate the pattern of usage of ICTs among various departments in Mogadishu University.
- ii. To choose appropriate model for investigating ICT adoption and usage in Mogadishu University.
- iii. To use the model in a case study to measure the adoption and usage of ICT in Mogadishu University management system.

## **1.6 Research Questions**

- i. What is the pattern of usage of ICTs among various departments in Mogadishu University?
- ii. Which is the appropriate model for investigating ICT adoption and usage in Mogadishu University?
- iii. How can the model be used to investigate adoption and usage in Mogadishu University management System?

## **1.7 Scope of the Study**

The study was conducted at Mogadishu University in Somalia within the five identified departments that are using management system being the unit of study. Both students and staff were involved in providing information regarding adoption and usage of ICT services.

## **1.8 Justification and Significance of the Study**

The study provides useful information on the effect experienced by Higher Institutions of learning in Somalia by adopting ICT. As suggested by (Farrell & Shafika, 2007) the rate of adoption of ICT is extremely variable and since governments are looking to their primary universities as the nodes for leadership in implementing national ICT policies as well as those in the education sector, the study of this nature is imperative. The Mogadishu university management system shall be improved with regard to efficiency based on the study outcomes. The findings of this study sheds more light on various issues affecting utilization of ICT in higher institutions of learning which may in turn affect the way the government plans including reviewing of relevant policies regarding ICT and education sector. This is also beneficial to the policy makers in analysing the best ways in which to develop a system of governance that promote, support and sustains human development who consequently appreciates ICT sub sector.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter presents both theoretical and empirical literature reviews regarding the past works related to modelling of ICT adoption and usage in various countries.

#### **2.2 Theoretical Literature Review**

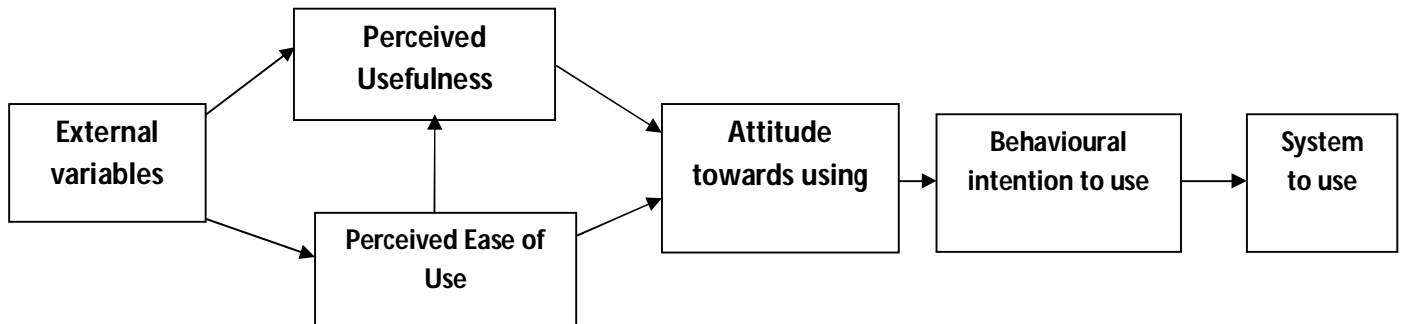
##### **2.2.1 The Technology Acceptance Model (TAM)**

This study considered the technology acceptance model developed by Davis and Davis. This model has been widely used as an important framework for predicting and explaining the use of computer based applications and solutions, (Oye, Iahad, & Rahim, 2012). Specifically, (Davis, 1989) presented the TAM in an effort to explain the determinants of user acceptance of a wide range of end-user computing technologies. Based on this model, it is asserted that the user's intention to use, which in turn is influenced by his or her attitudes towards the technology, is related to the adoption of a technology.

There are two theoretical constructs identified in this case, which includes perceived usefulness and perceived ease of use. These, according to (Davis, 1989) affect the intention to make use of a system. The former construct is believed to have a positive relationship with adoption intention while the latter is linked to continuance intention to use, (Venkatesh, Davis, Morris, & Davis, 2003). Despite the model being anchored towards the context of information system as well as being designed to predict on the job information technology acceptance and utilization, studies further suggest its post adoption characteristics. For example, (Bagozzi, 2007) claim that perceived usefulness influences satisfaction while (King & He, 2006) suggest that perceived usefulness leads to attitude toward the technology. On the other hand, (Davis, 1989) further argues that perceived ease of use influences both perceived usefulness and adoption intention. Most studies found out that perceived ease of use influences satisfaction, continuance intention and actual continuance usage especially, as indicated in the post adoption literatures, (Venkatesh & Davis, 2000).

However, (Taylor & Todd, 2001) show TAM as being encompassed by the limitation of not taking into consideration any existing barriers that may prevent an individual from adopting a particular information systems technology. This makes it not suitable model especially in elucidating ICT adoption in higher institutions of learning. Below is a framework;

**Figure 1: TAM Framework for ICT adoption and Usage**



Adapted from (Davis, 1989)

### **2.2.2 Theory of Reasoned Action and Planned Behaviour**

The Theory of Reasoned Action (TRA) categorised as a social psychology theory which describes an individual's behaviour based on his behavioural intention, which is influenced by his attitude toward the behaviour and perception of the subjective norms regarding the behaviour, (Fishbein & Ajzen, 1975). This theory is important as it can predict information technology acceptance and usage while on the job, which is relevant to staff in higher institutions of learning, (Venkatesh, Davis, Morris, & Davis, 2003). On the other hand, just like TRA, the Theory of Planned Behavior (TPB) also a social psychology theory which according to (Ajzen, 1991) states that specific salient beliefs influence behavioural intentions and subsequent behaviour.

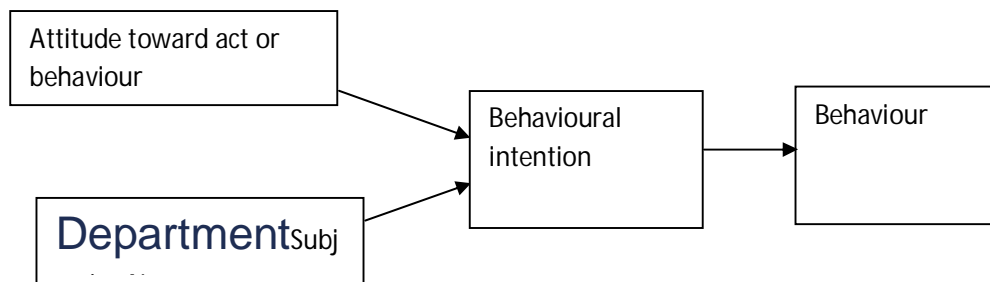
Considering usage and characteristics of these two theories, they have been used in ICT adoption and use research as fundamental theoretical frameworks, (King & He, 2006). According to (Yi, Jackson, Park, & Probst, 2006) referring to TRA, suggests that both attitude and subjective norm are important determinants of peoples' intentions to adopt and use ICTs. Attitude is claimed to have a significant influence on the intention to adopt and continued usage of ICT. From other literatures for example, (Venkatesh & Davis, 2000) found that subjective norm not only influences the behavioural intention but also other constructs including satisfaction, image and perceived usefulness, (Bagozzi, 2007).

(Ajzen, 1991) observes that TPB included an extra construct compared to TRA that is the perceived behavioural control described as one's perceptions of his ability to act out a given behaviour easily. Literatures on TRB like those in TRA, also found an existing significant relationships between attitude, subjective norm, perceived behavioural control and behavioural intention although perceived behavioural control as an additional construct in

TPB gives more light on the importance of the perceived difficulty of the behaviour and the person's perceived ability to act out the behaviour. Studies including (Yi, Jackson, Park, & Probst, 2006) and (Bagozzi, 2007), found that perceived behavioural control can directly influence the technology adoption intention and continuance usage intention, (King & He, 2006).

However, other studies have shown a lot of concern on TRA and TPB such that the two fail to consider such human biological and psychological needs as drivers toward behaviour, (Yi, Jackson, Park, & Probst, 2006).

**Figure 2: TRA and TRB Framework for ICT adoption and usage**



Adapted from (Fishbein & Ajzen, 1975)

### 2.2.3 Theory of Diffusion of Innovation (DoI)

This theory was proposed first by (Rogers, 2003) and has been widely used to explain the diffusion of innovation in numerous fields such as medicine, agriculture and information technologies. The theory postulates that the rate of adoption is partially influenced by perceived attributes known as innovation characteristics which are compatibility, relative advantage, trial-ability, complexity and observability. The perception of the members of the social system based on relative advantage, compatibility, trialability, and observability of an innovation are positively related to its rate of adoption. Similarly, Rogers argues that the complexity of an innovation is perceived to be negatively related to its rate of adoption.

The first study on attributes of innovation and their rate of adoption was conducted with farmers. However, (Usluel, As\_Kar, & Bas, 2008) observed that studies of teachers and school administrators suggested that similar attributes predict the rate of adoption for educational innovation. The perception of the teacher of the attributes of technology education was identified as the strongest predictor of the level of adoption of technology education. Finally, it is concluded that the theory of diffusion of innovation especially on the

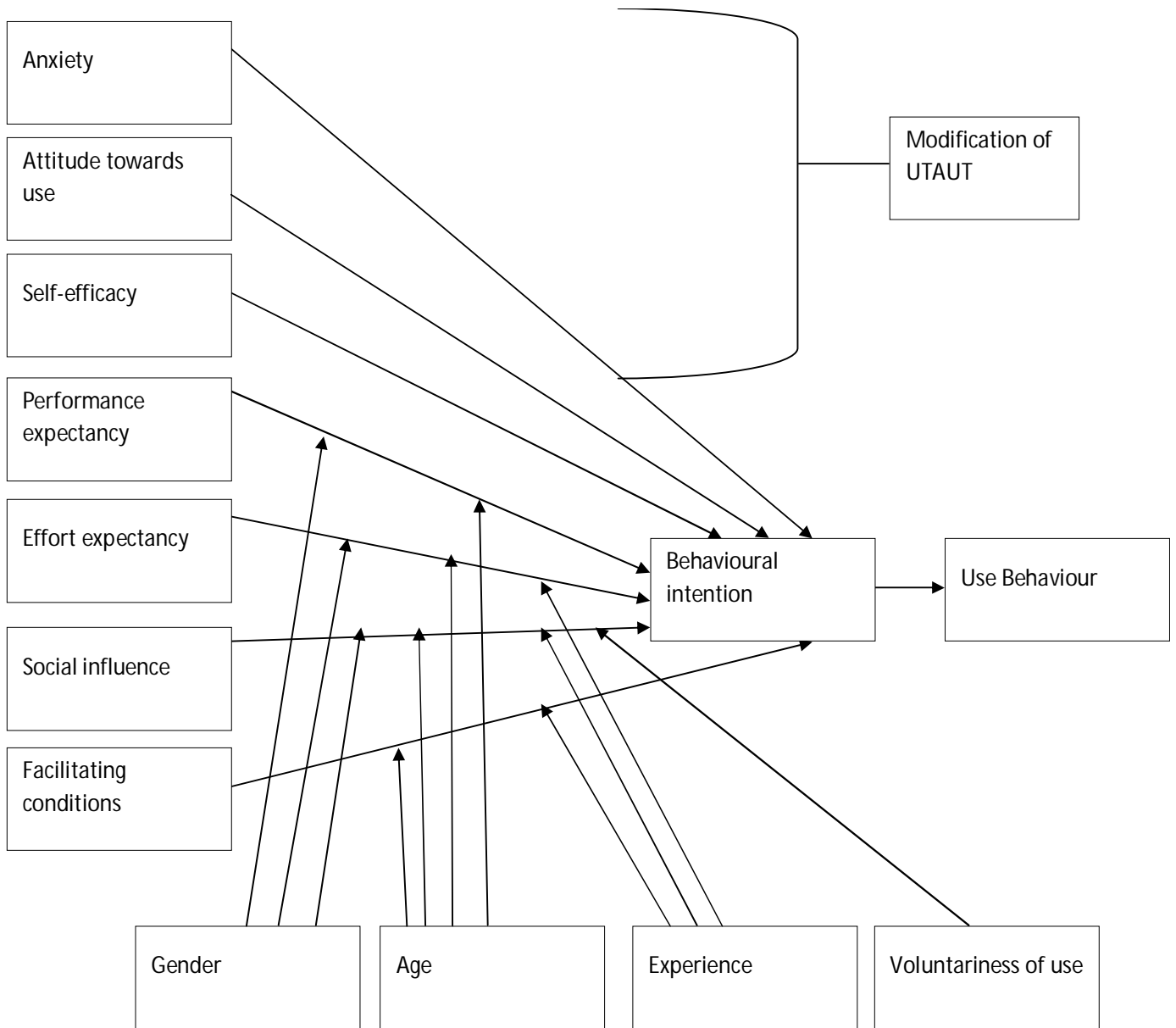
perceived attributes can be a valuable tool for instructional developers working to increase the utilization of their products.

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

The UTAUT model comprises four main effects and moderating factors. The combinations of the constructs and moderating factors, increases the predictive efficiency to 70%, a major improvement over previous TAM model rates, (Oye, Iahad, & Rahim, 2012). It is suggested that self-efficacy influences choices of whether to engage in a particular task, the effort expended in performing it, and the persistence shown especially in accomplishing it. According to (Miura, 1987), the longer people persist in their efforts depends on their perceived self-efficacy. However, (Chua, Chen, & Wong, 1999) defines computer anxiety as a fear of computers (ICT) when using one, or fearing the possibility of using ICT implying that attitudes towards computer are very critical issues. Therefore, monitoring the attitudes of the users towards computers (ICT) need to be a continuous process if ICT is to be used for effective training and learning, (Yi, Jackson, Park, & Probst, 2006).

