Addis Ababa University College of Business and Economics

Department Master of Business Administration

Determinants of Mobile Banking adoption in Ethiopia: A case of Commercial Bank of Ethiopia

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Declaration

I, Mezgebu Lemma, hereby declare that the study done on “Determinants of Mobile Banking Adoption: A case study in Commercial Bank of Ethiopia” is the result of my own effort and study that all sources of materials used for the study have been acknowledged. I have conducted the study independently with the guidance and comments of the research advisor.

This study has not been submitted for any degree in any university. It is conducted for the partial fulfillment of the Master of Art Degree in Business Administration.

Mezgebu Lemma

Date _____

Signature _____

Letter of Certification

This is to certify that Mezgebu Lemma has conducted this project work entitled “Determinants of Mobile Banking Adoption: A case study in Commercial Bank of Ethiopia” under my supervision.

This project work is original and suitable for the submission in partial fulfillment of the requirement for the award of Master of Arts Degree in Business Administration.

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List of Acronyms

ATM- automatic machine teller

CBE- Commercial Bank of Ethiopia

DIT- Diffusion Innovation Theory

ETB- Ethiopian Birr

GSMA- Group Special mobile association

IS- Information System

MBA-Mobile Banking Adoption

MIS-Management Information system

NBE-National Bank of Ethiopia

POS-Point of sale

SMS-Short Message Service

SPSS-Statistical Package for Social Science

TALC-Technology Adoption Life Cycle

TAM-Technology Acceptance Model

TPB-Theory of Planed Behavior

TRA-Theory of Reasoned Action

UTAUT-Unified Theory of Acceptance & Use of Technology

WAP- Wireless Application Protocol

Abstract

This study aims to assess factors that determine mobile banking adoption in Ethiopian Banking Industry. A case study of Commercial Bank of Ethiopia; This study tries to use extended TAM (Technology Acceptance Model) with Relative Advantage from Innovation Diffusion Theory, and Awareness to indentify factors influencing mobile banking adoption in Commercial Bank of Ethiopia with special focus on Branches under Addis Ababa Districts. By referring previous literature eight determinants as awareness, perceived usefulness, perceived ease of use, perceived credibility, perceived self-efficacy, perceived risk, perceived cost and relative advantage has been identified. Mobile banking has many benefits which includes reduce time of transactions, avoid physically visiting bank's branches and it involves anywhere anytime transactions. However, in Ethiopia the mobile banking adoption rate is very low when we compare with Bank's account holders and mobile connection penetrations in the country. The study was conducted based on the data gathered from customers of Commercial Bank of Ethiopia under Addis Ababa districts and the survey was conducted by using semi structured questionnaires. Out of 400 questionnaires that have been distributed, 374 customers were complete the questionnaire (response rate of 93.5%). The research results identified four variables influencing customers to adopt mobile banking such as awareness, perceived usefulness, perceived risk and relative advantage that had significant effect mobile banking adoption. Perceived risk was negatively influencing factor while awareness, perceived usefulness, and relative advantage positively affect mobile banking adoption. Thus, the bank should have to strive to improve customers level awareness by devising different means of change since; awareness has a multiplied effect on motivating customers to be mobile banking user. Even, if customers get sufficient know how risk related issues will be eliminated then mobile banking user will increase which reduced customers that visit the bank's hall and this helps the bank to allocate this resource on the other best alternatives.

***Key words**: Mobile banking, mobile banking adoption, Technology acceptance Models.*

CHAPTER ONE

1.1. Introduction

Before the introduction and enablement of mobile web services in 1999, mobile banking was completed primary through text or SMS (CFI, 2020). European banks were on the frontier of mobile banking service offering, using the mobile web via WAP support. SMS banking and mobile web were the most popular mobile banking products before 2010. The development of Smartphone with IOS or Android operating systems, mobile banking applications (apps) began to evolve and sophisticated interfaces and improved transactional ability of clients (CFI, 2020).

African mobile money has started in Kenya in 2007 when Safaricom and its parent Vodafone, who were experiencing a microfinance service pilot, could have taken notice of this and also another user experience and developed the M-PESA solution (MNS Consulting, n.d.). The service spread quickly and most African operators are now providing their money solution, and this success is due to a safe and quick money transfer solution to unbanked and under banked people (MNS Consulting, n.d.)

According to European Investment Bank (EIB, 2017) more than 40% of the adult population in countries like Kenya, Tanzania, Zimbabwe, Ghana, Uganda, Gabon and Namibia, use mobile money on an active basis. In Sub Saharan African countries mobile banking adoption rate is 36.8% up to 2018 (GSMA, 2019). The mobile banking development in Ethiopia is not full-fledged in terms of exhaustively utilizing all the mobile services one can get since most of the customers uses for notification or alarm inquiry (Birritu, No.119). Recently the number of banks operating in Ethiopia is 18, of which 16 are private banks and two of them are state owned. As December 31, 2019 Commercial Bank of Ethiopia has 23,545,030 on account holders in 1,558 branches and each branch serves 15,112 people on average (CBE, 2019). And the total number of mobile banking users reached 3.8 million which is 16.2% when compared with banks' customers and Sub Saharan countries. But now days the adoption of mobile banking services is getting extra support through digitalization enablers like National Bank directive which limit daily cash withdrawal and corona virus pandemic. These two factors shift customer's attention towards online means's rather than visiting Bank's Branches.

As the banking industry becomes increasingly competitive, each bank must develop quality service and products to serve existing customer needs and attract new potential customers. Banks should bring the greatest utility and convenience to their customers and their need to focus on satisfaction and provide incentives to influence customer loyalty. Commercial bank has a vision to become a world-class commercial bank by the year 2025, therefore it must provide the service that meet customer requirements, that is compatible, simple and personalized with complementary service. In addition, banks should have a digital platform with fast and secure access (Shaikh & Karjaluoto, 2015).

Mobile banking is a system that allows customers of financial institution to conduct a number of financial transactions through mobile phones. Banks are deploying innovative products and services to ensure their future survival and meet the changing expectation of their customers. In this intense globally competitive market, banks should strive to satisfy the needs of their customers through providing quality service and improve their customer relation management. According to (Indra, 2014), the bank has to build a digital relationship with the customer to achieve customer engagement. To do so, the customer has to perceive the bank as its advocate, i.e. the bank has to use its customers' information in order to guide them and anticipate changes in their lifestyle, providing them with access in the right place at the right time to the best financial products, without the usual friction of traditional banking. In this regard, information technology and the communication networking system have revolutionized the working of banks and financial entities all over the world.

With the advanced and dynamic growth of technology, how fast the consumers are accepting these technologies depend on a number of factors such as availability of technologies, convenience, consumers' need, security etc. The growth of information technology (IT) in the world is becoming a crucial factor in the development of businesses and industries around the world. Thus, by using the fast growth of mobile phone penetration in the country, Commercial banks and financial institution didn't exploit this opportunity. Ethio Telecom monopoly in all telecom services which brought poor network expansion and quality. According to (GSMA, 2019) report Ethiopia had limited availability of mobile money services and low rates of financial inclusion.

The review of research on technology adoption reveals that many authors have previously attempted to combine two or more theories to explore customer adoption of technology. In this research, the Extended Technology Acceptance Model (TAM) and Innovation Diffusion Theory are used to empirically study mobile banking adoption. Technology Acceptance Model (TAM) was introduced by Fred Davis in 1986 for his doctorate thesis at the MIT Sloan School of Management. The author suggested that, users' motivation can be in three factors: perceived ease of use, perceived usefulness and attitude toward using the system. The Innovation Diffusion theory explicates "the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 1995, p-5). Some factors have been highlighted to be a determinant of adoption of an innovation and they are complexity, relative advantage and compatibility.

According to Zhao, (2008) cited in (Tewodros Mulisa, 2018) to encourage further mobile banking adoption in developing countries, a better understanding of the barriers and drivers impacting mobile banking adoption is critical. By gaining an in-depth understanding of the factors and condition that influence developing country's ability to fully adopt and realize its benefits, strategic implications can be generated for the researchers and practitioners regarding how to promote the growth of mobile banking in the developing countries. However, despite the importance of these adoption studies in developing countries, limited studies are currently available, especially in Ethiopia. According to (Maurer, 2008), research on the adoption and socioeconomic impacts of mobile banking systems in the developing world is scarce because the systems are so new and confirmed by (Nguena, C.L. 2019). Therefore more studies are still required to understand the determinants of mobile banking adoption in Commercial Bank of Ethiopia. Therefore, to address the current gap in the literature: this study may play its role.

From practical perspective, the motivation behind this study is to increase the number of mobile banking users to create cashless banking by identifying factors that determine mobile banking adoption, specifically in CBE. Cashless banking is the one in which all transactions are done using debit card or credit card, or electronic payments methods rather than the use of cash. In addition, the aim was to assist financial institutions in the design of an effective mobile banking system to respond to the need of customers. The study findings explain how likely customers would adopt mobile banking.

1.2 Statement of the problem

Mobile banking now becomes an alternative service to traditional banking practices and other alternative digital channels like ATM, POS and CBE birr among banks' customers. Its acceptability highly depends on how individual perceive innovation attributes such as convenience, simplicity, cost, security, flexibility and accessibility (Porteous, 2007). According to Technology Acceptance Model, a user adoption of new technology or service is determined by the user's intention to use the system, which is determined by the user's beliefs about the system(F. D. Davis, 1989). It further suggests perceived ease of use and perceived usefulness is important in explaining the difference in user's intentions to use new technology or service. Mobile banking can be rejected or adopted by users depending on the factors that affect their attitude. Thus, it is reasonable to study which factors influence our society more to use or not to use mobile banking, and take corrective action in order to improve the adoption rate.

Banking industry becomes highly competitive, so each bank has to develop quality service and products to serve existing customer needs and attract new potential customers from available markets. The nature of competition should focus on innovation and developing services to succeed in banking industries now days. Thus, banks must have a digital platform with fast and secure access (Shaikh & Karjaluoto, 2015). The digital banking of our country is confined to cities and town which didn't cover large portion of our population live in rural areas.

According to European Investment Bank (EIB, 2017) more than 40% of the adult population in countries like Kenya, Tanzania, Zimbabwe, Ghana, Uganda, Gabon and Namibia, use mobile money on an active basis. In Sub Saharan African countries mobile banking adoption rate is 36.8% up to 2018 (GSMA, 2019). The mobile banking development in Ethiopia is not full-fledged in terms of exhaustively utilizing all the mobile services one can get since most of the customers uses for notification or alarm inquiry (Birritu, No.119). Recently the number of banks operating in Ethiopia is 18, of which 16 are private banks and two of them are state owned. As December 31, 2019 Commercial Bank of Ethiopia has 23,545,030 on account holders in 1,558 branches and each branch serves 15,112 people on average (CBE, 2019). And the total number of mobile banking users reached 3.8 million which is 16.2% when compared with banks' customers and Sub Saharan countries.

For many years Ethio Telecom is a monopoly in all telecom services including fixed, mobile, internet, and data communications. This control stifled innovation, restricted network expansion and limited the scope of services on offer. Thus, by using the fast growth of mobile phone penetration in the country, and hope of Ethiopian telecommunication half privatization (which is the back bone of E-banking) as an opportunity to design best way for financial inclusion of unbanked population in Ethiopia. Which means Ethio Telecom monopoly in all telecom services brought poor network expansion and quality. The absence of network coverage or the existence of weak network translates to weak mobile banking implementation (Alampay, 2020). In addition, for e-money services to reach the unbaked, one has to consider the capabilities of the unbanked to make use of these services given the technology and infrastructure available to them. According to (GSMA, 2019) report Ethiopia had limited availability of mobile money services and low rates of financial inclusion. In line with this, a strictly regulated Telco, restrictions on competition, luck of internet connectivity, and low level of consumer trust and financial literacy have created barriers to uptake and market entry. But, following privatization competition may bring network quality and expansion on telecom services which can create conducive environment for mobile banking expansion in banked and unbanked areas.

Many studies have been done to examine the relationship between mobile banking adoption and its determinants in developed countries. However, it is not satisfactory in the developing countries like Ethiopia. According to (Maurer, 2008), research on the adoption and socioeconomic impacts of mobile banking systems in the developing world is scarce because the systems are so new and confirmed by (Nguena, C.L. 2019). Even less attention has been paid to the social, economic, and cultural contexts surrounding the use of these systems. The statistical benchmarking analysis revealed that there is positive link between mobile banking development and economic development (Nguena,C.L. 2019). Though there are few studies done about electronic banking in Ethiopia it is a useful topic to study how to make it applicable using the available Information Communication Technology infrastructure together with the existing financial and legal frameworks so that the quality of services in Ethiopia banking sector can be enhanced for the future (Worku, Tilahun, & Ma, 2016). Few studies have still been conducted in users' intention to use internet banking/ internet commerce in the technology acceptance research stream (Hagos & Singh, 2019). Thus, it is possible to shift resources that spent on traditional banking for other priority sector by expanding mobile

banking services with less cost.

