



Role of Electronic Banking on Financial Performance of Commercial Banks in Ethiopia

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Declaration

I, Solomon Worku, hereby declare that the thesis work entitled “Role of Electronic Banking on Financial Performance of Commercial Banks in Ethiopia” submitted by me for the award of the degree of Master of Accounting and Finance of Addis Ababa University at Addis Ababa Ethiopia, is original work and it hasn’t been presented for the award of any other Degree, Diploma, Fellowship or other similar titles of any other university or institution.

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Abstract

This thesis aims to examine the Roles of E-banking on Financial Performance of Commercial Banks in Ethiopia. A successful bank in presenting good services to clients and gaining profit is the one using new banking tools. The study has examined the roles of e-banking on return on assets as one of the most fundamental indexes of profitability. The study used secondary data employed purposive sampling technique to select ten banks for the study commercial banks operating in Ethiopia covering the periods from 2013 to 2015. In light of prior literature, key explanatory variables were identified to disclose their relationship and influence on financial performance of commercial banks. These independent and other control variables are value or price of transaction of ATM, value or price of transaction of POS, debit card, number of automated teller machine terminals, number of point of sale terminal and market share of banks. Result using random effect panel least square regression with the aid of E-view 8 application exhibited that numbers of ATM terminals, number of POS terminals and bank market share have positive and significant role on financial performance of commercial banks measured by return on asset. The study shows that increased number of ATM, POS and market share had a positive role on the financial performance of commercial banks with many banking institutions indicating that increased market share allowed a company to achieve greater scale in its operations which generally improved its profitability. Therefore, this study recommends for enhancing return on asset commercial banks should exert more on awareness creation about e-banking service and timely support for users will cause an increase in e-banking practice in Ethiopia.

Key Words: *Electronic Banking; Commercial banks; ROA; Profitability*

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Contents

Declaration	i
Certification	ii
Abstract	iii
List of figures	viii
List of acronyms	ix
CHAPTER ONE: INTRODUCTION	1
1.1 BACKGROUND OF THE STUDY	1
1.2 STATEMENT OF THE PROBLEM	3
1.3 RESEARCH QUESTIONS	5
1.4 OBJECTIVE AND RESEARCH QUESTIONS, HYPOTHESIS.....	5
1.4.1 General Objective of the study	5
1.4.2 Specific Objectives	5
1.4.3 Research Hypothesis.....	6
1.5 SIGNIFICANCE OF THE STUDY.....	7
1.6 SCOPE AND LIMITATIONS OF THE STUDY.....	8
1.7 ORGANIZATION OF THE PAPER.....	8
CHAPTER TWO LITERATURE REVIEW.....	9
2.1 THEORETICAL REVIEW	9
2.1.1 Innovation diffusion theory	9
2.1.2 Task Technology Fit (TTF) Theory	11
2.1.3 Theory of planned behavior	12
2.1.4 Technology acceptance model	13
2.1.5 Definition of E-Banking	15
2.1.6.1 Overview of e-banking in Ethiopia	19
2.1.6.2 Economic Significance of Banks.....	19
2.1.7 Types of E-Banking Service	21
2.1.7.1 Debit card	21
2.1.7.2 Credit Card	21
2.1.7.3 Automated Teller Machine (ATM).....	22
2.1.7.4 Point of sale (POS)	23
2.1.7.5 Mobile Banking Service	23

