ADDIS ABABA UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES

SCHOOL OF INFORMATION SCIENCE

USABILTY EVALUATION OF MOBILE BANKING IN ETHIOPIA: THE CASE OF BERHAN BANK S.C

A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Science in Information System.

By

Essey Yohannes

Nov, 2021

Addis Ababa, Ethiopia

Declaration

I declare that this thesis entitled "**Usability Evaluation of Mobile banking in Ethiopia: The case of Berhan Bank S.C**" is my original work, has not been presented for degree in any other university and that all sources of materials used for the thesis have been duly acknowledged.

Declared by:

Essey Yohannes

Signature: _____

Date: _____

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Name and Signature of Members of the Examining Board

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_____	**Examiner**	_____	_____
_____	**Examiner**	_____	_____

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LIST OF ACRONYMS

ATM	Automatic Teller Machine
DRUM	Diagnostic Recorder for Usability Measurement
GPRS	General Packet Radio Service
ICT	Information Communication Technology
ISO	International Organization for Standardization
IT	Information Technology
MGQM	Mobile Goal Question Metric
MUSiC	Metrics for Usability Standards in Computing
NFC	Near Field Communication
PACMAD	People at the Centre of Mobile Application Development
QUIS	The Questionnaire for user interaction Satisfaction
QUIM	Quality in Use Integrated Map
SLR	Systematic Literature Review
SMS	Short Message Service
SUMI	Software Usability Measurement Inventory
TTF	Task Technology Fit
USSD	Unstructured Supplementary Service Data
WAP	Wireless Application Protocol

ABSTRACT

Although several studies have contributed substantially to the literature on usability evaluation of mobile banking, the findings of most of the studies may not be applicable to other countries like Ethiopia, due to differences in mobile banking development. Due to that, this research is conducted as conformatory research for Ethiopia. The purpose of this study is to evaluate the Usability of Mobile banking in Ethiopia: The case of Berhan Bank S.C. The research question of the study is stated as, "What is the level of Mobile banking usability at Berhan Bank?" and "How mobile system usability affects mobile banking adoption at Berhan Bank? "The research model was adopted from Neilsen model and ISO. Also one variable for the model was adopted from SLR of previous research which was conducted from relevant journals and conferences .A quantitative research approach was used to answer the research questions. This study was conducted based on the data gathered from customers of Berhan Bank in Addis Ababa, Ethiopia. The survey was conducted using a self-administered questionnaire. Out of 110 questionnaires that have been shared with customers, 94 questionnaires were collected but one of the respondents with no educational background is removed by considering the response may not be valid and he/she may not be able to respond to an online questioner if he/she doesn't have educational background. The findings of this study show that Berhan Mobile Banking has more usability issues on Trustfulness than efficiency, Effectiveness, and Learnability. But the usability issues on different user categories shows that there are differences between them. The older age has more usability issues on Berhan Mobile Banking than the middle and younger aged user. Having a low IT literacy level has more usability issues than High IT literacy. But being male or female doesn't have a difference on the Usability issues. The study also confirmed the existence of the influence of trustfulness, effectiveness, and learnability on the adoption of mobile banking.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

With globalization trends worldwide, it is difficult for a nation, whether big or small, developed or developing, to remain isolated from what is happening around. Information technology has shrunken the world, as a result of which, time and distance have become non-entities. It has enveloped every aspect of life. Today, most people adopt new generation technologies. In this changing scenario, the banking sector is not an exception.(Renju,2014). Globalization and rapid technological change have made knowledge a critical determinant of competitiveness in the world. ICT, in the globalization context, is all about global knowledge, access, participation and governance in the information age.(Adriana,Marilena and Elena,2007). ICTs are increasingly playing an important role in organizations and in society's ability to produce, access, adapt and apply information. ICT is basically an electronic based system of information transmission, reception, processing and retrieval, which has drastically changed the way we think, the way we live and the environment in which we live.(Ogunsola,2005).

Banks have embarked on the deployment of ICT-based banking products and services such as automated teller machine (ATM), internet banking, mobile banking solutions, point of sale terminals, computerized financial accounting and reporting, human resources solutions among others (Ovia, 2005). ICT is becoming an important tool to create a cashless society. In fact, we cannot imagine E-banking services without ICT. E-banking services allow the customer to make transactions anywhere, anytime, which is unusual for conventional banking services. The concept of electronic banking has been defined in many ways (Ala,2011). Ala defines electronic banking as the delivery of banking to customers via different delivery platforms that can be used with different electronic devices such as a personal computer, a mobile phone, or digital television. Among E-banking services, mobile banking is one of them. ICT, in the globalization context, is all about global knowledge, access, participation and governance in the information a Banks have embarked on the deployment of ICT-based banking products and services such as automated teller machine (ATM), internet banking, mobile banking solutions, point of sale terminals, computerized financial accounting and reporting, human resources solutions among

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Mobile Banking is an aspect of mobile commerce and the natural development of electronic banking(Mohammadi,2015). Mobile banking can be defined as the ability to conduct bank transactions via a mobile device, or more broadly – to conduct financial transactions via a mobile terminal (Drexelius & Herzig, 2001). Users are able to obtain banking services easily and quickly with mobile devices at any time and at anywhere. It creates a method passing through services via a channel with the customer processing that the bank is a mobile device (Xin Luo et al., 2010). Mobile banking refers to the provision of banking and financial services with the help of mobile telecommunication devices. It uses USSD gateway and Android that allows a "real-time session between the mobile handset and the application handling the service". The very advantage of this technology avoids customer efforts and the use of complex text instruction or commands. The scope of offered services may include facilities to conduct bank transactions, administer accounts and access customized information. In this regard, customers will get service flexibility by having their banking access at their hand. On the other hand, the Bank will be benefited from an increase in customer base and also from the lower cost of resources.

Mobile usability includes some of the challenges related to mobility, such as: Mobile framework, connections, small screen size, different resolutions, power and limited processing capability and input methods. (Nayebi, Desharnais and Abran, 2013). The usefulness of mobile devices has increased greatly in recent years allowing users to perform more tasks in a mobile context. This increase in usefulness has come at the expense of the usability of these devices in some contexts.(Rachel,Derek and David,2013).

According to Nielsen (2005), Usability is ease of use and correctness of a system for a specific class of users carrying out particular tasks in a precise environment. In this case, ease of use affects the user's performance and their satisfaction, while acceptability determines whether the

product is used by its users (Nielsen,2005). Usability of mobile application products is usually verified through its interfaces (Singh, & Razali,2013) Therefore, suitability to use any mobile application product depends mainly upon the satisfaction of users' and this can be achieved based on the simplicity and ease of use of such product [Lin, Wang & Hung,2011].This means satisfaction plays a role in bringing the quality of being right or appropriate for an end user. This is achieved by simplicity and ease of use of such product. (Nielsen,2005 considered those terms as definition of usability as mentioned at the beginning of this paragraph.

Berhan Mobile banking service is operated on Android App and USSD based communication whereby it uses a secured communication channel to send requests from customer mobile phones to the Bank Mobile banking gateway server. The application running in the gateway server is called Ruby: meant to say USSD application running on the server bridge named Ruby.

Its primary use is to interpret messages and exchange requests between Ethiotelecom servers and the Bank's Core Banking system called Rubikon. The Bank has acquired its own short codes for the USSD service and for the SMS service which is 881. The Bank provides a fully-fledged mobile banking service under its Berhan Mobile. There is also Berhan android application which allows the customer to access Berhan Mobile banking. The following are among the major ones included in the service: Check Balance, Mini statement, Transfer services, Loan Services, Bill Payment, Cheque Services, Purchasing Mobile Airtime, and Other services (berhanbanksc.com. (2018).

1.2 Statement of the problem

There is some research on mobile banking usability. Azham, Hamisu, and Norlaily(2014) presented a set of usability dimensions and measurements that can be used to evaluate the usability of mobile banking applications. The dimension and measurement have been generated from previous studies through systematic literature reviews. Relevant journals and conference proceedings were considered and reviewed. In this study, five dimensions: Efficiency, Effectiveness, Trustfulness, learnability, and user satisfaction, with twelve measurement criteria (sub-dimension) have been identified.

Amin and Salar (2015) provide a model to increase usability for mobile phones, smart banking. In addition to the factors in previous models, four factors of new "Visibility", "Design",

"Navigation" and "Compatibility" were obtained. The banking program implemented in the study is based on the Android operating system that uses the programming environment Android Studio has been developed. The above studies are generic and limited to model of usability of mobile banking and data was not collected to evaluate the end user usability issues.

Ali(2017) studied improving Mobile Phone Banking usefulness, usability, risk, cost, and Intention to adopt. Based on the theory of technology acceptance model and the innovation diffusion theory, the purpose of this correlational study was to examine the relationship between usefulness, ease of use, risk, cost, and mobile phone banking adoption in Burkina Faso. This study shows that all of the predictors have contributed significantly to the model except the risk.

Rabiu (2017) studied a usability evaluation of mobile banking application interfaces. The objectives of the study were to identify the usability issues and the level of differences among the mobile banking users on age, gender, qualification, and experience. The study employed the use of a quantitative approach using an online questionnaire with a total number of one hundred fifty (150) respondents from three banks in Nigeria called Gtbank, Diamon, and Skye bank. This review indicates that all three banks have usability issues on privacy and reliability of mobile banking application interface. This study also reveals that the male users have fewer usability issues than females, the younger and the middle-aged also have fewer usability issues than the old age. Users with lower educational qualifications have more usability issues than those who have higher educational qualifications.

Although several studies have contributed substantially to the literature on usability evaluation of mobile banking, the findings of most of the studies may not be applicable to other countries like Ethiopia, due to differences in mobile banking development. Due to that, this research is conducted as conformatory research for Ethiopia. Since the reviewed researches were done in other countries, it is not generalizable to the Ethiopian context as there are differences in the level of banking development. In Nigeria, there are international banks operating in the country while in Ethiopia it is not the case.

Nigeria is one of the leading market players for mobile banking applications in Africa (UNCTAD, 2007). Nigeria has been described as the fastest growing telecommunication infrastructure nation in Africa and third in the world (Ayo et al., 2007).Nigeria is the leading country in mobile commerce usage in Africa (Muganda et al., 2008). Nigeria has the highest

mobile subscriber base in Africa with about 70 million mobile subscribers (ITU, 2009; ICT works, 2010).

Ethiopia has looked at other developing countries to learn from their experiences with mobile banking. The National Bank of Ethiopia visited Kenya, Pakistan and Brazil.(VOA,2012)**.** On 1 January 2013, the National Bank of Ethiopia (NBE) issued a long-awaited directive that allows transaction-based mobile banking for the country's unbanked citizens**.(** Elissa ,2013). Though it is true that traditional banking has grown steadily over the years, in terms of technological based financial service/product the Ethiopian banking sector didn't fully benefit from ICT in general and Mobile banking in particular. (Henok,2015).

We can see that there is a gap between Nigerian and Ethiopian mobile banking from the above findings. Nigeria was already popular on mobile banking even before Ethiopia started Mobile banking services. The researcher is interested if the findings in the previous research are generalizable to Ethiopian context. Rabiu (2017) specifically studied only usability issues, but this research investigated usability of the mobile banking and its effect on mobile banking adoption. The research used different theories to build the research model..Berhan mobile interface design and accessibility is the same for all users regardless of their demographic differences. This study is case study because one of Ethiopian Bank; Berhan Bank is selected and the study is conducted on it and the study can be generalizable to other banks in Ethiopia.

1.3 Research questions

- What is the level of Mobile banking usability at Berhan Bank?

This level of mobile banking includes the research model variables such as efficiency, effectiveness, learnability and trustfulness level of Berhan Mobile banking usability.

- How mobile system usability affects mobile banking adoption at Berhan Bank?

1.4 Objectives of the study

1.4.1 General Objective

The General objective of the study is to investigate usability and its relation with adoption of Mobile banking at Berhan Bank S.C.

