Determinants of Adoption of Mobile Banking Services: The Case of South Addis Ababa District, Commercial Bank of Ethiopia

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Abstract

Commercial banks in Ethiopia introduced mobile banking technology. However, the numbers of users of the services are very small, even by African standard. This research paper aims to identify the factors that affect the adoption of mobile banking technology in the South Addis Ababa district of Commercial bank of Ethiopia. A sample of 384 customers were selected based on stratified and convenient sampling techniques, from which 362 respondents replied appropriately to the survey questionnaire. Data were analyzed using the binary logistic regression model, in addition to. descriptive statistics tools such as frequency, percentage, mean, and standard deviation. The study found out that sex, income, perceived security of the technology, perceived usefulness of the service, experience on technology and voluntarism to use the service have positive and significant effect on the adoption of mobile banking service. Therefore, to increase the penetration and growth of mobile banking service, Commercial bank of Ethiopia should work on the correlates that affect the adoption of the service.

Keywords: *Mobile banking service, adoption, determinants, binary logit, Commercial bank of Ethiopia*

1. Introduction

1.1 Background of the Study

Worldwide the way in which banks deliver services has undergone a paradigm shift with the banks increasingly going towards the provision of electronic services in the self service mode. Tough competition and increasing customer expectations have forced all major commercial banks, irrespective of the sectors, to adopt the provision of banking services through ATMs, internet banking, mobile banking etc. The services through these channels offer tremendous advantage both to the banks and their customers. For the banks, the advantages are reduced transaction costs and lesser crowding in their branches. For the customers, these channels offer the convenience of doing

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bank transactions from the places of their choice, even homes and conducting them any time of the day they want (Koshy, 2009).

The increase in competition and change, co-operation, globalization and convergence, as well as changing consumer preferences means that new strategies to attract and maintain customers are essential. The Internet is therefore being considered as a strategic weapon and will revolutionize the way businesses operate to seize opportunities and overcome threats. The banking sector is no exception, the Internet is causing major delivery changes and is bringing about a transformation of this sector this is because the financial sector is one of the most affected by technology banking has always been a highly information intensive activity that relies heavily on technology to acquire, process, and deliver the information to all relevant users. Increasingly competition in the financial services sector is forcing providers to develop and utilize alternative delivery channels IT and Internet technology is therefore a revolutionary approach for banks to provide convenient, reliable and expedient services to bank customers (Tan & Teo, 2000 cited in Jaruwachirathanakul, 2003). In banking, in the past, the technology strategy was considered as subordinate to business strategy. But now with so much advancement in technology it has become as important as business strategy. Technology has provided an altogether new way of interacting and providing service to bank customers rather than merely replicating activities of the bank employees (Koshy, 2009).

The banking industry has witnessed significant advancement in technology just like any other sector. The adoption of e-banking service is one of the advancement that affects banking operations entirely. With the adoption of self-service technology by the banks, e-banking system has continued to service the populace well. Electronic banking offers convenience to costumers and it provides banking services well beyond the traditional service period. It therefore encourages a cashless society and every sector of the economy whether financial or nonfinancial organization is adopting computer based approaches to the service rendered. Mobile banking which is a type of electronic banking is becoming more popular in modern banking and as such has been a subject of interest among researchers. Mobile banking means a financial transaction conducted by logging on to a bank's data base using a

cell-phone; such as viewing account balances, making transfer between accounts, or paying bills. It is a term used for performing balance checks, account transactions, payments etc, via a mobile device such as a mobile phone. In recent times e-banking is most often performed via SMS or the mobile interest and can also use special program called client downloaded to the mobile (Oluma et.al, 2016).

Electronic banking technologies have contributed to improving of effectiveness of banks' distribution channels through reducing the transaction cost and increasing the speed of service, mass customization, marketing and communication activities, and maintaining the customers and attracting new ones, From the customer's perspective, e-banking allow customers to save time and cost. Due to the advantages of e-banking for both banks and customers, the adoption of electronic banking recently has rapidly grown as a channel of distribution of banking products and services (Bucevska, 2011).
The concept of mobile-banking is generally used to refer to the new technologies that enable access to banking services via mobile phones. mobile-banking, also referred to as cell phone banking, is the use of mobile terminals such as cell phones and personal digital assistants (PDAs) to access banking networks via the wireless application protocol (Francois et.al 2015).

Mobile banking involves mini-statements and checking of account history, alerts on account activity or passing of set thresholds; monitoring of term deposits, access to card statements, mutual funds/equity statements; insurance policy management, pension plan management, access to loan statements; status on cheque, stop payment on cheque, ordering check books, balance checking in the account, PIN provision, change of PIN and reminder over the internet, domestic and international fund transfers, recent transactions, due date of payment, micro-payment handling, mobile recharging, commercial payment processing, bill payment processing, peer to peer payments and deposit at banking agent (Cudjoe et.al, 2015).

In Ethiopia, the first bank that deployed mobile banking service is the state-owned Commercial bank of Ethiopia. However, online banking is in its infant stage. Even though, the concept of online banking implemented in Ethiopia with a single service of SMS message during late 2008, it does not show that

much improvement as its age. Now a day some banks are adopting e-banking system which is the state of the art. In addition, many banks are making what seem like huge investments in technology to maintain and upgrade their infrastructure, in order not only to provide new electronic information based services, but also to manage their risk positions and pricing. The earliest forms of electronic and communications technologies used mainly in Ethiopian banking offices were automation devices. However, Telephones, telex and facsimile were employed to speed up and make more efficient the process of servicing clients (Mattewos, 2016). Banking institution cannot increase their customer base in the mobile banking environment without knowing what factors enable or inhabit consumers from adopting such service. As there are ever increasing pressures on telecommunications operators and banking institutions to increase their revenue, it is important to understand what drives consumer adoption of mobile banking services but failure to do so could result in a loss of market share and limited growth in the mobile banking sector for both financial and network operators.

1.2 Statement of the problem

Commercial bank of Ethiopia have spent huge amounts in establishing mobile banking systems, but the adoption and usage rate of mobile banking is still lower than expected and remains insignificant compared to the entire banking transactions. For instance the bank has only managed to recruit 625,000 new mobile banking in 2015/16 physical year but the actual new mobile banking activated was 431,677 customers (72% activations below the planned 80% activation) and total mobile banking registered stood at 1.1 million out of over 13.3 million accounts –holders as of December 30, 2016. This amounts account to only 8% of all commercial bank of Ethiopia customers. Furthermore, in the same period, mobile banking transaction stood at 868,464 with a total value of birr 3.5billon (CBE, 2016/2017).

The bank had hoped that it would be able to capture most, if not all of these mobile phone subscribers into its M-Banking platform which is available to both account and non-account holders. It is true that mobile banking is an infant stage since its introduction in 2013 for the Ethiopian society. It is therefore important for the banking industry to understand the factors that affect the technology adoption decision of mobile banking users.