In Figure 2.3; performance expectancy (PE) represents the extent an individual believes the system will help them do their jobs better, effort expectancy (EE) evaluates how ease an individual believes the system is to use, social influence (SI) relates to whether or not important others influence an individuals' intention to use the system while facilitating conditions (FC) shows whether individual have the personal knowledge and institutional resources available to use the management system at Mogadishu University. Similarly the Anxiety (AX) relates to the fear of computer (ICT) when using one, Attitude towards using technology (ATUT) and finally, self-efficacy (SE) relates to an individuals' confidence in his/her ability to perform the behaviour required to produce specific outcome.

**Figure 3: UTAUT Framework for ICT Acceptance and Usage**



Adapted from (Oye, Iahad, & Rahim, 2012)

### **2.3 Empirical Literature Review**

(Chisenga, 1999) explored the global information infrastructure focusing on African continent and found out that there is a lot of use of the Internet as a way of communicating content of interest to Africans. The creation of relevant content is important to encourage the interest of local users in the Internet. However, it was found that communication in Africa is categorized into urban and rural forms, the former being largely associated with Western influences.

(Monga, 2008) conducted a study to investigate e-government in India. The study revealed that transparency saves time, leads to better office and records management, reduced corruption, improved attitudes. The study concludes that e-government has ushered; transparency in governing process, saves time and costs involving in providing services to the citizens, better decision making, simplified office procedures, checking corruption and enhancing better office and record management. Most government agencies use ICT as means of maximizing their revenue through improving their internal efficiency thus ensuring speedier and efficient delivery of public services and also exchange information with its stakeholders.

(Basu, 2004) while studying the relationship between e-government and Developing Countries, suggested that ICT policies aim at achieving major objectives like upgrading citizens living standards, faster service delivery, development of human resource capital especially creation of jobs to the youth in the sector and ensuring decentralized governance. However, there are challenges in policy regulation i.e. government agencies coordination between themselves and less responsibility by government officials through using e-government as a scapegoat for not efficiently delivering services and in a timely manner.

Distance learning has taken shape in most developing countries. ICTs have great potential value for distance education in Africa by allowing 'distant' access to library services, the e-mailing of study material to students, or even two-way voice communication and remotely navigated Web-based lessons, (Avafia, 1998). However, this will require the appropriate technological infrastructure and requisite training for all involved. (Yi, Jackson, Park, & Probst, 2006) while examining distance education infrastructure for rural areas using Java as a development tool established that by adopting ICT, more and more services are provided by fewer librarians, with fewer funds and less resources, because the expectation is that technology can bridge more with less.



(Usluel, As\_Kar, & Bas, 2008) conducted study focusing on utilization of Information and Communication Technologies (ICT) as an indicator of diffusion in Turkey. The authors applied a structural equation model which was composed of the variables explaining ICT usage in Turkish higher education which they established and tested. The two dimensions of ICT usage the study considered included instructional and managerial. Based on various faculties under study, the study revealed that 61% of the faculties use ICT. The study showed that the perceived attributes of ICT and ICT facilities in the universities predict the ICT use. The results indicated that the faculty members make use of ICT mostly as a means of communication and for searching for information about the course through the Internet in order to publish their lecture notes and announce course assignments or projects. Finally, it was shown that, a strongly positive effect exists between ICT facilities and ICT usage and positive effect on perceived attributes.

(Bennett & Bennett, 2003) established factors that influence the diffusion of innovation when structuring a faculty training program. This was achieved during their study on the impacts of perceived characteristics of instructional technology on faculty members' willingness to integrate it in their teaching. Their study revealed that the most important factor which impedes the use of technology in higher education is not the lack of technological facilities or financial funds, but faculty members' reluctance and their disbelief in the use of technology.

(Oye, Iahad, & Rahim, 2012) conducted a study to explore factors behind acceptance and usage of ICT by university academicians. They applied Unified Theory of Acceptance and Use of Technology (UTAUT) Model at the University of Port Harcourt, Nigeria as a case study. Approximately 100 questionnaires were administered. The study result shows that the most important UTAUT paradigm is Effort Expectancy (EE). On the other hand, the most influential construct outside UTAUT model is Attitudes towards Use of Technology (ATUT). It was further revealed that anxiety about ICT does have an impact on the academicians.

#### **2.4 Summary of the Literature Review**

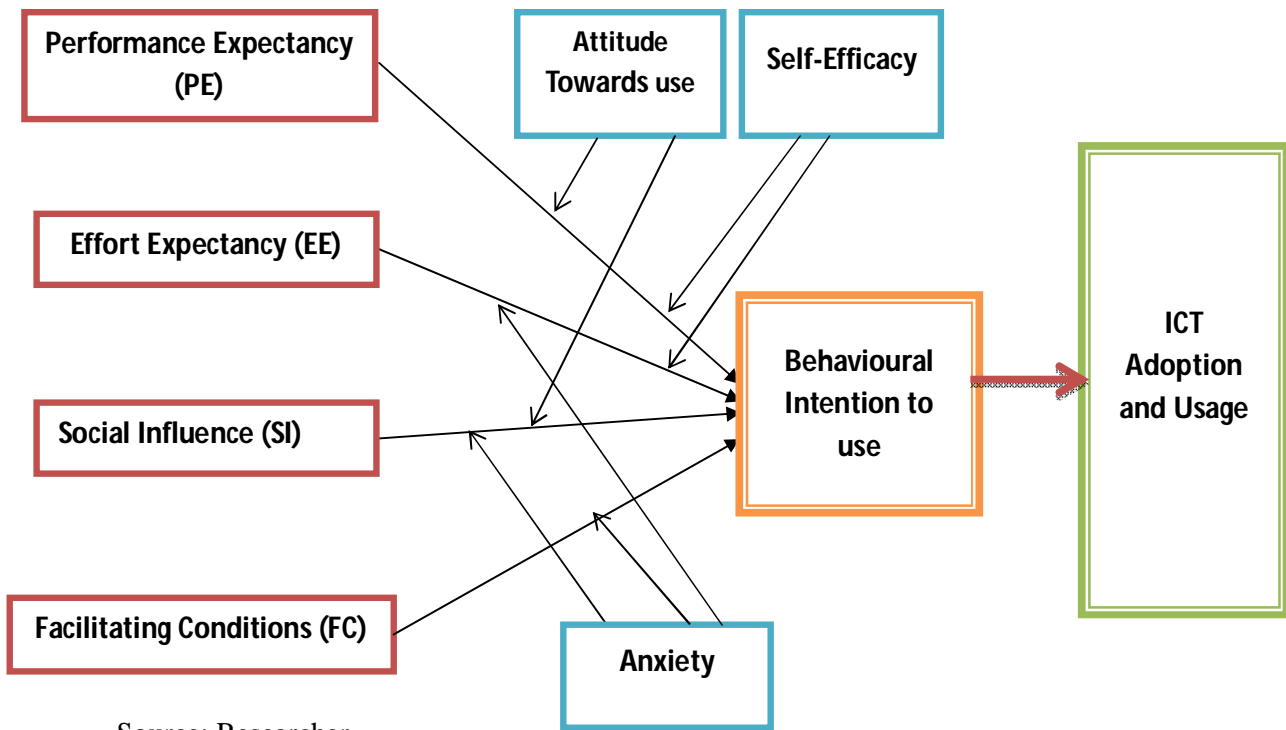
Based on both theoretical and empirical underpinnings, it is shown that adoption and usage of ICT is majorly demonstrated by either perceived usefulness, attitude or perceived ease of use. This has been demonstrated as majority of studies indicated a lot of internet usage, transparency which as per (Monga, 2008) saves time, leads to better office and records management, reduced corruption and improved attitudes, upgrading citizens living standards,

faster service delivery, development of human resource capital and ensuring decentralized governance. Similarly other studies for example (Yi, Jackson, Park, & Probst, 2006) argued that by adopting ICT, more and more service are provided which saves resources, on the other hand, (Usluel, As\_Kar, & Bas, 2008) and (Bennett & Bennett, 2003) claiming that perceived attributes of ICT and ICT facilities in the universities predict the ICT use and the latter arguing that also faculty members' reluctance and their disbelief leads to low adoption and usage of technology. Lastly, having adopted a dynamic UTAUT model, (Oye, Iahad, & Rahim, 2012) indicated that effort expectancy and attitudes towards use of technology greatly influence utilization of ICT services. Despite this findings and relevant theoretical underpinnings, few institution based studies reviewed like (Usluel, As\_Kar, & Bas, 2008) which modelled adoption and usage of ICT as they utilized a structural equation model to in exploring the relationship among variables explaining ICT usage in Turkish higher education which they not only established but also tested, however, the failed to take care of emerging estimation issues. Therefore, this studies apart from considering the reviewed studies, especially considering the UTAUT model, it conducted a cross sectional study of Mogadishu university management system and applied Binary Regression Model (BRM) indicating the likelihood of adopting and using ICT services at the same time considering the normality and Multicollinearity of the data collected.

## **2.5 Conceptual Framework**

Conceptual framework is defined as a group of concepts that are broadly defined and systematically organized to provide a focus, a rationale, and a tool for the integration and interpretation of information, (Mosby, 2009). On the other hand,(Kothari, 2004) defines an independent variable also known as the explanatory variable as the presumed cause of the changes of the dependent variable, while a dependent variable refers to the variable which the study explains. Based on the reviewed models and as adopted by studies like Oye, et al., (2010) our study adopted UTAUT theory in Management System. The following is figurative representation of the variables explored by this study.

**Figure 4: Conceptual Framework on ICT adoption and usage**



Brief definition and importance of the constructs:

**Performance expectancy (PE):** represents the extent an individual believes the system will help them do their jobs better.

**Effort expectancy (EE):** evaluates how ease an individual believes the system is to use.

**Social influence (SI):** relates to whether or not important others influence an individuals' intention to use the system.

**Facilitating conditions (FC):** shows whether individual have the personal knowledge and institutional resources available to use the management system at Mogadishu University.

**Anxiety (AX):** relates to the fear of computer (ICT) when using one.

**Attitude towards using technology (ATUT):** indicates an individual's overall affective reaction to using a system.

Finally, **Self-efficacy (SE)** relates to an individuals' confidence in his/her ability to perform the behaviour required to produce specific outcome.

## **CHAPTER THREE**

### **RESEACH METHODOLOGY**

#### **3.1 Introduction**

This chapter outlines the methodology employed in carrying out the study. The chapter begins by presenting overall description of the research design, target population, sample size, sampling procedure, data collection and data analysis procedures. This is followed by the model estimation and specification and validity and reliability of the study instruments.

#### **3.2 Research Design**

The study is a case study but adopting survey approach. The survey provides an opportunity to understand more on adoption of ICT and aids in structuring the research interviews and questionnaires and also provides the researcher with both qualitative and quantitative data. The study also uses observation and comparison of the case studies from different departments which leads the researcher into evaluating factors which leads to adoption ad utilization of ICT services in Mogadishu University and among other institutions of learning in Somalia. Further, a method for conducting sample subjects was devised and then implemented which facilitated data collection and analysis.

#### **3.3 Target Population**

A population is the total collection of elements about which inferences are made and refers to all possible cases which are of interest for a study. The study was carried out in Mogadishu University in Somalia. It targeted five departments namely; academic department, administration department, admission and registration department, student affairs department and finance department. The basis for selecting the five main departments was due to their level of involvement and usage of ICT facilities.

#### **3.4 Sample Size and Sampling Procedures**

There is no fixed number of percentages of subject that determine the size of an adequate sample, (Best and Khan, 1999). To them, the ideal sample is large enough to serve as an adequate representation of that population about which the study wishes to generalize and small enough to be selected economically in terms of subject availability, expenses in terms of time and money and complexity of data analysis. The study considers stratification approach/method. Therefore, in our study, the sample was considered enough at the point of saturation.