1.4.2 Specific Objective

The specific objective are:

- To assess the level of usability of Mobile Banking at Berhan Bank.
- To examine the influence of mobile banking usability on mobile banking adoption at Berhan Bank.

1.5 Significance of the study

The findings of this research may be of potential value to the banking industry in Ethiopia.The study is helpful to investigate usability issues of Berhan Mobile Banking. The study was conducted by considering different customer categories of Berhan Mobile users. So that this study has a practical contribution to improving the usability of mobile banking services for customers as well as for the Bank to attract more mobile users.

The result of the study can be the foundation for the researchers who want to conduct a study related to the subject matter as it is the pioneer to our country's context. Because research related to mobile banking usability is sparse in literature in Ethiopia.

The claims can be justified by considering that the data is collected from the end user of Berhan mobile banking, also filling the gap of scarcity of research in this area in our country is one significance of the study. Since the research is conducted, it is believable that it has contribution on adding value on literature on this area on our country

1.6 Scope and limitation of the study

The main aim of this study to evaluate usability of Mobile banking in Ethiopia: The case of Berhan Bank S.C.Although there are many banks providing mobile banking services in Ethiopia, the researcher conducted the study on Berhan bank S.C only. Also, the researcher dictated to limit the study area in Addis Ababa city.

The research considered only technological aspects to evaluate Usability issues of Berhan Mobile banking, additional social and cultural aspects are not considered in this research.

1.7 Organization of the Thesis

This research is organized in five chapters. Chapter One includes Background of the study, Statement of the problem, Research questions, General Objective, Specific Objective, Significance of the study, and scope and limitation of the study.

Chapter two presents the review of literature in Introduction to Mobile Banking, Adoption of Mobile Banking, Benefit of Mobile Banking, and The Main Business Drivers for Mobile Banking Adoption, The Concept of Usability, Usability theory, Usability Evaluation, Mobile Banking Usability, Mobile Banking Application Usability Dimensions and Measurement, and related works.

Chapter three describes Research Approaches, Research Model and Hypothesis, Population of the study and Sampling, Data Source & Collection Method, Data Collection Instrument Development, Data analysis Method, and Validity and Reliability of the Instrument.

Chapter Four presents a summary of the collected data which was analyzed, interpreted, described, and discussed based on the findings.

Chapter Five presents conclusion, recommendations for further investigation as per the findings of the study, and future work.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction to Mobile Banking

The earliest mobile banking services were offered via SMS with the introduction of the first primitive smartphones with WAP support enabling the use of the mobile web. In 1999, European banks started to offer mobile banking on this platform to their customers. Mobile banking until 2010 often was performed via SMS or the Mobile Web. Mobile-Banking system operates in such a way that a specific sequence of SMS messages will enable the system to verify if the client has sufficient funds in his or her wallet and authorize a deposit or withdrawal transaction at the agent. (Anitha,2011).

In the past, the use of Internet banking by providing access to the bank system at any time, had a great impact on the bank services to customers. Due to that, those customers were able to review the status of their bank account, make transactions such as deposit accounts, and pay bills from anywhere easily. A major limitation of this electronic banking model was the lack of computer and internet access. Therefore, mobile banking has been introduced as a model of electronic banking that provides customers who need only a mobile phone.

The evolution of mobile banking is described below:

• The introduction of GPRS technology in late 1999 and in 2000

• The introduction of Personal Office Mobile Services

• The introduction of mobile money (In 2000)

• The introduction of Third Generation Mobile (In late2001)

Mobile banking beginning in the late 1990s has experienced five different stages: The first stage, mobile banking provided simple banking operations, basically pays bills and sends SMS from the bank to the customers and vice versa. In the second stage, some of the accounts of depositors and related services to mobile banking services have been added. In the third stage, users started accessing banking services via mobile networks, other media such as the Internet and telephone, this phase was completed with the emergence of intelligent mobile phones. In the fourth stage,

development has been made with Android, and this progress has led to the providing of services such as mobile Internet access and connection to the operating systems of the bank. In the fifth stage, radio frequency identification chips for mobile payments, and Banking Network Connection to Visa Card and MasterCard systems have been started.

Many researchers define mobile banking in a different way. Mobile banking is the ability to conduct bank transactions via a mobile device, or more broadly – to conduct financial transactions via a mobile terminal.(Drexelius & Herzig, 2001). Mobile banking can be defined as the ability to conduct bank transactions via a mobile device, or more broadly to conduct financial transactions via a mobile terminal (Petrova (2002). According to (Kiesnoski, 2000) Mobile banking can be defined as the ability to bank virtually anytime, anywhere. Mobile Banking can be said to consist of three inter-related concepts viz. Mobile Accounting, Mobile Brokerage, and Mobile Financial Information. Mobile Accounting is sometimes characterized as transaction-based banking services that revolve around a bank account and are availed using mobile devices. Not all Mobile Accounting services are however necessarily transaction-based. A more precise definition of Mobile Accounting would therefore characterize it as "availment of account-specific banking services of non-informational nature".

Whereas Mobile Brokerage, in the context of banking services, refers to intermediary services related to the bourse, e.g. selling and purchasing of stocks. Mobile Brokerage can be thus defined as transaction-based mobile financial services of non-informational nature that revolve around a securities account. At last, Mobile Financial Information refers to non-transaction-based banking and financial services of informational nature. It includes subsets from both banking and financial services and is meant to provide the customer with anytime, anywhere access to information. The information may either concern the bank and securities accounts of the customer or it may be regarding market developments with relevance for that individual customer. The information may be customized on the basis of preferences given by the customer and sent with a frequency decided by him (Tiwari and Buse 2007).

Common services available on mobile banking are I, Balance Enquiry: The customer can check his/ her available balance on his/her bank account which is linked to his/her phone number. II, Transfer Service: The customer can be able to transfer amount to his/ her own or another customer bank account. III, Cheque book request: The customer can be able to request a cheque

from anywhere without visiting the bank branch. IV, Bill Payment: This service is done based on the agreement of third parties and the bank. The Bank sign an agreement with the service provider which collects the bill payment and the integration done based on the agreement. This saves resources of the customer, the service provider, and the bank, VI,SMS: Customers will be alerted for any kind of deposit transaction, withdrawal transaction., loan due date, and other services will be alerted for customers. VII, Other Services: This may include changing language, changing passwords and other services.

2.2 Adoption of Mobile Banking

Mobile banking is a revolution. It is driven by the world's one of the quickest developing sectors like in any emerging technology, there exist barriers to the adoption of mobile banking services. Financial Services need a lot of trusts for the user to use technology. Banks have changed from paper-based banking solutions providers to the latest of the technologies like online banking, mobile banking, etc.

Customers across the world, even technologically optimists, have refrained from using technology-aided solutions. There are many reasons why technology has not been able to ride the acceptance wave and cross the hurdle and become an acceptable feature in banking. As today's banking has redefined itself as customer-centric, it becomes more important that the customer is happy with the services being provided. Unfortunately, the acceptance and adoption rates are low even in the case of educated customers.

The main business drivers that contributed towards the adoption of mobile banking were listed below (Dubey,2010)

Customer experience: Customers are getting familiar with having access to information at their convenience anytime and anywhere. This penetrated into access to banking information which customers may need at locations of their conveniences. Mobile banking advanced to offer and enhance customer experience by adopting the latest technology for real-time data exchange.

Cost savings: Customers walk into bank branches and ATMs station point for simple transactions which of course added to the cost of operations for both customers and bank management of this channel. The use of cheques for mega value funds transfers, bill payments

becomes minimal. All these contributed immensely to the operational cost and banks instigated eyeing for other solutions.

Security: The mobile banking delivery channels depend on the communication layer supported by the mobile phone. An initial system of mobile banking uses SMS as the communicative approach which provides less security against hackers and message interceptors. Later, mobile banking advanced to Wireless application protocol and browser-based banking, which really enhanced the security on sophisticated hand phones to some level. However, the introduction of downloadable mobile applications avoided lots of the previous issues, since applications could be used on many hand phone devices and made mobile banking more standard and comprehensive.

2.3 Benefit of Mobile Banking

2.3.1 To Banks

The biggest benefit to mobile banking for banks is that it significantly reduces the cost of providing services such as communication, paper, and other materials. At the same time, the bank will gain additional revenue from the customer by collecting service charge. The other benefit of Mobile banking for banks is, it uses to attract new customers.

Mobile banking also uses to control fraud: since the customer gets update/about his/her bank account transactions via SMS, it will be easy to detect timely if any fraud happens. A bank informs customers in real-time when transactions happen. This way the owner is always informed when their card is used, and how much money was taken for each transaction. Reminder facility similarly, the bank could remind customers of outstanding loan repayment dates, dates for the payment of monthly installments, or simply tell them that a bill has been presented and is up for payment. The customers can then check their balance on the phone and authorize the required amounts for payment. (Vinod,Renju and Neha,2013).

2.3.2 To Customers

Availability: since mobile is almost always with the customer. It can be used over a vast geographical area. The customer does not have to visit the bank ATM or a branch to avail of the bank's services. Therefore, the customers can save time and cost by using mobile banking. Customers can pay their utility bills on time and save themselves from paying penalties since alerts are received from the bank.

Security features: The customer will receive the alerts only on the mobile number, which he has registered with the bank. The customer can receive his account balance and transactions only when the request is received from the mobile phone number registered with us and duly authenticated by the 4 digit Code Number, which will be provided when PULL Alert services are introduced. The mobile phone number and the Code number from which the service is accessed will serve as a User ID and password for authentication. The Code number has therefore to be kept confidential. (Vinod,Renju, and Neha,2013).

2.4 The Concept of Usability

The historical review of human-computer interaction as the process through which the conditions (Stefano and Simone, 2010)(Accessibility and usability) for the dialogue between "humans" and "computers" are developing, may be divided into three periods. During the first period (1950-1963), there was no need for Accessibility and usability in the human-computer interface because programmers (the creators of the interface) were at that time, also the users of the software. During the second period (1963-1984), there was no change for the users/programmers; this period was characterized by an evolution of systems and models of interaction. During the third period, (post-1985), accessibility and usability issues became more central, due to the spread of the personal computer and the Internet, with the consequent distinction between users and programmers and the needs of users to access and use the information on the World Wide Web.

Shackel (1991) defined usability as the artifact's capability, in human functional terms, to be used easily, effectively, and satisfactorily by specific users, performing specific tasks, in specific environments. The essence of the operational definition is that it explicitly places usability at the

level of the interaction between users and the artifact. According to Eason's (1988) Usability is the degree to which users are able to use the system with the skills, knowledge, stereotypes, and experience they can bring to bear. Usability is defined in ISO 9241-11 as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use to the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use. (ANSI,2001). This definition identifies three factors that should be considered when evaluating usability.

•User: Person who interacts with the product;

•Goal: Intended outcome;

•Context of use: Users, tasks, equipment (hardware, software, and materials), and the physical and social environments in which a product is used.

Generally, this definition of usability is a broad approach to usability (Bevaan, 1997): usability is not only a characteristic of a user interface it is also supporting users in achieving their goals in their work. When we elaborate the definition, it means that - first of all - usability is a function of users of a product or a system. Further, for each user, usability is a function of achieving goals in terms of a set of attributes (i.e. effectiveness, efficiency, and satisfaction) and environment of use.

Nielsen (1993) identified five attributes of usability: Learnability: The system should be easy to learn and understand. It should be easy for the user to get their job or task executed using the software system. Efficiency: Efficiency of the system is directly related to its productivity. The more efficient a system is, its throughput is correspondingly high. Memorability: It is best suited for intermittent users. The user can return to the system's previous state without starting away from the beginning. Errors: The error rate in any system should be less. If any error occurs, the system should be able to recover from it. Satisfaction: It is the pleasant feeling that the user gets while or after using the system. It can be observed as likeability for the system and fulfillment of the specified tasks.