Generally, it is believed that, mobile banking has brought a positive shift in customer's perception because the customer can make payments for goods or service he buys without carrying physical cash, or checks their balance or deposit made to his/her account and deliver what he/she has to deliver after confirmation. This assist their business by protecting from insufficient payments made through checks. Again this research will be added to the existing literature as additional contribution or alternative resources for the next researches done on this area.

1.3 Objectives of the study

1.3.1 General objective

The main objective of the study is to examine the determinants of mobile banking adoption in banking industry with specific study on Commercial Bank of Ethiopia (CBE).

1.3.2. Specific objective

1. To assess the level of customer understanding of mobile banking service and does it has reduced cycle time for customers.
2. To assess customer's response about services provided on mobile banking and mobile banking impacts in controlling movement on their accounts.
3. To know if mobile banking service has reduced the customer that visits branches.
4. To suggest necessary actions that should be considered by the Commercial Banks in order to increase the impact of mobile banking on customer satisfaction and may be a way forward for the NBE to assess policy to make the system ease.

1.4 .The Research Hypothesis

To accomplish the above stated objective, this study developed the following eight hypotheses

1. **Awareness**

According to Alsaab, (2009) cited in (Alkhaldi, 2018) in mobile banking sector, awareness was defined as "knowledge of the existence of mobile banking and its benefits. In other words, awareness reflects the extent to which users have information and knowledge about mobile banking. Having awareness about mobile banking services will contribute to their decision to use

mobile banking (Cudjoe, Anim, Gerald, & Tetteh, 2015). Therefore, this research proposes the following hypothesis:

H1: The degree of awareness of bank customers on mobile banking has positive effect on mobile banking adoption.

2. Perceived usefulness

Perceived usefulness: the degree to which an individual believes that using a particular system could enhance her or his job performance (F. Davis, 1986). When customers find mobile banking services useful, beneficial and convenient in managing their funds efficiently and effectively would be the potential adopters (Kabeer & Adeel, 2013). Thus, this research proposes the following hypothesis:

H2: Perceived usefulness will have a positive effect on mobile banking adoption

3. Perceived ease of use

Perceived ease of use: the degree to which an individual believes that using a particular system could be free of mental and physical effort (F. Davis, 1986). According to (Alsoufi & Ali, 2014) the intention to adopt mobile banking is mainly affected by perceived ease of use and perceived usefulness. Consumers are more likely to adopt mobile banking services when basic skills acquired easily (Kabeer & Adeel, 2013). Therefore, this research proposes the following hypothesis

H3: Perceived ease of use will have a positive effect on mobile banking adoption.

4. Perceived Self efficacy

Perceived Self efficacy is defined as the judgment of one's ability, knowledge, or skills to use mobile banking services. According to Compeau and Higgins (1995) cited in (Jeong & Yoon, 2013) social cognitive theory proposes that self efficacy is the belief that one has the ability to perform a specific behavior. And also (Luarn and lin, 2005) cited in (Jeong & Yoon, 2013) support that self efficacy has the positive influence on perceived ease of use and intention to use mobile services. Thus, this research proposes the following hypothesis:

H4: Self-efficacy will have a positive effect on mobile banking adoption.

5. Perceived risk

Perceived risk: is viewed as a hesitation regarding the result (good or bad) regarding using a product or service. According to Bauer (1960) cited in (Collins, n.d.), perceived risk is defined as a combination of uncertainty plus seriousness of outcome involved and the expectation of losses associated with purchase acts as an inhibitor to purchase behavior. Thus, this research proposes the following hypothesis:

H5: perceived risk will have negative effect on mobile banking adoption.

6. Perceived financial cost

Perceived financial cost is defined as the extent to which a person believes that he/she has financial resources needed to use mobile banking. According to Luarn and lin, (2005} cited in (Jeong & Yoon, 2013) these costs could typically include the cost of the mobile devise, network charges, and transaction charges for bank costs as well as costs for data sent via the network infrastructure. Financial considerations may influence consumer's behavioral intentions. An individual with high income may have higher intention than an individual with lower income to use mobile banking. Therefore, this research proposes the following hypothesis:

H6: Perceived cost will have a negative effect on mobile banking adoption.

7. Compatibility

Compatibility is the degree to which an innovation is being consistent with the existing values, past experiences and needs of potential adopters. An innovation can be compatible or incompatible with socio-cultural values and beliefs; with previously introduced ideas: or with client needs for innovation (Rogers, 1995). Innovations that are perceived as compatible with the members of a social system will be adopted more rapidly than other innovations (Rogers, 2002). Thus, this research proposes the following hypothesis:

H7: Compatibility has positive effect on mobile banking adoption.

8. Relative advantage

Relative advantage is the degree to which an innovation is perceived as better than an idea it supersedes (Rogers, 1995). The degree of relative advantage is often expressed as economic profitability, social prestige, or other benefits (Rogers, 1995). Innovations that are perceived by individuals as having greater relative advantage will be adopted more rapidly than other innovations (Rogers, 2002). Thus, this research proposes the following hypothesis:

H8: Relative advantage has positive effect on mobile banking adoption.

1.5. Scope of the study

The scope was determined by conceptual frame work, the methodological aspect and the population of study. Regarding conceptual framework variables from different models was integrated to sufficiently address the objective of the studies. Hence, Technology Accepting Model does not cover all aspects that could affect individual behavioral intention and the actual behavior in IS adoption. (F. D. Davis, 1989) suggest that the beliefs of an individual may be influenced by other external factors which recommend to add other variables to the main construct of TAM (perceived usefulness and perceived ease of use) in the original model. Thus, to investigate factors influencing mobile banking adoption in Commercial Bank of Ethiopia: the integration of Extended Technology acceptance model (TAM) of Luarn and Lin (2005) and Diffusion theory of Rogers with awareness about the technology could be used to build theoretical framework of the study. Therefore, factors such as awareness, perceived usefulness, perceived ease of use, perceived self- efficacy, perceived risk, perceived cost, Compatibility and relative advantage.

Commercial Bank of Ethiopia has 1,558 Branches in fifteen districts as December 31, 2019 all over the country. From fifteen districts of CBE this study focused on districts under Addis Ababa (south, north, west and east).Because, it is difficult for the researcher to include all branches of CBE. Thus, Addis Ababa is the commercial center, and large amount of transaction is transacted hear which ensures that potential respondents are available for the study. In addition, it is difficult to know how many of them are accessing mobile banking on daily or weekly basis from total number of mobile banking user. Quantitative research approach was used for this study to achieve the objectives of the study and to test the hypothesis.

1.6 Limitation of the study

The study focused on Commercial Bank of Ethiopia specifically four districts under Addis Ababa District. Since it is not applicable to collect data from all customers of under this district, taking a sample is a limitation. Thus, Addis Ababa is the commercial center of the county, and large amount of transaction is transacted hear which ensures that potential respondents are available for the study. In addition around 26% of account holders of CBE found under these four Addis Ababa districts

1.7 Significance of the study

The finding from this research study is expected to contribute its part on process of creating cashless society strategy of the bank by deeply focusing on determinants mobile banking with special focus on unbanked and underserved society.

The finding from this research can be used by the banks to improve mobile banking facilities and to identify those factors that can either contribute to the failure or success of the mobile banking services and this could be further used for decision making. In addition the finding from study may be way forward for the National Bank to assess policy to make the system easy to be adopted.

1.8 Definition of Terms

ATM: - which stands for automated teller machine, is specialized computer that makes it convenient to manage a bank account holder's funds. It allows a person to check account balances, withdrawals or deposit money, print statements of account activities or transactions, and even purchase stamps (Bankrate, 2020).

Mobile banking refers to provision of banking services through mobile devices such as mobile phone or tablet. It is a natural evolution of Internet banking and better digital alternative. It represents a breakthrough for remote banking services and providing this services at any time and any place (Sadiku, Tembely, & Musa, 2017). Mobile banking requires the customer to hold a deposit account to and from which payments or transfers may be made (Porteous, 2006). The term mobile banking, mobile payments, mobile transfer and mobile finance refer collectively to a set of applications that enable people to use their mobile phones to manipulate their bank

accounts, store value in an account linked to their handsets, transfer funds or even access credit or insurance products(Donner, Digital, & Tellez, 2015).

CBE Birr is a mobile based banking whereby the selects, trains and authorizes agents to provide banking services on behave of the bank through a mobile phone. It is deployed as a means of extending financial services to the unbanked segment of the public (SEMONEGNA, 2018).

Innovation theory: explained that innovation is communicated through certain channels over time among the members of a social system" (Rogers, 1995).

TAM (Technology Acceptance Model) was developed by (F. Davis, 1986) to explain the computer-usage behavior. According to the model, in explaining the adoption of any information system, perceived ease of use and perceived usefulness are the two most important determinants.

POS: - A point of sale (POS) transaction is takes place between a merchant and a customer when a product or service is purchased, commonly using a point of sale system to complete transaction (Feemster, 2020)

1.9 Organization of the study

This research is organized into five chapters. Chapter one contains Introduction of the study, statement of the problem, objectives of the study and research hypothesis, scope of the study, limitation of the study, significance of the study, and definitions of terms. Chapter two deals with literature of review on the existing knowledge related Technology acceptance models, mobile banking adoption and developing conceptual framework. Chapter three presented the research methodology, research approach employed in the study such as research design, target population, sampling and sampling technique, data collection and analysis. Chapter four is about data analysis, discussion of logistic regression results and hypothesis testing. Chapter five presented conclusion of the study, recommendation, and limitations of the study and future work.

Chapter two

2. Review of Related Literature

This section seeks to analyze relevant documentation and findings that are essential to improve the research and its capacity to analyze the concerns it seek to accomplish, that is, the theoretical literature and the empirical literature. The theoretical literature presents and attempts to explain theories that relate to the subject matter that is mobile banking adoption. The empirical literature describes what has been practically observed and validated objectively in relation to the subject matter.

2.1 Theoretical Review

Mobile banking is a means to monitor your bank account and make transactions from your cell phone, stay current on your bank balance, get alerts and more from the phone (mary-wisniewski/, 2020). Mobile banking also defined as a service provided by a bank or other financial institution that allows its customers to conduct financial transactions remotely using mobile device such as Smartphone or tablet (*Mobile banking - Wikipedia*, 2019). The term mobile banking, mobile payments, mobile transfer and mobile finance refer collectively to a set of applications that enable people to use their mobile phones to manipulate their bank accounts, store value in an account linked to their handsets, transfer funds or even access credit or insurance products(Donner et al., 2015). Mobile banking requires the customer to hold a deposit account to and from which payments or transfers may be made (Porteous, 2006) . Mobile money describes financial transactions that are conducted using a mobile phone, where value is stored virtually (e-money) in all account associated with a SIM card (Mehta, 2015) .

According to (Porteous, 2006) mobile payments in turn is a subset of m-banking. He explains mobile banking as access by the mobile device to the broader range of banking services, such as account based savings or transactions products offered by the banks (Porteous, 2006). He further explains m-banking and m-payments are themselves subsets of the broader domains of e-banking and e-payments. This classification of m-banking with respect to m-commerce, m-payment, and e-banking is appropriate since m-banking implies the availability of all the banking services through mobile devices. (Porteous, 2006) defines mobile payment as “the transference of value from payer to payee, as in remittance or bill payment”. Accordingly mobile banking remittance

is a subset of mobile payment.

Mobile finance includes mobile banking and possibly other non-bank related financial features. Branchless banking includes all banking activities that do not occur through an actual bank branch; as such term includes mobile banking but also includes other business models such as agent banking where banks in remote areas, in substitution for an actual bank branch, use trusted agents. This research will be focused on only mobile banking from the term listed above.

In addition definition to given above (Porteous, 2006) distinguishes between additive and transformational approaches.

Additive approaches, which primarily target existing banked customers, and which offer mobile channel as an additional, alongside or as part of other (such as internet); and transformational approaches, which intentionally reach out to markets beyond the existing banked groups, through a product offering which meets the known needs of the unbanked groups (Porteous, 2006). In general by using mobile banking the customer can bank virtually anywhere anytime without physically visiting the Bank's and saves his time, energy and cost which can employed on the other best alternatives.

2.1.1 Advantages and Disadvantages of Using Mobile banking

Mobile Banking is simply the use of mobile phones and accompanying mobile apps to carry out banking transactions (Mehta, 2015).

According to (Mehta, 2015), banks and credit unions can offer mobile banking services through the use of a mobile site, or, more popularly, through a custom mobile applications. This mobile application connects to the financial institution's servers and allows the user to check their balance, transfer funds, open or close accounts, order debit or credit cards, cash checks, and more.

The mobile banking field continues to grow as more and more customers prefer the freedom to access banking services from the comfort of their mobile phone. This freedom of location is arguably the biggest advantage of mobile banking. Additionally, many mobile banking apps now include face-to-face, mobile-video technology which allows customers the ability to have real-time, face-to-face conversations with representatives from their financial institution.