### **3.5 Data Collection Techniques and Procedures**

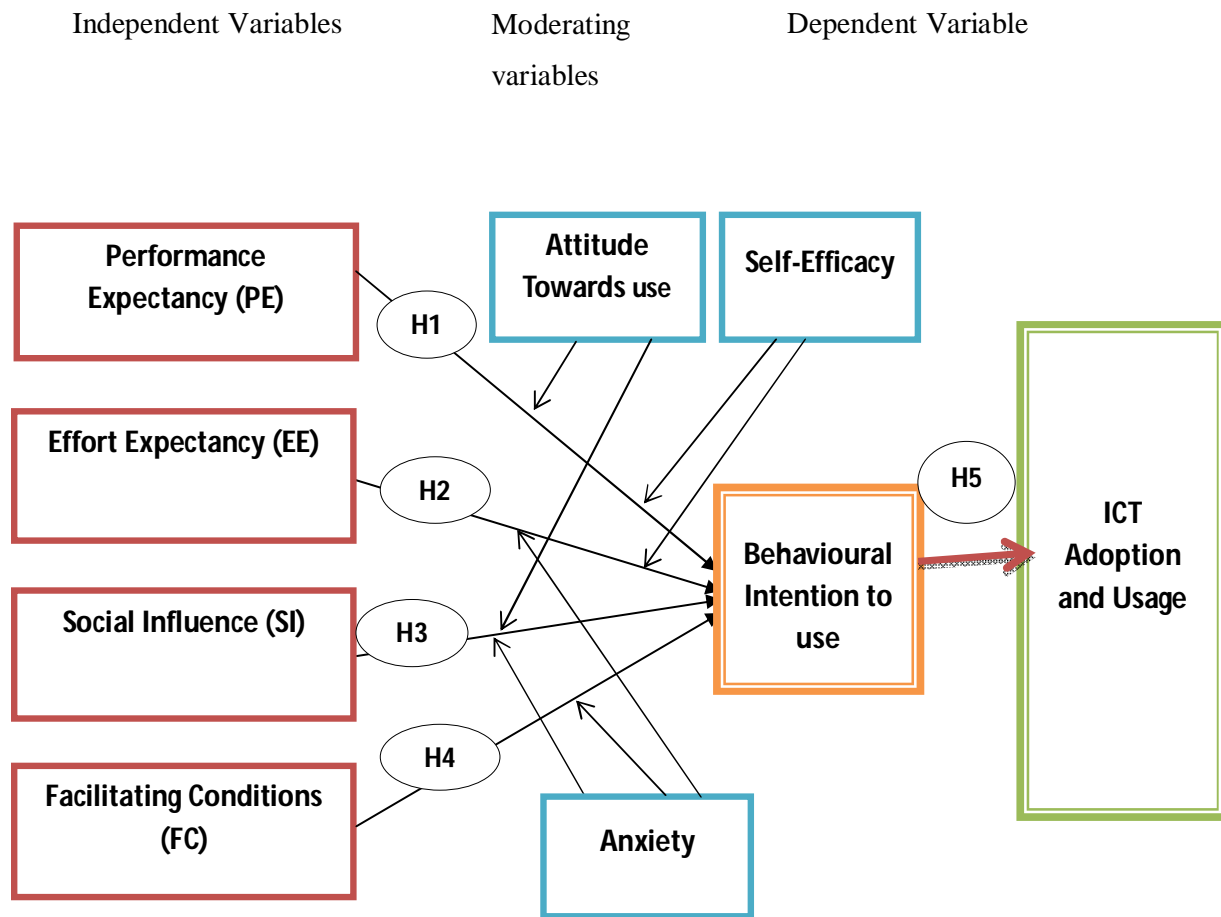
The study used primary data collected through a self-administered questionnaire to the various departments identified in this study at the Mogadishu University. UTAUT model was adopted while developing the study instruments. The questionnaires contained both open ended questions where the respondents expressed their opinions freely and some structured responses with pre-determined questions with choices. Information on main factors of UTAUT like effort expectancy, facilitating conditions, social influence, performance expectancy was explored and some modifying aspects (Oye, et al., 2010). The secondary data was also gathered through a review of the published academic literatures and any other relevant sources. A copy of the permit to undertake the study was presented at the research department, Mogadishu University.

### **3.6 Data Analysis Procedures and Hypothesis Testing**

The process of data analysis involved several stages namely; data clean up, data reduction, data differentiation and explanation. Data clean up involved editing; coding and tabulation in order to detect any anomalies in the response and assign specific numerical value to responses for further analysis. Completed questionnaires were edited for completeness and consistency. The data was coded and checked for any errors and omissions. The coding of categorized data was done according to various guiding stipulated by the question items. The next stage consisted of statistical applications to obtain actual values and better understanding of each factor considered in this study. Descriptive analysis was done on the quantitative data. Frequency tables, percentages and means were used to present the findings. Thereafter, the study estimated the suggested models that related the adoption and usage of ICT at Mogadishu University management system to independent variables.

The following hypotheses were tested as shown in Figure 5 below;

**Figure 5: Operationalized model through hypothesis testing**



Source: Researcher

**H<sub>01</sub>:** There is no significant effect between performance expectance and behavioural intention to use Mogadishu University Management System.

**H<sub>02</sub>:** There is no significant effect between Effort expectancy and behavioural intention to use Mogadishu University Management System.

**H<sub>03</sub>:** There is no significant effect between Social influence and behavioural intention to use Mogadishu University Management System.

**H<sub>04</sub>:** There is no significant effect between Facilitating conditions and behavioural intention to use Mogadishu University Management System.

**H<sub>05</sub>:** There is no significant relationship between behavioural intention to use and ICT adoption and usage of Mogadishu University Management System.

The study also tests the effect of the moderating factors (moderating effects) on adoption and usage of ICT in Mogadishu University Management System as shown below;

**H<sub>0s1</sub>**: Attitude towards use of technology has no significant moderating effect between performance expectancy and behavioural intention to use Mogadishu University Management System.

**H<sub>0s2</sub>**: Attitude towards use of technology has no significant moderating effect between social influence and behavioural intention to use Mogadishu University Management System.

**H<sub>0s3</sub>**: Self efficacy has no significant moderating effect between performance expectancy and behavioural intention to use Mogadishu University Management System.

**H<sub>0s4</sub>**: Self efficacy has no significant moderating effect between effort expectancy and behavioural intention to use Mogadishu University Management System.

**H<sub>0s5</sub>**: Anxiety has no significant moderating effect between effort expectancy and behavioural intention to use Mogadishu University Management System.

**H<sub>0s6</sub>**: Anxiety has no significant moderating effect between social influence and behavioural intention to use Mogadishu University Management System.

**H<sub>0s7</sub>**: Anxiety has no significant moderating effect between facilitating conditions and behavioural intention to use Mogadishu University Management System.

### **3.7 Model Estimation and Specification**

Based on the UTAUT framework, the study explores factors associated with adoption and usage of ICT by employing binary probit regression which is a probabilistic distribution from where interpretation of the probability of either using or not using ICT service given other factors are conducted. Therefore, an assumption is made that the error term takes a standard normal distribution thus estimating the marginal effects, in order to interpret the probit model. This reflects the change in the probability of experiencing an event (that is adoption and usage of ICT services by various departments at Mogadishu University), given a unit change in any of the explanatory variable. In specifying the model, the study uses a general multivariate analysis to explore the effect of adoption and utilization of ICTs in Mogadishu University, Somalia.

The General Model is represented as follows;

$$Y_i = \beta_s X_s + \varepsilon_i$$

Where  $Y_i$  is dependent variable that is adoption and usage of ICT services as shown in the theoretical framework (Figure 3.1) while  $X_s$  are the explanatory variables; performance expectancy, effort expectancy, social influence and facilitating conditions among other motivating factors (attitude towards use, anxiety and self-efficacy) on usage of ICT services in the identified departments according to UTAUT model,  $\beta_s$  are the coefficients of the respective independent variables and  $\varepsilon_i$  is the error term.

### **3.8 Reliability and Validity**

#### **3.8.1 Reliability**

Reliability is concerned with the ability of an instrument to measure consistently. To ensure reliability, the research assistants were trained and monitored/supervised to ensure they are competent and administer the questionnaires correctly during pretesting of tools and data collection. Standard operating procedures for data collection were used to ensure consistency in collection. All completed questionnaires were scrutinized and all errors corrected.

#### **3.8.2 Validity**

Validity is concerned with the extent to which an instrument measures what it is intended to measure. Validity of the instruments was ensured through a well-designed questionnaire and instruments which were piloted to ensure coherence and comprehensiveness. Standardized questionnaires were used for desired answers.



## CHAPTER FOUR

### RESULTS

#### 4.1. Introduction

This chapter presents the results composed of the major study findings based on the primary data collected from the respondents. The study results are presented in narrative, tables and graphs. This chapter is meant to accomplish the set study objectives with the main objective being to customize the existing framework in order to evaluate ICT adoption and usage in higher institutions of learning in Somalia as well as specifically assessing the pattern of usage of ICTs among various departments in Mogadishu University. Secondly, appropriate model for investigating ICT adoption and usage in Mogadishu University is identified and used in a case study to investigate the adoption and usage of ICT in Mogadishu University management system (MUMS).

The section begins by giving general demographic characteristics of the respondents and further presents the results of the responses on the factors that influence adoption and usage of ICT in higher institutions of learning in Somalia.

A total of 135 questionnaires were issued and to ensure the research yielded 100% response rate, the researcher met and discussed with each of the respondents the purpose of the study and took them through completing the questionnaire. Out of the total questionnaires distributed, 113 questionnaires were filled and returned. However, of the returned questionnaires, two had errors<sup>1</sup> and were not considered fit for analysis. Table 1 below shows the details the data collection. Most respondents were interviewed on 17<sup>th</sup> June, 22<sup>nd</sup> June, and 23<sup>rd</sup> June respectively. This implies that majority of them were within the university and in their respective departments especially the head of departments. Mored other details is as shown in Table 1 below;

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<sup>1</sup> Wrongly filled questionnaires

**Table 1: Date of interview**

Interview	Freq.	Percent	Cum.
17 Jun2015	20	18.02	18.02
19 Jun2015	1	0.90	18.92
20 Jun2015	7	6.31	25.23
21 Jun2015	6	5.41	30.63
22 Jun2015	29	26.13	56.76
23 Jun2015	17	15.32	72.07
24 Jun2015	9	8.11	80.18
25 Jun2015	9	8.11	88.29
26 Jun2015	4	3.60	91.89
27 Jun2015	9	8.11	100.00
Total	111	100.00	

**4.2. Descriptive statistics (Demographic characteristics)**

The study considers various descriptive statistics considered include frequencies, the mean (percentages), standard deviation and the range. The various responses have been presented in frequency tables and then a summary is made thereafter in relation to the MUMS.

**4.2.1: Gender**

In Table 2 below, the study shows the gender distribution of the respondents. The study found out that out of 111 respondents, 75.7% were male while 24.3% were female. This implies that most departments are male dominated.

**Table 2: Gender Distribution**

Gender	Freq.	Percent	Cum.
Male	84	75.68	75.68
Female	27	24.32	100.00
Total	111	100.00	

#### 4.2.2: Age

In terms of age distribution, Table 3 shows that most respondents were on average 29 years with the oldest respondent being 48 years while the youngest was 19 years old. The age was varying about 6 years on average about the mean. Further, the study analyzed age in six different age groups of five years. It revealed that the distribution was skewed towards respondents aged between 25-29 years with 37 observations. This implies that majority of the respondents were the younger generation distributed in the surveyed departments. Other details are as presented in table 3 below;

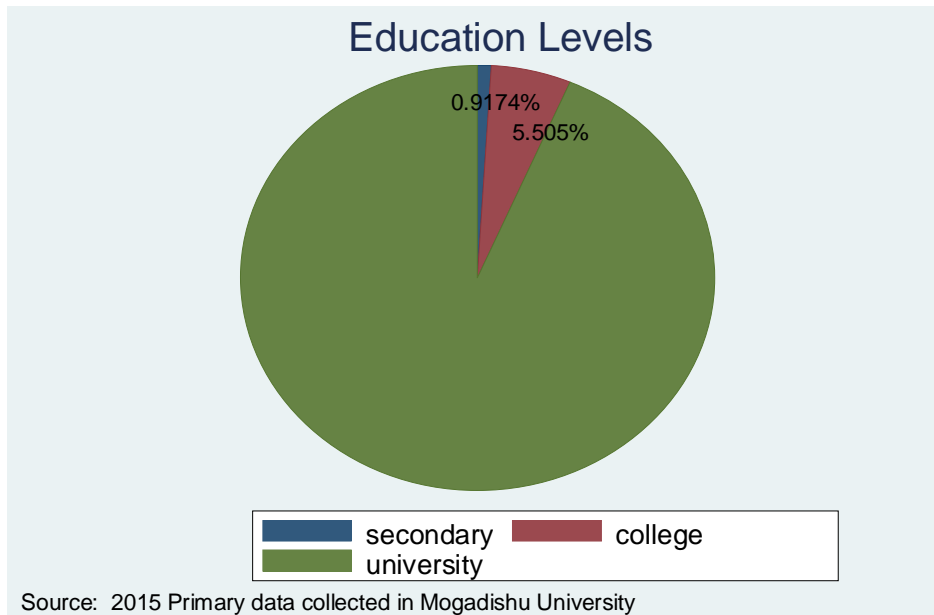
**Table 3: Age categories**

Categories	Observations	Mean	Std. Dev.	Min	Max
Between 19-24	22	22.40909	1.652101	19	24
Between 25-29	37	26.86486	1.357329	25	29
Between 30-34	18	31.11111	1.367217	30	34
Between 35-39	11	36.72727	1.272078	35	38
Between 40-44	6	40.66667	1.032796	40	42
Between 45-49	2	47.5	.7071068	47	48
Overall age distribution	96	29.0625	6.104032	19	48

#### 4.2.3: Education Levels

Education level was assessed with consideration of the highest academic level achieved by the respective respondent. Figure 6 below shows the distribution of highest level of education. The study revealed that all respondents had more than secondary education levels. There was no one with primary education. Approximately 0.9% had secondary education, 5.4% had college education while 91.9% of the respondents had university education.