Previous studies in various countries identified the factors that determine the adoption of mobile banking services. For example, studies by Alsheikh and Jamil (2014) in Saudi Arabia, Yu (2012) in Taiwan, Oliver (2012), Ndumba et.al (2014) and Abdullatif (2015) in Kenya, Fall et.al (2015) in Senegal, and Cudjoe et.al (2015) in Ghana have shown that the apathy of the bank consumers towards mobile banking services affected the adoption negatively, while customers belonging to the well educated, young, relatively well-off and residing mainly in urban areas, etc adopted the technology. Studies conducted about the determinants of adoption of mobile banking services in Ethiopian commercial banks by Mattewos (2016) and Laekemaryam (2016) found out that perceived usefulness and perceived ease of use of the technology to have positive relationship with the adoption of mobile banking whereas perceived risk has negative relationship with the adoption of mobile banking. In these studies important variables such as experience with technology and voluntarism to use the service were omitted while they are important. In the current study, the researcher included these omitted variables and estimated the determinants of adoption of mobile banking services using the binary logit model while in the previous studies data were analyzed using the Analysis of Moment Structure. Therefore, this study is an effort to fill in the existing knowledge gap due to omission of relevant variables in the analysis.

While the factors that determine adoption of mobile banking services presented in the literature are several, this study examines only some factors that determine adoption of mobile banking services in the case of south Addis Ababa district of the Commercial bank of Ethiopia. While the branches were selected by using stratified sampling technique, the sample respondents were selected using convenient sampling method due to the difficulty of accessing sample customers. Therefore, readers should accept the findings of the study given these limitations, which may affect the representative of the study.

1.3 Objectives of the study

The objective of the study is to identify the determinants of adoption of mobile banking services by customers of Commercial bank of Ethiopia. More specifically, it examines

1. the effect of demographic factors on the adoption of mobile banking technology by the Bank's customers,
2. the effect of customers' experiences on the technology and their voluntarism to use on the adoption of mobile banking services provided by commercial bank of Ethiopia, and
3. the influence of user's perceived risk of the technology on the adoption of mobile banking services.

2. Review of Literature

2.1 Theoretical literature review

Electronic Banking (E-Banking) service originated with Automated Teller Machine (ATM) since 1980. In 1990 the banking sector started to perform their banking transaction through telephone, and in 1995 internet banking service was introduced in USA. E-Banking users can perform many banking transaction like balance inquiry, paying of bill, transferring money from one account to another (Azam et al., 2014). Financial services industry over time has opened to historic transformation that can be termed as electronic developments which is advancing rapidly in all areas of financial intermediation and financial markets such as e-finance, e-money, electronic banking (e-banking), e-brokering, e-insurance, e-exchanges, and even e-supervision. The driving forces behind the rapid transformation of banks are influential changes in the economic environment include among others innovations in information technology, innovations in financial products, liberalization and consolidation of financial markets, deregulation of financial inter-mediation (Elisha, 2010).These factors make it complicated to design a bank's strategy, which process is threatened by unforeseen developments and changes in the economic environment and therefore, strategies must be flexible to adjust to these changes.

The e-banking is transforming the banking and financial industry in terms of the nature of core products /services and the way these are packaged, proposed, delivered and consumed. It is an invaluable and powerful tool driving development, supporting growth, promoting innovation and enhancing competitiveness. Banks and other businesses alike are turning to IT to improve business efficiency, service quality and attract new customers. Technological innovations have been identified to contribute to the

distribution channels of banks and these electronic delivery channels are collectively referred to as electronic banking (Elisha, 2010).

E-banking is a term which is explained as customer enjoyment of banking services electronically, without the having physical appearance to the bank's branch. It is also sometimes regarded with internet banking, home banking, virtual banking, online banking, remote electronic banking and personal computer banking. E-banking provides a wide range of financial services, namely, ATM services, fund transfer, utility bill payment and online payments. Generally, E-banking is a remote facility to perform banking services using the internet (Muhammad, 2015).

2.1.1 Mobile Web

Mobile web allows users to access web sites from their handsets and it is a channel for the delivery of web contents through the mobile handset. As result of the advancement in mobile handset devices in terms having web browsing feature as well as wider screen with high resolution coupled with availability of mobile internet services with higher quality (broadband) and affordable services relative to what was before, use of mobile web for various services is growing across the various segments of consumers. Among those services use of mobile web for mobile banking is becoming popular in the banking business. Like SMS channel mobile web has its own advantages and disadvantages some of which are described below.

2.1.2 Mobile Client Applications

Mobile client applications are a rapidly developing segment of the global mobile market. Mobile client applications are common on most mobile phones today and are key to providing user interfaces for basic telephony and messaging services as well as for more advanced and entertaining experiences. It has evolved to give a user access to services that require richer, faster and not necessarily connected user experiences. In this respect mobile applications are distinctly different from browsing the mobile web (CBE, 2016/17). In terms of advantages, it offers organizations more control over the user experience with a rich user interface capability, enhance the ability to work even when there is no connection to the wireless network, provides secured access with applications, supports for access to corporate customs

applications, and provides the ability to provide remote wipe-out of information when device is lost or stolen (CBE, 2016/17).

2.1.3 M- Banking Business Models

A wide spectrum of mobile/branchless banking models is evolving. 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 banking agents, i.e. retail or postal outlets that process financial transactions on behalf telecoms or banks. The banking agent is an important part of the mobile banking business model since customer care, service quality, and cash management will depend on them. Many telecoms will work through their local airtime resellers. However, banks in Colombia, Brazil, Peru, and other markets use pharmacies, bakeries, etc. These models differ primarily on the question that who will establish the relationship (account opening, deposit taking, lending etc.) to the end customer, the Bank or the Non-Bank/ telecom Company (Worku, 2015).

1. Bank-focused Model

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 banks‟ customers. This model is additive in nature and may be seen as a modest extension of conventional branch-based banking (Worku, 2015).

2. Bank- Led Model

The bank-led model offers a distinct alternative to conventional branch-based banking in that customer conducts financial transactions at a whole range of retail agents (or through mobile phone) instead of at bank branches or through bank employees. 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 (telecom operators / chain store) having experience and target market distinct from traditional banks, and may be significantly cheaper than the bank-based alternatives. The bank-led model may be implemented by either using correspondent arrangements or by

creating a JV between Bank and Telco/non-bank. In this model customer relationship rests with the banks non bank led model (Worku, 2015)

3. Non – Bank Led Model

The non-bank-led model is where a bank does not come into the picture (except possibly as a safe-keeper of surplus funds) and the non-bank (e.g. telecom operators) performs all the functions (Worku, 2015).

2.1.4 M-banking Technology Adoption models

Adoption: is defined as the act or process of beginning to use something new or different (Webster, 2009). Technology adoption is thus the process of beginning to use new technology or different technology by customers, organizations etc. As result of the dynamism of the information and communications technology innovative technological products are released. And the growth of nations, organizations and individuals is highly dependent on how best they adopt the technology in their operations. In order to understand how people can accept or adopt technology various models are developed and used. In the following paragraphs some technology acceptance models are briefly discussed which include: (1) The Theory of Reasoned Action (TRA), (2) Theory of planned Behavior (TPB), (3) Innovations Diffusion Theory, and (4) Technology Acceptance Model (TAM).