Shackel (1991) identified four attributes of usability: Effectiveness: It is described as system's performance is better than some required level, by some required percentage of the specified

target range of users, within some required portion of the range of usage environments. Learnability: It is the training of users after some specific time from the installation of the system. Also, includes the user's re-learnability time for training and support systems. Flexibility: It is the positive changes or variations in the system to the existing ones. Attitude: It is the acceptance of users within their levels of discomfort, tiredness, frustration, and personal effort.

Eason (1984) identified three attributes of usability with eight sub-attributes. Task with frequency and openness sub-attributes: Frequency: Number of times a task is performed by a user. Openness: Extent to which a task is modifiable. User with knowledge, motivation, and discretion sub-attributes. Knowledge: The knowledge that the user applies to the task. It may be appropriate or inappropriate. Motivation: How determined the user is to complete the task. Discretion: The user's ability to choose not to use some part of a system. System with ease of learning, task of use, and task match sub-attributes. Ease of Learning: The effort required to understand and operate an unfamiliar system. Ease of use: The effort that is required to operate a system once it has been understood and mastered by the user. Task match: The extent to which information and functions that a system provides match the needs of the user.

ISO 9126 (2001) identified five attributes of usability: Understandability: The capability of the software product to enable the user to understand whether the software is suitable, and how it can be used for particular tasks and conditions of use., Learnability: The capability of the software product to enable the user to learn its application., Operability: The capability of the software product to enable the user to operate and control it., Attractiveness: The capability of the software product to be attractive to the user. Usability compliance: The capability of the software product to adhere to standards, conventions, style guides, or regulations related to usability.

2.5 Usability theory

2.5.1 ISO (International Organization for Standardization)

International Organization for Standardization (ISO) defined usability as the "Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency

and satisfaction in a specified context of use" [ISO,1997]. This definition identifies factors that should be considered when evaluating usability.

User: Person who interacts with the product; Goal: Intended outcome; Context of use: Users, tasks, equipment (hardware, software, and materials), and the physical and social environments in which a product is used.

In order to measure how usable a system is, the ISO standard outlines three measurable attributes: Effectiveness: Accuracy and completeness with which users achieve specified goals; Efficiency: Resources expended in relation to the accuracy and completeness with which users achieve goals; Satisfaction: Freedom from discomfort, and positive attitudes towards the use of the product.

2.5.2 Nielsen's Model

(Nielsen, 1994) identified five attributes of usability: Efficiency: Resources expended in relation to the accuracy and completeness with which users achieve goals; Satisfaction: Freedom from discomfort, and positive attitudes towards the use of the product. Learnability: The system should be easy to learn so that the user can rapidly start getting work done with the system; Memorability: The system should be easy to remember so that the casual user is able to return to the system after some period of not having used it without having to learn everything all over again; Errors: The system should have a low error rate, so that users make few errors during the use of the system and that if they do make errors they can easily recover from them. Further, catastrophic errors must not occur.

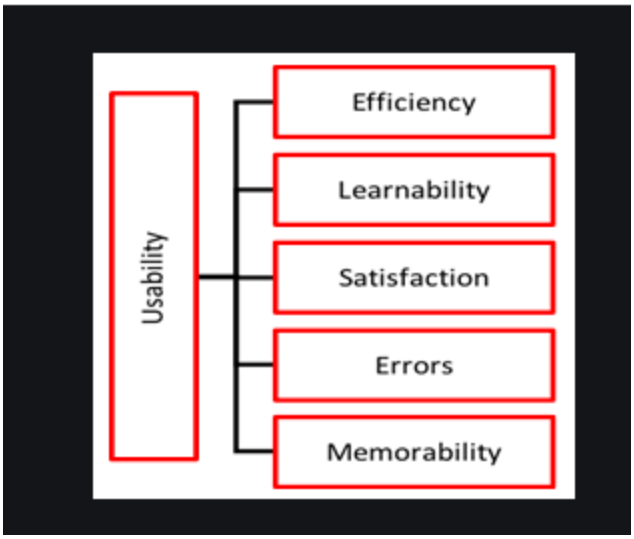


Figure 2-1 Nielsen's Model

2.5.3 QUIM Model (Quality in Use Integrated Map)

QUIM (Quality in Use Integrated Map) attempts to quantify and organize usability attributes with the intention to create application-independent usability ontology (Sefah,2001). QUIM is a hierarchical model like the software engineering models. The difference is that it distinguishes four levels called factors, criteria, metrics, and data. QUIM attempts to quantify and organize usability attributes with the intention to create application-independent usability ontology ((Sefah,2001).). Their attempts have resulted in a software tool (QUIM Editor) to hold usability attribute structure, their descriptions and other related information.

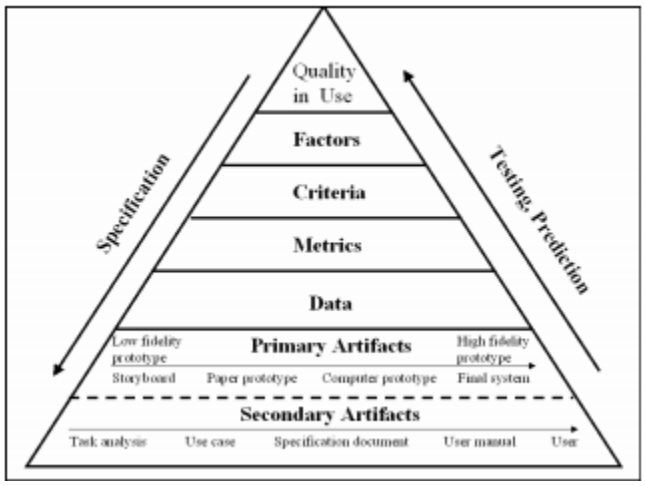


Figure 2-2 QUIM Structure and Usages

2.5.4 MGQM (Mobile Goal Question Metric)

(Azham and Maria,2012) have developed a Mobile Goal Question Metric (mGQM) model to evaluate mobile apps. The model contains usability metrics to assess quantitative and qualitative measures of mobile phone apps. They developed the model based on the original GQM approach by Basili,1994. A standard GQM model is a hierarchy structure starting with goals, in which these goals are refined into questions in the later stage before metrics for each question are developed.

(Zhang 2005) stated usability attributes such as Learnability: How quickly users can improve their performance levels, Efficiency: How fast users can accomplish a task, Memorability: Level of ease with which users can recall, Errors Counting the number of mistakes that users make. User satisfaction: Reflects the attitude of users toward using a mobile application, Effectiveness: Defined as completeness and accuracy, Simplicity: The degree of comfort with which users find a way to accomplish tasks, Comprehensibility: Measures how easily users can understand the content presented, Learning performance: Measures the learning effectiveness.

Based on Zhang,2005 usability attributes, (Azham and Maria,2012) created goals such as Simplicity, Accuracy, Time, Features, Safety, and Attractiveness, and they generated the questions to assess each goal. The questions constitute the basis for quantitative and qualitative metrics definition. Finally, a set of metrics has been produced to provide information to answer the questions developed.

The Questions that (Azham and Maria,2012) generated were: -Is it simple to key in the data? -Is the output easy to use? -Is the application easy to learn? -Is the application accurate? -How many tasks are successful in a given time? -How much time taken to complete a given task? -How much time taken by the user to learn? -Does the application provide appropriate help? -Does the application provide voice assistance? -Does the application provide an automatic updates? -How the users feel when using the application? -Is the application secure to use while driving? -Are users happy with the interface? -Are users familiar with the user interface?

Also, the metrics (Azham and Maria,2012) produced were: -Time taken to key-in the data -Satisfaction with virtual keypad -Satisfaction with help -Satisfaction with screen size optimization -Satisfaction with output -Time taken to install -Satisfaction with the installation process -Time taken to learn -Number of mistake while learning -Number of error -Time taken to complete given task -Time taken to response -Time taken to connect to the network -Satisfaction with menu button -Satisfaction with voice assistance -Number of voice assistance -Number of system resource display-No of request to update the apps -Enjoyment -Signal strength -Satisfaction with contents -Satisfaction with virtual joystick -Finding help -Satisfaction with interfaces -Safety while driving -Strain injury or stress. -Satisfaction on the learning process.

2.5.5 PACMAD (People at the Centre of Mobile Application Development)

The PACMAD usability model identifies three factors that can affect the overall usability of a mobile application: User, Task, and Context of use (Rachel,2013). Rachel identifies 7 attributes that reflect the usability of an application: effectiveness, efficiency, satisfaction, learnability, memorability, errors, and cognitive load. Each of these attributes has an impact on the overall usability of the application and as such can be used to help assess the usability of the application.

Existing usability models such as those proposed by the ISO (Zhang ,2005) and Nielsen (1994) also recognize these factors as being critical to the successful usability of an application. For mobile applications context of use plays a critical role as an application may be used in multiple, very different contexts.

User: It is important to consider the end-user of an application during the development process. As mobile applications are usually designed to be small, the traditional input methods, such as a keyboard and mouse, are no longer practical. It is, therefore, necessary for application designers to look at alternative input methods. Some users may find it difficult to use some of these methods due to physical limitations.

Another factor that should be considered is the user's previous experience. If a user is an expert at the chosen task then they are likely to favor shortcut keys to accomplish this task. On the other hand, novice users may prefer an interface that is intuitive and easy to navigate and which allows them to discover what they need. This trade-off must be considered during the design of the application.

Task: The word task refers here to the goal the user is trying to accomplish with the mobile application. During the development of applications, additional features can be added to an application in order to allow the user to accomplish more with the software. This extra functionality comes at the expense of usability as these additional features increase the complexity of the software and therefore the user's original goal can become difficult to accomplish.

Context of use: The word context refers here to the environment in which the user will use the application. Context is mentioned separately from both the user and the task. Context not only refers to a physical location but also includes other features such as the user's interaction with other people or objects and other tasks the user may be trying to accomplish. As mobile applications can be used while performing other tasks it is important to consider the impact of using the mobile application in the appropriate context.

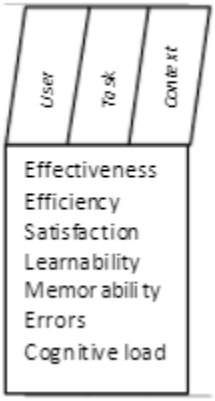


Figure 2-3 PACMAD Model

ISO and Nielsen's Model was selected for this study: Efficiency, Effectiveness, Trustfulness, and Learnability was adopted for the research model and considered as Usability attributes.

2.6 Usability Evaluation

Usability evaluation consists of methodologies for measuring the usability aspects of a system's user interface and identifying specified problems [Dix et al. 1998; Nielsen 1993]. Usability evaluation is an important part of the overall user interface design process, which ideally consists of iterative cycles of designing, prototyping, and evaluating [Dix et al. 1998; Nielsen 1993].

Usability evaluation is itself a process that entails many activities depending on the method employed.

Common activities include:

√ Capture - collecting usability data, such as task completion time, errors, guideline violations, and subjective ratings;

√ Analysis - interpreting usability data to identify problems in the interface; and

√ Critique - suggesting solutions or improvements to mitigate problems.

Ankita (2012) presented Usability Evaluation methods as show below:

Various methods are available in the literature for usability evaluation like Inspection, DRUM, QUIS, SUMI MUSIC, Empirical testing.

2.6.1 Inspection

This method is proposed by Boehm et al. (1976).The users are observer or testing and evaluation of the design layout of the software system is done by the experts. It provides expert's views and opinions which are essential for development of various aspects of the software system. The two most widely used inspection methods are:

2.6.1.1 Heuristic Evaluation

It is fast, cheap and easy method to figure out the shortcomings and problems in a user interface design. The evaluators use the usability principles or the heuristics for its implementation.

2.6.1.2 Cognitive Walkthrough

This method is based on assessment of the user interface by the experts who consider the opinion and experience of the users. It is useful in identifying the problems of user interface.