According to (Mehta, 2015) **Advantages of mobile banking**, from both the perspective of the bank and customer, include:

1. **Decreased infrastructure costs** - Banks do not have to build or maintain as many physical branches if more customers carry out banking via their mobile phone. For the financial institution, this means a reduction in overhead expenses. For the customer, this likely means savings that are passed on from the bank.
2. **Efficient utilization of experts and human capital** - Financial institutions can centralize their limited pool of banking and financial experts and use these experts to service customers no matter where customers are located. For the financial institution, this means maximum utilization of high-cost human capital. For the customer, this means more access (and often around-the-clock access) to banking and financial experts from the comfort of the customer's home.
3. **Document sharing and assistance with other digital banking services** - Mobile banking technology now enables mobile, document sharing and screen sharing of the customer's mobile device. This allows customers and bank representatives to conduct real-time, document review and real-time, personalized support with the financial institution's mobile app. For the financial institution and the customer, this means that more complicated, nuanced transactions that include side-by-side document review can now be done from anywhere the customer is located.
4. **Enhanced security over telephone banking** - Mobile phones now often include face-recognition technology, fingerprint scanners, and even iris scanners. This biometric data helps the bank ensure the "customer" is actually who they claim to be, and this biometric data provides more security and protection for customers than simple telephone banking passwords or requests for birth-date confirmations can provide. For both the financial institution and customer, this means fewer instances of compromised data and fraud.
5. **Increase in accessibility to underserved customer segments** - Mobile banking allows those with difficulty in accessing branch locations the ability to enjoy banking services. This includes individuals with physical-mobility limitations or people who live in rural locations, far from a physical branch. Additionally, mobile video-banking can provide individuals who need a sign-language interpreter with easier access to banking services.

Mobile Banking gives you the privilege of anytime and anywhere banking. One can do most of the banking transaction after banking hours from anywhere, irrespective of whether you are traveling in bus or auto. Mobile Banking is Free: The service provided by bank is free of charge, there is no limit for number of times you can access your account.

Various banking services provided include Account Balance Inquiry, Credit/Debit Alerts, Bill Payment Alerts, Transaction History, Fund Transfer Facilities, Minimum Balance Alerts etc. can be accessed from your mobile. You can transfer money instantly to another account in the same bank using mobile banking.

In terms of **disadvantages of mobile banking**:

1. Inability to deal with cash:- customers cannot withdrawals or cash deposits with a mobile phone. However, this disadvantage is mitigated by the fact that payments are shifting towards cashless, mobile-based payments or crypto currency- based transactions.
2. A previous "disadvantage" of mobile banking was that banking transactions lost the "human touch" when they took place over mobile applications, or, similarly, banking transactions that required human interactions (such as mortgage applications) could not be completed over mobile apps. However, these "disadvantages" of mobile banking are largely erased by the presence of face-to- face, mobile video- banking technology (Mehta, 2015).

To sum up, according to our countries banking industries context, the above stated disadvantages can be tackled by using other digital channels such as: ATMs, POS and CBE birr from agents for cash related problems and customers can visit branches physically for special cases like mortgage applications.

2.1.2 Mobile banking adoption

Mobile banking adoption can be examined using the Technology Adoption Life Cycle (TALC) which describes how new ideas and technologies speared in different cultures (Esther, 2013). The technology adoption life cycle is a sociological model that describes the adoption or acceptance of a new product or innovation, according to the demographic and psychological characteristics of defined adopter groups (Moore, 1999).

There are five different categories of adopters namely innovators, early adopters, early majority, late majority and laggards. Innovators are those people, who want to be the first to try the innovation, are interested in new ideas and are willing to take risks. Early adopters are people

who represent opinion leaders; they enjoy leadership roles, embrace change opportunities and do not need convincing for them to change. Early majority adopt new ideas before the average person but they typically need to see the innovation work before they are willing to adopt it. Late majority are people who are skeptical of change and will only adopt an innovation after it has been tried by the majority. Laggards are bound by traditional and are very conservative; hence they fear innovation (Moore, 1999).

2.1.3 Modes of operation by providers

Digitalization and branchless banking ideas are currently established since it reduces the cost of branch opening and related costs. Three models have been identified and developed, and they are primarily different from one another based on who established the relationship (Banks and the Non- Bank /Telecommunication Company) of account opening, deposit or withdrawer or borrowing, etc., with the customers. However, no matter what business model, if mobile banking is being used to attract low income populations in often rural locations, the business model will depend on the banking agent, that is the retail outlet that will process the financial transaction on behalf of the bank (Porteous, 2006).

Porteous (2006) has defined mobile banking using models which are categorized as Bank-focused (pure bank- driven), Joint-venture (bank-led), Non-Bank-led and Non-bank driven model.

1.The bank-focused model emerges when a traditional bank uses non-traditional low-cost delivery channels to provide banking services to its existing customers. Examples range from use of automatic teller machines (ATMs) to internet banking or mobile phone banking to provide certain limited banking services to the bank‘s customers. This model is additive in nature and may be seen as a modest extension of conventional branch-based banking.

2. In the Joint Venture model the customer conducts financial transactions through a mobile phone instead of at the bank‘s branches. This model promises the potential to substantially increase the financial services outreach by using a different delivery channel (retailers/ mobile phones), a different trade partner having experience and target market distinct from traditional banks, and may be significantly cheaper than the bank-based alternatives. The model may be implemented by using correspondent arrangements between

the bank and a non-bank agent. In this model customer account relationship rests with the bank.

3.The non-bank-led model is where a bank has a limited role in the day-to-day account management and sometimes may not even come into the picture, and the non-bank agent performs all the transactions. Typically the role of the bank in this model is limited to safe- keeping of surplus funds. Account management functions are conducted by a nonbank agent who has direct contact with individual customers

4. The Non-bank driven model is where the non-bank agent effectively becomes the depository entity through the issuance of e-money. Account ownership and transactions management is done purely by the telecommunication companies.

Table 2.1.3.1 summary mode of operation by providers

Model Name	**Bank-focused**	**Joint Venture (Bank-led)**	**Non-Bank led**	**Non-Bank driven**
Who holds the deposit	Bank	Bank	Bank	Non-bank
Whose brand is dominant	Bank	Joint- non bank Agent	Non-bank dominant	Non-bank
Where can cash be accessed	Bank	Bank	Bank and alternative agent network	Non-bank
Who carries the payment instructions	Any Non-bank Agent	Specific to one non-bank agent	May be one or any	Specific to offering Telco

Table taken from (Porteous, 2006)

2.1.4 Technologies employed to provide mobile banking services

Mobile banking services could be used through more than one channel such short messaging service/messaging and application download (client-based) and browser based (Tiwari, R and Buse, S. 2007) as cited in (Nebiyu, 2017).

1) SMS-Short Messaging Service

This is where the customers communicate with the bank through their mobile devices by sending an SMS (short messaging service) to the bank. The short messaging service (SMS) works in two ways, and it can be either a pull mode or a push mode. In the push mode, the mobile customer send a text message to the bank which contains a service command with a predefined request code to the bank's specific number. The bank also reply with SMS containing the specific information requested from the bank while the pull mode is when the banks sends a text message to the subscriber (customer) to inform the customer about certain transaction that have just taken place over the account. The message could be in the form of an MMS (multimedia message service) or SMS (short message service) they both work similarly even though the use of SMS is more popular. This is commonly used in Nigeria by mobile banking customers.

2) Client-Based

This method requires the customers to use software installation, and this will serve as a user interface that can allow customers to use the mobile device while offline to access some basic transactions before going online. Typing details before connecting to the internet could reduce cost. This client based application is particularly useful because it allows customers to stay offline and while preparing transaction such as entry of account de- tails and afterwards the transmission is made by sending out the data, this banking process conducted offline reduces online connection time and cost.

3) Browser-Based

Brower-based customer needs to be connected to the internet to use this service. The interface is generated from the server which is transported to mobile device, and this allows the content to be displayed through the browser. This method is extremely fast depending on the server that the customer is connected to but one its disadvantages is that, it requires the subscriber (customer) to stay online all through the transaction process and could lead to higher cost for the customers.

2.2 Technology Adoption Model and Theories

A number of theories have proposed to explain customers' acceptance of new technologies and their intention to use. These include, but were not restricted to, the Theory of Diffusion of Innovations (DIT) (Rogers,1995) that started in 1960, the Theory of Task-Technology Fit (TTF) (Goodhue, and Thompson, 1995), the Theory of Reasonable Action (TRA) (Fishbein & Ajzen, 1975), the Theory of Planned Behavior (TPB) (Ajzen,1985,1991), Decomposed Theory of Planned Behavior (Taylor & Todd,1995), the Technology Acceptance Model (TAM) (Davis, Bogozzi & Warshaw,1989), Final Version of Technology Acceptance Model (TAM) (Venkatesh & Davis ,1996), the Technology Acceptance Model 2 (TAM2)) (Venkatesh & Davis ,2000), Unified Theory of Acceptance & Use of Technology (UTAUT) (Venkatesh.Morris & Davis,2008) and Technology Acceptance Model 3 (TAM3) (Venkatesh & Bala,2008) (Gualberto, 2017).

2.2.1 Innovation diffusion theory

The theory explicates "the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 1995). He also defines the communication as a process where people create and share information among one another to reach on a mutual understanding. Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system (Rogers, 2002). The (Rogers, 1995) diffusion of innovation theory explained that the innovation and adoption happened after going through several stages including understanding, persuasion, decision, implementation, and confirmation that led the development of Rogers (1995) S-shaped adoption curve of innovators, early adopters, early majority, late majority and laggards

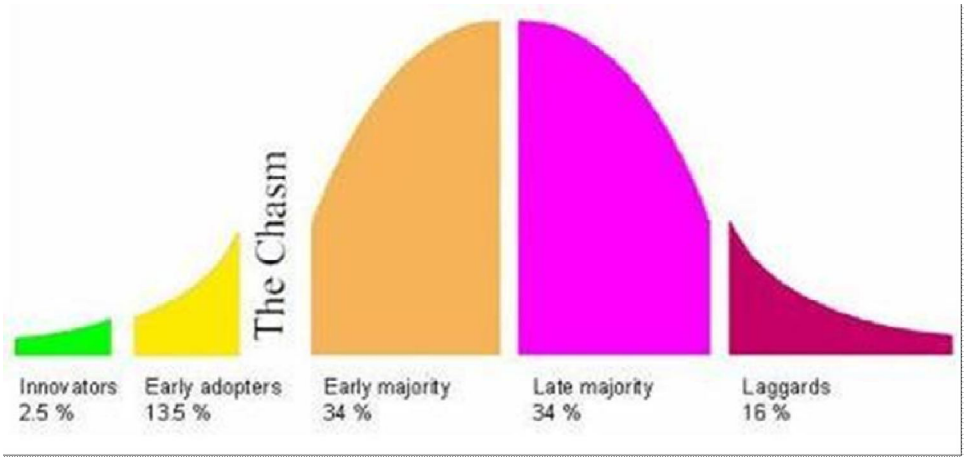


Figure 2.2.1.1 Innovation adoption curve (Rogers, 1995)

Some factors have been highlighted to be a determinant of adoption of an innovation and they are complexity, relative advantage and compatibility.

According to (Rogers, 2002) the characteristics of an innovation as perceived by social system which determines the rate of adoptions are Relative advantage, compatibility, complexity, trial ability and observability.

Relative advantage is the degree to which an innovation is perceived as better than an idea it supersedes (Rogers, 1995). The degree of relative advantage is often expressed as economic profitability, social prestige, or other benefits (Rogers, 1995)

Compatibility is the degree to which an innovation is being consistent with the existing values, past experiences and needs of potential adopters. An innovation can be compatible or incompatible with socio-cultural values and beliefs; with previously introduced ideas: or with client needs for innovation (Rogers, 1995). Innovations that are perceived as compatible with the members of a social system will be adopted more rapidly than other innovations (Rogers, 2002)

Complexity is the degree to which an innovation is perceived as difficult to understand and use. Consumers will reject an innovation if it is very complex and not user friendly (Rogers, 2002).

Trial ability is the degree to which an innovation may be experimented with on a limited basis (Rogers, 2002).

Observability is the degree to which the results of an innovation are visible to others (Rogers, 2002).

According to (Rogers, 2002) innovations that are perceived by individuals as having greater relative advantage, compatibility, trial ability, observability, and less complexity will be adopted more rapidly than other innovations.