(1) Theory of Reasoned Action (TRA)

Theory of Reasoned Action is a psychological theory that tries to explain an individual's action that is determined by his/ her behavioral intention to perform it. Ajzen and Fishbein (1975). According to their theory, behavioral intention (use technology), is explained by people's attitudes toward that behavior and subjective norms. People's attitude toward a behavior includes behavioral beliefs; assess the consequences of behavior, subjective norms, normative beliefs and motivations that must be answered (Riivari, 2005; Puschel et al, 2010). This theory, as long as the behavior is voluntarily controlled by the individual, can accurately explain the factors influencing technology adoption (Laukkanen and Cruz, 2009).

(2) Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB) is proposed as an extension of the Theory of Reasoned Action (which was related to voluntary behavior), because of the limitations of TRA in dealing with behaviors over which people have incomplete Volitional/autonomous control. The TPB introduced a third independent determinant of intention, perceived behavior control (PBC). For this reason, TPB was introduced by Ajzen in 1985 (Ajzen 1985) The theory was called the theory of planned behavior (TPB) since it evolved from the Theory of Reasoned Action, with an additional construct (PBC). According to Ajzen (1991), TPB incorporates an additional construct in order to account for situations where an individual lacks the control or resources necessary for carrying out the targeted behavior freely.

(3) Technology adoption models

Several economic models have tried to explain how the diffusion of technology takes place and why firms adopt the technology at different stages These models roughly consist of the so-called "equilibrium" models (Battisti & Stoneman, 2003; David, 1991; Karshenas & Stoneman, 1993), the "epidemic" models (Mansfield, 1961, 1968) and the adoption models with "network externalities" (David, 1985; Farrell & Saloner, 1985; Katz & Shapiro, 1986)3. On the other hand, several models have focused on the demand side, or the consumer technology diffusion process (Battisti, 2008). This literature takes into consideration the spreading of consumer technology within and across households (Mahajan, Muller, & Bass, 1990; Zettelmeyer & Stoneman, 1993). However, as Battisti (2008) states consumers' choice could be modeled following either the epidemic or the equilibrium approach.

1) Equilibrium Models: The equilibrium models are based on at least two of the tenets of mainstream neoclassical theory: such as equilibrium, infinite rationality and full information (Battisti & Stoneman, 2003; David, 1991; Karshenas & Stoneman, 1993 cited in Fall 2014). This theory considers that the decision to adopt is the result of a cost-benefit calculation by potential adopters (firms or individuals) who anticipate the net benefits from adopting and using these technologies.

2) Epidemic models: The second group of technology adoption models is the "epidemic" models (Mansfield, 1961, 1968 Cited in Fall 2014).), which

emphasize the influence of information spillover effects on the diffusion of technologies. The process of technological diffusion is considered similar to the spread of disease by infection. A greater number of adopters indicate a greater amount of information that is available about the technologies and a higher diffusion rate of the information. The basic hypothesis is that it takes time for information about a new technology to reach all potential users (Geroski, 2000).

3) Networks externalities: Technology adoption models with "network externalities" have been well studied in the literature, especially for the adoption of competing technologies (David, 1985; Farrell & Saloner, 1985; Katz & Shapiro, 1986 cited in Fall 2014). Technology is characterized by network externalities that occur when the benefit an agent obtains from his adhesion to a network is positively correlated to the number of members connected to this network. In these type of models, users are heterogeneous, with different preferences for innovation and simultaneously decide whether to adopt or switch to a new technology or stick with their current own. In the same matter, it may be optimal for a firm to adopt a technology, simply because others have already done so, regardless of the information they have on the efficiency of such technology (Arthur, 1989). Katz and Shapiro (1986) suggest three possible sources of network externalities: i) the direct physical effect of the number of adopters on the quality of a particular technology.

(4) The Unified Theory of Acceptance and Use of Technology Model

Venkatesh et al. (2003) proposed and tested a unified information technology acceptance and use research model, called the Unified Theory of Acceptance and Use of Technology (UTAUT). The model integrates significant elements across eight prominent user acceptance models and formulates a unique measure with core determinants of user behavioral intention and usage. In this model the original UTAUT aims to explain user intentions to use an IS and subsequent usage behavior. Furthermore UTAUT model suggests that there are a set of factors that influence the intention of the individual user acceptance (Mohammad, 2012). Venkatesh (2003), in their research article theorized that, four constructs play a significant role as direct determinants of user acceptance and usage behavior: (i) performance expectancy, (ii) effort expectancy, (iii) social influence, and (iv) facilitating conditions. Gender, age,

experience, and voluntariness of use are also explained to mediate the impact of the four key constructs on usage intention and behavior (Venkatesh et al., 2003).

(i) Performance Expectancy (PE): Performance expectancy (PE) is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance (Venkatesh et al., 2003). PE Is the strongest predictor of intention and remains significant at all points of measurement in both voluntary and mandatory settings however from a theoretical point of view, there is reason to expect that the relationship between performance expectancy and intention will be moderated by gender and age.

(ii) Effort Expectancy: Effort expectancy found to be significant in the early time periods, but became insignificant over time (Venkatesh et al., 2003). As individuals became more familiar with the technology, the effort needed to use the technology declined. Previous research supported that the effort necessary to learn and use a new technology affected its acceptance and use (Gefen & Straud, 2000). In other word the easier a system is to use, the more likely it will be accepted and used (Sungwoo, 2009). To the extent that promoted effort expectancy leads to improved performance, previous studies indicated that effort expectancy had a direct effect on performance expectancy and intention to use mobile learning (Carlsson et al., 2006).

(iii) Social Influence: Social influence is defined as the degree to which an individual perceives that important others believe he or she should use the new system. Social influence has an impact on individual behavior through three mechanisms: compliance, internalization, and identification (Venkatesh and Davis, 2000). Previous models showed that gender moderated this relationship as the effect was stronger for females than males (Sungwoo, 2009). However, current results showed that gender failed to moderate this relationship when testing the proposed model. Experience also was not a significant moderator of this relationship, which fails to support the UTAUT findings in which non-users showed a stronger effect than users (Venkatesh et al., 2003).

(iv)Facilitating Conditions: Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system (Venkatesh et al., 2003). This definition captures concepts embodied by three different constructs: perceived behavioral control from (TAM), facilitating conditions from (MPCU), and compatibility from (IDT).

(5) Innovation diffusion theory (IDT)

Another theory pertaining to the adoption of new technology is the Innovation Diffusion Theory by Rogers (1983). According to Rogers (2003), there are five perceived characteristics of innovation that can be used to form a favorable or unfavorable attitude towards an innovation, namely: relative advantage, compatibility, complexity, trialability, and observability.

2.1.5 The Main Players of Mobile Banking

In order to analyze mobile banking we have to define the different players who participate in mobile banking. These players' actions and practice are important in developing mobile banking industry. Mobile banking is a collective participation of four parties that is:

1. Banking sector represented by operating banking institutions: The banking sector is composed of various financial institutions like Commercial bank of Ethiopia, Dashen bank, United bank and other banks operating in the Ethiopian economy. These banks provide a network for accessing mobile banking services. The banking institutions have realized that there is need to increase financial inclusion by providing a network that helps the unbanked people to access financial services even without bank accounts (Daniel, et.al, 2014).

2. Mobile network providers operating in the country: Network providers are the diverse companies that provide mobile banking services which include banks and telecommunication companies. An example of a Mobile Network provider is Ethiopian Telecommunication Corporation the Ethiopian people to send and receive money with or without an account or mobile phone. These network providers charge a fee for using their financial services and hence, the reason for being in business (Daniel, et.al, 2014).