2.6.2 Empirical testing

This method was proposed by Marciniak, J.J., (2002). It is a lab oriented methodology which accounts user experience as a requirement for the design and development of the software system. It also examines performance and attitude of the users involved in testing the system (Lund, A. M., 1997). The naive users are allowed to interact with the system and the behavior of the user and the system's response is recorded. The system can either be a prototype or the final product on which the testing is performed. In the case of prototype system, amendments can be made for the successful design of the product whereas in the case of final product user acceptance can be measured. Accordingly, if required a system can be discarded.

2.6.3 Metrics for Usability Standards in Computing (MUSiC)

MUSiC (Bevan, 1995; Macleod et al., 1997) was developed at the National Physical Laboratory, UK, for the purpose of quantitative and qualitative data required to support usability engineering. This method evaluates the measures of effectiveness and efficiency as follows:

Effectiveness is the capability of a software system to carry out the specified task successfully. It is defined as a function of two components, the quantity of the task attempted by the users, and the quality of goals they achieve (Miles Macleod et al., 1998).

Efficiency and cost of task performance, this can be formulated by calculating the amount of effort put into that is basically the input.

MUSiC method is designed to assess the performance related attributes of a product. The essence of MUSiC method is to observe a subject in a simulated environment while the subject (or a group of subjects) is using the product. By analyzing how the user performed (how many mistakes did he made etc.)It is possible to quantify specific usability attributes. This method extends the usability structure by a set of new user performance related attributes and proposes tools and methods to assess these attributes. Tools include video recording and 11 other user observation equipment. The methods describe systematic steps on how to perform usability evaluation. (Macleod,1997)

2.6.4 Software Usability Measurement Inventory (SUMI)

SUMI was developed by University College Cork Software Usability Measurement Inventory as part of the MUSIC project (Kirakowski, Porteous and Corbett, 1992). It measures the quality of the software system from the end user's point of view. It consists of industry standardized questionnaire statements which are answered by the user according to whether they Agree, Don't Know, or Disagree. This internationally structured 50-item questionnaire is available in a variety of languages for the convenience of the users like in English, German, Dutch, Spanish and Italian. It is not at all time consuming and takes 10 minutes or so. We can decide to administer it on paper or on the other hand can decide for the internet, online option.

2.6.5 Diagnostic Recorder for Usability Measurement (DRUM)

DRUM (Macleod and Rengger, 1993) is a software tool developed at NPL within the MUSIC project, for usability evaluation. DRUM has a graphical user interface, online context-sensitive help and a comprehensive user manual (Macleod et al., 1992). It analyses the tests of a product and derives performance-based usability metrics from the results and send it to the usability engineer. The video session recorded is analyzed in real time during the first pass of recording. The DRUM increases the pace of the analysis greatly and automates the activity wherever possible. The component of the DRUM, Log Processor provides calculation to its database of performance measures and performance based usability metrics, which includes task time; snag, Search and Help Times; Efficiency; Relative Efficiency; Productive Period (Miles Macleod, Rosemary Bowden and Nigel Bevan, 1998). There is a tabular and graphical representation of the measures and metrics. The report is given to the product's designers who are concerned with the usability defects.

2.6.6 The Questionnaire for user interaction Satisfaction (QUIS)

QUIS (Chin et al. 1988, Harper and Norman 1993) evaluation is based on the factors mentioned in the 'User Evaluation of Interactive Computer Systems' given by Ben Shneiderman (1986). QUIS is designed in modular format to get section wise accessibility as well as to specific

aspects. This questionnaire provided is effective in providing guidance in the design or redesign of systems. It also helps the evaluators find the areas of potential improvement in the software system. Thereby, it serves as a testing instrument in usability laboratories and operates on the concrete product features and the user experience.

QUIS usability evaluation was used for this study by providing questionnaires for end users.

2.7 Mobile Banking Usability

Users perform mobile banking using mobile apps, browsers on the mobile devices, USSD, SMS, NFC, mobile wallets, etc. Mobile banking is relatively easy to use for frequent and repeated transactions as the navigation can be menu driven. But it will be difficult to finish a task if there are many steps for a single task or if it has poor navigation. Also sometimes the timeout session will be ended without the user finishing the task.

2.8 Mobile Banking Application Usability Dimensions and Measurement

Azham, Hamisu and Norlaily(2014) reviewed relevant journals and conferences using SLR (systematic literature review) and they identified five usability dimensions and twelve relevant criteria sub-dimensions that can be used to evaluate mobile banking application.

EFFICIENCY: I, Compatibility: This refers to the extent to which user interface is compatible with different mobile devices and human ability. II, loading time: This measures the time required for the apps to load into mobile device and login/logout time, i.e. how fast it responds to the user when loading and using the application. III, Accuracy: It is the performance measure of apps to complete specified task, successfully, accurately and within a time. Therefore, integrating the three measurements will determine the efficiency of mobile banking application interface.

EFFECTIVENESS: I, Presentation: This refers to the logical presentation of the menu buttons (visibility of important options which can easily be understood by user), graphic, interface layout and the readability of the output. II, Navigation: The degree to which navigation is logically structured and make sense to the user by allowing the user to move around easily between related to find contents. However, to measure the effectiveness of mobile banking application, the

navigability and presentation should be integrated to mirror out the actual effectiveness of user interface.

TRUSTFULNESS: I, Privacy: It measures whether the user personal information is appropriately protected, i.e. user personal data should be confidential. II, Reliability: It measures the error rate and the extent to which the interface is absolutely dependable, trusted and reach user mind stability. Therefore, the mapping of these measurements will determine the reliability and confidence of the mobile banking application from the customer side.

LEARNABILITY I, Simplicity: This measures the simplicity level for the interface to allow users to carry out transactions so easily with a minimal effort/action and communicate with concise and simple user's own language. II, Familiarity: It measures the extent to which the interface provides recognizable elements to the user through interactions so as to aid easy understanding. Therefore, simplicity and familiarity can be integrated together to measure the degree of effort required for the user to learn the interface with a high level of satisfaction.

USER SATISFACTION I, Content: It measures the degree to which the content addresses the user's objectives or goals and whether the content has value to the user. Content can be used as one of the criteria to measure user satisfaction more especially the degree to which the content addresses the user's objectives or goals and whether the content has value to the user. II, Structured task: Information should be well organized in the interface so as to provide the user with a selection of options and interact so easily when carrying out a transaction or task. III, User guide: This measures the extent to which the interface provides context sensitive help and meaningful feedback. Therefore, there three measurements can be integrated to measure the user satisfaction for mobile banking application interface.

2.9 Related Works

(Rabiu, 2017) studied to identify the usability issues and the level of differences among the mobile banking users on age, gender, qualification and experience. The study employed the use of quantitative approach using online questionnaire with a total number of one hundred and fifty (150) respondent from three banks in Nigeria called Gtbank, Diamon and Skye bank.

The finding of the study indicates that all the three banks have usability issues on privacy and reliability of mobile banking application interface. This study also reveals that the male users have less usability issues than females, the younger and the middle aged also have few usability issues than the old aged, for qualification of the users with lower qualification, and they have more usability issues than those who have higher qualification. While in years of experience using the mobile, the result shows that there are not much usability issues for the whole category of years.

The study investigated the usability issues of several Nigerian banks and compared the mean differences between different age groups, genders, qualifications and experience in terms of usability issues of mobile banking during transactions. The result of the study shows that it is important for the future development of mobile banking application interface to consider older aged users and also those with lower knowledge background and also the users with less experience in mobile banking application. Improving the mobile banking application interface is to allow users with different age groups, genders, qualifications and experience to use the application easily because today many users are performing their transactions using mobile banking application.

(Azham, Hamisu and Norlaily, 2014) presented a set of usability dimensions and measurement that can be used to evaluate the usability of mobile banking application. The dimension and measurement have been generated from the relevant previous studies through systematic literature review. Relevant journals and conference proceedings were considered and reviewed using SLR (systematic literature review). Five main HCI journals and three conference proceedings have been selected from 2007 ahead Seven hundred and eight papers were downloaded but merely forty nine papers have been selected and fully reviewed/ analyzed. Five usability dimensions and twelve relevant criteria (sub-dimensions) have been created that can be used to evaluate mobile banking application.

The method used for the selection of relevant papers are mainly in the area of usability study, evaluation method/design and of course papers that provide usability principles and dimensions/design guidelines. The main objective of this study was to provide usability dimensions and measurement for evaluating mobile banking application; so that five dimensions

with twelve measurement criteria (sub-dimension) have been identified. Efficiency, Effectiveness, Trustfulness, Learnability and User satisfaction.

As (Hamisu and Hussain,2016) stated, Many of the existing usability evaluation models for mobile applications have not been evaluated to determine its usefulness, accuracy and applicability into the real world environment. This may not provide confidence on the side of the evaluator and the results may not be comprehensive and valid.

A list of predefined validation measures such as: Perceived usefulness , Decision support satisfaction , Comparison with existing usability evaluation models, ,Clarity , Relevant to the intended applications , Task appropriateness , Perceived ease of use , Internally consistent ,Organization (well organized) , Presentation (readable and useful format) ,Ability to produce expected results , Ability to produce relevant and useful results , Completeness , Understandability (easy to understand) ,Easy to implementation ,were used by the experts' in order to determine the accuracy and applicability of the proposed model. The results show that the model is useful, accurate and can be used for evaluating the usability of mobile banking applications interface. The Authors stated that the study is useful for both the research community and the usability practitioners towards better understanding of model validation process. The above research is related with this research since usability evaluation models for mobile banking applications interface is provided by considering different predefined validation measures.

(Azham, Aysar and Adilah, 2018) has presented a set of usability dimensions in this study, which is illustrated as a unified model for mobile applications. The dimensions in the model were proposed based on the reviews of previous studies. The model consists of ten usability dimensions and 4 contextual factors. The model can be used by researchers as well as practitioners as a usability guideline for mobile application. Practitioners can use the model to determine which usability dimensions should be considered when designing and measuring usability level for mobile applications. On the other hand, researchers may extend the study by investigating how these dimensions can be operationalized as specific measurements. As mobile devices vary, researchers may also need to empirically test these dimensions for specific mobile devices with predetermined usages.

This study was conducted on 3 phases, the first phase is user research where an informal interview was conducted on frequent users of the application to identify key tasks of the application which are checking balance, transferring funds to favorite account, mobile reload and under account management changing account password. Accordingly, the questionnaire was created. The second phase is user experience testing, in this phase the sample were tested individually and were asked to complete the four tasks and fill the usability question afterwards.

CHAPTER THREE

METHODOLOGY

3.1 Research Model and Hypothesis

3.1.1 Research Model

The research model was adopted from ISO, Nielsen's Model and SLR which was presented on the literature review. It has four variables: Efficiency, Effectiveness, Trustfulness and Learnability. Effectiveness and efficiency was adopted from ISO (International Organization for Standardization), Learnability was adopted from Nielsen's Model and Trustfulness was adopted from SLR (systematic literature review) which was presented on the literature review.

The three models: ISO, Nielsen and SLR on literature review are selected by seeking the below variables which applied on the research model.

Efficiency and Effectiveness from ISO : Productivity is composition of effectiveness and efficiency (Rantanen H,1995) points out to output/input +output/goal as productivity); and (King R,1993) It is referring to broader concept that whatever makes the organization has a better function. Moreover, (Asia Productivity Organization (APO), 2008) defines productivity as: Productivity = Efficiency + Effectiveness ="Doing things right" + "Doing the right things".

Measuring user satisfaction in handling their task is essential as satisfaction factors greatly affect productivity (Halkos and Bousinakis, 2010).from the above sayings, we can understand that it is possible to get user satisfaction by working on productivity. Since productivity is the result of effectiveness and efficiency. User satisfaction is not included on the model by considering that it is included indirectly.