**Figure 6: Highest academic levels**



#### 4.2.4: Marital status

Marital status of the respondents was assessed also in three different levels, i.e. single, married and widowed. In these three categories, it was shown that all respondents were either single or married implying that none of them was widowed. Approximately 45% of the respondents were single while 55% were married as presented in table 4 below;

**Table 4: Marital Status**

Marital status	Freq.	Percent	Cum.
Single	50	45.05	45.05
Married	61	54.95	100.00
Total	111	100.00	

#### 4.2.5: Years stayed in the institution

The study further explored the total number of years that an individual has been operating within the institution. The categories were grouped as follows; those respondents who have stayed five years and below, between 5years and 10 years and above ten years. The study found out that in the first category, on average, there was 67 respondents who have been

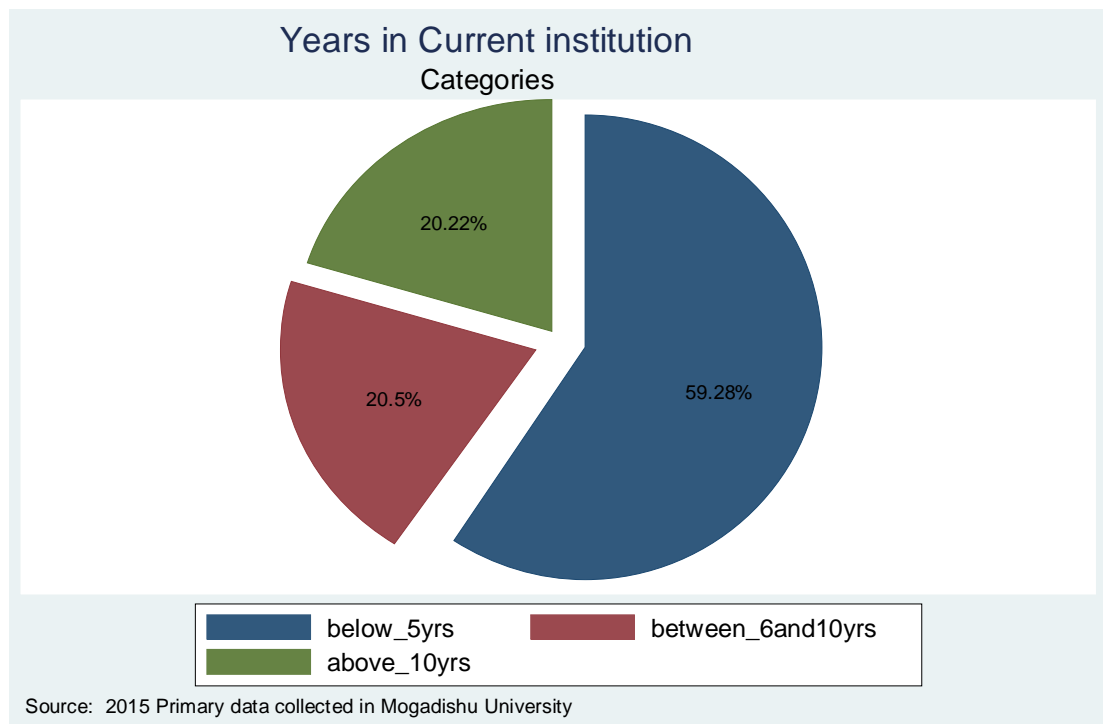
within the institution for a span of 3 years, 10 respondents in the second category have stayed in the institution for an average span of 7 years while the third category, six respondents have been in the country for a span of 12 years on average. However, among the three categories, the below 5 years category was found to be 29.3%, between 6 and 10 years was 20.5% while above ten years was 20.2% respectively.

**Table 5: Duration of stay in the institution**

Variable	Obs	Mean	Std. Dev.	Min	Max
below_5yrs	67	3.19403	1.131355	1	5
between_6a~s	10	7.4	1.264911	6	10
above_10yrs	6	12.16667	.4082483	12	13

Figure 7 below is a representation of more other characteristics as described above;

**Figure 7: Years in current institution**



#### 4.2.6: Working Experience

Similarly, the years of working in current position which is proxied as the working experience is as indicated in Table 6 below. It is shown that most respondents had worked in their current position between one and three years with majority (27.4%) reporting to work for 3 years. The highest worked duration reported was 12 years by one respondent while the least duration one year reported by 13 respondents.

**Table 6: Years in current position**

Working experience (years)	Freq.	Percent	Cum.
1	13	17.81	17.81
2	15	20.55	38.36
3	20	27.40	65.75
4	7	9.59	75.34
5	8	10.96	86.30
6	3	4.11	90.41
7	1	1.37	91.78
8	1	1.37	93.15
9	2	2.74	95.89
10	2	2.74	98.63
12	1	1.37	100.00
Total	73	100.00	

#### 4.2.7: Name of the current department

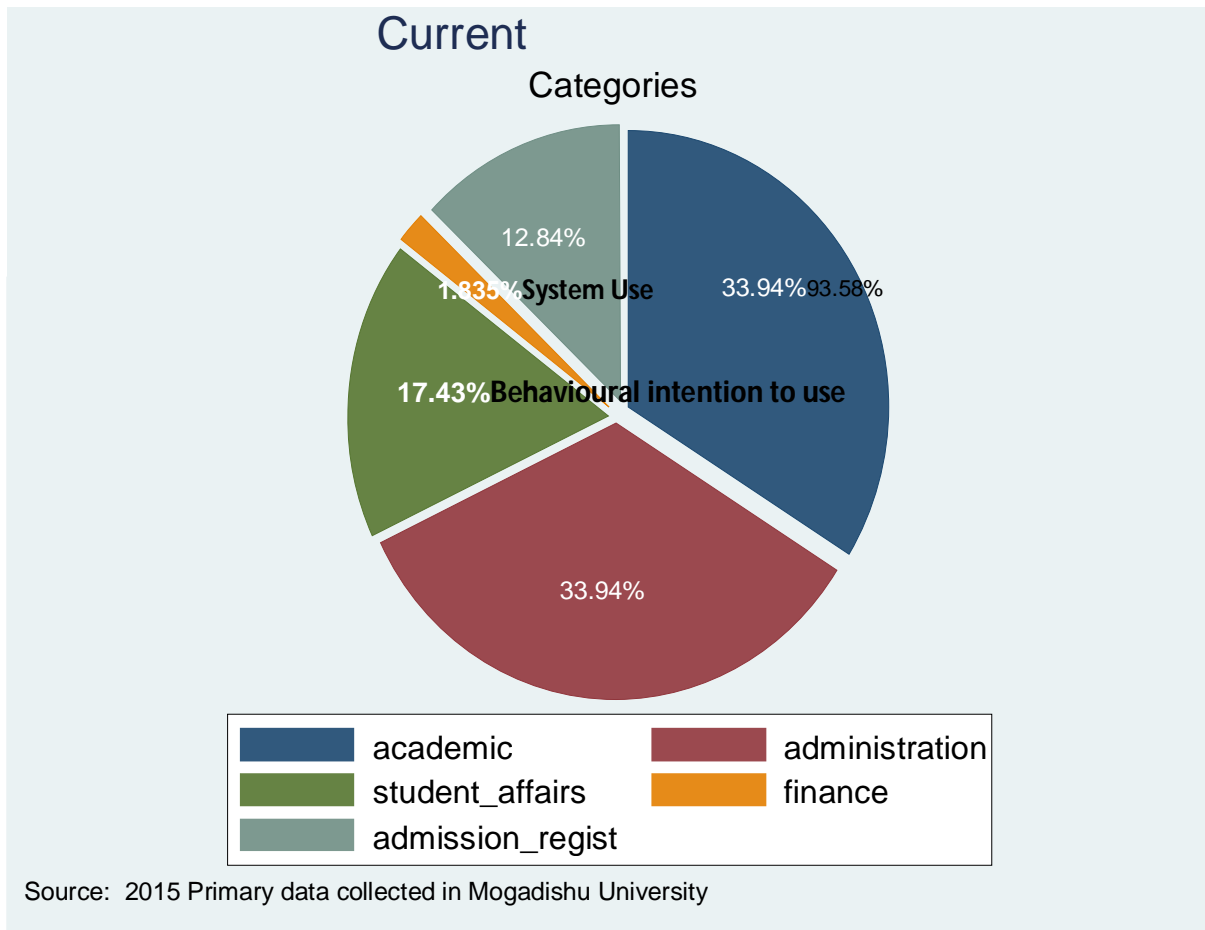
Lastly in this section, respondents indicated the name of their current department which was aligned to five major departments, i.e. academic department, administration department, student affairs department, admission and registration department, and finance department. The study revealed that 33.9%, 33.9%, 17.4%, 12.8% and 1.8% were realigned based on the five departments respectively. The frequency is as indicated in Table 7 below;

**Table 7: Current Department**

Department	Freq.	Percent	Cum.
Academic	37	33.94	33.94
Administration	37	33.94	67.89
Student affairs	19	17.43	85.32
Admission and registration	14	12.84	98.17
Finance department	2	1.83	100.00
Total	109	100.00	

Figurative presentation of the name of the current department is presented in Figure 8.

**Figure 8: Name of the current department**



#### 4.2.8: Gender Distribution per department

Focusing on the gender distribution on the five departments, the study revealed that among the departments, male gender was highly concentrated in the academic department while the females were highly concentrated in administration department. Since the response rate from finance department was low, the study showed that the two respondents were all male. Other details are as indicated in Table 8 below;

**Table 8: Gender distribution across departments**

Gender	Departments					Total
	Academic	Administration	Student affairs	Finance	Admission & Regis	
Male	33	25	10	2	13	83
Female	4	12	9	0	1	26
Total	37	37	19	2	14	109

#### 4.2.9: Education attainment per departments

The distribution of the respondents in various departments was also assessed as per the level of education. There was only one respondent who reported to be having secondary education and was stationed in the administration department. Similarly, 6 respondents had college level of education and five of them were stationed in administration department while one was under academic department. Most respondent as described in the beginning of this chapter had university education. However, majority of them are located in academic department followed by administration and then student affairs. This is true since most respondents were lecturers with both undergraduate and post graduate level of education.

**Table 9: Distribution across the departments by Education levels**

Education level	Academic	Administration	Student affairs	Finance	Admission & Regis	Total
Secondary education	0	1	0	0	0	1
College education	1	5	0	0	0	6
University education	35	31	19	2	14	101
Total	36	37	19	2	14	108



#### 4.2.10: Marital status per department

Distribution of the respondents by marital status indicated that most married and single respondents were under academic departments were distributed equally between academic department and administration (16 and 21 respondents) respectively. However, married respondents were majority in the two departments compared to student affairs department. More other details are as indicated in Table 10 below;

**Table 10: Distribution across the departments by marital status**

Marital status	Academic	Administration	Student affairs	Finance	Admission & Regis	Total
Single	16	16	11	0	6	49
Married	21	21	8	2	8	60
Total	37	37	19	2	14	109

### 4.3. Reliability, Validity and Sampling Analysis

#### 4.3.1: Reliability and Validity Analysis

Before conducting structural modelling, the study evaluated whether instruments were reliable and valid in order to enhance the accuracy of their assessment and evaluations. It should be noted that the reliability of an instrument is closely associated with its validity. An instrument cannot be valid unless it is reliable. However, it should also be noted that reliability of an instrument does not depend on validity, (Nunnally & Bernstein, 1994). The study therefore measured reliability of the instrument by conducting Cronbach's alpha.

Cronbach's alpha is an index that provides a measure of the internal consistency of a test or scale ranging between 0 and 1. Internal consistency describes the extent to which all the items (say pe1, pe2, pe3 and pe4) in a test measures the same concept or construct and hence it is connected to the inter-relatedness of the items within the test. Internal consistency is recommended before a test can be employed for research or examination purposes to ensure validity (Nunnally & Bernstein, 1994). Reliability estimates on the other hand show the amount of measurement error in a test. Note that the acceptable values of alpha range from 0.60 to 0.90, (Bland & Altman, 1997) and (DeVellis, 2003). The Table 11 indicates Cronbach's alpha coefficient for both root and moderating constructs.

**Table 11: Cronbach's Alpha Index and KMO**

Type of Construct		No. of items in the scale	Cronbach's Alpha Index	Sampling adequacy
<b>Root Constructs</b>			<b>Alpha</b>	<b>KMO</b>
	Performance Expectance	4	0.5501	0.571
	Effort Expectance	4	0.4281	0.5598
	Social- influence	4	0.4138	0.5980
	Facilitating conditions	4	0.2043	0.5581
	Behavioural intention to use	3	0.6964	0.5332
<b>Moderating factors</b>				
	Attitude towards use	4	0.6956	0.6325
	Self-efficacy	4	0.5908	0.5578
	Anxiety	4	0.6784	0.5793

\*KMO= Kaiser-Meyer-Olkin

Since the study had more than one construct for both root and moderating constructs, the overall Cronbach's alpha index was not reported as it could not make sense to report alpha for the test as a whole as the larger number of questions were inevitable and thus likely to inflate the value of alpha. In principle therefore, alpha was calculated for each of the concepts rather than for the entire test or scale.

From the study results, most variables had four items except behavioural intention to use which had only three items. It was shown that behavioural intention to use, attitude towards use and anxiety were some of the constructs with the reliable and thus valid. On the other hand, the reliability coefficients for all main constructs were below the threshold ( $\alpha < 0.60$ ) including one of the moderating factor (self-efficacy). They consequently had higher measurement errors (highest being facilitating conditions (95.8%). As the estimate of reliability decreases, the fraction of a test score that is attributable to error increase. The study identified factors with low Cronbach's coefficient which includes performance expectance, effort expectance, social influence, facilitating conditions and self-efficacy. These results

imply that the correlation between items in a test was low<sup>2</sup>. A similar behaviour or trend was also detected in the factor analysis (factor loadings).

Further, a low value of Cronbach's alpha found among the root constructs and one of the moderating factors could be attributed to a low number of questions for example in the behavioural intention to use the system which had only three questions as well as poor interrelatedness between items or heterogeneous items. It is recommended that a low alpha due to poor correlation between items should be revised or discarded (DeVellis, 2003). However, in this study, most of the constructs were fairly correlated. Since this study was evaluating the framework under consideration and not developing a new framework, it was not possible to discard or revise the items; instead, they were subjected to the survey.