3. Beneficiaries, businesses and private consumers: Beneficiaries of the mobile banking services are the local Ethiopian citizens or other people in

Ethiopia using the mobile banking services and business people who intend to make their payments using mobile money. Businesses and private consumers always use mobile money services to send or receive money from different kinds of people who are either family members or business partners. Mobile banking improves these players' standards of living (Abdulatif, 2015).

4. Regulating authorities (Country's Central bank): The regulating authority is the Central Bank of Ethiopia which is the country's top most authority in banking matters. Central Bank of Ethiopia regulates fiscal and monetary activities that take place in the country. To operate in the country, the financial service providers have to follow all the regulations and terms set by the regulatory authorities (Daniel, et.al, 2014).

The most vital factors are considered to make M-Banking successful are policy and regulations. Any profit making business usually takes into account the performance of all parties involved in the line of business (Abdulatif, 2015).

2.1.6 Information technology and the Global Market

The globe has more or less become a village; this is as a result of the internet and in fact the World Wide Web (www) whose impact has been felt by all sectors as well as all aspects of human endeavors. The ripple effect of globalization an offshoot of the internet and World Wide Web has breathed a new life into the way individuals and businesses communicate .It has also amalgamated various cultures as well as brought high level but stiff economic competition among various players in the global business arena. The banks and other financial institutions has leveraged the explosive powers of this super-high way and most banks now use it as the main vehicle of marketing, selling as well purchasing. The era of brick-and-mortar and high costs attached to its establishment are now gradually giving way to simple and lower cost form of business transactions simply over the internet and the worldwide-web mostly in the developed countries, and now creeping into the developing countries (Edwin, 2015).

2.1.7. Technologies Employed to Provide Mobile Banking Services

Mobile banking services could be used through more than one channel such as short messaging service/messaging and application download (client-based) (Cudjoe et.al, 2015).

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) (Cudjoe et.al, 2015).

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 details and afterwards the transmission is made by sending out the data, this banking process conducted offline reduces online connection time and cost) (Cudjoe et.al, 2015).

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) (Cudjoe et.al, 2015).

2.1.8 Overview of factors influencing mobile banking

User adoption of mobile commerce applications has been determined by many factors such as:

1) Risk and security: security and trustworthiness of a service was identified as one of the most important factors within every target customer segment when deciding on the use of a banking service delivery channel. Using mobile phone in banking is trustworthy. Fain and Roberts (1997) defined "risk is a perception of consumer, not a characteristics of a product". It was found that the security factor could influence consumers' attitudes towards online banking .Furthermore, it was considered to be one of the greatest concerns in adoption of mobile banking services, as individuals may worry about security issues during mobile banking service transactions such as data input and output mechanisms loss of connection risk and personal performance mistakes. As a result, many people may decide not to use this service and ignore the extra benefits of using mobile banking (Yu, 2009).

2) Service characteristics: The account balance service is one of the most promising mobile banking services, and is designed to help customers check their account balance and latest transactions immediately anytime/anywhere. Location free access created convenience in requesting account balances. Furthermore, accessibility and portability are classified as dimensions of convenience in the consumer behavior. Consequently the spatial and temporal distance between need recognition and need satisfaction can be considered important for doing banking via mobile phone. The ability to allow consumers to have more control over their financial situation is one attraction of mobile banking services, as the consumer prefers to act for himself/herself when dealing with his /her own monetary transactions through the mobile device. The flexibility of being able to use the service wherever and whenever the users want enables immediate completion of banking tasks (transferring money or paying a bill). This would save time and be perceived as convenient and efficient. The bank provides several services through mobile media, information based, transaction–based and personal services. The SMS service is the easiest way to check account balances and latest transactions via mobile phone. Speed of data transmission and the user interface impaired the added value of mobile services. Therefore, the characteristics of the service as perceived by the user and provided by the banking intuition and service

provider are important factors influencing the usage of mobile banking (Yu, 2009).

3) Trust: In business studies, trust has been found to be important for building and maintaining long-term relationships .Electronic exchanges are believed to present numerous risks to customers while trust appears to be especially important for creating loyalty when the perceived level of risk is high. This has been identified as key to customer loyalty especially in the area of e-commerce, because it is crucial wherever risk, uncertainty and interdependence exist. The banking sector is strongly associated with high levels of trust related to security and privacy issues in the physical environment. Therefore, trust is an important consideration in the development and fostering of e-commerce relations in the context of knowledge-based economy. Lowering perceived risks associated with online transactions as well as maintaining transaction trust is vital keys to attracting and retaining customers (Benjamin, 2015).

4) Service Quality: Service quality refers to reliability, content quality, personalization. Daft and Lengel (1986) suggested that accuracy, reliability, and quality of information exchanged across a medium were critical to the effectiveness. In the context of mobile, the content refers to information, features, or functions that are offered via mobile banking services. Such content should be constructed logically to help user find information and incorporate features such as accuracy, timeliness, relevance, and flexible presentation (Huizingh, 2000). A reliable mobile system should ensure the effectiveness of mobile banking.

5) Perceived cost: The degree to which an individual views that utilizing mobile banking will incur cost s defend as perceive cost (Luarb & Lin 2005). These costs could typically include the cost of the mobile device, network charges, and transaction charges for bank costs as well as costs for data sent via the network infrastructure. The factor that had the least impact on mobile banking adoption in comparison to the other variables which includes perceived usefulness, perceived risk and compatibility, was perceived cost (wu and wang, 2005).

6) Behevioral intention

Consistent to all models drawing from psychological theories, which argue that individual behavior is predictable and influenced by individual intention, UTAUT contended and proved behavioral intention to have significant influence on technology usage [Venkatesh et al. 2003]. Given that the ultimate goal of businesses (i.e. commercial banks) is to attract consumers to adopt their services.

2.2 Empirical review

Building on the above literature review, empirical mobile banking and related studies were summarized below. The original UTAUT model proposed by Venkatesh et al. uses four moderators as determinants of intention and behavior with four core determinants, the moderators are sex, age, experience, and voluntariness of use.

A. Sex

Previous research showed that sex differences have shown to exist in technology acceptance (Venkatesh & Davis, 2000; Wolin & Korganmkar, 2003; Gefen & Straudb, 1997). Wolin and Korganmkar (2003) found that males and females differ significantly in several dimensions with 28 males exhibiting more positive beliefs and attitudes about E-commerce than females. In the UTAUT model, Venketash et al. (2003) proposed that gender would moderate the relationship between performance expectancy, effort expectancy, and social influence on intention to utilize the technology males exhibiting more positive beliefs and attitudes about E-commerce than females. They suggested that such differences stem from gender roles and socialization processes. Effort expectancy on intention was also moderated by gender. Previous studies have found a stronger proportion of perceived usefulness of mobile services among men than among women (Nysveen et al. 2005).