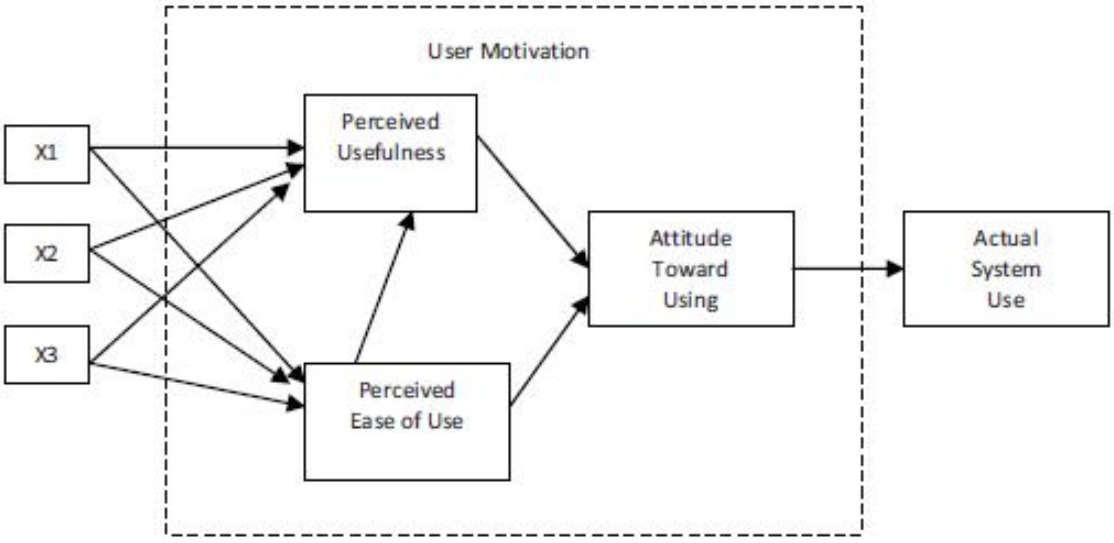
2.2.2 Technology Acceptance model (TAM)

TAM was developed by (F. Davis, 1986) to explain the computer-usage behavior. According to the model, in explaining the adoption of any information system, perceived ease of use (PEOU) and perceived usefulness (PU) are the two most important determinants.

Perceived usefulness: the degree to which an individual believes that using a particular system could enhance her or his job performance (F. Davis, 1986).

Perceived ease of use: the degree to which an individual believes that using a particular system could be free of mental and physical effort (F. Davis, 1986). The degree to which an individual believes that using information technology system would be free of effort. Perceived ease of use will lead to attitude toward use, behavioral intention to use and actual use.

Figure 2.2.2.1 Original Technology Acceptance Model (Davis, 1986).



Original Technology Acceptance Model (F. Davis, 1986).

As noted by (F. D. Davis, 1989), future research of Information system (System consisting of the network of all communication channels used within an organization) usage has to address the other variables which affect usefulness, ease of use and user acceptance: because these two determinants may not fully explain the factors which predict the acceptance of a technology application such as mobile banking.

According to (Venkatesh & Davis, 2000) proposed the TAM2 which provided more detail explanations for the reasons users found a given system useful at three (3) points in time: pre-implementation, one month post-implementation and three month post- implementation. TAM2 theorizes that users' mental assessment of the match between important goals at work, and the outcomes of performing job using the system serves as a basis for forming perceptions regarding the usefulness of the system (Venkatesh & Davis, 2000). The results showed that TAM 2 performed well in both voluntary and mandatory environment.

Venkatesh and Bala (2008) combined TAM2 of (Venkatesh & Davis, 2000) and the model of the determinants of perceived ease of use (Venkatesh, 2000), and developed the model of technology acceptance known as TAM3 (Gualberto, 2017). Venkatesh and Bala (2008) developed the TAM3 using the four different types including the individual differences, system characteristics, social influence, and facilitating conditions which are determinants of perceived usefulness and perceived ease of use (Gualberto, 2017). In this research model, the perceived ease of use to perceived usefulness, computer anxiety to perceived ease of use and perceived ease of use to behavioral intention were moderated by experiences. The TAM3 research model was tested in real world settings of IT implementations

Luarn and Lin (2005) cited in (Jeong & Yoon, 2013), extended TAM includes additional constructs as TAM'S fundamental constructs don't address certain technological and usage content factors that may also alter the decision making behavior of an individual. The factors included in extended TAM are perceived usefulness, perceived ease of use, perceived credibility, perceived self efficacy, and perceived financial cost.

Perceived credibility

Perceived credibility is defined as the extent to which a person believes that using mobile banking will be free of security and privacy concerns. Luarn and Lin (2005) cited in (Jeong & Yoon, 2013), consumers are concerned with risks such as faulty transactions or stolen username and password. And the increased awareness about hackers is another concern. With such high level of ambiguity over the authenticity of information, perception of a secure environment that people have the in the ability of mobile banking to process their transactions securely and to protect the privacy of their personal information is likely to positively affect user's behavioral intention to adopt mobile banking.

Perceived Self efficacy is defined as the judgment of one's ability, knowledge, or skills to use mobile banking services. According to Compeau and Higgins (1995) social cognitive theory proposes that self efficacy is the belief that one has the ability to perform a specific behavior (Jeong & Yoon, 2013). (Luarn and lin, 2005) cited in (Jeong & Yoon, 2013), support that self efficacy has the positive influence on perceived ease of use and intention to use mobile services.

Perceived financial cost is defined as the extent to which a person believes that he/she has financial resources needed to use mobile banking. According to Luarn and lin (2005) cited in (Jeong & Yoon, 2013) these costs could typically include the cost of the mobile devise, network charges, and transaction charges for bank costs as well as costs for data sent via the network infrastructure. Financial considerations may influence consumer's behavioral intentions (Jeong & Yoon, 2013). An individual with high income may have higher intention than an individual with lower income to use mobile banking.

(Featherman & Featherman, 2001) extended Technology Acceptance Model by inclusion of perceived risk to test web services adoption of customers.

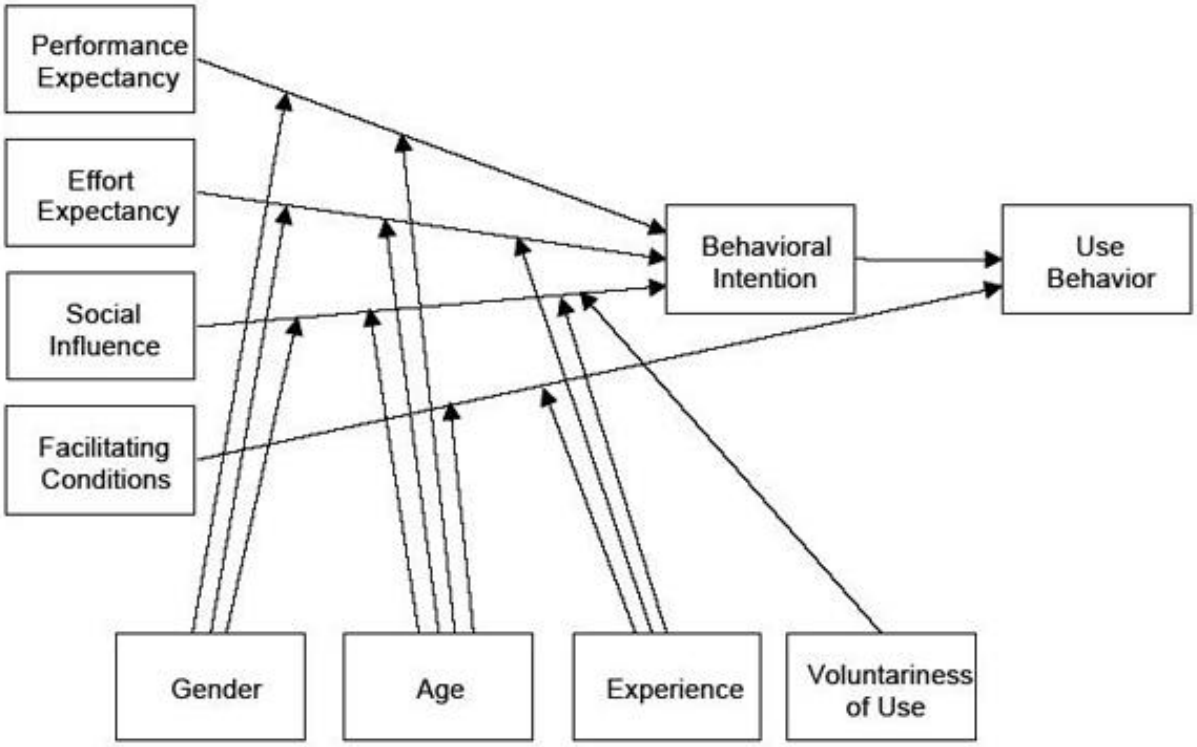
Perceived risk: is viewed as a hesitation regarding the result (good or bad) regarding using a product or service. According to Bauer (1960) Perceived risk is defined as a combination of uncertainty plus seriousness of outcome involved and the expectation of losses associated with purchase acts as an inhibitor to purchase behavior (Collins, n.d.)

2.2.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) was developed through consolidation of eight models that previous research had employed to explain IS usage behavior. To develop the theory, (Venkatesh, et al, 2003) firstly reviewed user acceptance literature. This review included the previously discussed theories, TRA, and TAM as well as the motivational model, theory of planned behavior (TPB).

This analysis illustrated that seven constructs appeared to be significant direct determinants of intention or usage (performance expectancy, effort expectancy, and social influence, facilitating conditions, attitude toward using technology, self-efficacy, and anxiety). Of these, (Venkatesh, et al, 2003) found that the first four constructs played a significant role as direct determinants of user acceptance and usage behavior. Afterwards, a unified model UTAUT was formulated by integrating different elements across the eight models. Using the original data from the aforementioned theories, the UTAUT model outperformed the eight individual models. A subsequent empirical validation using data gathered from two additional organizations confirmed the theory (Venkatesh, et al, 2003).

Figure 2.2.5.1 Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis and Davis, 2003).



Unified Theory of Acceptance and Use of Technology (UTAUT) (Viswanath Venkatesh, Michael G. Morris, Gordon B. Davis, 2003).

2.3 Theoretical Framework for the Study

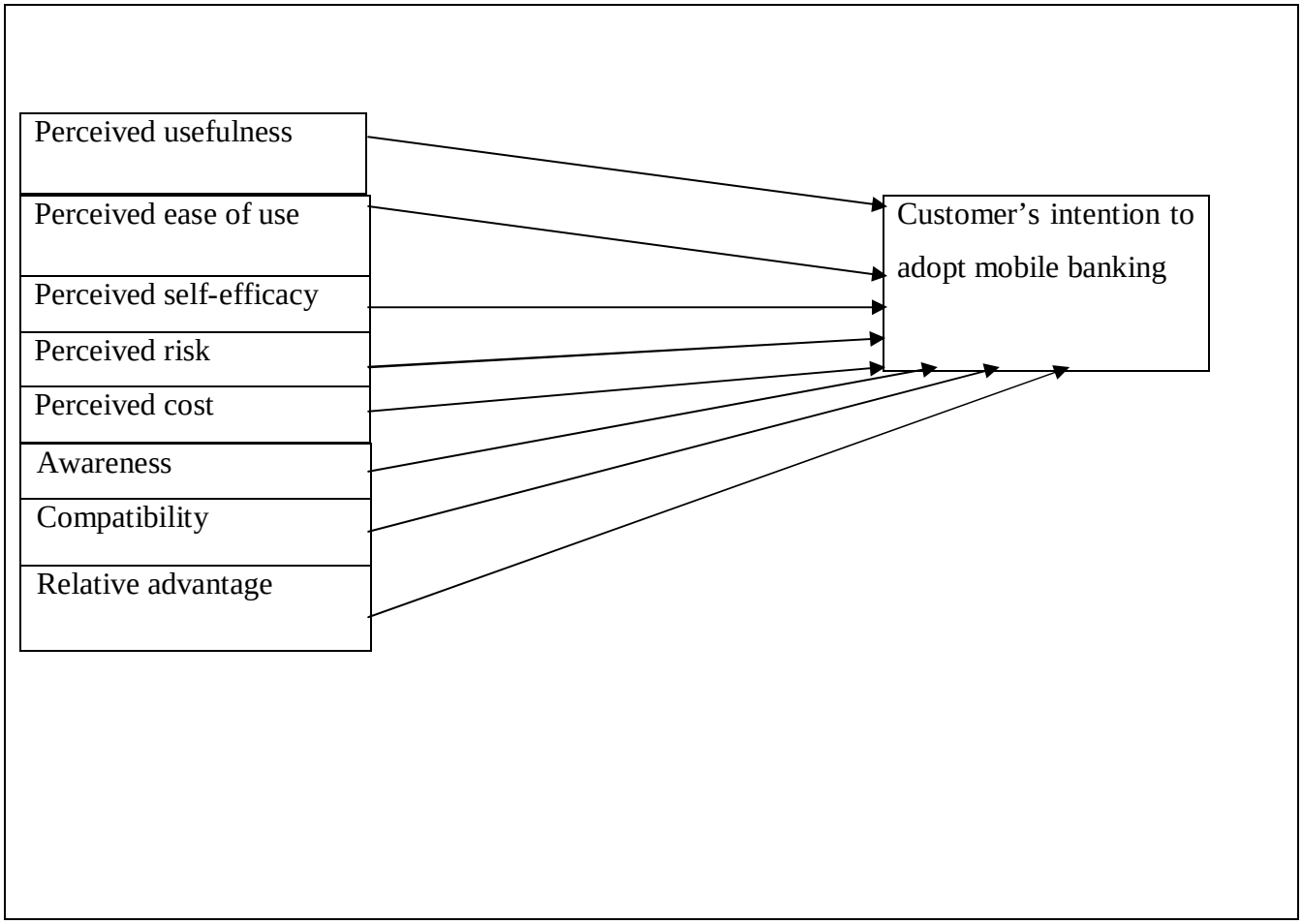
The theoretical framework was developed by depending on the research problems and objectives, gap analysis and understanding of technology adoption models and theories based on available materials. With regards to existing theories and ideas on the literature examined, it is evidence that there are certain factors responsible for the adoption of mobile banking by combining different models at the same time.