#### **4.3.2. Sampling Adequacy**

Sampling adequacy predicts if data are likely to factor well, based on both correlation and partial correlation. In determining sample adequacy, the study estimated the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. Based on Table 11 above, on average, social influence was highly sampled (59.8%) compared to other root constructs while behavioural intention to use was lowly sampled (53.3%). On the other hand, the study estimated the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy for moderating factors. From Table 11, the KMO result revealed that among the three moderators, self-efficacy was lowly sampled. Self-efficacy had a KMO of 55.78% compared to anxiety (57.93%) and attitude towards use which was highly sampled (63.25%). However, it should be noted that almost all constructs both root and moderating factors had sampling rate of above 50% implying that the least construct was fairly sampled. Further, on overall, Attitude towards use is highly sampled whereas behavioural intention to use the system was shown to be lowly sampled.

#### **4.4. Characteristics of job related outcomes**

The study in this section focus on the characteristics of the performance expectance, effort expectance, social influence, facilitating conditions, behavioral intention to use the system and the three moderating factors i.e. attitude towards using technology, self-efficacy and anxiety. Table 12 indicates the level of agreements with regard to the job related outcomes given the technology.

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<sup>2</sup> However, a high coefficient of alpha does not always mean a high degree of internal consistency. This is because alpha is also affected by the length of the test. If the test length is too short, the value of alpha may also be reduced (Nunnally & Bernstein, 1994).

#### **4.4.1: Performance Expectancy**

In performance expectancy, the study show majority of the respondents (46.4%) strongly agreeing that the system helps them in their daily assignment. Approximately 49.1% agree that the system enables them accomplish their tasks more quickly compared to 2.7% of the respondents who strongly disagreed on that statement. Also, 39.1% of the respondents strongly agreed that the system increased their productivity where most respondent (40%) agreed that if they use the system, they were likely going to increase their earnings compared to 7.3% who strongly disagreed on this statement.

#### **4.4.2: Effort Expectancy**

Similarly, on effort expectancy, approximately 47.7% of the respondents strongly agreed that their interaction with the system was clear and understandable compared to 1.8% who just disagreed and no respondent strongly disagreed with this statement. On the other hand, most of the respondents (46.4%) agreed that it was easy for them to become more skilful at using the system whereas only 34.6 % strongly agreed with 0.9% strongly disagreed. In terms of easiness of using the system, the study found out that 43.6% and 2.7% of the respondents strongly agree to that statement and the latter just disagreed while none of the respondents strongly disagreed. The study further indicate that 52.7% who formed the majority of the respondents agreed that learning to operate the system was quite easy for them while 31.8 strongly agreed and 1.8% strongly disagreed to this statement.

#### **4.4.3: Social Influence**

Social influence was shown to be influencing adoption and usage of ICT. The study indicated that approximately 47.3%, 38.2% and 1.8% of the respondents strongly agreed, agreed and disagreed respectively on the influence of administrators in the institution think that he/she should use the system. No respondent was reported to strongly disagree regarding to this statement. On the other hand, 22.7%, 60% and 2.7% of the respondents strongly agree, agree and disagree respectively on the believe that those people who are important to them think that they should use the system. Whereas, those respondents who strongly agree that the senior management of this institution has been helpful in the use of the system are 34.6% compared to 2.7% of the respondents who strongly disagree on this aspect. Finally, approximately 43.6% and 3.6% of the respondents strongly agreed and the latter strongly disagreed that the institution has supported them in the use of the system.

#### 4.4.4: Facilitating Conditions

In finding out whether respondents had personal knowledge and institutional resources available to use the management system, approximately 33%, 44%, 5.5% and 0.9% strongly agreed, agreed, disagreed and strongly disagreed that they had the resources necessary to use the system. On the possession of knowledge necessary to use the system, majority of the respondents (13.6) were silent or had no comment/ neutral compared to 38.2%, 43.6% and 4.6% of the respondents who strongly agreed, agreed and disagreed respectively whereas none strongly disagreed with regard to this statement. Similarly, 29.4% of the respondents were neutral on whether the system was not compatible with other systems they use whereas 10.2% and 13% strongly agreed and strongly disagreed on this statement respectively. The study revealed that 34.9% and 11% of the respondents strongly agreed and the latter strongly disagreed that there was a specific person (or a team) assigned and readily available in case of system difficulties. Table 12 below provides more other details.

**Table 12: Job related outcomes (%)**

<b>Code</b>	<b>Based on your experience, please indicate your level of agreement with this statements in regard to job related outcomes when using MUMS</b>	<b>Strongly agree</b>	<b>Agree</b>	<b>No Comment</b>	<b>Disagree</b>	<b>Strongly disagree</b>
<b>pe1</b>	The system is useful in my daily assignments.	46.4	42.7	5.5	4.6	0.9
<b>pe2</b>	The system enables me to accomplish tasks more quickly.	37.3	49.1	4.6	6.4	2.7
<b>pe3</b>	The system increases my productivity.	39.1	35.5	15.5	9.1	0.9
<b>pe4</b>	If I use the system, I will increase my chances of getting a raise.	20	40	23.6	9.1	7.3
<b>ee1</b>	My interaction with the system is clear and understandable.	47.7	43.1	7.3	1.8	-
<b>ee2</b>	It is easy for me to become more skilful at using the system.	34.6	46.4	13.6	4.6	0.9
<b>ee3</b>	I find the system easy to use.	43.6	41.8	11.8	2.7	-
<b>ee4</b>	Learning to operate the system is easy for me.	31.8	52.7	8.2	5.5	1.8
<b>si1</b>	Administrators in my institution think that I should use the system.	47.3	38.2	12.7	1.8	-
<b>si2</b>	People who are important to me think that I should use the system.	22.7	60	14.6	2.7	-
<b>si3</b>	The senior management of this institution has been helpful in the use of the system.	34.6	36.4	23.6	2.7	2.7
<b>si4</b>	In general, the institution has supported the use of the system.	43.6	34.6	11.8	6.4	3.6
<b>fc1</b>	I have the resources necessary to use the system.	33	44	16.5	5.5	0.9
<b>fc2</b>	I have the knowledge necessary to use the system.	38.2	43.6	13.6	4.6	-

<b>fc3</b>	The system is not compatible with other systems I use.	10.2	25.9	29.6	21.3	13
<b>fc4</b>	A specific person (or a team) is assigned and readily available in case of system difficulties.	34.9	30.3	18.4	5.5	11
<b>bi1</b>	I intend to use the system in the next three months.	34.6	33.6	24.6	4.6	2.7
<b>bi2</b>	I predict that I would use the system in the next three months.	18.2	32.7	40	2.7	6.4
<b>bi3</b>	I plan to use the system in the next three months.	24.8	29.4	29.4	8.3	8.3

#### **4.4.5: Behavioural intention to use the system**

Behavioural intention to use the system was explored in three different forms. The results as indicated in Table 12 above show 34.6% of the respondents strongly agreed that they intend to use the system in the subsequent three months whereas 2.7% of the respondents strongly disagreed on the same statement. On prediction over the usage of the system in the subsequent three months, the study found that majority of the respondents (40%) were silent or had no comment/ neutral compared to 18.2%, 32.7%, 2.7% and 6.4% of the respondents strongly agreed, agreed, disagreed and strongly disagreed with regard to this statement. Lastly, the behavioural intention to use the system scored 24.8% among those who strongly agreed and 8.3% on those who strongly disagreed regarding their plan to use the system in the subsequent three months. However, most respondents just agreed and others were neutral at 29.4% respectively.

#### **4.5: Moderating factors**

The three moderating factors (attitude towards technology use, self-efficacy and anxiety) are also considered in this study to indicate whether they have any influence on the usage of ICT in higher institution of learning.

##### **4.5.1: Attitude towards use of technology**

According to the findings in Table 13 below, majority of the respondents (73.4%) strongly agreed that usage of the system is a good idea while 3.7 strongly disagreed, similarly, 50% of the respondents strongly agreed while 3.6% strongly disagreed that the system makes work more interesting. In the same order, majority of respondents (45.4%) just agreed that working with the system is fun whereas 37% and 1.9% strongly agreed and strongly disagreed respectively. The study showed that more respondents (49.5%) like working with the system while 4.6% strongly disagreed.

#### 4.5.2: Self- Efficacy

On self-efficacy, the study evaluated whether the respondents could complete a job or task using the system; majority (39.1%) agreed on that aspect if there was no one around to tell them what to do in case of any challenge while 18.2% strongly agreed and 6.4% strongly disagreed. The study show 15.5%, 37.3% and 7.3% of the respondents strongly agreed, agreed and strongly disagreed that they can complete task if they could call someone for help if got stuck. On the other hand, 17.3% and 41.8% of the respondents strongly agreed and agreed respectively compared to 2.7% of the respondents on the aspect of allocation of more time in order to complete the job for which the software was provided. Further, it was shown that more respondents agreed that they could complete a task if they had just the built-in help facility for assistance. However, 19.1% and 9.1% strongly agreed and the latter strongly disagreed with that statement respectively.

**Table 13: Moderating Factors (%)**

Code	Based on your experience, please indicate your level of agreement with this statements in regard to moderating factors when using MUMS	Strongly agree	Agree	No Comment	Disagree	Strongly disagree
<b>attut1</b>	Using the system is a good idea.	73.4	18.4	2.8	1.8	3.7
<b>attut2</b>	The system makes work more interesting.	50	35.5	9.1	1.8	3.6
<b>attut3</b>	Working with the system is fun.	37	45.4	13	2.9	1.9
<b>attut4</b>	I like working with the system.	49.5	34.9	7.3	3.7	4.6
<b>se1</b>	If there was no one around to tell me what to do in case of any challenge.	18.2	39.1	28.2	8.2	6.4
<b>se2</b>	If I could call someone for help if I got stuck.	15.5	37.3	22.7	17.3	7.3
<b>se3</b>	If I had a lot of time to complete the job for which the software was provided.	17.3	41.8	23.6	14.6	2.7
<b>se4</b>	If I had just the built-in help facility for assistance.	19.1	33.6	25.5	12.7	9.1
<b>ax1</b>	I feel fearful/apprehensive/uneasy about using the system.	19.1	16.4	16.4	21.8	26.4
<b>ax2</b>	It scares me to think that I could lose a lot of information using the system by hitting the wrong key.	10.9	22.7	16.4	32.7	17.3
<b>ax3</b>	I hesitate to use the system for fear of making mistakes I cannot correct.	8.3	20.2	15.6	33	22.9
<b>ax4</b>	The system is somehow intimidating to me.	10	18.2	16.4	30.9	24.6

### **4.5.3: Anxiety**

The study finally analysed the extent of agreement on statement relating to anxiety to use of the system. Those respondents reported to strongly agree and strongly disagree regarding their feeling on fearful/apprehensive/uneasy about using the system, were 19.1% and 26.4% respectively. On the other hand, 10.9% strongly agreed to fear using the system due to fear of losing information by hitting the wrong key while 17.3% strongly disagreed with the statement. Although majority of the respondents (32.7%) just disagreed. Similarly, 22.9% of the respondents reported to strongly disagree that they hesitate to use the system for fear of making mistakes they cannot correct while only 8.3% strongly agreed. Lastly, 30.9% of the respondents disagreed that the system is somehow intimidating with 24.6% strongly disagreed and only 10% strongly agreed. More details are as presented in Table 12 above.

## **4.6. Factor Loadings and Uniqueness**

### **4.6.1: Root Constructs**

The study considered factors from the root constructs as indicated in Table 14 below. According to Overby and Konsynski, (2011), the loadings of each item on the root construct are meant to measure what is referred to as the substantive loading. From the study results below, the items load on systematically on the factors. The loadings indicate presence of both convergent and discriminant validity. However, factor loadings are equivalent to correlation between factors and variables when only a single common factor is involved. Since loadings range from -1 to 1, the study inspected the factor loadings and thus revealing the extent to which each of the root construct contributes to the meaning of each of the factors. Note that high loadings provide meaning and interpretation of factors (regression coefficients).

For more details, consider table below;



**Table 14: Factor loadings and Uniqueness of the Root Constructs**

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Uniqueness
pe1	<b>0.2727</b>	-0.2879	0.5120	0.2547	-0.0767	0.4744
pe2	<b>0.4627</b>	-0.1700	0.3876	0.0667	0.2515	0.4655
pe3	<b>0.4565</b>	-0.1583	0.0610	-0.0656	-0.3274	0.5911
pe4	<b>0.4616</b>	-0.2029	-0.1550	-0.2374	-0.0913	0.5252
ee1	0.3399	<b>0.1037</b>	0.3373	0.1149	-0.0507	0.6334
ee2	0.3270	<b>-0.0087</b>	-0.0352	0.2194	-0.2814	0.6584
ee3	0.4739	<b>-0.0890</b>	-0.2050	0.1208	0.2297	0.5352
ee4	0.4501	<b>-0.0830</b>	-0.2864	0.1256	0.3402	0.5243
si1	0.1398	-0.0103	<b>0.1219</b>	-0.1586	0.2675	0.7452
si2	0.4912	-0.0673	<b>-0.1271</b>	-0.2937	-0.1440	0.5371
si3	0.4195	-0.1317	<b>0.1009</b>	-0.2090	0.0648	0.6639
si4	0.5959	-0.1897	<b>-0.1713</b>	0.2123	0.0449	0.4371
fc1	0.4111	0.0127	0.1127	<b>-0.2922</b>	0.0499	0.6366
fc2	0.3724	-0.0035	-0.1584	<b>-0.0162</b>	-0.1834	0.6757
fc3	-0.0738	0.2053	0.0825	<b>0.1779</b>	0.0933	0.7302
fc4	0.2103	-0.0578	-0.2216	<b>0.3981</b>	-0.1046	0.6822
bi1	0.3280	0.5514	0.2431	-0.0840	<b>-0.0304</b>	0.4615
bi2	0.2890	0.6646	0.0150	0.1120	<b>-0.0379</b>	0.3879
bi3	0.4089	0.5467	-0.1611	-0.0172	<b>0.0501</b>	0.4023

**4.6.2. Moderating Factors**

Further the study computed the factor loading for the moderating factors and the results are shown in Table 15 below. As described earlier, the loadings among the moderators represent the degree to which each moderator uniquely correlates with each other.