B. Age

Numerous studies have discussed the effects of demographics on new technology adoption. However, compared to traditional innovation diffusion studies (Rogers 2003) that reveal earlier adopters of technological innovations as typically younger in age, having higher incomes, better educated, and having higher social status and occupation, research findings in the context of electronic banking are not consistent. Similar to gender, age is theorized to

play a moderating role in the UTAUT model. In looking at gender and age effects, it is interesting to note that gender differences can be misleading without reference to age, Levy (1988). Venketash et al. (2003) proposed that the influence of performance expectancy will be moderated by both gender and age. Furthermore Age is confirmed as integral features of UTAUT.

C. Experience

Several studies showed that prior similar experience, such as computer or internet use, strongly influence intention to use and usage behavior of a specific system (Venkatesh et al, 2003; Wu et al., 2007). Venkatehs et al. (2003) suggested that an increase in experience would decrease the influence of effort expectancy and social influence on behavior intention to use. Kim and Malhotra (2005) confirmed that when user experience increase, effort expectance and social influence decrease. People who have more experience 29 using similar system are more relying on instrumental basis rather than social basis because experience users of mobile devices or wireless internet are more skillful and easy to use M-commerce (Wang and Yang, 2005).

D. Voluntariness of use

Voluntariness is the level to which an individual can choose to use a system; image is the extent to which individuals believe the use of a system will increase their social status within a group or how well others perceive them (Venkatesh and Davis, 2000). Yu (2012) on his study factors affecting to adopt mobile banking empirical evidence from the UTAT model, found that social influence, perceived financial cost, performance expectancy, and perceived credibility, significantly affect intentions toward mobile banking. The model employed for the study was Unified Theory of Acceptance and Use of Technology (UTAUT), distributing 441 respondents. This study discovered that gender significantly moderated the effects of performance expectancy and perceived financial cost on behavioral intention, and the age considerably moderated the effects of facilitating conditions and perceived self-efficacy on actual adoption behavior. On the same study, the determinants of the adoption and use of m-banking in Senegal. It was based on technology diffusion theories, particularly applied to households, existing within a general framework of technology leapfrogging by developing countries. They distinguish between the possessions (partial adoption) from the actual use

(total adoption) of m-banking. The study was based on a sample of 1052 households in the suburbs of Dakar. The main results are that the two decisions (adoption and use) are not independent from each other. Household's characteristics such as education and possession of a bank account are determinants of the adoption while age, gender and being a member of a tontine are determinants of the use.
In addition, the main sources of information leading to the adoption of M-banking are formal such as promotions from mobile operators and informal such as friends and family networks.

The study examined by Cudjoe et.al (2015) on the determinant of mobile banking adoption among bank customers in Ghana applied theoretical frameworks which have been developed from existing literatures on innovation and revealed that, awareness, usefulness, simplicity, compatibility, self efficacy and creditability of mobile banking service significantly affected consumer's intention to adopt and use mobile banking services provided by Access Bank. Additionally the study unveiled that, perceived credibility and perceived financial cost were the major setback with regards to customers adoption of mobile banking services provided by Access Bank, and as a result of this, Ghanaians have formed a negative behavioral pattern towards mobile banking. In addition, the findings showed that, perceived credibility and perceived financial cost have a stronger effect on consumer intention to adopt and use mobile banking service than perceived usefulness and perceived ease of use.

Ndumba et.al (2014) assessed the factors affecting the adoption of mobile banking in Kenya's commercial bank. This study employed a descriptive research design. The sample size for the research comprised of, data were collected from 67 customers through use of questionnaires. The research results indicated that the adoption rate of mobile banking in Kenyan commercial bank is below target. The main reasons behind the low adoption of mobile banking service were risk of loss and fear of system failure. Customers' perceived risk was found to negatively affect adoption of M-Banking service. On the other hand, perceived convenience, trust, the reliability of M-Banking services was found to positively affect adoption of these services. In the same topic Yu (2009) studied factors influencing the use

of Mobile Banking in the case of SMS-based Mobile Banking in New Zealand. The research adopted the basic concepts of the Technology Acceptance Model (TAM), as well as some constructs derived through a focus group discussion a survey questionnaire was developed and employed to collect data sample of 250 university students in New Zealand the results of the data analysis factors such as service quality and service awareness are influencing user perceptions about the usefulness of SMS mobile banking which in turn affect intention to use and adoption of mobile banking.

Laekemaryam (2015) examined factors affecting the adoption of mobile banking in commercial bank of Ethiopia based on the Unified Theory of Acceptance and Use of Technology (UTAUT) model to identify the causal relationships between adoption of mobile banking and Performance expectancy, perceived risk, perceived cost, effort expectancy, trust, mobile banking service quality and behavioral intention items. The data were analyzed using AMOS version 23 and SPSS version 20. And the data was analyzed through descriptive statistics such as frequency, correlation and ANOVA. Each variable is measured using five point likert scale using primary data collection method, questionnaire were distributed to target respondents of customers of commercial bank of Ethiopia for mobile banking users. The findings of this study revealed that performance expectancy, perceived risk, perceived cost, effort expectancy and trust, were the factors affecting users having intention to adopt mobile banking. Meanwhile, the Mobile banking service quality was found to be insignificant in that study. Furthermore, the study also manages to present demographic variables effects toward behavioral intention to adopt mobile banking, and found that gender is non-significant factor for mobile banking adoption. Age and occupation is found as significant factor for adoption of mobile banking but educational qualification was not a significant factor for adoption of mobile banking in Ethiopian mobile banking user context.

Worku (2015), also studied the factors affecting adoption of mobile banking the case of commercial bank of Ethiopia in Addis Ababa city using the technology acceptance model and analyzed the data gathered using descriptive statistics such as frequency, percentage, mean, mode, median and standard deviation. Besides binary logistic regression analysis is conducted to

understand the relationship of mobile banking adoption and perceived usefulness, perceived ease of use and perceived risk. The study found out that perceived usefulness and perceived ease of use have positive relationship with the adoption of mobile banking whereas perceived risk has negative relationship with the adoption of mobile banking.

Ayana (2012) examined the barriers and drivers of the adoption of electronic banking system in Ethiopia. The study was conducted based on the data gathered from four banks in Ethiopia; three private banks (Dashen bank, Zemen bank and Wegagen bank) and one state owned bank (Commercial bank of Ethiopia). A research framework developed based on technology-organization-environment framework and Technology acceptance model guided the study. The result of the study indicated that security risk, lack of trust, lack of legal and regulatory frame work, lack of ICT infrastructure and absence of competition between local and foreign banks as the major determinants of adoption of electronic banking system in Ethiopia. The study also identified perceived ease of use and perceived usefulness as a driver of adopting E-banking system.

Muhammad et.al (2015) studied the determinants of e-banking adoption in Pakistan by adopting the TAM model and the framework of structural equation modeling (SEM). For that purpose, they have used Analysis of Moment Structures (AMOS) to test the hypothesized model. Overall, the empirical outcome suggests that the enjoyment had a greater total effect on perceived usefulness (PU) and perceived ease of use (PEOU) while, subjective norm shows greater total effect on the intention to use the e-banking service. And also Kwame et al (2014) studied on Applying Logistic Regression to E-Banking Usage in Ghana to meet the objective the researchers was used 241customers of three state-owned retail banks from Kumasi in Ghana, were used as sample for the survey. Responses gathered from the customers were mainly analyzed using a binary logistic regression and find that internet banking; ATM, and mobile phone banking were the commonly identified e-banking services offered by the banks. Among such services, ATM was the most frequently patronized service whereas internet banking recorded very low patronage. From the chi-squared test of association, customer's operational bank and occupational status were found

to have significantly informed the decision to use e-banking. With respect to the logit analysis, customer's operational bank, occupational status and monthly income were significant socioeconomic classification variables that informed customer's decision to use e-banking.