The Technology Accepting Model does not cover all aspects that could affect individual behavioral intention and the actual behavior in IS adoption. (F. D. Davis, 1989) suggest that the beliefs of an individual may be influenced by other external factors which recommend adding other variables to the main construct of TAM in the original model. Some authors combined different methods and external conceptual variables in order to better examine the adoption of innovations, such as (Viswanath Venkatesh, Michael G. Morris, Gordon B. Davis, 2003). To understand mobile banking acceptance in Yemen the integration of Technology acceptance

model (TAM) of Davis and Diffusion theory of Rogers has been used (Mutahar, Norzaidi, Ramayah, & Isaac, 2017) .

Thus, to investigate factors influencing mobile banking adoption in Commercial Bank of Ethiopia: the integration of extended Technology acceptance model (TAM) of Luarn and Lin (2005) and Diffusion theory of Rogers with awareness about the technology could be used to build theoretical framework of the study. Therefore, factors such as awareness, perceived usefulness, perceived ease of use, perceived self- efficacy, perceived risk, perceived cost, Compatibility and relative advantage.

Figure 2.3.1 Model Developed by self based on previous study



Model Developed by self based on *extended* TAM model (Luarn and Lin,2005) and DIT model (Rogers, 2013) cited in (Salloum, Al-emran, Khalaf, Habes, & Shaalan, 2019).

2.4 Empirical studies

Many studies have been done to access the relationship between mobile banking adoption, and its determinants in developed, and developing countries. Even if impossible to present hear all research done on this topic, some of the researches done on worldwide on mobile banking presented below.

Salloum et al. (2019) Attempts to investigate the factors affecting e-payment system adoption in six different universities in the United Arab Emirates (UAE) by integrating five different factors, namely perceived benefit, perceived security/privacy, perceived risk, and trust and performance expectancy. A total number of 289 students involved in the study. The partial least squares-structural equation modeling (PLS-SEM) approach was used. The empirical results showed that perceived benefit and performance expectancy have a significant have a significant positive relationship with the students' intention to use e-payment systems, on other hand perceived security/privacy and perceived risk have a significant negative relationship. However, Trust has insignificant relationship with the students' intention to use the e-payment systems.

Mutahar et al.(2017) combined Technology Acceptance Model (TAM) and Innovation Diffusion Theory (IDT) to test the external critical success factors that impact the intention to use mobile banking in Yemen. The study was done through a survey of 482 Yemeni individuals who are non-users of mobile banking. Structural Equation Modeling (SEM) via AMOS was used to determine the relative importance of associations and interactions between the factors tested. The result of the study revealed that trial ability and compatibility have a significant positive effect on perceived usefulness (PU) and perceived ease of use (PEOU). Perceived usefulness (PU) and perceived ease of use (PEOU) have a positive influence on the behavioral intention to use mobile banking service in Yemen.

Kabeer & Adeel (2013) investigated the determinants likely to influence the adoption of mobile banking service, with a special focus on under banked/unbanked low-income population of Pakistan. For this purpose, Technology Acceptance Model (TAM) was used, with additional determinants of perceived risk and social influence. Data was collected by surveying 372 respondents from the two largest cities (Karachi and Hyderabad) of the province of Sindh, in Pakistan using judgment sampling method. This study empirically concluded that consumers'

intention to adopt mobile banking services was significantly influenced by social influence, perceived risk, perceived usefulness, and perceived ease of use.

Esther (2013) mobile banking adoption in the Banking Industry in Kenya, random sampling technique was used to a sample of five hundred (500) from the top five commercial banks in Kenya. Data analysis was done using descriptive statistics. Based on this research among the factors identified as influence or affecting mobile banking, convenience was rated 70% of the respondents rating it as very important, followed by knowledge of the services and handset operability.

Lema (2017) investigated factors influencing the adoption of mobile financial services in the unbanked population of Tanzania in the Chamwino district. The study employed cross- sectional design by collecting data at a single point in time. Six variables from extended Technology Acceptance Model (TAM) such as: Perceived usefulness, perceived ease of use, perceived cost, perceived risk and social influence. The study collected samples from 250 respondents. The study revealed that perceived usefulness, perceived cost and social influence had a significant influence on the adoption mobile financial services. Perceived ease of use, perceived risk and perceived trust were found to have insignificant influence on the adoption of mobile financial services. The study recommends a longitudinal research to be conducted in order to understand the influence of the adoption behavior at different level of market maturity and points of time

In Ethiopia also a number of studies were done on mobile banking adoption and some of them presented. Kalkidan (2016), examined a research on factors influencing the usage of mobile banking in Ethiopia. The study used by combining Technology Acceptance Model (TAM) with Innovation Diffusion Theory (IDT) and integrate with perceived risk, trust and awareness into the established models. The data for this study was collected from customers of Commercial Bank of Ethiopia and United Bank in Addis Ababa, Ethiopia by conducting Survey using questionnaire. The research results revealed that relative advantage, compatibility, perceived trust, perceived usefulness, and perceived risk as major influencing factors for mobile banking adoption, whereas perceived ease of use and awareness were found to have insignificant effect on mobile banking usage for bank customers located in Addis Ababa, Ethiopia. The study recommended banks to consider investing in campaigns and arranging information sessions to demonstrate the features of mobile banking services, and its benefits over traditional channels.

Hayat (2017), mobile banking adoption in Ethiopia, A case study of commercial bank of Ethiopia, Quantitative research design is used for this study, and the researcher selected four hundred (400) customers randomly. Data analysis was done using the statistical package for social sciences (SPSSV23). The study combined two widely used models for technology adoption, the extended TAM model along with Relative Advantage to investigate factors influencing mobile banking adoption in commercial bank of Ethiopia. The research results found perceived usefulness, perceived ease of use, perceived self-efficacy, relative advantage, and perceived risk as a major influencing factors for mobile banking adoption whereas the study found perceived credibility and perceived cost were found to have insignificant effect on mobile banking usage for bank customers located in Ethiopia. Banking sectors should continue to innovate and invest in mobile banking services which allow users to have more alternatives and get more values from mobile banking services; the bank should focus on non-mobile banking users and should have strong security power.

Nebiyu (2017) examined factors influenced mobile banking adoption in Ethiopia with specific study on Commercial Bank of Ethiopia customers' in Addis Ababa. The study was used five variables such as, perceived usefulness, perceived ease of use, perceived trust, perceived risk and awareness in determining their effect on intention to adopt mobile banking. A cross- sectional survey was employed, from which conventional sample of 384 customers were selected. Data was analyzed using SPSS regression analysis. The result of the study showed that perceived ease of use, awareness and trust had a positive impact on mobile banking adoption, whereas perceived risk had a negative impact. However, perceived usefulness had no effect on the intention to adopt mobile banking. The study recommends the following points since it have multiplied effect on mobile banking adoption improving customer awareness is crucial one, in addition security aspects for safe transaction and making the technology user friendly will help in defusing mobile banking adoption with short period of time.

Bekema (2019), examines determinants of mobile banking and agent banking services adoption: evidence from selected Commercial Banks of Ethiopia. The study used mixed research approach which means both qualitative and quantitative research methods. The descriptive study was conducted based on the data collected from four Banks in Ethiopia namely Cooperative Bank of Oromia, Wagagen Bank, Abay Bank and Loin International Bank of Ethiopia. The data was

analyzed using explanatory statistics and regression analysis. A research framework was developed by combining Technology-Organization-Environment (TOE) and Technology Acceptance Model (TAM). The result of the study revealed that perceived ease of use and perceived usefulness were major driving factors in adoption of agency banking among Commercial Banks in Ethiopia. Lack of legal framework, lack of competition among Banks', lack of sufficient government support, under developed ICT infrastructure including poor network connectivity and perceived risk were the barriers in the adoption of mobile banking. This study recommends that, the banks should consider technology based competition focusing on customer base expansion, Awareness creation, ease of use, security and availability to exploit the benefit of agency banking, and government should support banking sector by facilitating sufficient ICT infrastructure development and issue workable legal framework to ease the adoption of agency banking system.

Firdisa (2019) investigates determinants of mobile banking adoption at Commercial Bank of Ethiopia with specific case of Bako District. To analysis the determinants of mobile banking adoption in Bako Tibe, open and semi-structured questionnaires were used. The result of the study indicated that quality of internet, lack of awareness, relative advantage, awareness, trial ability, experience, gender, education, income, and age were the factors that significantly influenced customers' mobile banking adoption decisions at Commercial Bank of Ethiopia. This study recommends that since mobile banking is a recent phenomenon in Ethiopian banking industry; National bank should issue suitable legal framework to ease the adoption of mobile banking system on other hand government and private sectors should support banking sector by facilitating development of sufficient ICT infrastructure for the successful implementation of mobile banking adoption system.

2.5 Conclusion and research gap

According to GSMA (Money, 2017) Mobile money has been around in 2001, when the first service launched in the Philippines and 2007 was a watershed moment for the industry, with the launch of M-Pesa in Kenya which is the lightning pace of customer adoption demonstrated the power of mobile money to reach the underserved. In addition, by the end of 2013, the bright lights of the mobile money industry had expanded beyond East Africa including Asia, Latin America and the Caribbean, West Africa, and the Middle East and North Africa region. By the

year 2016, there were 277 million registered accounts in Sub- Saharan Africa of which more than 100 million were active users. Since Ethiopia is found in sub Saharan Africa it's share is very low when compare with others specially Kenya brought remarkable change on this aspect. According to CBE December, 31 2019 report Commercial bank of Ethiopia has 23.5 million account holders and 3.8 million mobile banking users which is 16.2%. Thus, this service must be expanded to banked and unbanked society since its operational cost is very low than branch opening.

To have deep insight about determinants of mobile banking different articles, books which is related with subject, and empirical studies were assessed. In Ethiopia, different studies have been made by different individuals but still the adoption rate is very low and people carry physical cash which expose them for different risk. In this research, variables from extended technology acceptance model (TAM) and innovation diffusion theory with perceived awareness about mobile banking were used by focusing on users and non users of mobile banking since most of the studies done in our country focus on mobile banking users only.

CHAPTER THREE

3. RESEARCH METHODOLOGY

This chapter provides the methods and procedures used in conducting the study. This part deals with the research approach used, research objectives and developments of hypothesis, the research design of the study, population of the study, the sample and sample design adopted, data collection methods and techniques employed in the collected data analysis (which is demonstrated in two parts, descriptive methods and econometric models).

3.1 Research design

The research design refers to the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring you will effectively address the research problem; it constitutes the blueprint for the collection, measurement, and analysis of data (Kirshenblatt-Gimblett, 2006).

Quantitative research adopts deductive approach because hypothesis is developed from an already existing theory. Quantitative research is observing through the eyes of researcher using closed research question. The essence of quantitative research is to use a theory to frame and thus understand the problem at hand (Jonker & Pennink, 2010). Theory is translated into conceptual model and elaborated predominantly by means of hypothesis. The researcher operationalizes a theory and measuring it by means of variables and questions.

In my research quantitative research method is used. Survey will be collected from customers of Commercial Bank of Ethiopia to assess the perceived determinants of mobile banking adoption based on factors which are found to be significantly influence adoption of mobile banking in prior studies. Thus, Quantitative research approach is best for this study to achieve the objectives of the study and to test the hypothesis. In quantitative research design, the researcher explores relationships using numerical data, results can be generalized and also a basic strategy of social research that usually involves analysis of patterns co variation across a large number of cases (Jonker & Pennink, 2010).

3.2 Source of data

This study used both secondary and primary data sources. Primary data and secondary data both have their advantages and disadvantages. Therefore, when carrying out research, it is left for the researcher to weigh these factors and choose the better one (Formplus Blog, 2020). Primary data is the kind of data collected directly from the source without going through any existing sources. On other hand, secondary data is data that has been collected on the past by someone else but made available for use (Formplus Blog, 2020).

A primary data was collected by structured closed ended questionnaire from customers of Commercial Bank of Ethiopia, while secondary data are obtained from literatures, online sources and annual reports of NBE and CBE.

The researcher used standard questionnaire developed by previous researchers with a little amendment to relate with the banks culture. The questionnaire contains closed-ended questions. The closed-ended questionnaires aimed to ensure standardization and uniformity of the respondents answers. The questionnaire was first prepared in English language and then translated into Amharic by the researcher.

3.3 Target Population

Target population refers to all members who meet the particular criterion specified for the research investigation (Personal & Archive, 2016).The population of the study is account holders of CBE under Addis Ababa district; they can be mobile banking user or non-user. Hence, the total population of the study is estimated to be 6,010,003.