2.1.7.5.1	<i>M-PESA</i>	23
2.1.7.6	<i>Internet Banking Service</i>	25
2.1.7.7	<i>Agent Banking Service</i>	26
2.1.8	<i>Measure of Bank performance</i>	28
2.1.8.1	<i>Measurement of Bank's Financial Performance</i>	30
2.2	<i>Review of Empirical studies</i>	31
2.2.1	<i>Studies in Developed and emerging market countries</i>	31
2.2.2	<i>Studies in Sub-Saharan African countries</i>	35
2.2.3	<i>Empirical studies related to E-Banking in Ethiopia</i>	37
2.2.4	<i>Gaps in literature</i>	40
2.2.5	<i>Conceptual framework</i>	41
	CHAPTER THREE RESEARCH METHODOLOGY AND DESIGN	43
3.1	RESEARCH DESIGN	43
3.1.1	<i>Population of the study and Sampling Techniques</i>	43
3.1.2	<i>Source and types of Data</i>	44
3.1.3	<i>Data analysis</i>	45
3.2	MODEL SPECIFICATION	46
3.3	VARIABLES DEFINITION AND HYPOTHESIS DEVELOPMENT	48
3.3.1	<i>Dependent Variable</i>	48
3.3.2	<i>Independent Variable</i>	49
3.3.2.1	<i>Value of transaction of Automated Teller Machine (VATM)</i>	49
3.3.2.2	<i>Value of transaction of Point of sale (VPOS)</i>	50
3.3.2.3	<i>Debit Card (DC)</i>	50
3.3.2.4	<i>Number of Automated Teller Machine terminals (NATM)</i>	50
3.3.2.5	<i>Number of Point of sale terminals (NPOS)</i>	51
3.3.2.6	<i>The bank market share (MS)</i>	52
3.4	OPERATIONALIZATION OF STUDY VARIABLES	54
	CHAPTER FOUR DATA ANALYSIS AND INTERPRETATION	55
4.1	DESCRIPTIVE STATISTICS	55
4.2	CORRELATION ANALYSIS	56
4.3	REGRESSION MODEL TESTS	57
4.3.1	<i>Classical linear regression model (CLRM) Assumptions</i>	57

4.3.1.1	Constant Assumption 1: $E(u_t) = 0$	58
4.3.1.2	Test for heteroskedasticity assumption ($\text{var}(u_t) = \sigma^2 < \infty$)	58
4.3.1.3	Test for absence of autocorrelation assumption ($\text{cov}(u_i, u_j) = 0$ for $i \neq j$)	59
4.3.1.4	Test of normality ($u_t \sim N(0, \sigma^2)$)	60
4.3.1.5	Test for multicollinearity	62
4.3.1.6	Choosing Random effect (RE) Vs. fixed effect (FE) models	63
4.4	RESULT OF THE REGRESSION ANALYSIS.....	65
4.4.1	Operational model	66
4.4.2	Interpretations on regression results and research Hypothesis.....	67
4.4.2.1	Number of ATMs and Return on Assets	68
4.4.2.2	Number of POS and Return on Assets	69
4.4.2.3	Market share and Return on Asset	70
4.4.2.4	Value of transaction of ATM and Return on Assets.....	71
4.4.2.5	Value of transaction of POS and Return on Assets	72
4.4.2.6	Debit card and Return on Assets	73
	CHAPTER FIVE CONCLUSION AND RECOMMENDATIONS	74
5.1	CONCLUSION	74
5.2	RECOMMENDATIONS.....	75
5.3	FURTHER RESEARCH SUGGESTIONS.....	75
	APPENDICES	I
	Appendix A: - Heteroskedasticity Test: Breusch-Pagan-Godfrey.....	I
	Appendix B: - Breusch-Godfrey Serial Correlation LM Test	I
	Appendix C: - Correlated Random Effects - Hausman Test	II
	Appendix D: - Random Effects test result.....	III
	Appendix E: - Commercial banks in Ethiopia.....	IV

List of tables

Table 3.1 Definition, notation and expected sign of the explanatory variables	50
Table 4.1 Descriptive statistics.....	51
Table 4.2 Correlations analysis of variables.....	53
Table 4.3 Heteroskedasticity test.....	56
Table 4.4 Breusch-Godfrey Serial Correlation LM Test	57
Table 4.5: Correlations matrix of explanatory variables	59
Table 4.6 Hausman test.....	60
Table 4.7 Random effects model regression results.....	62
Table 4.8 Comparison of test result with expectation.....	69

List of figures

Figure 2.1 the conceptual framework or model of the study.....	39
Figure 4.1 Normality test for residuals.....	58

List of acronyms

ATM -	Automated Teller Machine
CLRM -	Classical Linear Regression Model
DC -	Debit Card
DW -	Dublin Watson
E-banking	Electronic banking
EFT -	Electronic Fund Transfer
EFTPOS	Electronic fund transfer point of sale
ETB -	Ethiopian Birr
ICT -	Information and Communication Technology
Ksh -	Kenyan Shilling
LM -	Linear Model
LOG -	Logarithm
FEM -	Fixed Effect Model
NBE -	National Bank of Ethiopia
NIBT -	Net income before tax
OLS -	Ordinary List Square
PBT	Profit before Tax
POS -	Points of Sale
REM -	Random Effect Model
ROA-	Return on Asset

ROE-	Return on equity
SMS	Short Message Service
SSA -	Sub Saharan African
TPB	Theory of Planned Behavior

CHAPTER ONE: INTRODUCTION

This chapter begins by presenting brief background of the study which is followed by the statement of the problem. Under the statement of the problem, the study states the reasons to carry out this study. Following the statement of the problem, the general and specific objectives of the study are presented. The next section presents the research hypothesis. Finally, significance of the study, scope and limitation of the study including organization of the paper are presented.