Edwin (2015**)** examined the empirical determinants of consumers' uptake of electronic banking in selected states of Nigeria. The research uses the consumer decision making process to identify factors that consumers use when deciding between electronic banking and non-electronic banking services. Factors include service quality dimensions, service product characteristics, perceived risk factors, user skill factors, and price factors. And the demographic variables include age, gender, marital status, ethnic background, educational qualification, employment, and income.

3. Research Methodology

3.1 Research Approach and Design

The research approach used in this study is quantitative in nature which involves the use of primary and secondary data in order to answer the research questions to achieve its objective. And this research is about the determinants of the adoption of mobile banking services in Commercial Bank of Ethiopia South Addis Ababa District. The research adopted mainly causal/explanatory type of research design which relevant to achieve a research objective that aims at examining the relationship among the different factors adoption of mobile banking services. .

3.2 Population and sampling

There are four districts in Addis Ababa. All branches perform similar tasks, and share same role in achieving the Company's objectives. So, because of the homogeneity of those branches, the researcher used simple random sampling to select sample district. After selecting the sample district of south Addis Ababa the researcher used stratified sampling to select the branches. Under South Addis District of CBE, there are around 80 branches and differentiates in their grade level. Accordingly, since there are branches with grade level 1, 2, 3, and 4 and finally, since the willingness of respondents is very necessary, the researcher used convenience sampling technique and personal interview to select sample respondents. There were around

1,295,150 (in January, 2017) customers in South Addis District of CBE. And there are 80 branches in the District. For the purpose of this research, to get the sample size of these 1,295,150 customers, the researcher used the confidence level of 95% and error of margin 5 %, Z score 1.96, and population proportion 0.5. So, the sample size was 384 customers.

$(1.96)^2(1295150*0.5)\ (1-0.5)/\ (0.05)^2(1295150-1) + (1.96)^2\ 0.5(1-0.5)$

1243862.06/3238.7765=384

Sample size is determined based on Krejcie & Morgan (1970), which is presented as:

$S = \frac{X^2 N_p(1-p)}{d^2(N-1)} + p(1-p)$, where

S= required sample size

X=Z value (1.96)

N= Population size

P=Population proportion

d=Error of margin

After determining the total sample size, the researcher used stratified sampling technique to decide on the sample size to be drawn from each stratum. Stratification was done based on the grades of the branches operating in south Addis Ababa district. There are about 80 branches under the District, and their distributions and the number of samples drawn from each stratum are presented in the table below.

Table 3.1 Distribution of Samples by Grade and Branches

Grade of	**Number of**	**Total number of**	**Proportionate**

Branches	branches	customers	number of sample
Grade 1	19	101205	30
Grade 2	50	554779	164
Grade 3	2	103442	31
Grade 4	9	535724	159
Total	80	1295150	384

Source: Researchers

Convenience sampling technique was applied to select the customers to be interviewed. This was done when customers come to the branches to get banking services. While random sampling would have increased the representativeness of the sample, obtaining the addresses of the customers and reaching them where they are available was very difficult and costly, though not completely impossible. This could be taken as one of the limitation of the study in utilizing the findings of the research. The researchers asked the willingness of the customers to provide information about the status of mobile banking service usage and other relevant variables, before indulging on the interview.

3.3 Data Source and Data Collection Method

The study is collected both secondary and primary data to examine the determinants of adoption of mobile banking services provided by commercial bank of Ethiopia. Secondary data are used mainly to have information about mobile banking customers and total bank customers. It was collected from Commercial bank of Ethiopia, and national bank of Ethiopia. Primary data were collected from customers of south Addis Ababa district by conducting personal interview with the customers of south Addis Ababa district. Variables included in the interview were demographic characteristics of sample customers, their perception about the usefulness of mobile banking technology, ease of use and risk associated with the use of mobile banking, etc.

3.4 Model specification and Data analysis method

Based on the theoretical review and empirical considerations the following model is specified by using binomial logistic regression model. The mathematical (functional) expression of the model is given as follows:

$\text{logit}(pi) = \beta 0 + \beta 1\ \text{X1i} + \beta 2\text{X2i} + \cdots + \beta n\text{Xni}$

Where Pi=is the probability of the presence of characteristic of interest.
The functional form of the regression model estimating the factors that affect the usage of mobile banking in the commercial bank of Ethiopia presented as follows:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, E)$

Where:

Y = Use of mobile banking; 1 if the respondent is mobile banking user; 0 otherwise

X1 = sex; 1 if male, 0 female.

X2 = Age level of the respondent(in years).

X3 = Monthly Income level of the respondent.

X4 = Year of schooling

X5 = Fear of misuse of personal data; 1 if respondent is afraid that his/her personal data will

be misused; 0 otherwise.

X6 = Perceived security; 1 if respondent perceives commercial Bank's as secure, 0

otherwise.

X7=Perceived usefulness (relative advantage); 1 if respondents perceive mobile banking is

useful, 0 otherwise.

X8= Perceived ease to use); 1 if respondents perceive mobile banking is easy to use, 0

otherwise.

X9=Occupation; 1 if the respondents are employed, 0 otherwise

X10=Experience on technology; 1 if the respondents are experience on technology, 0

otherwise

X11=Service quality; 1 if respondents perceived service quality is there, 0other wise

X12=Perceived cost; 1 if respondents perceived the service is costly, 0 other wise

X13=Voluntarism to use; 1 if respondents are voluntary to use the service, 0 other wise

E=error term

The explicit estimable bi nominal logistic econometric model is formulated as follows:

$$User = \beta_0 + \beta 1x1 + \beta_2 x2 + \beta_3 x3 + \beta_4 x4 + \beta 5x5 + \beta 6x6 + \beta 7x7 + \beta 8x8_+ \beta 9x9 + \beta 10X10 + \beta\ 11X11 + \beta\ 12X12 + \beta\ 13X13 + E$$

3.4.2. Data analysis method

A logistic regression technique was employed to examine the factors influencing the adoption of mobile banking products. This technique will be employed to find the model which would best fit in describing the relationship between the dichotomous characteristic of interest (adoption intentions) and the thirteen independent variables.

3.5 Multicollinearity Test

A test of Multicollinearity has conducted to determine the correlation of the independent variables. Multicollinearity refers to the extent to which an

independent variable could be explained by other independent variables in the analysis and if too high this can have harmful effect on regression. Multicollinearity occurs when two or more predictors in the model are correlated and provide redundant information about the response. It is a situation where the variables are too highly correlated. The correlations between constructs were checked for Multicollinearity and the results showed that the correlations between all constructs were measured by variance inflecting factor(VIF) which is greater than 10 multicolliniarity problem is there (Maddala,1992)

4. Results and Discussion

In this section analysis and discussion of the data gathered based on the research methodology designed for the research is conducted. For this purpose, statistical instruments called descriptive statistics as well as logistic regression analysis is used to perform data analysis. Besides the descriptive analysis inferential statistics is applied to find out the relationship of mobile banking adoption with determinant factors hypothesized in the research model.