3.4 Sampling Procedure and Sample size

According to (Personal & Archive, 2016) defined sample as a group of relatively smaller number of people selected from the a population for investigation purpose. Under Ababa four districts (south, north, east and west) were found which accounted 26% to total account holders of Commercial Bank of Ethiopia. Thus, samples were randomly selected from various branches under Addis Ababa districts. Respondents were mobile banking user and non-user, as the same time they can be from any one of CBE's branches who are served under selected branches at the time of taking this survey.

Table 3.4.1 Total number of population and mobile subscribers in each region

Sr,no		Total number of Account holders in each region	Total number of Subscribers in December,2019
1	Addis Ababa	6,010,003	1,129,865
2	Afar	204,099	22,534
3	Amhara	4,522,035	613,608
4	Benshagul Gumuz	238,349	35,482
5	Dire Dawa	302,482	47,572
6	Gambella	131,659	15,451
7	Harari	159,509	24,436
8	Oromia	6,731,392	1,147,445
9	SNNP	3,297,885	513,968
10	Somali	318,577	66,045
11	Tigray	1,629,040	233,109
	Total	23,545,030	3,849,335

Source: CBE MIS (December 31, 2019)

A sample will drawn from branches under four Addis Ababa Districts randomly, in such away the total sample from the population equals 400, accordingly to Yamane's (1967) formula given by

$n = \frac{N}{1+Ne^2}$ (*When do you use Yamane formula to determine sample size_ - Quora*, n.d.).

Total number of account holders in Addis Ababa =6,010,003

n =6,010,003/1 + 6,010,003 (0.05)2

n =6,010,003/15,025.0075 =400.00

n = 400

3.5 Reliability and Validity

Reliability refers to how consistently a method measures something. It the same result can be consistently achieved by using the same method under the same circumstance, the measure is considered as reliable (Fiona, 2020). Validity refers how accurately a method measures what it is intended to measure. High reliability is one indicator that a measurement is valid.

Even if designing perfect questionnaire is impossible, researchers can create effective surveys by pretesting it before conducting actual survey. Pretesting helps in determining the strength and weakness of survey concerning question format, wording, order and specifically to test for question variation, meaning, task difficulty and respondents interest and attention (*Pretesting the Questionnaire*, n.d.). To check reliability of items 20 questionnaires were distributed for respondents. Then, the collected data were tested using cronbach's alpha which is 0.879 as shown below. As a rule of thumb a reliability coefficient of 0.70 or above is considered acceptable in most social science research situations (UCLA, 2020).

pretest Reliability of Questionnaires

Cronbach's Alpha	N of Items
.879	47

3.6 Method of Data Analysis

The study analyzed the data collected through questionnaires concerning determinants of mobile banking adoption in Ethiopia. For the purpose of analysis, this study will use both descriptive and econometric model. Data will be entered into the computer system by using a tool **SPSS** for statistical analyses and generating the actual results. In model specification logistic regression analysis will be carried out to determine the extent to which independent variables influence the dependent variable..

3.7 Definition of variables and measurement of variables

Dependent Variable: Mobile banking adoption

Mobile banking adoption has binary response that is 1 if the customer adopts mobile banking and 0 for those who did not adopt mobile banking service yet.

In this study the predictor variables are users' income influence, security concern, banks advertisements, attitude towards technological change, and active mobile user, each item has the value of 1 if the customers answer is yes and 0 if the customers answer is no. The researcher used standard questionnaire developed by previous researchers such as (Cudjoe et al., 2015), (Esther, 2013) and (Lin, 2011) with a little amendment to relate with the banks culture. The questionnaire contains closed-ended questions.

Independent Variables

In this study, except demographic questions, additional questions in the survey related to mobile banking and , all variables are measured through five- point Likert type scale (strongly disagree, disagree, neutral, agree, strongly agree). Therefore, respondents are asked to rate their level of agreement.

Under each variables at minimum three items are used. Cook et.al (1981) cited in (Hinkin, 1995) recommends that for statistical approach minimum as few as three items per constructs (variables) should be used.

Awareness:, in mobile banking sector, awareness was defined by Alsaab (2009) cited in (Alkhaldi, 2018) as "knowledge of the existence of mobile banking and its benefits. In other words, awareness reflects the extent to which users have information and knowledge about mobile banking. Having awareness about mobile banking services will contribute to their decision to use mobile banking (Cudjoe et al., 2015).For this variable three items such as:

1. I know about mobile banking service, take its advantage in saving time and cost.
2. I have received enough information how to use mobile banking services from the bank.
3. My cell phone support mobile banking service.
4. I have received information about security system of mobile banking services from the bank.
5. In general, I have received enough information about mobile banking services.

   The above 5 items are measured by the level of agreement from 1 to 5 (strongly disagree to strongly Agree).

Perceived usefulness: is the degree to which a person believes that using a particular system would enhance his/her job performance (F. Davis, 1986). For this construct or variable three items are used.

1. I find mobile banking is useful in conducting my banking activities.
2. Mobile banking enables to complete banking activities conveniently which reduces number of customers come to the banking hall.
3. No time limit to access bank account and information

The above items are measured by the level of agreement from 1 to 5 (strongly disagree to strongly Agree).

Perceived ease of use: refers the degree to which a person that using a particular system would be free from effort (F. Davis, 1986). In this study the following four items are used for this variable.

1. Learning to use mobile banking is easy for me.
2. Our bank provides guidelines on the use of mobile banking facility.
3. Mobile banking requires a simple registration process.
4. Using mobile banking makes it easier for me to conduct my own banking transactions.

The above four listed items are measured by the level of agreement from 1 to 5 (strongly disagree to strongly agree).

Self efficacy is defined as the judgment of one's ability, knowledge, or skills to use mobile banking services. According to Compeau and Higgins (1995) cited in (Jeong & Yoon, 2013) social cognitive theory proposes that self efficacy is the belief that one has the ability to perform a specific behavior.

1. I do not need anyone to teach me how to use mobile banking because I can learn it by myself.
2. I use mobile banking because it has built- in help facility for assistance.
3. I use mobile banking because I have seen someone has shown else using it.
4. I use mobile banking because someone has shown how to do it.

The items are measured by the level of agreement from 1 to 5 (strongly disagree to strongly agree).

Perceived risk: is viewed as a hesitation regarding the result (good or bad) regarding using a product or service. According to Bauer (1960) cited in (Collins, n.d.), perceived risk is defined as a combination of uncertainty plus seriousness of outcome involved and the expectation of losses associated with purchase acts as an inhibitor to purchase behavior.

Under this variable three items are used as follows:

1. I do not trust the technology provided by the banks.
2. Mobile banking is unreliable because I afraid that my personal or transaction detail would be leaked during message passing.
3. If I lose mobile phone as a mobile banking user, in the meantime, I will lose my money as well.

And measured by the level of agreement from 1 to 5 (strongly disagree to strongly agree).

Perceived financial cost is defined as the extent to which a person believes that he/she has financial resources needed to use mobile banking. According to Luarn and lin (2005) cited in (Jeong & Yoon, 2013) these costs could typically include the cost of the mobile devise, network charges, and transaction charges for bank costs as well as costs for data sent via the network infrastructure. Financial considerations may influence consumer's behavioral intentions (Jeong & Yoon, 2013). For this construct items such as:

1. It costs a lot to use mobile banking.
2. Using mobile banking increases my banking costs.
3. There are financial barriers (cost of mobile phone)

   The above three listed items are measured by the level of agreement from 1 to 5 (strongly disagree to strongly agree).

Compatibility: is the degree to which an innovation is being consistent with the existing values, past experiences and needs of potential adopters. An innovation can be compatible or incompatible with socio-cultural values and beliefs; with previously introduced ideas: or with client needs for innovation (Rogers, 1995). Under compatibility the following four items are used and measured by the level of agreement from 1 to 5 (strongly disagree to strongly agree).

1. Using mobile banking fits well with the way I like to control and manage my banking transactions.
2. I use mobile banking because I am doing everything with my cell phone.

3. I am satisfied with current mobile banking service at this stage is because it is already the part of my daily life.
4. I know that my banking details are safe if my phone is stolen.

Relative advantage: is the degree to which an innovation is perceived as being better than its precursor (Rogers, 1995). Under this variable three items are used as follows:

1. Mobile banking is more accessible than other banking services (i.e. Internet banking, visiting the bank, ATM service)
2. Mobile banking is more convenient than other banking options
3. Mobile banking is time saving than other banking services (i.e . Internet banking, visiting the bank, ATM service).

The above three listed items are measured by the level of agreement from 1 to 5 (strongly disagree to strongly agree).

3.8.Model Specification

Mobile banking adoption has been specified using the logit model. As this model is relevant, when the outcome of the dependent variable is dichotomous (Gujarati 2004), which is realistic in this study, the dependent variable, mobile banking adoption (treatment status of individuals) has taken a value 1 if the i^{th} individual is mobile banking user and 0, otherwise.

Linear probability models and OLS (ordinary list squares) are not best to compute qualitative response. The linear probability model causes many problems, such as non-normality of ui, heteroscedasticity of ui, possibility of $\hat{y}$ lying outside the 0-1 range and generally lower R2 values (Gujarati, 2004). Therefore, it is preferable to use either logit or probit model. The researcher chooses logit regression model which is stated as follows:

Logit (P(MBA)=1) =f (A,PU,PEU,PSE,PR,PC,C,RA,e)

MBA= Dependent variable which stand for Mobile banking adopt or not adopt

A= Awareness

PU=Perceived usefulness

PEU= Perceived ease of use

PSE=Perceived self-efficacy

PR=Perceived risk

PC=Perceived cost

C=Compatibility

RA=relative advantage

E=error term

To sum up, this chapter deals with the main determinants of mobile banking adoption, the research approach used, developing hypothesis, type of data and techniques used to collect data, Sampling and sampling size, methods of data analysis, selection of variables, the expected relationships between dependent variables and independent variables.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

In this chapter, data collected using survey method is analyzed. Descriptive statistical analysis is used to explain the demographic profile of the respondents, questions related to mobile banking and mobile banking services. The basic eight variables selected as determinants of mobile banking adoption, analyses were performed by using statistical software package SPSS 20. The hypothesis is tested at 95% confidence interval and the statistical outcome is discussed.

A total of 400 questionnaires were distributed to be filled by the respondents, and 387 of them responded but 13 responses were discarded due to incomplete information. Therefore, 374 responses were valid and were used for analysis with 93.5 response rate.

4.1Demographic Characteristics

In this section the findings on the demographic characteristics of the sample such as: Gender, age, marital status, educational level, occupational status, monthly income, and in addition factors influenced the respondents to sign for mobile banking service.

Table 4.1.1 Demographic characteristics of the samples

variables	classifications of variables	Frequency	Percent
Gender	Male	232	62.0
	Female	142	38.0
	Total	374	100.0
Age	18-25	60	16.0
	26-35	216	57.8
	36-45	63	16.8
	46-55	29	7.8
	Greater than 55	6	1.6
	Total	374	100.0
Marital Status	single	180	48.1

	married	194	51.9
	Total	374	100.0
Educational level	primary school	14	3.7
	high school completed	33	8.8
	diploma completed	42	11.2
	degree completed	213	57.0
	masters and above	72	19.3
	Total	374	100.0
Occupational Status	student	18	4.8
	employed	224	59.9
	self employed	105	28.1
	unemployed	10	2.7
	other	17	4.5
	Total	374	100.0
monthly income	0-1650	10	2.7
	1651-3200	54	14.4
	3201-5250	43	11.5
	5251-7800	93	24.9
	7801-10900	55	14.7
	greater than 10900	119	31.8
	Total	374	100.0
what influenced to sign up for	advertisement	132	35.3
	banks employee	125	33.4

mobile banking	family/ friend	79	21.1
	bank policy	18	4.8
	other	20	5.3
	Total	374	100.0

Source: My own computation from survey result on SPSS.

As we can understand from the above table 38 of the respondents were females while 62% of them were males. The result shows that the majority of the respondents were males.

The next variable was the age of respondents which varies from eighteen years to more than fifty five years. Out of 374 respondents, 57.8% (216) were between twenty six and thirty five years (26-35), 16.8 %(63) were between thirty six and forty five (36-45), 16%(60) were between eighteen and twenty five years (18-25), 7.8%(29) were between forty six and fifty five years (46-55), and 1.6%(6) were above 55 years. Accordingly, the highest percentages of respondents were between adults' age between twenty six and thirty five years.

Regarding marital status, 51.9% (194) of respondents were married and 48.1% (180) were single.

The other variable from the above table was educational level, and the majority of the respondents were first degree holders 57% (213) followed by masters and above 19.3% (72).

According to their monthly income the highest percentage of respondents 31.8% (119) were paid monthly above followed by monthly salary between 5251-7800 which was 24.9% (93).

Finally respondents were influenced to sign up for mobile banking services advertisements 35.3% (132) and next by bank's employees 33.4% (125).

4.2Usage of mobile banking services

This sections outlines services options provided by mobile banking to customers of Commercial Bank of Ethiopia rated to know which option is frequently used, and in addition to asses which customers need were meet or not. To measure how frequently they have used the under listed options, a numerical scale of 1.-5 raging from never to always is used.