Learnability from Nielsen: Learnability is considered to be the most fundamental usability attribute (Nielsen, 1993). Nielsen (1993) believes that learning to use is the first experience most users have with a new product/service.

Trustfulness from SLR on literature review: In the m-commerce environment trust is more critical and complex than in general and traditional commerce (Va.sileiadis, 2014). Jansen, (2015), and Luo, Li, Zhang, & Shim (2010),

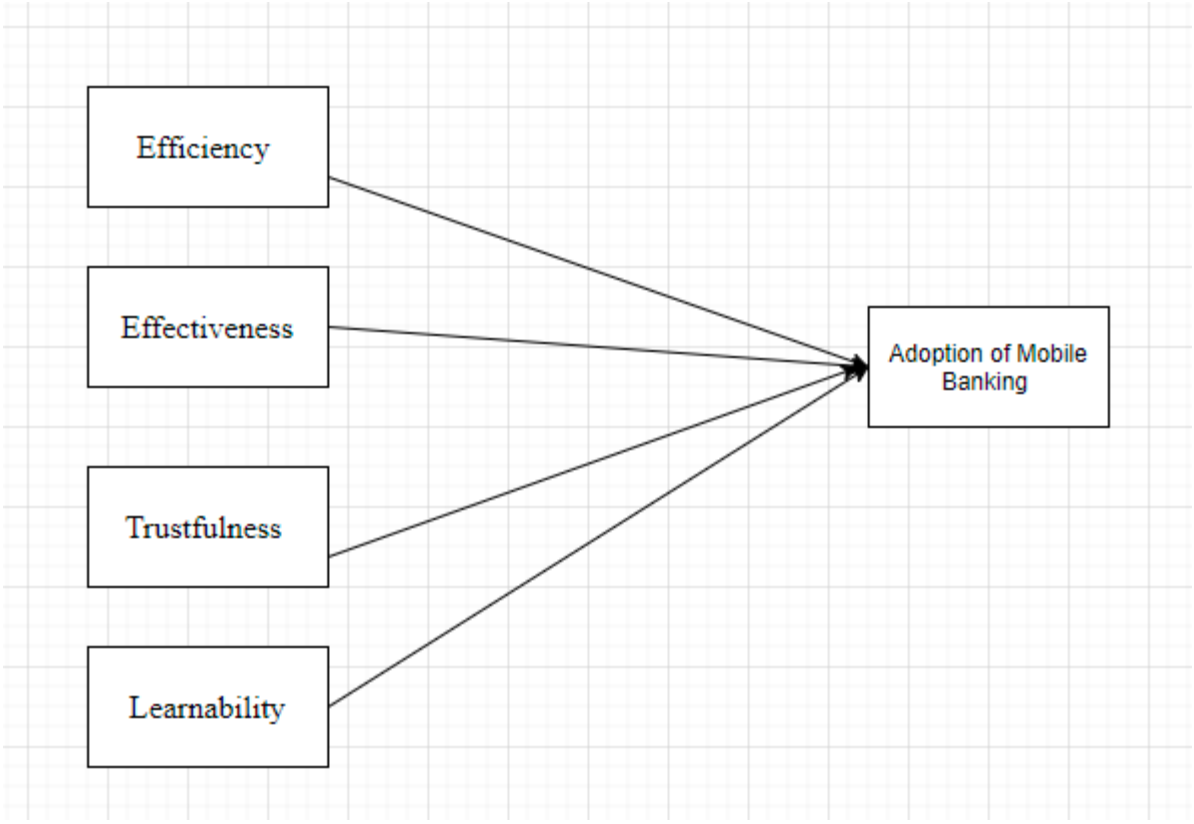


Figure 3-1 Research model

3.1.2 Hypothesis

In this research, four hypotheses are presented. Hypothesis 1 and Hypothesis 2 are new but they are compiled from former research findings as explained below. Hypothesis 3 and Hypothesis 4 adopted from former literature. Hypothesis 3 adopted from (Hotna,Iwan,Rajesri, and Iman 2019). Hypothesis 4 adopted from (Ebsa, 2017) also they are not specific to Berhan Mobile Banking.

Efficiency is the resources expended in relation to the accuracy and completeness with which users achieve goals (ISO 9241-11, 1998). According to Nielsen (2003), Efficiency concerns about once users have learned the design of a system, how quickly they can perform tasks. According to Goodhue et al. (1995), TTF emphasizes individual impact. Individual impact refers to improved efficiency, effectiveness, and/or higher quality. He assumed that the good fit between task and technology is to increase the likelihood of utilization and also to increase the

performance impact since the technology meets the task needs and wants of users more closely. By considering these findings, we hypothesize as;

Hypothesis 1. Efficiency positively influences adoption of mobile banking.

Effectiveness is the accuracy and completeness with which users achieve specified goals (ISO 9241-11,1998). According to Goodhue et al. (1995), TTF emphasizes individual impact. Individual impact refers to improved efficiency, effectiveness, and/or higher quality. He assumed that the good fit between task and technology is to increase the likelihood of utilization and also to increase the performance impact since the technology meets the task needs and wants of users more closely. By considering these findings, we hypothesize as;

Hypothesis 2, Effectiveness positively influences adoption of mobile banking.

Trustfulness: Trust in e-banking is defined as willingness of customers to perform online banking transactions, expecting that the bank will fulfil its obligations irrespective of ability to monitor or control the banks' actions (Citera, Beauregard, & Mitsuya, 2005). In the m-commerce environment trust is more critical and complex than in general and traditional commerce (Vasileiadis, 2014). Jansen, (2015), and Luo, Li, Zhang, & Shim (2010), found out that trust play a vital role in the acceptance of mobile banking adoption. By considering these findings, we hypothesize as;

Hypothesis 3. Trustfulness positively influences adoption of mobile banking.

Learnability is considered to be the most fundamental usability attribute. (Nielsen, 1993) According to Nielsen (2003), Learnability concerns about how easy it is for the users to accomplish basic tasks the first time they encounter the design. (Hotna,Iwan,Rajesri, and Iman 2019) defined perceived learnability as the degree to which certain technology is perceived by people to be easy to learn and that they can become skillful at using it. They also believe that it is likely that the more mobile banking is perceived to be easy to learn, the more inclined users will be to continue using it. By considering these findings, we hypothesize as;

H4. Learnability positively influences adoption of mobile banking

3.2 Population of the study and Sampling

The population of the study is Berhan Bank Bole Branch Mobile banking users. The population size of the study is 1773. Therefore a total of 1,773 customers are target population for the study.

(Yamane, 1967).

$$n = \frac{N}{1 + N * e^2}$$

Where,

- n is a sample size
- N is a total population
- e^2 is a probability of an error.

Mostly 0.05 is used for probability of an error, but for this study 0.1 is used since it can be used as far as the required initial sample size is determined.

Thus, the sample size for this study is determined as follows:

$$n = \frac{1773}{1+1773*0.1^2} = 94$$

3.3 Data Source & Collection Method

The study used both primary and secondary data. Primary sources of data include questionnaire, whereas secondary sources of data has been generated through a review of organization documents. Data was prepared using Google form.

3.4 Data Collection Instrument Development

In order to collect data the researcher used questionnaire for end users of mobile banking and document reviews was conducted to understand the key facts about the cause and impact of the subject under study. The documents were reviewed by referring most recent information from authorized documents of the Bank, annual bulletin, web site of the Bank and different publications & reports made by the Bank.

3.4.1 Questionnaire

Two types of **questionnaire** has been applied.

I, Demographic study: it consist of general information about the customer and questions pertaining to the respondents' demographic profiles: such as age, gender, educational qualification, work experience and IT literacy level has been asked. The researcher conducted a customer category study related to usability issues besides profiling.

II, Customer Opinion questionnaires' regarding Mobile Banking usability: it consists of questions related to Mobile Banking usability issues. For these case Likert scale ranging from 1 = strongly disagree 5 =strongly agree has been asked.

Table 3-1 Questionnaire

Construct name	**Operational definition**	**Questionnaire items**	**Item Code**
EFFICIENCY	Efficiency is the ability of a user to complete a task with speed and accuracy. Efficiency is measured in a number of ways,	1,I am able to complete my work quickly using Berhan Mobile Banking.(Ahlem, 2016).	Ef1
		2,Berhan Mobile Banking helps me to do my job	Ef2

	such as the duration spent on each screen, the duration to complete a given task (a set of tasks), and the user's error rate. (P.Weichbroth,2020)	more efficiently. (Ahlem, 2016).	
		3, Berhan Mobile Banking saves me time(Kraig,2010).	Ef3
		4, I don't make many errors with Berhan Mobile Banking (Kraig,2010).	Ef4
EFFECITVNESS	Effectiveness is the ability of a user to complete a task in a given context. It is measured by the number of successfully completed tasks, the number of steps required to complete a task, the number of double taps unrelated to the operation of an application, and the number of times that a back button is used by the mobile device. (P.Weichbroth,2020)	1,Berhan Mobile Banking allows me to accomplish my tasks.(Kraig,2010).	Eff1
		2,I can effectively complete my work using Berhan Mobile Banking (Ahlem, 2016).	Eff2
		3, Berhan Mobile Banking capabilities meet my requirement. (Kraig,2010).	Eff3
		4,Overall, I am satisfied with the ease of completing the tasks in Berhan Mobile Banking(Lewis,1995)	Eff4

TRUSTFULNESS	Trustfulness measures whether the user personal information is appropriately protected and it measures the error rate and the extent to which the interface is absolutely dependable, trusted and reach user mind stability. (Azham, Hamisu and Norlaily,2014)	1,I am concerned about Berhan Mobile Banking transactions (Gabriella,2008)	T1
		2, I believe that Berhan Mobile Banking will not allow me complete a transaction (Gabriella,2008)	T2
		3, I need tech support to be able to use Berhan Mobile Banking (Gabriella,2008)	T3
		4, I believe that some aspect of Berhan Mobile Banking transaction may go wrong. (Gabriella,2008)	T4
		5, I have fear that my personal information on Berhan Mobile banking will be made accessible to others (Gabriella,2008)	T5
		6, I am confident that my personal information on Berhan Mobile Banking	T6

		will be protected (Gabriella,2008)	
LEARNABILITY	Learnability refers to the degree of ease with which a user can interact with a newly-encountered system without getting guidance or referring to documentation. It is measured by the number of attempts to solve a task, the number of assists during performing a task, and the number of errors performed by a user. (P.Weichbroth,2020)	1,It is easy to learn to use Berhan Mobile Banking . (Bambang,2016)	L1
		2, I believe I could become productive quickly using Berhan Mobile Banking(Bambang,2016).	L2
		3, It will be easy to become skilled in the use of Berhan mobile banking.(Ali,2017).	L3
		4, I would find Berhan mobile phone banking flexible to interact with. (Ali,2017).	L4
		5, I would find that procedures of the use of Berhan mobile phone banking adaptable to my needs(Ali,2017).	L5
		6, My interactions with Berhan mobile phone	L6

		banking would be clear and well understood (Ali,2017).	
MOBILE BANKING ADOPTION		1, Adopting Berhan Mobile Banking is a convenient way to conduct banking transactions.(Ali,2017)	A1
		2, The information in Berhan Mobile Banking is well organized, so I could easily find the information I needed. (Ali,2017)	A2
		3, Adopting Berhan Mobile Banking is useful for managing my finance. (Ali,2017)	A3

3.4.2 Data Collection Procedure

Respondent's contacts are taken from Bole branch and Introduction was provided for the respondents about the research through phone and Google form link shared via different platforms such as Telegram, Email and Skype for those who are willing to fill the questionnaire. Some respondents responded quickly and some of them took more days. Even though the sample size was 94, the link was shared for 110 users by considering that the respondents may forget to fill and submit, So that the Google form "accept response" was disabled after the 94 users

responded. 110 customers were chosen since it is considered that it is enough to collect the data, The number would be increased if the researcher didn't get the sample size during the time the data needed

3.5 Data analysis Method

Descriptive statistics (such as frequency) analysis was conducted on the demographics data. The data was sorted to group questions according to applicable constructs of hypotheses analysis. In this study the target population were mobile banking users. Descriptive analysis and linear regression was used to analyze (determine) the influence of usability on adoption of mobile banking. Various combinations of variables, which included efficiency, effectiveness, trustfulness and learnability were tested to establish the combination of predictors. Anova and independent sample t-test were used to identify the usability issues based on customer category.