4.1 Results of Descriptive Statistics

The age of majority of the respondents was between 18-30 years of age numerically 64.08 percent. Whereas 20.44 percent falls between the ages of 31-40 and that means more than 92.5 percent of the customers were within the age of 18- 50 years. The fact that the majority of the respondents were young and adult implies it is an opportunity for mobile banking adoption in the coming periods. Because the youth are often more adventurous and more fascinated by technology than the old.

Year of schooling attained by respondents were between grade 11 to 15 years, which accounts 62.71 percent of the total respondents followed by those who attained 16 to 20 years of schooling (15.19 percent). This indicates that most of CBE customers in south Addis Ababa district have higher educational status which is an opportunity to CBE to provide advanced services such as mobile banking since ease of use of the service will be better. Among the total sample respondents, 35.36 percent of them earn a monthly income between 5001-10000 birr. Whereas 25.97 percent of the respondents earn monthly

income between 1001-3000 birr and also 21.27 percent of the respondents earn monthly income between 3001-5000. Hence most of the customers have income above the poverty line which is (1300 ETB) by international standard (World Bank, 2016).These is a good opportunity for mobile banking adoption as Jayawardhena (2000) claimed that high-level income customers are more likely to use electronic banking.

Table 4.1 Descriptive statistics result for binary variables

Variables	**Frequency**	**Percentage**
Cell phone Ownership		
Yes	350	96.68
No	12	3.32
Total	**362**	**100**
M-banking awareness		
Yes	302	83.42
No	60	16.58
Total	**362**	**100**
Mobile Banking Adoption		
Yes	235	64.92
No	127	35.08
Total	**362**	**100**
Sex		
Male	197	54.42
Female	165	45.58
Total	**362**	**100**
Work status		
Employed	306	84.53
Unemployed	56	15.47
Total	**362**	**100**

Source: Survey data and own computation (2017)

Among the respondents who adopted mobile banking service 40.61 percent of them mentioned that they used all mobile banking service provided by Commercial Bank of Ethiopia. The most frequently used services are

checking account balance which accounted 21.55 percent and money transfer service, which accounted 18.23 percent implying that payments using mobile banking needs to be promoted. So that customers will exploit the benefit of m-banking services by effecting payment wherever they are without incurring transportation and time cost. Summary of the descriptive statistics of the independent variables used in the model show that the average age of respondents is 31.41 years with standard deviations of 11.34. The average monthly income of the respondents is 4512.508 birr. The average years in formal education are 12.84807, indicating that respondents on average are high school leavers.

With regard to cell phone ownership and usage as shown in table 4.1 above 96.68 percent of the sample respondents replied that they have cell phone and use it. On the other hand 3.32 percent of the respondents replied that they do not have cell phone personally. The implication of this finding is that cell phone ownership is not hindrance for mobile banking adoption since the majority of bank customers in south Addis Ababa have cell phone. The respondents' response with regard to the awareness of customers about the existence of mobile banking services as stated in table 4.1 above, 83.42 percent of respondents are aware of the existence of mobile banking service whereas only 16.58 percent of the respondents lack awareness about the existence of mobile banking service. This implies that most CBE customers in south Addis Ababa know the existence of m-banking but this does not mean that customers have adequate information about m-banking since among those who respond that they know the existence of the services they need additional information about its usefulness, ease of use and risk.

In terms of usage of mobile banking services the respondents reply indicate that among the total respondents 64.92 percent use mobile banking as can be seen from the table 4.1 above. Whereas 35.08 percent of respondents replied that they totally not interested to use mobile banking service. This shows us commercial bank of Ethiopia specifically south Addis Ababa district needs to work hard to make customers understand about m-banking advantages in detail. The respondent's gender profile indicates, as shown in the table 4.1 above, the majority of the respondents are male which accounts 54.42 percent of the sample respondents where as female respondents account for 45.58

percent of the sample respondents. This shows that women lag behind men in using banking services which may also affect adoption of mobile banking adoption since the base for mobile banking adoption in the bank led model of mobile banking is bank customers. It is similar with the study done by Kohsay (2009), more males than females tend to adopt self service technology such as mobile banking and other similar technologies.

The work status of the respondents, most of them are employed which is 84.53 percent of the total respondents. And 15.47 percent are unemployed this is a good opportunity for mobile banking adoptions because those who are employed have time constraint since most of them are at work place when the bank branches are operational (have less time freedom). Hence, mobile banking will give them time saving advantage by enabling customers to make banking transactions and payments such as payment of utilities and other bills, money transfer etc. without traveling to the bank branches. This confirms the previous studies that said those who belong to the upper middle class and have high-level occupations are more likely to use electronic banking (Jayawardhena and Foley, 2000).

4.2 Results of Logistic Regression

To examine the suitability of the logistic regression model, Omnibus Tests were conducted. The Omnibus Tests of Model Coefficients gives an overall indication of how well the model performed (Pallant, 2011). This is referred to as a 'goodness-of-fit' test. The results in Table 11 show that the test is highly significant ($p<0.01$). Hence, the relationship between the independent variables and the dependent variable is verified. To diagnose the presence of multicolinearity in the logit model, the tolerance test or variance inflecting factor (VIF) was performed it shows how much of the variability of the specified independent variable is not explained by the other independent variables in the model. All the observed tolerance values are greater than 0.10, or the mean of VIF are less than 10 indicating that there is no problem of multicolinearity in the logistic regression model.

Table 4.2 Results of Logistic regression Model

The predictive power of the model was tested using pseudo R square tests. The result from this table indicates that 75.85 percent of the variations in the dependent variable are explained by the model or explanatory variable.

Number of obs = 362
LR chi2 (13) = 355.83
Prob > chi2 = 0.0000
Log likelihood = -56.6483
Pseudo R^2 = 0.7585

Variables	**ß**	**Std. Error**	**Z**	**P>/Z/**	**VIF**
Constant	-9.72***	1.98	-4.91	0.000	
Sex	1.87***	0.69	-2.72	0.007	1.20
Age	-0.045	0.033	-1.37	0.172	1.53
Income	0.003**	0.00	2.38	0.017	1.89
YSC	0.043	0.08	0.53	0.593	1.61
FPD	0.49	0.59	0.84	0.398	1.40
PS	2.07***	0.67	3.05	0.002	2.24
PU	2.46**	1.187	2.08	0.038	2.41
PEU	0.90	0.71	1.28	0.202	2.49
OCC	0.90	0.89	1.01	0.312	1.63
EOT	3.13***	0.66	4.74	0.000	2.09
SQ	0.27	0.61	-0.44	0.661	1.65
PCO	-0.78	0.89	0.88	0.380	1.30
VTU	4.72***	0.92	5.11	0.000	2.75

***, ** and ** represent 1%, 5% and 10% level of significances respectively.
Source: Survey result (2017)

From Table 4.2 above the coefficient of sex (X_1) is 1.865 and the probability of the Wald statistic for the variable sex (X_1) is significant at one percent ($P< 0.01$). Thus, the null hypothesis that the β coefficient for sex (X_1) is equal to zero is rejected. It can be deduced from the result that males are more adopted than females. This confirms the hypothesis that male use of mobile banking innovations increases adoption. The finding is in agreement with that of previous research (Venkatesh & Davis, 2000) found that males and females differ significantly in several dimensions males exhibiting more positive beliefs and attitudes about E-commerce than females. They suggested that such differences stem from gender roles and socialization processes. Effort expectancy on intention was also moderated by gender. Previous studies have

found a stronger proportion of perceived usefulness of mobile services among men than among women (Nysveen et al. 2005).