Table 4.2.1 usage of mobile banking services

	N	Minimum	Maximum	Mean
Balance_inquiry	374	1.00	5.00	2.8529
account_transfer	374	1.00	5.00	2.0348
payment_beneficiary	374	1.00	5.00	1.9064
payment_others	374	1.00	5.00	2.3235
local_transfer	374	1.00	5.00	1.4706
Valid N (listwise)	374			

Source: My own computation from survey result on SPPS

As we understood from the above table, the means of customers' responses on the provided option lies between 1.4706 and 2.8529. The highest mean 2.8529 indicates most of the respondents used for balance inquiry followed by, payment to others with a mean of 2.3235, transfer between your accounts with a mean of 2.0348, payment to beneficiary with a mean of 1.9064 ,and local money transfer with a mean of 1.4706.

Thus, CBE wants to play its part in creating cashless society in the country which means all transaction are done using debit cards or credit cards, or electronic payments like mobile banking. This reduce the number of customers comes in banks hall, saves customers time and cost, and also assists the bank to use the scarce resource on another best alternatives. But as we can understood from the above table most of the respondents used mobile banking services for balance inquiry. Therefore, the banks management and staff must focus on awareness creation regarding the services offer in detail.

4.3 Factors that affect mobile banking adoption

Table 4.3.1 Summary of factors affecting Mobile banking adoption

variables	classifications of variables	Frequency	Percent
Do you use mobile banking services?	Yes	281	75.1
	No	93	24.9
	Total	374	100.0
Are you active mobile banking user?	yes	199	53.2
	no	175	46.8
	Total	374	100.0
Does your income influence your use of mobile banking user?	yes	130	34.8
	no	244	65.2
	Total	374	100.0
Are there any security concerns that have been raised concerning your bank's Mobile banking services?	yes	189	50.5
	no	185	49.5
	Total	374	100.0
Do you find your bank's advertisements on mobile banking appealing or interesting enough to encourage customers to sign up?	yes	226	60.4
	no	148	39.6
	Total	374	100.0
Does your attitude towards change (how you perceive change) affect your use or uptake of mobile banking?	yes	188	50.3
	no	186	49.7
	Total	374	100.0

Source: My own computation from survey result on SPPS

According to the table 75.1% (281) of the respondents were mobile banking service user and 24.9% (93) were non user. Out of mobile banking user 53.2% (199) were actively access mobile

banking. Majority of the respondents 65.2 (244) were thought that their income didn't influence their mobile banking usage. On other hand, 50.5 (189) respondents were have security concern in using mobile banking, 60.4 (226) had found bank's advertisement were interesting to sign up, and 50.3 (188) of the respondents thought that attitude affect to use mobile banking services.

4.4. Reliability and Validity

Reliability refers to how consistently a method measures something. If the same result can be consistently achieved by using the same method under the same circumstance, the measure is considered as reliable (Fiona, 2020). Validity refers how accurately a method measures what it is intended to measure. High reliability is one indicator that a measurement is valid.

Reliability has many types such as test retest (the consistency of a measure across time), inter ratter (the consistency across ratters or observers) and internal consistency (the consistency of the measurement itself) (Fiona, 2020). The study used internal reliability (Cronbach's alpha) to justify reliability and internal consistency of questionnaires and independent variables.

4.4.1. Reliability of Questionnaire Items

Reliability Statistics

Cranach's Alpha	N of Items
.762	47

As we can refer from the above table, the Cranach's alpha (internal consistency) of the questionnaire of 47 items was 0.762, which shows high internal reliability of items of the questionnaires Cronbach's alpha is the measure of internal consistency that is how closely related a set of items are as a group. As a rule of thumb a reliability coefficient of 0.70 or above is considered acceptable in most social science research situations (UCLA, 2020).

4.4.2. Reliability Analysis of Variables

Reliability Statistics

Cronbach's Alpha	N of Items
.762	8

Table 4.4.2.1 Reliability Analysis

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
awareness_scale	23.1811	9.006	.649	.699
perceived usefulness scale	23.9598	10.444	.526	.731
perceived ease of use scale	23.6737	10.144	.627	.718
self efficacy scale	24.1964	9.459	.373	.762
perceived risk scale	24.4517	11.463	.314	.759
perceived cost scale	23.8519	11.563	.156	.780
compatibiliy scale	23.3040	8.647	.812	.670
relative advantage scale	23.6719	8.693	.440	.754

Based on the above table cronbach's alpha is 0.762, which is within acceptable region.

4.5. Regression results

Under this section Multicollinearity, logistic regression analysis, results of regressions is discussed and hypothesis will be tested.

4.5.1. Multicollinearity

Multicollinearity/ is the phenomenon in which two or more identified predictor variables in multiple regression models are highly correlated (Schreiber-gregory, Jackson, & National, 2017). As a rule thumb, if the correlation is greater than 0.8 the multicollinearity may be present (If, n.d.).

Table 4.5.1.1 Correlation matrix

Correlations										
		use MB or not	AW	PU	PEU	SE	PR	PC	C	RA
Use mobile banking or not(use MB or not)	Pearson Correlation	1	.149**	.118*	-.009	-.281**	-.124*	-.031	-.091	-.082
	Sig. (2-tailed)		.004	.023	.867	.000	.016	.555	.080	.112
	N	374	374	374	374	374	374	374	374	374
awareness_scale(AW)	Pearson Correlation	.149**	1	.579**	.740**	.155**	.232**	.126*	.705**	.229**
	Sig. (2-tailed)	.004		.000	.000	.003	.000	.015	.000	.000
	N	374	374	374	374	374	374	374	374	374
perceived usefulness scale(PU)	Pearson Correlation	.118*	.579**	1	.625**	.137**	.220**	.126*	.546**	.234**
	Sig. (2-tailed)	.023	.000		.000	.008	.000	.015	.000	.000
	N	374	374	374	374	374	374	374	374	374
perceived ease of use scale(PEU)	Pearson Correlation	-.009	.740**	.625**	1	.162**	.120*	.038	.798**	.222**
	Sig. (2-tailed)	.807	.000	.000		.002	.021	.465	.000	.000
	N	374	374	374	374	374	374	374	374	374
self efficacy scale(SE)	Pearson Correlation	-.281**	.155**	.137**	.162**	1	.154**	.056	.388**	.473**
	ed)	.000	.003	.008	.002		.003	.279	.000	.000
	N	374	374	374	374	374	374	374	374	374
perceived risk scale(PR)	Pearson Correlation	-.124*	.232**	.220**	.120*	.154**	1	.176**	.291**	.237**
	Sig. (2-tailed)	.016	.000	.000	.021	.003		.001	.000	.000
	N	374	374	374	374	374	374	374	374	374
perceived cost scale(PC)	Pearson Correlation	-.031	.126*	.126*	.038	.056	.176**	1	.167**	.098
	Sig. (2-tailed)	.555	.015	.015	.465	.279	.001		.001	.059
	N	374	374	374	374	374	374	374	374	374
compatibiliy scale©	Pearson Correlation	-.091	.795**	.546**	.798**	.388**	.291**	.167**	1	.386**
	Sig. (2-tailed)	.080	.000	.000	.000	.000	.000	.001		.000
	N	374	374	374	374	374	374	374	374	374
relative advantage scale(RA)	Pearson Correlation	-.082	.229**	.234**	.222**	.473**	.237**	.098	.386**	1
	Sig. (2-tailed)	.112	.000	.000	.000	.000	.000	.059	.000	
	N	374	374	374	374	374	374	374	374	374
**. Correlation is significant at the 0.01 level (2-tailed).										
*. Correlation is significant at the 0.05 level (2-tailed).										

Spearman's correlation was used because; the Spearman rank order correlation coefficient (spearman's correlation, for short) is non parametric measure of the strength and direction of association that exists between two variables measured on at least on ordinal scales. As we can understand from the above table, the coefficient of correlation is not greater than 0.80. Thus, multicollinearity is not suspected at this stage.

4.5.2. Logistic Regression analysis

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	374	100.0
	Missing Cases	0	0.0
	Total	374	100.0
Unselected Cases		0	0.0
Total		374	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Yes	0
No	1

Block 0: Beginning Block

Classification Table[a,b]

Observed			Predicted		
			use_mobile		Percentage Correct
			Yes	No	
Step 0	use_mobile	Yes	281	0	100.0
		No	93	0	0.0
	Overall Percentage				75.1

a. Constant is included in the model.

b. The cut value is .500

Block 1: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	168.554	8	.000
	Block	168.554	8	.000
	Model	168.554	8	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	250.970[a]	.363	.538

Under model summary we see that the -2 log likelihood statistic is 250.970[a], which tells us statistic measures how model predicts the decisions. Cox & Snell R square and Nagelkerke R square values provide an indication of the amount of variation in the dependent variable

explained by the model (from a minimum of 0 values to a maximum of approximately 1). These are described as pseudo R square statistics, rather than the true values that you will see provided in the multiple regression output. From the above table, between 36.3% and 53.8% of the variability is explained by this set of variables.

. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Observed			Predicted		
			use_mobile		Percentage Correct
			Yes	No	
Step 1	Use mobile banking	Yes	257	24	91.5
		No	41	52	55.9
	Overall percentage				82.6

Table 4.5.2.1 Logistic regression analysis

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Awareness_scale	8.163	1.045	60.991	1	.000	3508.346
	usefulness_scale	2.484	.669	13.780	1	.000	11.989
	easeuse_scale	-6.585	1.287	26.162	1	.000	.001
	selfefficacy_scale	-.277	.217	1.631	1	.202	.758
	risk_scale	-1.131	.419	7.269	1	.007	.323
	cost_scale	.013	.311	.002	1	.968	1.013
	compatibility_scale	-4.794	.788	37.012	1	.000	.008
	relativeadvantage_scale	.721	.222	10.563	1	.001	2.057
	Constant	.210	1.950	.012	1	.914	1.233

a. Variable(s) entered on step 1: Awareness, scale, perceived usefulness, perceived ease of use, perceived self efficacy, perceived risk, perceived cost, compatibility, relative advantage.

Scale : 1- Strongly Disagree, 2- Disagree, 3- Neutral, 4- Agree, 5- Strongly Agree

Significance at 1%,5%

As we understand from **Table 4.5.2.1**.. Awareness, perceived usefulness and relative advantage has positive relationship with mobile banking adoption and statistically significant at 1% and 5% level. On other hand perceived ease of use and compatibility has negative relationship and statistically significant at 1% and 5% level. Perceived risk has negative relationship with mobile banking adoption and statistically significant at 1% and 5% level. Perceived cost has positive relationship with mobile banking and statistically insignificant at 1% and 5% level. Perceived self efficacy has negative relationship with mobile banking adoption and statistically insignificant at 1% and 5% level.

4.5.3. Discussions of regressions results and hypothesis testing

The dependent variable has a binary outcome which takes a value of one if the respondents are using mobile banking and zero if they are not. Thus, logistic regression was used to analyze these findings.

Therefore, logistic regression results of independent variables that affect mobile banking adoption were presented on table 4.5.2.1 here hypothesis will be tested.

4.5.3.1. Awareness and mobile banking adoption

H1: The degree of awareness of bank customers on mobile banking has positive effect on mobile banking adoption.

The results of logistic regression analysis, on table 4.5.2.1 showed that awareness has a positive significant effect on mobile banking adoption with ($B=8.163$, $p<0.05$). Thus, from these findings we can conclude that awareness has a positive and significant effect on the adoption of mobile banking services. Customers respond positively if they got the right and sufficient information about mobile banking. The same results were gained by previous studies (Cudjoe et al., 2015, Kalkidan, 2016, Siyal, Donghong, Umrani, Siyal, & Bhand, 2019).

4.5.3.2. Perceived usefulness and mobile banking adoption

H2: Perceived usefulness will have a positive effect on mobile banking adoption

As presented on table 4.5.2.1 perceived usefulness has a positive relationship and has significant effect on mobile banking adoption with (B=2.484, P<0.05). Thus, this study suggest that customers have to perceive mobile banking is useful and speed up in doing their banking transaction than traditional banking or other banking options to be accepted. The result of the study found to be in line with studies of (Kabeer & Adeel, 2013, Kalkidan, 2016, Yusuf, 2017).

4.5.3.3. Perceived ease of use and mobile banking adoption

H3: Perceived ease of use will have a positive effect on mobile banking adoption.

The results of logistic regression on table 4.5.2.1 revealed that perceived ease of use has negative relationship but has significant effect on mobile banking adoption with (B=-6.585,P<0.05). This study was in line with the results founded by (*Kalkidan*, 2016). Therefore, this study doesn't support initially stated hypothesis and leads to reject the null hypothesis that stated perceived ease of use has positive effect on mobile banking adoption. The findings of the study was inconsistence with past studies which states perceived ease of use has positive effect on mobile banking adoption (Kabeer & Adeel, 2013, Nesibu, 2017).

4.5.3.4. Perceived self efficacy and mobile banking adoption

H4: Self-efficacy will have a positive effect on mobile banking adoption.