**Table 15: Factor loading and Uniqueness of moderating factors**

Variable	Factor1	Factor2	Factor3	Uniqueness
attut1	<b>0.4858</b>	0.0213	0.0693	0.6448
attut2	<b>0.7636</b>	0.0255	0.2508	0.3253
attut3	<b>0.4637</b>	0.1949	0.1376	0.6475
attut4	<b>0.5753</b>	0.0075	0.3838	0.4875
se1	0.2847	<b>0.3433</b>	-0.0368	0.7021
se2	0.3045	<b>0.2015</b>	-0.1905	0.7092
se3	0.3292	<b>0.5051</b>	-0.3476	0.4764
se4	0.3899	<b>0.2681</b>	-0.5171	0.4559
ax1	-0.4154	0.5793	<b>-0.0090</b>	0.4506
ax2	-0.2348	0.6572	<b>0.2340</b>	0.4440
ax3	-0.1408	0.3756	<b>0.2612</b>	0.6311
ax4	-0.2211	0.4819	<b>0.1682</b>	0.5912

## 4.7. Structural Modelling and Framework Validation

### 4.7.1: Introduction

Literature put emphasis on the positive contribution of modern technology in any organization including institutions which are flogged with huge numbers of students (higher institutions of learning) or customers (banking sector). Despite huge benefits associated with existing and new technologies on improving productivity, they must be accepted and used by employees in these institutions and in their relevant department in accomplishing their day to day tasks. This section thus tests various hypotheses proposed to validate the proposed and adapted UTAUT framework for evaluating ICT adoption and usage in higher institutions of learning. The study begins by testing the main hypothesis followed by sub-hypothesis as proposed in the methodology section through usage of structural equation models following the binary probit model expressed below ;

$$Y_i = \beta_s X_s + \varepsilon_i \quad 4.1$$

Where  $Y_i$  is the probability of an individual using the System

$\beta_s$  are the coefficients to be estimated

$X_s$  are the various factors to be estimated

$\varepsilon_i$  is the error term

### 4.7.2: Path Analysis

#### 4.7.2.1: Hypotheses Testing (Main Constructs)

The study validates the framework through testing of the hypothesis. The first hypothesis was establishing whether there is any significant relationship between performance expectance and behavioral intention to use Mogadishu university management system. Below is the structural equation model of computed coefficients of marginal effects as indicated in Table 16;

$$Y = 0.3498EE - 0.2272SI - 0.4905FC - 0.2421YCI + 0.3779MS + 0.3779WE \quad 4.2$$

Where, Y is the probability of behavioural intention to use MUMS

EE is the effort expectancy

SI is the social influence

FC is the facilitating conditions

**YCI** is years stayed in current institution

**MS** is the marital status of the respondents

**WE** is the working experience

Based on the above structural equation model, the study revealed insignificant relationship between performance expectancy and behavioral intention to use the system and thus not included in the model.

The second hypothesis investigated the effect between effort expectancy and behavioral intention to use Mogadishu University management system. From the study finding, at 5% significance level, effort expectancy was shown to be negative and statistically significant in influencing the behavioral intention to use the system. The study found that effort expectancy significantly increases the probability of behavioral intention to use the system by 35% holding other factors constant.

The third hypothesis, examines the existing relationship between social influence and behavioral intention to use Mogadishu University management system. The study found that at 5% significance level, social influence significantly lowers the likelihood of behavioral intention to use the system. The results show that social influence reduces the probability of behavioral intention to use the system by 22.7% holding other factors constant.

The study in the fourth hypothesis investigated the relationship between facilitating conditions and behavioral intention to use Mogadishu University management system. The study revealed that at 1% significant level, facilitating condition significantly lowers the likelihood of behavioral intention to use the system by 49.1% holding other factors constant.

**Table 16: Regression results for factors determining behavioural intention to use the system**

Variables	ME	Std. Err.	T	P	[95% Confidence Interval]	
Age	0.00508	0.014180	0.36	0.720	-0.0227106	0.032875
Years in current institution	-0.24210**	0.095727	-2.53	0.011	-0.4297263	-0.0544824
Marital status (married=1)	0.37792**	0.162626	2.32	0.020	0.0591789	0.6966617
Working _experience	0.20433***	0.064174	3.18	0.001	0.0785552	0.3301151
Performance Expectancy	-0.04480	0.121355	-0.37	0.712	-0.2826571	0.1930463
Effort Expectancy	0.34982**	0.137300	2.55	0.011	0.0807216	0.6189292
Social Influence	-0.2272**	0.102913	-2.21	0.027	-0.4289775	-0.0255659
Facilitating Conditions	-0.49054***	0.128881	-3.81	0.000	-0.7431472	-0.2379417
Number of observation = 43						
LR chi2(8) = 26.54						
Prob > chi2 = 0.0008						
Log likelihood = -10.050413						
Pseudo R2 = 0.5690						

\*\*\* p ≤ 0.01, \*\* p ≤ 0.05, \* p ≤ 0.10, two-tailed test

Based on the results in Table 16 above, the root constructs and their corresponding moderating factors (age, years in current institution, marital status and working experience) were found to explain the dependent variable (behavioral intention to use MUMS by 56.9% whereas 43.1% of unexplained variation is attributed to other factors outside the model or unobserved factors.

The study further considered the relationship between behavioral intention to use and ICT adoption and usage of Mogadishu University management system. The structural model estimated this relationship with age of the respondent, whether the respondent had university education or not, years in current institution and marital status as control variables. The following is the estimated structural equation model (SEM) based on the results in Table 17;

$$Y = 0.4754BI + 0.3351UE \quad 4.3$$

Where Y is the probability of adopting and using the MUMS

BI is the behavioral intention to use the system

UE is the university education

From the SEM above, behavioural intention to use the system was found to be highly significant at 1% significance level. This implies that behavioral intention to use the system (MUMS) increases significantly the probability of adoption and usage of ICT by 47.5% holding other factors constant. Among the control variables, the study found that only having more than university education significantly increases the likelihood of adopting and using the ICT by 33.5% holding other factors constant.

**Table 17: Regression results for factors influencing ICT usage**

<b>Variables</b>	<b>ME</b>	<b>Std. Err.</b>	<b>t</b>	<b>P</b>	<b>95% Conf. Interval</b>	
Behavioural intention to use	0.475459***	0.1016603	4.68	0.000	0.2762085	0.6747095
Age	0.01651	0.01207	1.37	0.171	-0.0071468	0.0401668
University education	0.3350718**	0.1417687	2.36	0.018	0.0572103	0.6129333
Years in current institution	-0.0189953	0.025673	-0.74	0.459	-0.0693135	0.0313228
Marital status (Married=1)	-0.1730643	0.1232033	-1.40	0.160	-0.4145382	0.0684097
Number of observations= 47						
LR chi2(5) = 21.59						
Prob > chi2 = 0.0006						
Log likelihood= -12.160829						
Pseudo R2= 0.4702						

\*\*\*  $p \leq 0.01$ , \*\*  $p \leq 0.05$ , \*  $p \leq 0.10$ , two-tailed test

Based on the analysed factors in Table 17, Figure 9 presents path coefficients for the factor that affect the probability of adopting and using MUMS. Note that the probability to adopt and use MUMS has been explained 47.02% by behavioural to use the system and the respective moderating factors (university education, years in current institution and marital status) while the rest variations are attributed to factors not included in the model. The p value of 0.0006 implies that all factors considered fit the model well.

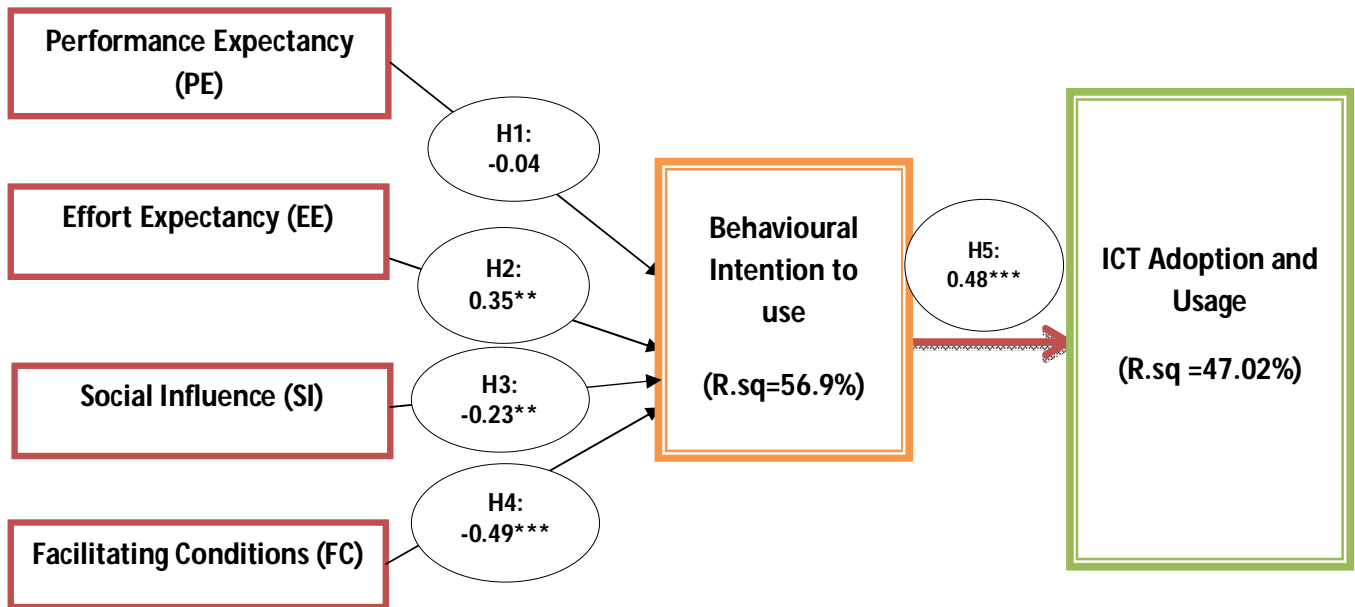
Below is a summary (Table 18) indicating acceptance/ rejection of the hypothesis regarding the main constructs relating to the behavioural intention to use the system;

**Table 18: Summary of Hypothesized root constructs and the Decision**

Variable	Coefficients	t- statistic	P-value	Decision
Performance expectancy	-0.0448	-0.37	0.712	Reject
<b>Effort expectancy</b>	<b>0.34982</b>	<b>2.55</b>	<b>0.011</b>	<b>Accept</b>
<b>Social Influence</b>	<b>-0.2272</b>	<b>-2.21</b>	<b>0.027</b>	<b>Accept</b>
<b>Facilitating conditions</b>	<b>-0.49054</b>	<b>-3.81</b>	<b>0.000</b>	<b>Accept</b>
<b>Behavioural intention to use</b>	<b>0.4754</b>	<b>4.68</b>	<b>0.000</b>	<b>Accept</b>

\*Based on three significance levels (10%, 5% and 1%)

**Figure 9: Path Coefficients for Root Constructs**



Source: Computed based on the collected data

**4.7.2.2. Hypothesis Testing (Moderating Factors)**

The moderating factors considered include the Attitude towards use of technology, self-efficacy, and anxiety to use the system. In this study, performance expectance and behavioral intention to use MUMS was moderated by attitude towards use and self-efficacy which was included in the structural model as moderating factors. Below is the estimated model;

$$Y = 0.1552PE - 0.2295ATTUT \tag{4.4}$$

Where Y is the probability of behavioral intention to use MUMS

PE is the performance expectance

ATTUT is the attitude towards use of the system

The study found out that attitude towards use of technology significantly moderated performance expectancy at 1% significance level. On the other hand, self-efficacy was found not to be significant moderating factor of performance expectance and behavioral intention to use the system.

**Table 19: Performance Expectance and Behavioural intention to use the system**

Variables	ME	Std. Err.	t	P	[95% Conf. Interval]	
Performance expectancy	0.1551846*	0.0832773	1.86	0.062	-0.0080359	0.3184051
Attitude towards use	-0.2295381***	0.0878378	-2.61	0.009	-0.4016971	-0.0573792
Self-efficacy	0.0383426	0.0928136	0.41	0.680	-0.1435688	0.2202539
Number of observations = 84						
LR chi2(3) = 9.76						
Prob > chi2 = 0.0207						
Log likelihood = -41.225769						
Pseudo R2 = 0.1058						

\*\*\* p ≤ 0.01, \*\* p ≤ 0.05, \* p ≤ 0.10, two-tailed test

The study examined moderating effect of both self-efficacy and anxiety with regard to effort expectancy and behavioral intention to use Mogadishu University Management System.

Surprisingly, the study found out that both self-efficacy and anxiety to be statistically insignificant in moderating between effort expectancy and behavioral intention to use the system.