Statistical hypothesis testing that is a method of statistical inference was conducted on proposed hypotheses to confirm data analysis. Hypothesis is proposed for the study that statistical relationship between the two data sets or relationship between variables (variables and mobile banking system) were analyzed. For this study hypothesis test that is also called confirmatory data analysis, was conducted statistically based on significance values/ significance level.

3.6 Validity and Reliability of the Instrument

3.6.1 Pre-Testing of Questionnaire

The questions were easy to understand as per taking a pre-test which was carried out on some individuals. They were tested by the bank E-banking staff first, if customers were able to understand. Then they were tested with some customers. After those customers confirmed that the questions were fine, and the comments were taken care of, the question was distributed to all respondents using Google form. Each question was adopted from different literature.

The respondents were informed that the questions will be in English and they were ok with it. But from the 94 respondents, one respondent has status of "No educational Background". This respondent is removed since it seems contradictory that "understanding English" and "having no educational Background".

Table 3-2 Reliability Statistics for Pilot Test

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.912	.921	4

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.1 Research and Statistical Tools Employed

The research and statistical tools employed in this study are simple frequency distribution, reliability and validity tests, and regression analysis. The researcher has gathered data with numerical form and the data has been analyzed using SPSS. The reliability of the data was carried out by using Cronbach's Alpha Value. Data has been collected from different categories, such as gender, age, qualification, work experience and IT Literacy level. The SPSS, statical package version of IBM SPSS statistics 20 was used to run the collected data using descriptive statistics, independent sampling t-test and Analysis of Variance (ANOVA) to find out the significant difference among the age, gender, qualification experience, and IT literacy level in order to identify the usability issues of Berhan Bank Mobile banking. Furthermore, the results of the analysis used to determine the significant differences if exist between the participants based on the defined categories: gender, age, qualification and experience and IT Literacy level. Regression analysis was used to confirm if the result met the hypothesis which determined to identify the influence of usability on adoption of mobile banking.

4.2 Respondents Demographic Characteristics

The demographic variables used in this study are Gender, Age, Educational Background,and Information Technology literacy level (see Table 1).

Gender

Table 4-1 Gender of respondents in number and in percentage terms

Variables	Classification of Variables	Frequency	Percentage
Gender	Male	55	59.1
	Female	38	40.9

As reflected in table 4.1 above, 59.1 percent (55) of the entire respondents were male and 40.9 percent (38) were female. This indicates that there are more male respondents than females.

Age

Table 4-2 The age of respondents in number and in percentage terms.

Variables	Classification of Variables	Frequency	Percentage
Age	20 years or less	13	14
	21 to 30 years	42	45.2
	31 to 40 year's	31	33.3
	41 years and above	7	7.5

As reflected in the table 4.2 above, 14 percent (13) of the entire respondents were age group of 20 years or less,45.2 percent (42) were age group of 21 to 30 years, 33.3 percent(31) were age group of 31 to 40 years and 7.5 percent(7) were age group of 41 years and above. This shows that respondents between the ages of 20-30 are in the dominant group.

Educational Background

Table 4-3 Educational background of respondents in number and in percentage terms.

Variables	Classification of Variables	Frequency	Percentage
Educational	Primary School	2	2.2

Background	Secondary School	19	20.4
	Degree	50	53.8
	Master Degree or above	22	23.7
	I don't have Educational	-	-

As reflected in the table 4.3 above, 2.2 percent (2) of the respondents were educational background group of Primary School, 20.4 percent (19) of the respondents were educational background group of Secondary School, 53.8 percent (50) of the respondents were educational background group of Degree, and 23.7 percent (22) of the respondents were educational background group of Master Degree or above. This shows that respondents of Degree holders are in the dominant group. There are two respondents who have Educational Background of Primary School. There was one respondent from "No education background "group, but the respondent is removed by considering the response may not be valid and he/she may not be able to respond to an online questionnaire if he/she doesn't have educational background.

Work Experience

Table 4-4 work experience of respondents in number and in percentage terms.

Variables	Classification of Variables	Frequency	Percentage
Work Experience	1-5 year's	32	34.4
	6-10 years	25	26.9
	>10 years	18	19.4
	No work experience	18	19.4

As reflected in the table 4.4 above, 34.4 percent (32) of the respondents were work experience group of 1-5 year's, 26.9 percent (25) of the respondents were work experience group of 6-10 years, 19.4 percent (18) of the respondents were work experience group of >10 years, 19.4 percent (18) of the respondents were no work experience group.

Information Technology literacy level

IT Literacy level for the researcher and for the respondents mean: How the user is able to assess, acquire, interact and communicate information in a digital environment.

Table 4-5 IT literacy level of respondents in number and in percentage terms

Variables	Classification of Variables	Frequency	Percentage
Information Technology literacy level	Low	11	11.8
	Medium	47	50.5
	High	35	37.6

As reflected in the table 4.5 above, 11.8 percent (11) of the respondents were Information Technology literacy level group of low, 50.5 percent (47) of the respondents were Information Technology literacy level group of medium, 37.6 percent (35) of the respondents were Information Technology literacy level group of high.

4.3 Reliability and Validity Test

Table 4-6 Reliability Statistics

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.796	.804	4

Table 4-6 shows Reliability **Statistics** that provides the actual value for **Cronbach's alpha.**

According to Fornell & Larcker (1981) and Wong (2013), Internal Consistency Reliability values larger than .7 are desirable to assure strong internal consistency reliability, we can see that Cronbach's alpha is **0.796**, which indicates a high level of internal consistency for our scale.

Table 4-7 Item-Total Statistics

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Efficiency	11.2287	1.874	.720	.539	.686
Effectiveness	11.2926	2.211	.608	.435	.747
Trustfulness	11.6383	2.172	.456	.228	.828
Learnability	11.2553	2.121	.684	.505	.713

This column presents the value that Cronbach's alpha would be if that particular item was deleted from the scale. We can see that removal of any Variable, except Trustfulness, would result in a lower Cronbach's alpha. Therefore, we would not want to remove these questions. Removal of Trustfulness would lead to a small improvement in Cronbach's alpha, and we can also see that the "Corrected Item-Total Correlation" value was low (0.456) for this item. Even though Cronbach's alpha would be increased if Trustfulness was removed, it is considered that the average Cronbach's alpha (**0.796)** is acceptable and Trustfulness was not removed.

4.3.1 Validity Test

Validity can be defined as the extent to which data collection methods or methods accurately measure what they were intended to measure. Bhattacherjee (2012). Correlation coefficient was run in order to check the validity of the items. Values below 0.30 correspond to weak correlations; values between 0.30 and 0.50 are considered moderate correlations; and the ones above 0.50, strong correlations. (Ajzen, 1980). Correlation coefficient results show that each items have $p<0.05$. Four pair items have moderate correlations, one pair item have weak correlations and the rest of pair items have strong correlations. As per the mentioned result the study has reached a satisfactory level of Validity.

4.4 Level of Mobile banking usability at Berhan Bank (RQ1)

Descriptive Statistics of Usability

Table 4-8 Descriptive Statistics of Usability

Descriptive Statistics

	N	Minimum	Maximum	Mean
Efficiency	93	2.00	5.00	3.9194
Effectiveness	93	2.25	5.00	3.8441
Trustfulness	93	1.67	5.00	3.5108
Learnability	93	2.67	5.00	3.8835
Valid N (listwise)	93			

Table 4-8 above shows that there was significant difference in mean score among the trustfulness (M =3.5108) and other variables .Trustfulness has less mean than other variables (efficiency, effectiveness and learnability). This shows that Berhan Mobile Banking users have more usability problems on the trustfulness.

Usability Issues on Gender

Table 4-9 Descriptive Statistics of Gender

	Gender	N	Mean
Usability	1	38	3.7111
	2	55	3.8436

Table 4-10 Equality of variance for Gender

		Levene's Test for Equality of Variances		t-test for Equality of				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	
Usability	Equal variances assumed	.249	.619	-1.351	91	.180	-.13249	
	Equal variances not assumed			-1.341	77.549	.184	-.13249	

An independent sample t-test was conducted to compare the usability issues of mean score for male and female users of Berhan Mobile Banking. Female participants were identified with 1 and Male participants were identified with 2.

The Table 4-9 above shows that there was no significant difference in mean score between the male (M =3.8436) and female (M =3.7111, t (91) = -1.351, p = .180, two-tailed). Table 4-10 shows that the Levene's test for equality of variance was not statistically significant (t = 1.351, df = 91, p >0.05). So that being male or female doesn't make a difference on the usability issues.

Usability Issues on Age

Table 4-11 Equality of variance for Age

Usability

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.657	3	1.552	8.967	.000
Within Groups	15.407	89	.173		
Total	20.064	92			

Descriptive of Age Group

Table 4-12 Descriptive of Age Group

Usability

	N	Mean
1	13	3.5785
2	42	3.9643
3	31	3.7836
4	7	3.1577
Total	93	3.7894

Since p is statistically significant (<0.05). Post hoc test results is included as below

Post hoc tests are used to uncover specific differences between three or more group means when an analysis of variance (ANOVA) F test is significant.

Table 4-13 Post Hoc Tests for Age

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Usability
LSD

(I) Age	(J) Age	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-.38576*	.13205	.004	-.6481	-.1234
	3	-.20508	.13748	.139	-.4782	.0681
	4	.42079*	.19506	.034	.0332	.8084
2	1	.38576*	.13205	.004	.1234	.6481
	3	.18068	.09852	.070	-.0151	.3764
	4	.80655*	.16986	.000	.4690	1.1441
3	1	.20508	.13748	.139	-.0681	.4782
	2	-.18068	.09852	.070	-.3764	.0151
	4	.62586*	.17411	.001	.2799	.9718
4	1	-.42079*	.19506	.034	-.8084	-.0332
	2	-.80655*	.16986	.000	-1.1441	-.4690
	3	-.62586*	.17411	.001	-.9718	-.2799

*. The mean difference is significant at the 0.05 level.

Table 4-11 and 4-12 above show the one way between groups analysis of variance (anova) result which was conducted to explore the impact of age groups on the use of Berhan Mobile Banking

The participants were divided into four groups according to their age (Group 1: 20 years or less; Group 2: 21 to 30 years; Group 3: 31 to 40 year's; Group 4: 41 years and above)

There was statistically significant difference at the p <.05 level in usability score for the four age groups F(3,90)=8.967, p=.000.

Here we use Tukey HSD test Tukey HSD test since it is a statistical tool used to determine if the relationship between two sets of data is statistically significant.

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 1 was significantly different from Group 2, Group 2 significantly differ from Group 4, and Group 3 significantly differ from Group 4.

The means plot shows that older user have more usability issues on Berhan Mobile Banking than the middle and younger aged user.

Usability Issues on Qualification Group

Table 4-14 Equality of variance for Qualification Group

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.485	3	1.495	8.541	.000
Within Groups	15.579	89	.175		
Total	20.064	92			

Table 4-15 Descriptive of Qualification Group

	N	Mean
1	2	3.1979
2	19	3.4836
3	50	3.9767
4	22	3.6818
Total	93	3.7894

Table 4-14 and 4-15 above show the one way between groups analysis of variance (ANOVA) result which was conducted to explore the impact of qualification groups on the use of Berhan Mobile Banking. The participants were divided into five groups based on their levels of qualification (Group 1: Primary school; Groups 2: Secondary School; Group 3: Degree; Group 4: Masters and above; Group 5: No educational background).