The hypothesis that higher incomes amongst customers increase the likelihood of adopting mobile banking innovations is accepted. This is because of the positive β value of 0.003 as we can see from regression table 4.2 above. It is often postulated that customers with higher income levels are more likely to adopt mobile banking products than their counterparts with low income levels (Kolodinsky *et al*., 2004). A study conducted in South Africa cited in Daniel (2014) by Singh (2004) also found that adopters of e-banking innovation are those in the high-income bracket. Although this finding confirms what is often found in the literature, it nonetheless makes a lot of sense since the interplay of income level and the other factors influencing innovation adoption could determine whether or not an innovation is adopted by higher-income clients.

Perceived security was found to be a significant factor for facilitating customers' adoption of mobile banking. As indicated by the β value of the regression result which is 2.06 which is significant at one percent. Thus, the hypothesis that perceived security has positive relation with the likelihood of mobile banking adoption is accepted. The results indicate that the level of perceived security is positively related to the likelihood of consumers adopting mobile banking. The finding is different from the previous research showing that perceived security is an insignificant factor for predictor of mobile banking adoption that are done by (Bucevska et.al, 2011) in Ghana.

The study also finds that perceived usefulness (PU) of mobile banking innovations increases adoption of its services. This is indicated by a significant level of five percent and a beta (β) value of 2.46, which can be observed in logistic regression table (see Table 4.2). This shows that perceived usefulness has a significant and positive effect on the intention to adopt mobile banking products. The result supports studies by Kolodinsky *et al*. (2004) who established a positive relationship between perceived usefulness and the adoption of mobile banking services. This study also found that experience on technology has a positive and significant factor of mobile banking adoption at one percent level of significance. As we can see from table 4.4 experience on technology coefficient of beta (β) was 3.13 it can be deduced from the result that experienced customer has more adopted than non

experienced customer in using mobile banking technology. The greater the level of experience on technology associate with the use of a particular self service product, the more likely they are to adopt it.

Several studies showed that prior similar experience, such as computer or internet use, strongly influence intention to use and usage behavior of a specific system (Venkatesh et al, 2003; Wu, Tao, & Yang, 2007), Venkatehs et al. (2003) suggested that an increase in experience would decrease the influence of effort expectancy and social influence on behavior intention to use. Kim and Malhotra (2005) and Venkatesh et al. (2003) confirm by showing that when user experience increase, effort expectance and social influence decrease. People who have more experience using similar system are more relying on instrumental basis rather than social basis because experience users of mobile devices or wireless internet are more skillful and easy to use mobile banking (Wang and Yang, 2005).

The results in Table 4.2 also indicate that voluntarism to use mobile banking technology has increases the likelihood of mobile banking adoption. The logistic regression result of beta (β) 4.72 which is significant at one percent level of significance indicates that bank customers who are voluntaries to use mobile banking are more likely to adopt (continue to use) than non voluntary customers to use mobile banking products. Voluntariness is the level to which an individual can choose to use a system, image is the extent to which individuals believe the use of a system will increase their social status within a group or how well others perceive them (Venkatesh and Davis, 2000).

5. Conclusion and Recommendations

The research paper uses descriptive statistics as well logistic regression analysis model with additional variable of experience on technology and voluntarism to use mobile banking technology to understand customers' perception of the factors that affect adoption of mobile banking technology in the commercial bank of Ethiopia in case of south Addis Ababa district customers and following are the summary of the findings of the research and its implication. The responses of the sample respondents indicate that most of the respondents 83.42 percent of the respondents are aware of the existence of mobile banking. On the other hand even if most of the respondents are aware of the existence of mobile banking service only 64.92 percent of respondents use mobile banking services. However, 35.08 percent of sample respondents do not use mobile banking services. The main objectives of this research are to understand the factors affecting mobile banking adoption in commercial bank of Ethiopia. The first specific objective of this research work is to examine the effect of demographic factors on the adoption of mobile banking technology by bank customers. The finding of the research shows that only sex is the significant factor for mobile banking adoption which are males are 1.865 more times used than females due to some factors.

The second objective of this research is to examine the effect of customers experience on technology and voluntarism to use, on the adoption of mobile banking in commercial bank of Ethiopia. The finding of the research shows that customers experience on technology and voluntarism to use has a positive relationship with mobile banking adoption and the most significant factor; customers has an experience on technology and have voluntarism to use the technology then based on empirical evidences about the research potential customer are ready to adopt the technology.

The third objective of this research work is to examine the influence of user's perceived risk on the adoption of mobile banking. The finding of the research shows that perceived risk such as fear of personal data has an insignificant factor for mobile banking adoption based on regression result. And also the logistic regression analysis conducted in the research shows perceived usefulness has positive relationship with mobile banking adoption and customers also perceive mobile banking as useful. And if mobile technology is perceived as useful then based on the empirical evidences about research

potential customer are ready to adopt the technology. The finding also perceived security and income of the customer has positive relationship with mobile banking adoption and customers perceive mobile banking is secured for using the service and if mobile technology is perceived as secured to use and customers have higher income then based on empirical evidences about the research potential customer are ready to adopt the technology.

The study identified six important factors that influenced the adoption of mobile banking technology in commercial bank of Ethiopia. Mobile banking system is a new financial evolution in Ethiopia, but it's an important issue, because it has a great impact on the whole banking system, at the same time it's difficult and need a lot of efforts to be adopted and accepted by the banking industry, so it need a lot of efforts to succeed. Based on the above summery and conclusion, the researcher recommends the following points.

- Hence, policy makers of commercial bank of Ethiopia should concern on regulation about security issues, the manner in which mobile banking are implemented, identifying users, protecting users and how much money can be transacted, should be a major area the regulation should address.
- Ethio telecom as mobile network service provider shall give special attention to mobile banking technology from its side to provide reliable network to commercial banks specifically Commercial Bank of Ethiopia as the customers perceive the mobile network is not risky to adopt mobile banking.
- The banks have to initially target, the high income customers and male users to promote services such as mobile banking, so that the probability of adoption is more. Later on they can target other potential segments.
- Commercial bank of Ethiopia shall produce user guide for mobile banking services using various means such as booklets, flyers, and in electronic means such as website based electronic documents to make users more experienced and knowledgeable about mobile banking so that the probability of adoption is more.
- Commercial bank of Ethiopia shall broaden the service portfolio under mobile banking technology to make the service more useful and as well to be perceived useful in the minds of its customers.

- Commercial Bank of Ethiopia in general and its south Addis Ababa districts in particular shall promote mobile banking services to its customers using various promotional tools appropriate to the target market so that it can increase the awareness and voluntarism to use the service and these increases the adoption level of the mobile banking technology.

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