**Table 20: Effort expectance and behavioral intention to use the system**

Variables	ME	Std. Err.	T	P	[95% Confidence Interval]	
Effort Expectancy	-0.0911286	0.0948418	-0.96	0.337	-0.2770151	0.0947579
Self-efficacy	-0.1105418	0.0907993	-1.22	0.223	-0.288505	0.0674215
Anxiety	0.0633091	0.1405193	0.45	0.652	-0.2121037	0.3387219
Number of Observations = 84						
LR chi2(3) = 2.95						
Prob > chi2 = 0.4001						
Log likelihood = -44.632701						
Pseudo R2 = 0.0319						

\*\*\* p ≤ 0.01, \*\* p ≤ 0.05, \* p ≤ 0.10, two-tailed test

The moderating effect of attitude towards use of the system and anxiety on social influence and behavioral intention to use Mogadishu University Management System was tested and found out that both of the moderating factors (attitude towards use and anxiety) were statistically significant at 1% and 5% respectively.

The SEM is as presented below;

$$Y = 0.1856SI - 0.2893ATTUT + 0.2666AX \quad 4.5$$

Y is the probability of behavioral intention to use MUMS

SI is the social influence

ATTUT is the attitude towards the use of the system

AX is the anxiety

**Table 21: Social Influence and Behavioral Intention to use the system**

Variables	ME	Std. Err.	T	P	[95% Confidence Interval]	
Social influence	0.1855921**	0.0857877	2.16	0.031	0.0174513	0.3537329
Attitude towards use	-0.289349***	0.0856503	-3.38	0.001	-0.4572208	-0.1214777
Anxiety	0.2665769**	0.1318208	2.02	0.043	0.0082128	0.5249409
Number of Observation = 84						
LR chi2(3) = 13.17						
Prob > chi2 = 0.0043						
Log likelihood = -39.521519						
Pseudo R2 = 0.1428						

\*\*\* p ≤ 0.01, \*\* p ≤ 0.05, \* p ≤ 0.10, two-tailed test



Finally the study assessed the moderating effect of anxiety on facilitating conditions and behavioral intention to use Mogadishu University Management System. Upon conducting the regression, anxiety was found to be statistically insignificant in moderating facilitating conditions and behavioral intention to use the system.

**Table 22: Facilitating conditions and behavioral intention to use the system**

<b>Variables</b>	<b>ME</b>	<b>Std. Err.</b>	<b>T</b>	<b>P</b>	<b>[95% Confidence Interval]</b>	
Facilitating conditions	-0.2807878***	0.0846345	-3.32	0.001	-0.4466685	-0.1149072
Anxiety	0.1304904	0.0997956	1.31	0.191	-0.0651053	0.3260861
Number of Observations = 84						
LR chi2(2) = 11.47						
Prob > chi2 = 0.0032						
Log likelihood = -40.370196						
Pseudo R2 = 0.1244						

\*\*\*  $p \leq 0.01$ , \*\*  $p \leq 0.05$ , \*  $p \leq 0.10$ , two-tailed test

Below is a summary table of the hypotheses tested relating to moderating factors;

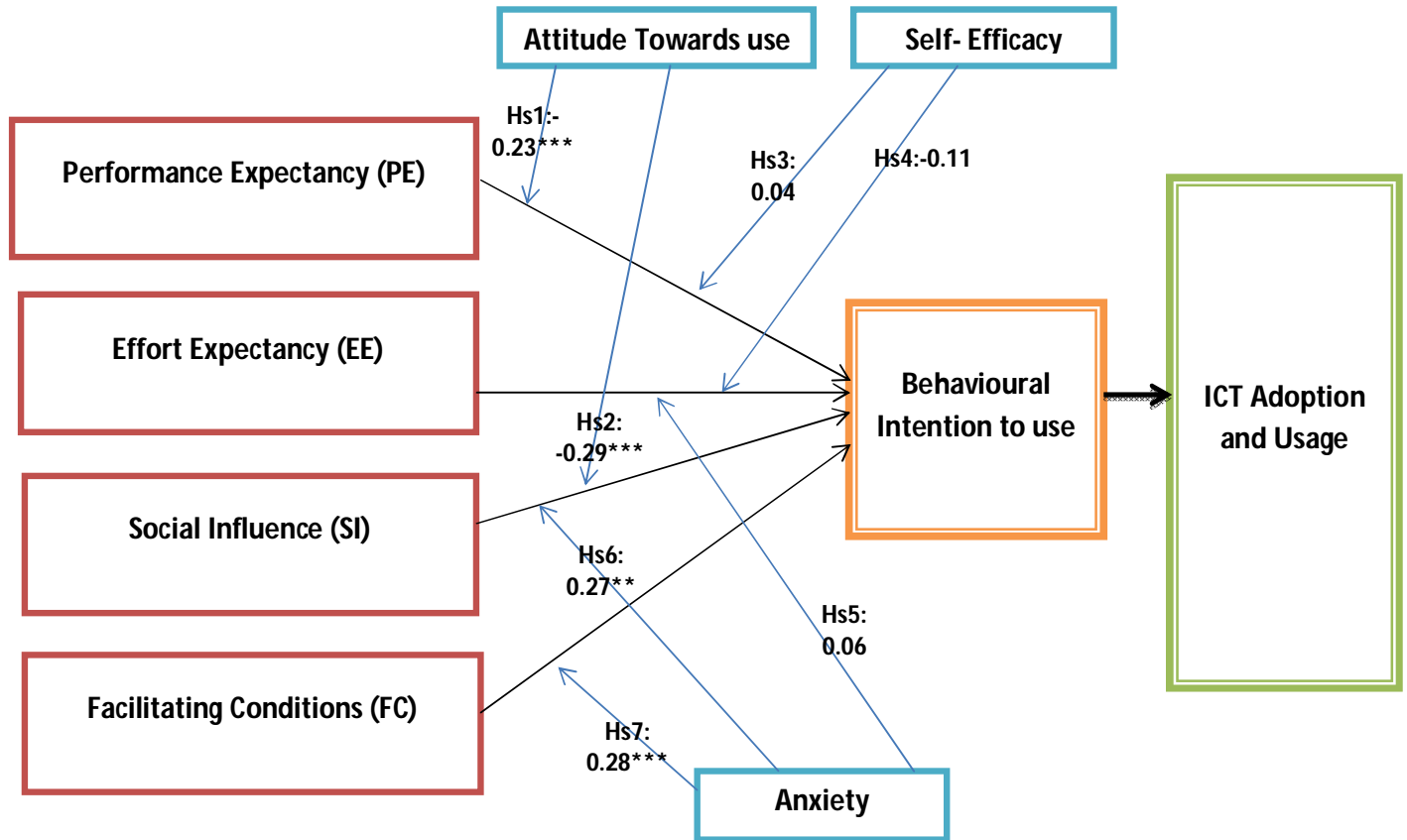
**Table 23: Summary of Hypothesised Moderating factors and the Decision**

<b>Main Constructs</b>	<b>Moderating factors</b>	<b>Coefficients</b>	<b>t-statistic</b>	<b>P value</b>	<b>Decision</b>
Performance expectancy	<b>Attitude towards use</b>	<b>-0.2295</b>	<b>-2.61</b>	<b>0.009</b>	<b>Accept</b>
	Self-efficacy	0.0383	0.41	0.68	Reject
Effort expectancy	Self-efficacy	-0.1105	-1.22	0.223	Reject
	Anxiety	0.0633	0.45	0.652	Reject
Social Influence	<b>Attitude towards use</b>	<b>-0.2893</b>	<b>-3.38</b>	<b>0.001</b>	<b>Accept</b>
	<b>Anxiety</b>	<b>0.2666</b>	<b>2.02</b>	<b>0.043</b>	<b>Accept</b>
Facilitating conditions	Anxiety	0.1305	1.31	0.191	Reject

\*Note that significance is based on three significance levels (10%, 5% and 1%)

Based on Tables 16-23 above and the structural equations (4.1-4.5), the study formulated the framework indicated in Figure 10 below with their respective path coefficients;

**Figure 10: Framework with path coefficients for moderating factors**



**Source: Researcher based on the collected data**

#### 4.7.3. Summary of the study findings

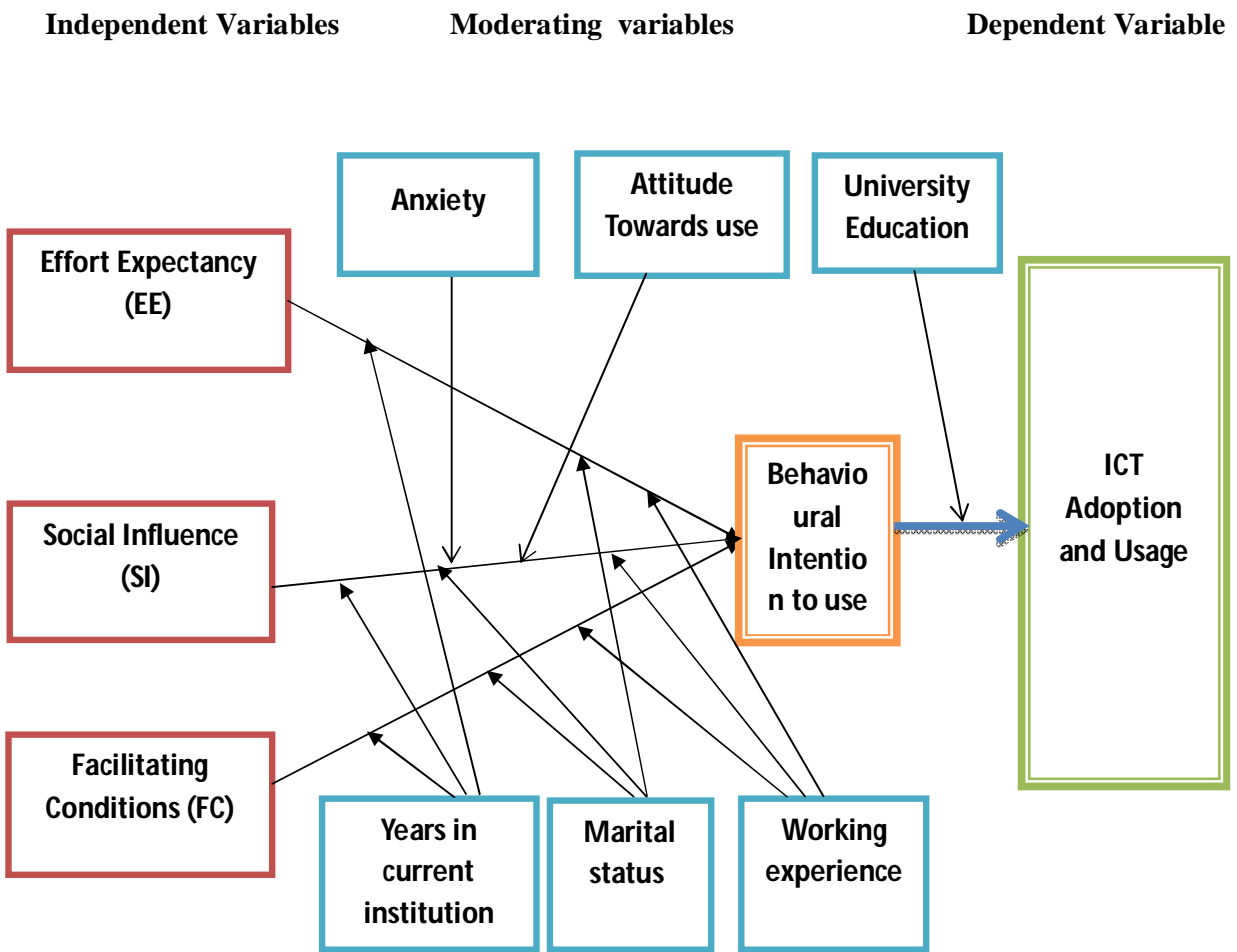
The study having reviewed and empirically compared the various models, formulation of the working framework based on the collected data is made of possible. The study selected the significant factors across the models which validates the framework. According to Tables 16 and 17, the study indicated effort expectance, social influence and facilitating conditions as statistically significant factors that influenced behavioural intention to use the system.

On the other hand, behavioural intention to use the system was also shown to be significant in determining adoption and usage of MUMs. Between behavioural intention to use the system and adoption and usage of the system, the study revealed that having more than university education as a significant factor and thus a valid moderator. Further, the study show years in current institution, marital status and working experience as significant moderating factors for all of the four main constructs.

On the proposed moderating factors, the study in Table 19-22 presented cross-sectional tests of the moderating effects of attitude towards use, self-efficacy and anxiety on the respective constructs. Several findings emerged. First, for every model, there was at least one factor that was not significant except in social influence where all proposed moderating factors were significant. Second, in effort expectance, all two moderating factors were not significant.

Based on the study findings, the study proposed the validated framework for evaluating adoption and usage of ICT in Mogadishu University and other institutions of learning as presented in Figure 11 below. The study included years stayed in current institution, marital status, working experience and university education as other moderating factors. For more details, see Figure 11.

**Figure 11: Validated framework for evaluating adoption and usage of ICT in higher institutions of learning in Somalia**



Source: Based on the collected Data.

The framework in Figure 11 above has been conceptualized and validated based on the study findings and the adoption of the appropriate structural modelling. The study is supported by consideration of the relevant theoretical framework grounded on Unified Theory of Acceptance and Use of Technology (UTAUT). The study revealed that behavioural intention to use the system is influenced by three main UTAUT constructs (effort expectance, social influence and facilitating conditions). The moderating factors include marital status, working experience, years in current institution, attitude towards use and anxiety. Also university education was found to be moderating factor between behavioural intention to use the system and adoption and usage of MUMS.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1: Introduction

This chapter summarizes the findings of the study in relation to the objectives, literature review and main constructs. It later makes comprehensive conclusions based on the framework for ICT adoption and usage in higher institutions of learning institutions in Somalia which leads to appropriate recommendations. Suggestions for further areas of study are also captured as a way of filling the gaps identified in the study.