As we can understood from the above table 4.5.2.1 Perceived self efficacy has a negative insignificant (B= -0.277, P>0.05) effect on mobile banking and the result of the study was inconsistent with prior studies (Extended TAM, Nesibu, 2017). Thus, the study showed ability, knowledge or skills have nothing to do with intention to adopt mobile banking adoption.

4.5.3.5. Perceived risk and mobile banking adoption

H5: perceived risk will have negative effect on mobile banking adoption.

The results of table 4.5.2.1 showed that perceived risk has negative relationship and significant with (B=-1.131, P<0.05) effect on mobile banking adoption. Therefore, the research result confirmed the previously stated hypothesis; perceived risk has negative relationship and significant effect on mobile banking adoption. This study was in line with past studies (Kabeer & Adeel, 2013, Yusuf, 2017). The research result revealed that customer's fear of financial transactions conducted over mobile networks. Thus, the bank management should address

customers concern, and provide assurance for their transaction they made through mobile banking is safe and trustworthy.

4.5.3.6. Perceived cost and mobile banking adoption

H6: Perceived cost will have a negative effect on mobile banking adoption.

As showed table 4.5.2.1 Perceived cost has positive relationship and insignificant (B=0.013, P> 0.05) effect on mobile banking adoption, and this result is inconsistent with past studies on mobile banking adoption (Luarn and lin (2005) cited in (Jeong & Yoon, 2013), which stated perceived cost has negative and insignificant influence on mobile banking adoption. Thus, the finding implied that cost wouldn't influence Commercial bank's customers from using Mobile banking.

4.5.3.7. Compatibility and mobile banking adoption

H7: Compatibility has positive effect on mobile banking adoption.

The results of logistic regression on table 4.5.2.1 revealed that compatibility has negative and significant (B= -4.794 P<) effect on mobile banking adoption, and the result forced to reject the null hypothesis which stated as compatibility has positive effect on mobile banking adoption. Therefore, the finding showed that this innovation is incompatible with the existing values, past experience and needs of potential adopters will adopted than others. The research result was inconsistent with past studies (Rogers, 2002, Kalkidan, 2016).

4.5.3.8. Relative advantage and mobile banking adoption

H8: Relative advantage has positive effect on mobile banking adoption.

The result of table 4.5.2.1 revealed that relative advantage has positive and significant (B= 0.721, P< 0.05) effect on mobile banking adoption. This study implied that mobile banking users got more relative advantage as compared to other traditional banking options such as ATM or physically visiting bank. Thus, the study has similar result with the past studies (Kalkidan, 2016, Nesibu, 2017, Firdisa, 2019).

In general, this study discussed the survey analysis results and identified four variables influencing customers to adopt mobile banking such as awareness, perceived usefulness, perceived risk and relative advantage that had significant effect mobile banking adoption. The hypothesis testing results were summarized in the table 4.5.3.9 below.

Table 4.5.3.9 Acceptance/ Rejection of hypothesis

		B	Significant.	Acceptance /rejection of hypothesis
Step 1[a]	Awareness_scale	8.163	.000	Accepted
	usefulness_scale	2.484	.000	Accepted
	easeuse_scale	-6.585	.000	Rejected
	selfefficacy_scale	-.277	.202	Rejected
	risk_scale	-1.131	.007	Accepted
	cost_scale	.013	.968	Rejected
	compatibility_scale	-4.794	.000	Rejected
	relativeadvantage_scale	.721	.001	Accepted

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1. CONCLUSION

This research was undertaken on determinants of mobile banking adoption in Ethiopia A case study in Commercial Bank of Ethiopia. The study used quantitative approach by integrating extended Technology Acceptance Model (TAM) of (Luarn and Lin, 2005) and Diffusion theory of Rogers with Awareness. Thus, Awareness, perceived usefulness, perceived ease of use, perceived self efficacy, perceived risk, perceived cost, compatibility, and relative advantages eight factors that selected affect mobile banking adoption after reviewing literatures and empirical studies.

The main objective of this research is to indentify factor influencing customers on adoption of mobile banking in Commercial Bank of Ethiopia. Thus, four variables such as awareness, perceived usefulness, perceived risk and relative advantage that had significant effect mobile banking adoption.

As showed on this study awareness has positive relationship and has significant effect on mobile banking adoption. Therefore, customer awareness creation campaign and training program have to undertake to make them knowledgeable about detail information on mobile banking security issue to feel confident, convenience to access the banking services at any time anywhere, and empower them to self serve and reduce the dependency on bank's staff to facilitate the services.

Perceived usefulness has positive relationship and significant effect on mobile banking adoption. Thus, this study suggest that customers have to perceive and well communicated, mobile banking is useful and speed up in doing their banking transaction than traditional banking or other banking options.

Next, perceived risk has negative relationship and significant effect on mobile banking adoption. The research result revealed that customer's fear of financial transactions conducted over mobile networks due to safety issues, because customers are not sure about reliability of financial transactions made by them through mobile banking. Therefore, the bank should develop online platform that can provide complete information about the security and related issues of mobile banking since internet has good penetration among customer of the bank. In addition, the bank

management should address customers concern, and provide assurance for their transaction they made through mobile banking is safe and trustworthy.

In addition, relative advantage has positive and significant effect on mobile banking adoption intentions of customers. This study implied that mobile banking users got more relative advantage as compared to other traditional banking options such as ATM or physically visiting bank since mobile banking doesn't need physical presence of the customer, hence customer saves his/her time and cost.

5.2. Recommendation

This study showed that awareness, perceived usefulness, perceived risk and relative advantage were a dominant factor influencing customers to use or not to use mobile banking. Thus, the bank should have to strive to improve customers level awareness by devising different means of change since; awareness has a multiplied effect on motivating customers to be mobile banking user. Even, if customers get sufficient know how, risk related issues will be eliminated then mobile banking user will increase which reduced customers that visit the bank's hall and this helps the bank to allocate this resource on the other best alternatives. In general, this research give recommend the following points.

- Awareness creation campaign and training program have to undertake to make them knowledgeable on mobile banking related issues. According to (Digital 2020, 2020), report 46.75 million mobile connections in the country, so if great effort exerted on awareness creation current low adoption rate will curved.
- The bank should develop platform that can provide online complete information about the security and related issues of mobile banking since internet has good penetration among customer of the bank, and the bank management should address customers concern, and provide assurance for their transaction they made through mobile banking is safe and trustworthy.
- The distributions of infrastructures like Telecommunications, electricity and ICT should expand in all directions to set up platform for mobile banking adoption.

5.3. Limitations of the study and Future work

This studies finding will contribute to the existing literature on determinants of mobile banking adoption in Ethiopia. And this study has the following limitations,

First, the population covered by the study was customer of CBE found under Addis Ababa Districts. Future studies can build on this study through collecting samples from all over the country as much as possible especially rural areas should get focus since 85% of the population live in these areas.

Secondly, this study have used Extended Technology Acceptance Model by integrating with diffusion theory a total of eight constructs, thus the future research should include other technology adoption theories with additional variables that can predict mobile banking adoption.

Thirdly, the study incorporates only account holders of CBE by excluding non-account holders of the bank. Therefore, it better to include non account holders to predict the customer intentions, and including other bank's customer (which means private banks).

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APPENDIX I

QUESTIONNAIRE

DEAR PARTICIPANTS

My name is Mezgebu Lemma.I am currently conducting a survey for my thesis on the topic, "Determinants of mobile banking adoption in Ethiopia: A case of Commercial bank of Ethiopia" at Addis Ababa university college of Business and Economics Masters of Business Administration. The purpose of this questionnaire is to investigate factors influencing mobile banking adoption in Commercial Bank of Ethiopia. Any information that is given here is assured to be treated as confidential. Please, complete all statement in this questionnaire as frankly as possible. Thank you so much for your cooperation and participation.

For any comments and clarification you can contact me through: my email address,

Mezgebemlm1979@gmail.com

Or mezgebulema@cbe.com.et

Cell phone 091218 6863 or 093917 5802

General Instruction

This questionnaire contains four sections and 5 pages that will be expected to take approximately 10 to 15 minutes to complete. Please provide your responses to the questions based on the instructions under each section.

SECTION I: MOBILE BANKING SERVICES

This sections outlines services options provided by mobile banking to customers of Commercial Bank Of Ethiopia rated to know which option is frequently used, and in addition to asses which customers need were meet or not.

1. On a scale of 1 to 5 please state how often you use the following services on average in a month, by ticking the appropriate box, where 1- Never, 2 - Rarely, 3 – Sometimes, 4 - Often, 5 – Always

		(1) Never	(2) Rarely	(3) sometimes	(4) Often	(5) Always
1	Balance Inquiry					
2	Own Account Transfer (Transfer between your accounts)					
3	Make a payment to beneficiary(Transfer to your beneficiaries)					
4	Payment to others(Transfer to any CBE account)					
5	Local Money Transfer (Transfer to any non CBE customer)					

SECTION II: FACTORS AFFECTING MOBILE BANKING ADOPTION.

Please indicate your answer by ticking on the appropriate option:

Please indicate the extent to which you agree or disagree with each of the following statements by ticking **"√"** from 1 to 5 that best represents your level of agreement with the statement.

Note: 1- Strongly Disagree, 2- Disagree, 3- Neutral, 4- Agree, 5- Strongly Agree

The following are some factors affecting Adopting Mobile banking services; please indicate level of your choice.		(1)	(2)	(3)	(4)	(5)
	Awareness					
1	I know about mobile banking service, Take its advantage in saving time and cost.					
2	I have received enough information how to use mobile banking services from the bank.					
3	My cell phone support mobile banking service.					
4	I have received information about security system of Mobile banking services from the bank.					
5	In general, I have received enough information about Mobile banking services					
	Perceived usefulness					
6	I find mobile banking is useful in conducting my banking activities.					

7	Mobile banking enables to complete banking activities conveniently which reduces number of customers come to the banking hall.					
8	No time limit to access bank account and Information					
Perceived ease of use						
9	Learning to use mobile banking is easy for me.					
10	Our bank provide guidelines on the use of mobile banking facility					
11	Mobile banking requires a simple registration process.					
12	Using mobile banking makes it easier For me to conduct my own banking transactions					
Perceived Self-Efficacy						
13	I do not need anyone to teach me how to use mobile banking because I can learn it by myself					
14	I use mobile banking because it has a built –in help facility for assistance					
15	I use mobile banking because I have seen someone else using it					
16	I use mobile banking because someone has shown me how to do it					
Perceived Risk						
17	I do not trust the technology provided by the banks					
18	Mobile banking is unreliable because I afraid that my personal or transaction detail would be leaked during					
19	If I lose the mobile phone as a mobile banking user, in the meantime, I will lose my money as well.					
Perceived cost						
20	It costs a lot to use mobile banking					
21	Using mobile banking increases my banking costs					
22	There are financial barriers (Cost of mobile phone)					
Compatibility						
23	Using mobile banking fits well with the way I like to control and manage my banking transactions					

24	I use mobile banking because I am doing everything with my cell phone					
25	I m satisfied with current mobile banking service at this stage because It is already a part of my daily life					
26	I know that my banking details are safe If my phone is stolen					
Relative Advantage						
27	Mobile banking is more accessible than other banking services (i.e. Internet banking, visiting the bank					
28	Mobile banking is more convenient than other					
29	Mobile banking is time saving than other banking services (i.e. Internet banking, visiting the bank,					

SECTION III: QUESTIONS RELATED TO MOBILE BANKING ADOPTION

Please answer the following by ticking the appropriate option:

30. Do you use mobile banking services?

1(Yes)	
2(No)	

31. Are you active mobile banking user?

1(Yes)	
2(No)	

32. Does your income influence your use of mobile banking?

1(Yes)	
2(No)	

33. Are there any security concerns that have been raised concerning your bank‘s mobile banking services

1(Yes)	
2(No)	

34. Do you find your bank‘s advertisements on mobile banking appealing or interesting enough to encourage customers to sign up?

1(Yes)	
2(No)	

35. Does your attitude towards change (how you perceive change) affect your use or uptake of mobile banking?

1(Yes)	
2(No)	

SECTION IV: Demographic Profile of Respondents

Please indicate the following by ticking (√) on the spaces in front of the response options:

1.Gender

1.(Male)	
2.(Female)	

2. Age

(18-25)	26-35	36-45	46-55	55+

3. Marital status

1.Sigle	
2.Married	

4. Highest Educational level achieved

1. Primary school Completed	
(2)High school Completed	
3.Diploma Completed	
4.Degree Completed	
5.Masters and above	

5. Occupational status

(1)Student	
(2)Employed	
(3)Self Employed	
(4)unemployed	
(5)Others please specify	

6. Monthly income in Ethiopian Birr (ETB):

(1) 0-1650	
(2) 1651-3200	
(3) 3201-5250	
(4) 5251-7800	
(5) 7801-10900	
(6) >10900	

7. What influenced you to register or sign up for mobile banking services?

(1)Advertisement	
(2)Family/Friends	
(3)Bank's Policy	
(4)Others/please specify	

Thank you for your co-operation