The result shows there was statistically significant difference at the $p < .05$ level in usability score for the five qualification groups: $F(3, 89) = 8.541$, $p = .000$. This implies that customers with low educational qualifications have a low tendency to use mobile banking.

Usability Issues on IT Literacy Level Group

Table 4-16 Equality of variance for IT Literacy Level Group

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.049	2	2.025	11.359	.000
Within Groups	16.220	91	.178		
Total	20.270	93			

Descriptive by IT Literacy Level Group

Table 4-17 Descriptive by IT Literacy Level Group

	N	Mean
1	32	3.9264
2	25	3.8550
3	18	3.7431
4	18	3.5012
Total	93	3.7894

Since p is statistically significant (<0.05). Post hoc test results is included as below

Table 4-18 Post Hoc Tests for IT Literacy Level Group

Post Hoc Tests

Multiple Comparisons

Dependent Variable: Usability
Tukey HSD

(I) Information Technology literacy level	(J) Information Technology literacy level	Mean Difference (I-J)	Std. Error	Sig.
1	2	-.61710*	.14215	.000
	3	-.64491*	.14670	.000
2	1	.61710*	.14215	.000
	3	-.02781	.09476	.954
3	1	.64491*	.14670	.000
	2	.02781	.09476	.954

Table 4-19 and 4-20 above show the one way between groups Analysis of Variance (ANOVA) result which was conducted to explore the impact of IT Literacy Level groups on the use of Berhan Mobile Application. The participants were divided into three groups based on their IT Literacy Level (Group 1: Low; Groups 2: Medium; Group 3: High).

The result shows there was statistically significant difference at the $p < .05$ level in usability score for the four qualification groups: $F(2, 91) = 2.025$, $p = 0.000$.

Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 1 was significantly different from Group 2 and 3.The means plot shows that customers with low IT literacy level have more usability issues.

4.5 Mobile banking usability influence on mobile banking adoption at Berhan Bank (RQ2)

In order to do the hypothesis test, linear regression statistical method was used. With regards to the data analysis, the dependent variables (Adoption of mobile banking) was aggregated with the independent variables. Similar approach was also applied for the independent variables for aggregation (i.e, Efficiency, Effectiveness, Trustfulness and Learnability). As it is indicated earlier in order to test the four hypotheses, the study used linear regression.

4.5.1 Test of assumption of linear regression

I, Linear relationship: This assumption allows us to test if there is a linear relationship between the independent variables, efficiency, effectiveness, trustfulness and learnability, and the dependent variable, Mobile banking adoption. The points in the plot below look like they fall on a straight line, which indicates that there is a linear relationship between Mobile banking adoption and efficiency, effectiveness, trustfulness and learnability.

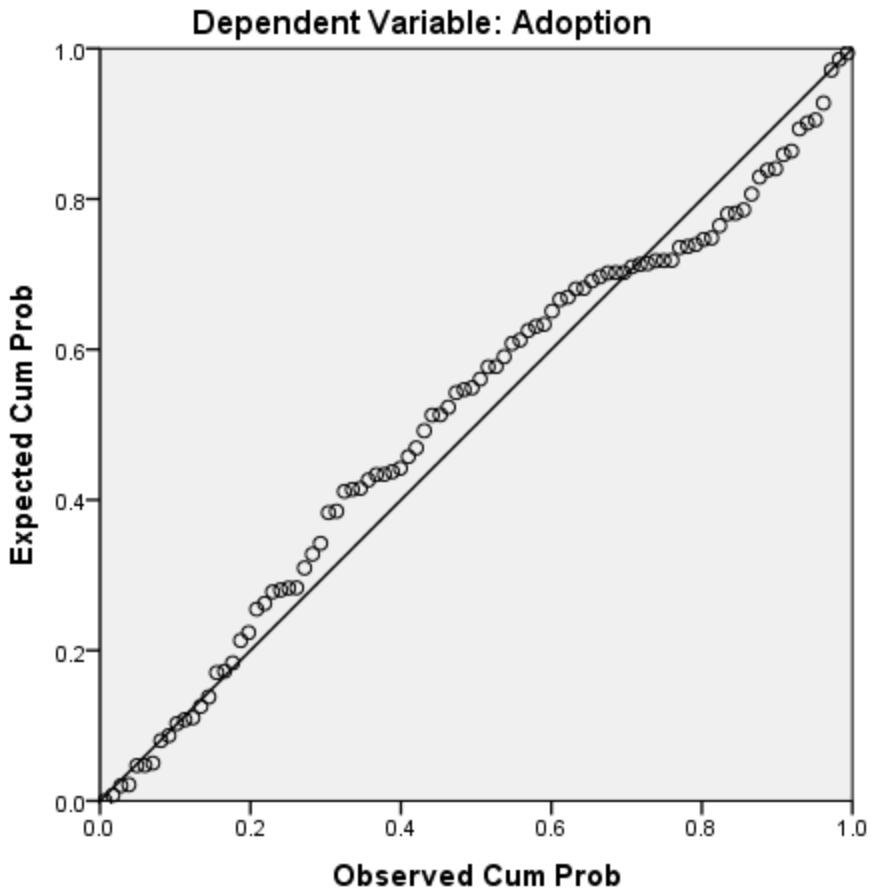


Figure 4-1 P-P plot

II, Normality: Q-Q shows the distribution of the data against the expected normal distribution. . In the below plot, the observed value for each score is plotted against the expected value from the normal distribution. The scores appear to be normally distributed.

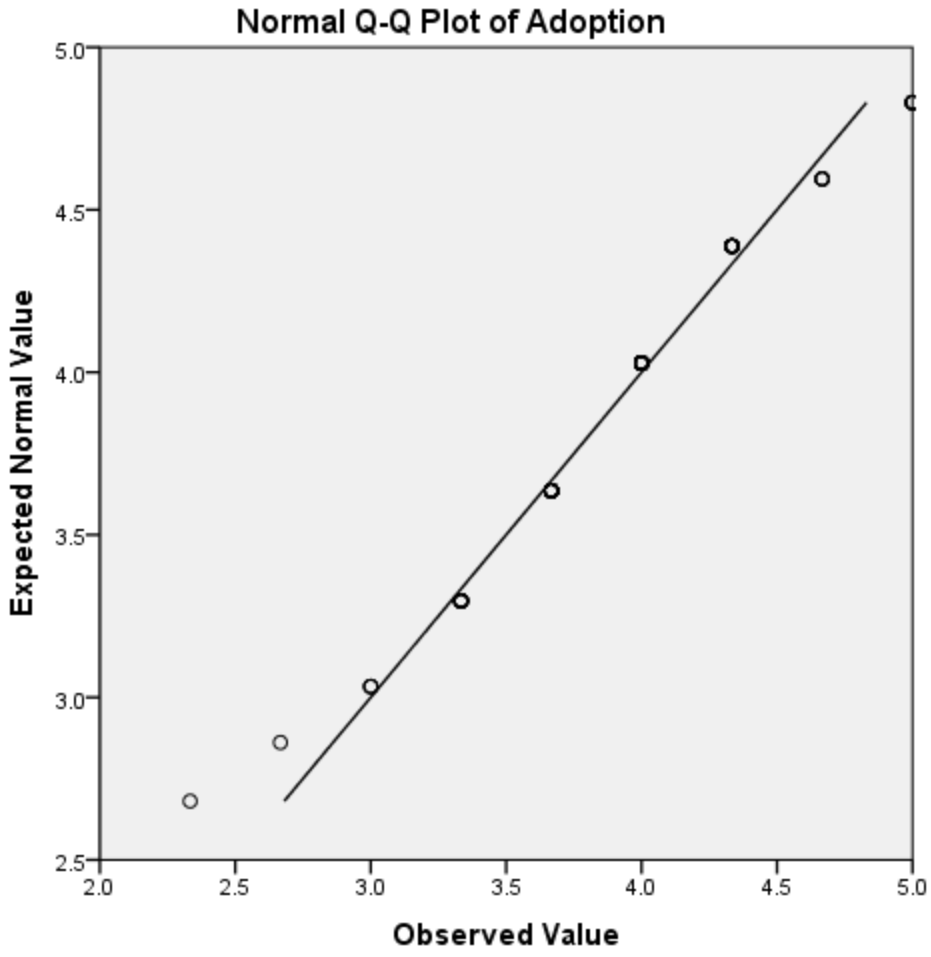


Figure 4-2 Q-Q plot

III, **The dependent variable should be measured at the continuous level**. The dependent variable, mobile banking adoption, is measured at continuous level.

4.5.2 Hypotheses testing

The dependent variables and the independent variable are integrated and tabulated in SPSS for hypothesis testing. Hypothesis testing is done based and relies on the standardized coefficient significance (value of P) and also the standardized coefficient (Beta). In order to support the hypothesis, the significance of the standardized coefficient should be below the 0.05 level (the minimum probability to reject or accept the hypothesis) and the standardization coefficient should be greater than 0.1 which is the accepted rate. In order to calculate standardized coefficient (Beta v) and the significant of the standardized coefficient (value of P) the following steps were followed:

1, Independent variable: Efficiency is individually regressed against the dependent variable Adoption of mobile banking. (Hypotheses H1).

2. Independent variable: Effectiveness is individually regressed against the dependent variable Adoption of mobile banking. (Hypotheses H2).

3. Independent variable: Trustfulness is individually regressed against the dependent variable Adoption of mobile banking. (Hypotheses H3).

4. Independent variable: Learnability is individually regressed against the dependent variable Adoption of mobile banking. (Hypotheses H4).

Accordingly, the following results were obtained and the results shown on table 4-22

Efficiency and Mobile banking Adoption: Hypothesis 1 that is Efficiency positively influences adoption of mobile banking. That is rejected because of the standardization coefficient that equals -0.087, which is less than the accepted rate 0.1 and the significance is 0.492, which is greater than the accepted rate 0.05.

Effectiveness and Mobile banking Adoption: Hypothesis 2 that is Effectiveness positively influences adoption of mobile banking. That is accepted because of the standardization coefficient that equals 0.264, which is greater than the accepted rate 0.1 and the significance is 0.022, which is lower than the accepted rate 0.05.

Trustfulness and Mobile banking Adoption: Hypothesis 3 that is Trustfulness positively influences adoption of mobile banking. That is accepted because of the standardization coefficient that equals 0.317, which is greater than the accepted rate 0.1 and the significance is 0.001, which is lower than the accepted rate 0.05.

Learnability and Mobile banking Adoption: Hypothesis 4 that is Learnability positively influences adoption of mobile banking. That is accepted because of the standardization coefficient that equals 0.264, which is greater than the accepted rate 0.1 and the significance is 0.032, which is lower than the accepted rate 0.05.