#### 5.2: Summary of the study findings

Literature indicates that digital technologies (ICTs) have the ability to reshape the quality of teaching and learning in higher institutions of learning. This could only be possible if accepted and used by the staff and students. This study therefore, has been conducted with the main objective of customizing existing framework in order to evaluate ICT adoption and usage in higher institutions of learning in Somalia. The study specifically sought to investigate the pattern of usage of ICTs among various departments, choose appropriate model for investigating ICT adoption and usage in Mogadishu University and finally to use the model in a case study to measure the adoption and usage of ICT in Mogadishu University management system. The study was conducted at Mogadishu University in Somalia within the five identified departments that are using management system as the unit of the study. The paper considered various significance levels (1%, 5% and 10%) in evaluating the framework using the collected data. The main root constructs considered in the structural model adopted from the UTAUT framework were performance expectancy, effort expectancy, social influence and facilitating conditions. The moderating factors were attitude towards use, anxiety and self-efficacy. From the study results, it was found out that effort expectancy, social influence and facilitating conditions significantly influenced behavioral intention to use the system whereas, anxiety and attitude towards use as significant moderators between social influence and behavioral intention to use the system. Further, the study revealed years stayed in current institution, marital status and working experience as significant moderators between the three main constructs and behavioral intention to use the system. On the other hand, university education was shown to be significant factor in moderating between behavioral intention to use the system and adoption and usage of ICT in Mogadishu University.

### **5.3: Conclusions of the study findings**

Despite the fact that computers have been widely available in educational setting for more than two decades, yet, some staff and/or students are neither confident nor competent users of ICT, (Oye, et al., 2012). The study in achieving its set objective of evaluating the framework for adoption and usage of ICT in higher institutions of learning in Somalia undertook a pilot study at the Mogadishu University to address specific hypotheses. Based on the study findings both descriptive and structural modelling of ICT adoption and usage, it was revealed that although many departments adopt and use ICT, however, the level of adoption among the respondents was shown to be still low. According to Vinkatesh et al., (2003) and Oye, et al., (2012) the challenges to ICT usage especially in the learning environment is associated with lack of funds, no opportunity for training, lack of sponsorship by the school management, inability to acquire personal ICT facilities, no ICT facilities at workplace, poor electricity supply, lack of ICT knowledge, insufficient time due to workload, lack of interest in learning, and lack of time for practice.

In this study, the probability of behavioural intention to use MUMS was found to be specifically and significantly reduced by social influence and facilitating conditions. In other words, social influence which is characterised by surrounding environment, senior management of the department and institution as a whole contribute to low utilization of ICT. In facilitating conditions, characterised by lack of resources (funds), lack of relevant knowledge to use the system, current system incompatibility with existing systems and lastly failure of experts addressing system difficulties contribute to poor utilization of ICT. The study further showed effort expectance as significantly increasing the behavioural intention to use MUMS. Effort expectance was characterised by better and clear understanding of the system, easy to become skilful at using the system, ease of use of the system, and easy operating the system for majority of the respondents. This therefore contributed to increased likelihood of using the system at Mogadishu University. Years lived in the current institution, marital status and working experience were found to be significant moderators of these root constructs. On the other hand adoption and usage of MUMS is increased by both behavioral intention to use the system characterised by increased intention and chances to use the system in the subsequent three months and increased actual usage of the system in the same subsequent period (three months). Having university education was found to be a significant moderating factor.

#### **5.4: Recommendations of the study findings**

To increase or improve usage of ICT in higher institution of studies in Somalia, based on the results, the study therefore recommends to the government through the relevant ministries to consider developing right policies of attracting or influencing the potential users of ICT through relevant competitions and other subsidies to cultivate a positive thinking in the general population. Similarly, interventions on the establishment of more ICT centres and/or institutions which will boost acquisition of the knowledge of using the facility while making available relevant ICT systems thus facilitate the use of the technology. Also, for the systems that are not compatible with the system desired by the users, need to be evaluated and installation of appropriate systems be emphasised. More funds (resources) need to be re-allocated for the complimentary facilities/ personnel supporting ICT usage. For instance, for every new IT system proposed, an expert is hired to assist with system difficulties.

From the study findings, more systems that are easy to use should be increased. The positive relationship established indicates that for more system use, there is a need for the relevant stakeholders under education sector in Somalia to recommend more systems that have clarity during interaction with them at the same time they promote skilfulness while using them and even the system that takes little time to learn how to use. This increases the behaviour towards usage of the system and consequent usage of the same system.

#### **5.5: Areas of further study**

Having considered various theoretical models applied in customizing the framework of adopting and using ICT as indicated in the literature and applied structural modelling in testing the hypotheses, the study therefore recommends further study to be conducted with consideration of other institutions in the Somalia Republic in relation to adoption and usage of ICT in higher institution of learning. This is because the study used Mogadishu University alone as a case that may not reflect and thus take care of dynamism of other institutions of higher learning in the entire Somalia.

Lastly, a similar study is suggested focussed at developing a framework for evaluating ICT adoption and usage in higher institutions of learning with higher reliability and thus validity estimates with consequently less measurement errors.

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## APPENDICES

### ANNEX 1: SCHEDULE FOR RESEARCH PROJECT (FEB-AUGUST, 2015)

	Feb		March		April		April-May- June		June- August
<b>LEVELS OF ACHIEVEMENT</b>	Week 1-2	Week 3-4	Week 5-7	Week 8-9	Week 10-11	Week 12	Week 13-18	Week 19-22	Week 23-25
<b>Preliminary study</b>									
<b>Writing Chapter One: Introduction</b>									
<b>Conducting Literature Review</b>									
<b>Conceptualising Methodology</b>									
<b>Submission for Reviewing</b>									
<b>Proposal Presentation to the panel</b>									
<b>Addressing corrections and data collection process</b>									
<b>Report writing: Data cleaning, Analysis, Interpretation and presentation of the results</b>									
<b>Submission of the final research paper</b>									

Source: Researcher

**ANNEX 2: BUDGET**

<b>OBJECTIVE</b>	<b>ACTIVITIES</b>	<b>UNITS</b>	<b>UNIT COST(Kshs)</b>	<b>TOTAL COST(Kshs)</b>
<b>Proposal writing</b>	Typing	30pgs	25	750
	Printing	30pgs	10	300
	Binding	3copies	50	150
<b>Data Collection Process</b>	Travelling to site and back	2	30,000	60,000
	Training Research Assistant	1 Research Assistant	10,000	10,000
	Actual data collection	-	-	15,000
<b>Report Writing</b>	Data entry	1 Data Entry Clerk	10,000	10,000
	Data analysis	Purchase of the software (Stata)	10,000	15,000
	Miscellaneous	-	-	10,000
<b>TOTAL COST</b>				<b>121,200</b>

**Source: Researcher**

## ANNEX 3: QUESTIONNAIRE

### PART A: COVER LETTER

Dear Participant,

Please allow me to take a few minutes of your time. My name is **Jama Taqal Abbas**. I am a Masters of Information System student at the University of Nairobi. I am undertaking a study designed to evaluate the framework for ICT adoption and usage among higher institutions of learning in Somalia. This study will enable development of evaluation model for improving the adoption and usage of various ICT products and services either in this and/or other institutions. Your voluntary participation in this study is greatly appreciated. Similarly, your opinions and comments will be of great value to me as the researcher. The completion of this study implies consent to all conditions. The data collected will be kept strictly confidential and anonymous. At no time will your name be reported along with any of your responses. All the responses will be aggregated, summarized, and analyzed for the award of the Master's Degree. For inquiry about rights as a research participant, feel free to contact the University of Nairobi Offices in Kenya.

Thank you for your consideration.

Sincerely,

---

Jama Taqal Abbas

University of Nairobi

P.O Box P.O BOX 30197, 00100

Email : cabaassom@gmail.com

I have read and understand the above information. I agree to participate in this study.

1. Yes.
2. No.

If No, Please may we know the reason: \_\_\_\_\_

**PART B: Demographic Data**

In this section, the study shall basically focus on the general information regarding the respondent, their experience of the management system. In this case, choose a single option for all questions unless required to do otherwise.

1.1. Gender

Male = 1 [ ]

Female =2 [ ]

1.2. Age: ..... (years)

1.3. What is your highest level of education?

Primary =1 [ ]

Secondary =2 [ ]

College =3 [ ]

University =4 [ ]

None =5 [ ]

1.4. What is your marital status?

Single =1 [ ]

Married =2 [ ]

Widowed =3 [ ]

1.5. Years in Current Institution: [ ]

1.6. What is your current position in this institution? ..... (e.g. Lecturer, administrator etc.)

1.7. Years in current position:

1.8. What is the name of your department? .....

1.9. Date of Interview: .....

**PART C: MOGADISHU UNIVERSITY MANAGEMENT SYSTEM (MUMS) PROJECT DETAILS**

This section is concerned more on management system and project details focusing on the key factors forming the contents of the research in general with regard to Mogadishu University. Therefore, you need to select one option at a time unless you have further information or suggestions.

**Scale, 1.Strongly Agree=1, 2.Agree=2, 3.No comment=3, 4.Disagree=4, and 5.Strongly Disagree=5.**

The Unified Theory of Acceptance and Use of Technology (UTAUT) model evaluated inform further inquiry into short- and long-term effects of information technology implementation on job-related outcomes like performance expectancy (pe), effort expectancy (ee), social influence (si) and facilitating conditions (fc) with moderating factors which includes self-efficacy, anxiety and attitude towards use (attut).

Performance expectancy refers to the extent an individual believes the system will help them do their jobs better.

**Performance Expectancy**

<b>Code</b>	<b>Based on your experience, please indicate your level of agreement with this statements in regard to performance expectancy when using MUMS</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>pe1</b>	The system is useful in my daily assignments.					
<b>pe2</b>	The system enables me to accomplish tasks more quickly.					
<b>pe3</b>	The system increases my productivity.					
<b>pe4</b>	If I use the system, I will increase my chances of getting a raise.					

Effort expectancy evaluates how ease an individual believes the system is to use.

**Effort expectancy**

<b>Code</b>	<b>Based on your experience, please indicate your level of agreement with this statements in regard to effort expectancy when using MUMS</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>ee1</b>	My interaction with the system is clear and understandable.					
<b>ee2</b>	It is easy for me to become more skilful at using the system.					

<b>ee3</b>	I find the system easy to use.					
<b>ee4</b>	Learning to operate the system is easy for me.					

Social science relates to whether or not important others influence an individual's intention to use the system.

### **Social Influence**

<b>Code</b>	<b>Based on your experience, please indicate your level of agreement with this statements in regard to social influence expected when using MUMS</b>	1	2	3	4	5
<b>si1</b>	Administrators in my institution think that I should use the system.					
<b>si2</b>	People who are important to me think that I should use the system.					
<b>si3</b>	The senior management of this institution has been helpful in the use of the system.					
<b>si4</b>	In general, the institution has supported the use of the system.					

Facilitating conditions shows whether the individual have the personal knowledge and institutional resources available to use the management system at Mogadishu University.

### **Facilitating conditions**

<b>Code</b>	<b>Based on your experience, please indicate your level of agreement with these statements in regard to facilitating conditions when using MUMS</b>	1	2	3	4	5
<b>fc1</b>	I have the resources necessary to use the system.					
<b>fc2</b>	I have the knowledge necessary to use the system.					
<b>fc3</b>	The system is not compatible with other systems I use.					
<b>fc4</b>	A specific person (or a team) is assigned and readily available in case of system difficulties.					

### **Behavioural intention to use the system**

<b>Code</b>	<b>Based on your experience, please indicate your level of agreement with these statements in regard to behavioral intention to use the system when using MUMS</b>	1	2	3	4	5
<b>bi1</b>	I intend to use the system in the next three months.					



<b>bi2</b>	I predict that I would use the system in the next three months.					
<b>bi3</b>	I plan to use the system in the next three months.					

Attitude toward using technology is an individual's overall affective reaction to using MUMS

### Attitude toward using technology

<b>Code</b>	<b>Based on your experience, please indicate your level of agreement with these statements in regard to attitude toward using technology when using MUMS</b>	1	2	3	4	5
<b>attut1</b>	Using the system is a good idea.					
<b>attut2</b>	The system makes work more interesting.					
<b>attut3</b>	Working with the system is fun.					
<b>attut4</b>	I like working with the system.					

Self-efficacy relates to an individual's confidence in his/her ability to perform the behaviour required to produce specific outcome.

### Self-efficacy

<b>Code</b>	<b>Based on your experience, please indicate your level of agreement with this statement in regard to self-efficacy expected when using MUMS (I could complete a job or task using the system...)</b>	1	2	3	4	5
<b>se1</b>	If there was no one around to tell me what to do in case of any challenge.					
<b>se2</b>	If I could call someone for help if I got stuck.					
<b>se3</b>	If I had a lot of time to complete the job for which the software was provided.					
<b>se4</b>	If I had just the built-in help facility for assistance.					

Anxiety relates to fear of computer when using one.

### Anxiety

<b>Code</b>	<b>Based on your experience, please indicate your level of agreement with this statements in regard to anxiety expected when using MUMS</b>	1	2	3	4	5
<b>ax1</b>	I feel fearful/apprehensive/uneasy about using the system.					
<b>ax2</b>	It scares me to think that I could lose a lot of information using the system by hitting the wrong key.					
<b>ax3</b>	I hesitate to use the system for fear of making mistakes I cannot correct.					
<b>ax4</b>	The system is somehow intimidating to me.					