Table 4-19 Results of linear regression for Usability and Adoption of mobile banking

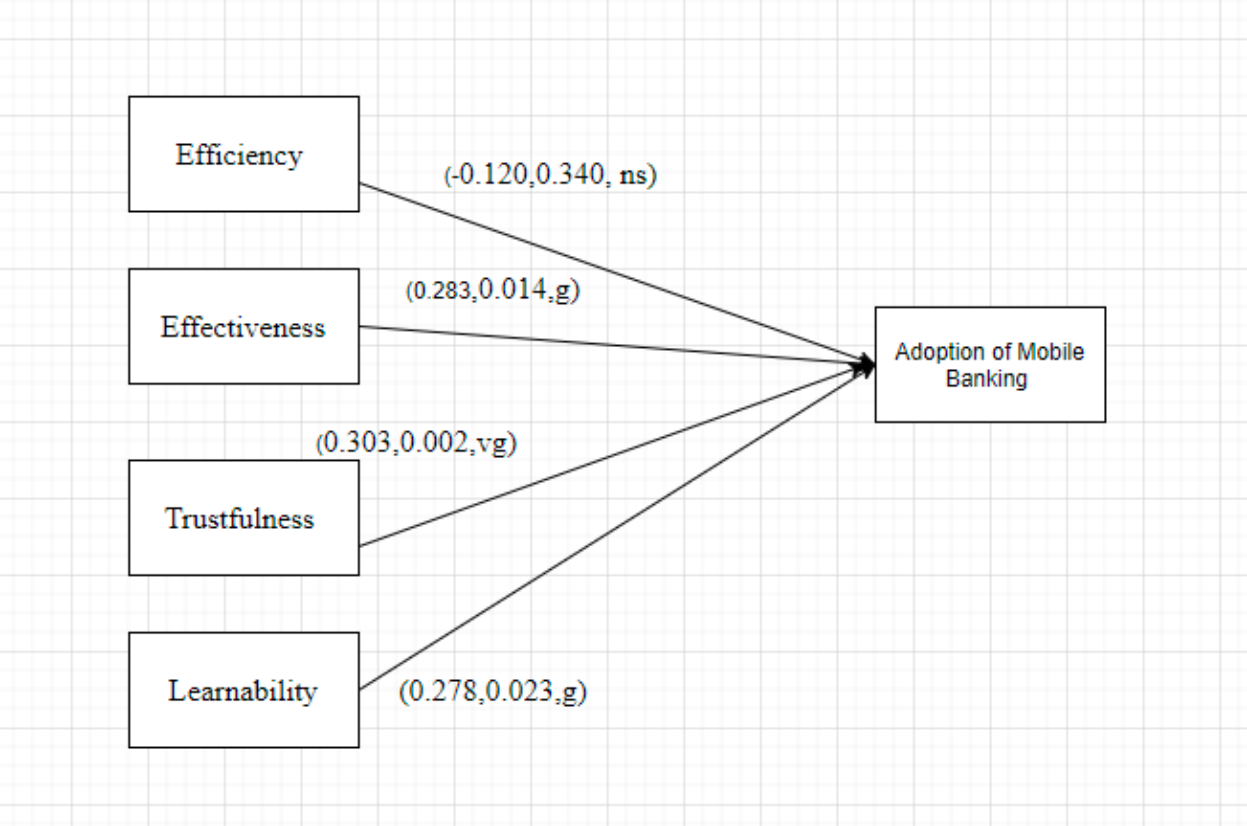
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.461	.353		4.134	.000
	Efficiency	-.070	.101	-.087	-.689	.492
	Effectiveness	.242	.104	.264	2.329	.022
	Trustfulness	.242	.073	.317	3.304	.001
	Learnability	.243	.111	.264	2.182	.032

Table 4-20 Summaries of the hypothesis tests.

Hypothesis	**Standardization coefficient**	**Significant**	**Acceptance/rejection of the hypothesis**
H1	**-0.087**	0.492	Rejected
H2	**0.264**	0.022	Accepted
H3	**0.317**	0.001	Accepted
H4	**0.264**	0.032	Accepted

To conclude all the relations, the study shows that Mobile banking adoption is affected by effectiveness, trustfulness and learnability whereas not by efficiency. Among all the factors based on our result trustfulness is the strongest factor for adoption of mobile banking as it has the largest standard coefficient of 0.317 which is larger than the others.



g =good, vg =very good, ns=not significant

Figure 4-3 .The research model and relationship between the variables.

4.6 Discussion

The findings of this study show that Berhan Mobile Banking has more usability issues on Trustfulness than other variables such as efficiency, effectiveness and learnability. But the usability issues on different user categories shows that there are differences between them. The older age have more usability issues on Berhan Mobile Banking than the middle and younger aged user. Low educational qualification customers have a low tendency to use mobile banking. Having a low IT literacy level has more usability issues than High IT literacy. But being male or female doesn't make a difference on the Usability issues. Rabiu (2017), identified usability issues and the level of differences among the mobile banking users on age, gender, qualification and experience. He found out that the banks have usability issues on privacy and reliability of mobile

banking application interface. His study indicated that the male users have less usability issues than female, the younger and the middle aged also have few usability issues than the old age. Users with lower educational qualification have more usability issues than those who have higher educational qualification. This study indicated that usability has relation with Adoption of mobile banking unlike Rabiu (2017). He just identified usability issues. Ali (2017) studied improving Mobile Phone Banking usefulness, usability, risk, cost, and Intention to adopt. Based on the theory of technology acceptance model and the innovation diffusion theory, the purpose of this correlational study was to examine the relationship between usefulness, ease of use, risk, cost, and mobile phone banking adoption in Burkina Faso. The study shows that all of the predictors have contributed significantly to the model except the risk. Ali's study confirmed that there is correlation between usability and mobile banking adoption. He studied the relation between usefulness, ease of use, risk, cost, and mobile phone banking adoption. Ali's study focused on the relationship of the mentioned variable but this study included the level of mobile banking usability besides the relationship between usability and mobile banking adoption.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The research was aimed to investigate usability of Mobile banking at Berhan Bank S.C. To achieve its main goals intensive literature review was done and a research model with four variables: Efficiency, Effectiveness, Trustfulness and Learnability were adopted from ISO, Nielsen's Model, and SLR which presented in the review. Effectiveness and efficiency were adopted from ISO, Learnability was adopted from Nielsen's Model and Trustfulness was adopted from SLR which presented on review.

In order to answer the research questions, the study mainly focused on the four variables Efficiency, Effectiveness, Trustfulness, and Learnability. In this research, the mentioned four usability attributes have been examined. It is focused on research questions since it is a specific inquiry which the research seeks to provide a response. Quantitative survey research was conducted to collect data from users of Berhan mobile banking at Berhan Bank Bole branch. 110 questionnaires were shared with users and 94 were collected and 93 responses were used for data analysis. One respondent with no educational background is removed by considering the response may not be valid and he/she may not be able to respond to an online questionnaire if he/she doesn't have educational background. Since the questionnaires were prepared and collected via Google form with multiple-choice form, there was no option to submit without filling the questionnaires.

The findings of this study show that Berhan Mobile Banking has more usability issues on Trustfulness than efficiency, Effectiveness, and Learnability. But the usability issues on different user categories shows that there are differences between them. The older age has more usability issues on Berhan Mobile Banking than the middle and younger aged user. The study implies that having low educational qualification customers has low tendency to use mobile banking. Having a low IT literacy level has more usability issues than High IT literacy. But being male or female doesn't make a difference on the Usability issues. The study also found out that Effectiveness positively influences adoption of mobile banking, Trustfulness positively influence adoption of mobile banking and Learnability positively influences adoption of mobile banking.

5.2 Recommendations

Based on the above findings of the research, the following suggestions are put forward for Berhan Bank S.C and Berhan Mobile Banking to address usability issues.

√ The study indicated that Berhan Bank S.C should work intensively to improve Berhan Mobile Banking trustfulness since it was identified as an issue on this research from the four usability attributes. Also the bank could improve learnability and effectiveness since they positively influences adoption of mobile banking.

√Berhan Bank should work intensively to minimize the usability issues for older age users since the study indicated that older age users has more usability issues on Berhan Mobile Banking than the middle and younger aged user..

√Berhan Bank should work intensively to increase the tendency to use mobile banking for low qualification customers since the study indicated that low educational qualification customers has low tendency to use mobile banking.

√Berhan Bank should work intensively to minimize the usability issues for low IT literacy users since the study indicated that having low IT literacy level has more usability issues than high IT literacy user.

5.3 Future Work

This research was conducted to explore usability issues of Berhan mobile banking. As such, there is still room for further investigation of usability issues of Mobile banking and this can be considered as limitation.

The following are areas that could be considered for future research:

√This research was conducted in Addis Ababa, Ethiopia. Further studies may also consider selecting respondents from other areas outside of Addis Ababa.

√The research considered only technological aspects to evaluate Usability issues of Berhan Mobile banking, additional social and cultural aspects can be considered in future work.

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Appendices

Appendix 1: Questionnaire

Addis Ababa University
College of Natural Sciences
School of Information Science

Dear Sir or Madam:

In partial fulfillment of the requirements for the Degree of Master of Science in Information System, I am conducting the study on "Usability Evaluation of Mobile banking in Ethiopia: The case of Berhan Bank S.C" at Addis Ababa University. Accordingly I have prepared the following Usability Evaluation tools to be used to evaluate Berhan Mobile Banking. The main goal of this questioner is to evaluate Berhan Mobile Banking. Your honest, attention and time to responses to each question and statement are extremely valuable to the outcome of this research. The questionnaire will take approximately 15 minutes to complete and the results of the research will be used for academic research only. Hence, all responses will be kept in strict confidentiality and hence would not affect anyone in any case.
Your dedication is most valued and appreciated and I would like to take this opportunity to thank you in advance for your kind participation, honest and on-time response to the questionnaire.

Thank You
Essey Yohannes

DEMOGRAPHIC INFORMATION

Description (optional)

Gender *

- Female
- Male

Age *

- 20 years or less
- 21 to 30 years
- 31 to 40 year's
- 41 years and above

Educational background *

- Primary School
- Secondary School
- Degree
- Master Degree or above
- I don't have Educational Background

Work Experience *

- 1-5 year's
- 6-10 years
- >10 years
- No work Experience

Information Technology literacy level *

- Low
- Medium
- High

EFFICIENCY

Description (optional)

I am able to complete my work quickly using Berhan Mobile Banking. *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Berhan Mobile Banking helps me to do my job more efficiently *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Berhan Mobile Banking saves me time *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

I don't make many errors with Berhan Mobile Banking *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

EFFECITVENESS

Description (optional)

Berhan Mobile Banking allows me to accomplish my tasks *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

I can effectively complete my work using Berhan Mobile Banking *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Berhan Mobile Banking capabilities meet my requirement *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Overall, I am satisfied with the ease of completing the tasks in Berhan Mobile Banking *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

TRUSTFULNESS

Description (optional)

I am concerned about Berhan Mobile Banking transactions *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

I believe that Berhan Mobile Banking will not allow me to complete a transaction. *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

I need technical support to be able to use Berhan Mobile Banking *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

I believe that some aspect of Berhan Mobile Banking transaction may go wrong *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

I have fear that my personal information on Berhan Mobile banking will be made accessible to others *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

I am confident that my personal information on Berhan Mobile Banking will be protected *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

LEARNABILITY

Description (optional)

It is easy to learn to use Berhan Mobile Banking *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

I believe I could become productive quickly using Berhan Mobile Banking *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

It will be easy to become skilled in the use of Berhan mobile banking *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

I would find Berhan mobile phone banking flexible to interact with *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

I would find that procedures of the use of Berhan mobile phone banking adaptable to my needs *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

My interactions with Berhan mobile phone banking would be clear and well understood. *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

MOBILE BANKING ADOPTION

Description (optional)

Adopting Berhan Mobile Banking is a convenient way to conduct banking transactions *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

The information in Berhan Mobile Banking is well organized, so I could easily find the information I needed

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Adopting Berhan Mobile Banking is useful for managing my finance *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Appendix 2 Letter of cooperation from University to the Bank and Acceptance by Berhan Bank

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Addis Ababa University
College of Natural Science
School of Information Science

Date: March 29, 2021
Ref No. SIS/28/2021/13

To Whom It May Concern

Subject:- Student Essey Yohannes

Dear Sir /Madam,

Student Essey Yohannes (ID.No GSE/2386/11) is graduate student at the School of Information Science, Addis Ababa University. He is currently conducting a M.Sc. Thesis research under the title "Usability Evaluation of Mobile Banking in Ethiopia: The Case of Berhan Bank S.C ".

I would like to thank you in advance for all the assistance that you would provide to the student.

With Regards

Tibebe Beshah (PhD)
Head, School of Information Science

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SCHOOL OF INFORMATION SCIENCE
ADDIS ABABA UNIVERSITY

To: Bole Branch
Please, assist Essey Yohannes, BrB staff member to conduct academic research at your branch
12/05/2021

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