1.1 Background of the study

Banking industry has been in a process of significant transformation. They are the main intermediaries between those with excess money (depositors) and those individuals and businesses with viable projects but requiring money for their investment (creditors). The force behind this transformation of the banking industry is innovation in information technologies Abaenewe et al., (2013)

The banking industries play a significant role in supporting economic development through efficient financial services Dube et. al., (2009).

Traditional banks offer many services to their customers, including accepting customer money deposits, providing various banking services to customers and making loans to individuals and companies. Compared with traditional channels of offering banking services through physical branches, e-banking uses the internet and telecom (SMS) to deliver traditional banking services to their customers, such as cash withdrawals, foreign currency exchange, transferring funds, balance inquiry, electronic bill payment, applying for letter of credit, downloading copies of bank statement, cheque book request, cheque stop payment request, account alerts, security alerts and reminders and more recurring services Girma Abebe (2016).

Due to emergence of global economy, e-business has increasingly become a necessary component of business strategy and a strong catalyst for economic development. E-banking has become popular because of its convenience and flexibility, and also transaction related benefits like speed, efficiency, accessibility, etc. Elisha, (2010)

The new information technology (IT) is turning into the most important factor in the future development of banking, influencing banks' marketing and business strategies. In recent years, the adoption of e-banking began to occur quite extensively as a channel of distribution for financial services due to rapid advances in IT and intensive competitive banking markets Mahdi and Mehrdad, (2010); Dube, et. al., (2009).

The e-banking is transforming the banking and financial industry in terms of the nature of core products or 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 Gupta, (2008); Kamel, (2005).

The primarily role of commercial banks is to mobilize deposit and avail such resource for investment. Banks also play a pivotal role in the financial system; in the clearing and settlement of transactions. This intermediary role removes deficiency of capital which in turn plays significance impact in bringing economic development in a nation.

A sound banking system mobilizes the small and scattered savings of the community, and makes them available for investment in productive enterprises.

Expanding the banking system will create greater savings opportunities that will in turn boost funding via savings. The alternative is a country's heavy reliance on external sources, private or official value transfers such as remittances, and external borrowing (Keatinge, 2014).

Ethiopian commercial banks continue to offer most of their banking transactions using electronic means. Electronic communication means are particularly coming to the forefront. These are more convenient, faster and often cheaper for clients. Banking experience shows it is suitable to use combinations of several communication means, depending on individual segments, clients and types of operations, products and situations. Electronic banking is a service that specifically uses electronic communication forms. Electronic banking can be divided on the basis of the instruments used; telephone connection, personal computers, means of payment (bank cards) and self-service zones NBE (2015).

In the face of rapid expansion of e-payment systems throughout the world, the Ethiopian financial sector cannot remain an exception in expanding the use of the system (Gardachew, 2010). E-banking plays a crucial role in the banking industry by creating value for banks and customers. E-banking has enabled banking institutions to compete more effectively in the global environment by extending their products and services beyond the restriction of time and space Turban, (2008).

Currently the use of cash has been replaced by digital cash and digital wallets. It can be precisely said that this is the fourth stage of evolution after Barter, Currency, Paper money (Cheques) and now digital cash Hannington, (2013).

Today's business environment is extremely dynamic and experience rapid changes as a result of technological improvement, increased awareness and demands Banks to serve their customers electronically.

Objectively Commercial Banks are established to earning profits by providing banking services. They seeking to achieve their strategic objectives of profitability and growth in an effective and efficient manner in order to maximizing their market value and increase the wealth of the owners. This can be done in various ways by improve their performance and increase profits under the age characterized by competition through technological development and knowledge. They invest huge amount of financial resources on capacity building and electronic system which promote efficiency of their services and facilitate decision-making process using data and accurate information.

1.2 Statement of the problem

In the emerging global business, Commercial Banks play an important role as financial mediators in the economic development of the nation. Banks collect financial resources from individuals and organizations, and redistribute it to others so as to have further benefit Okoth & Gemechu (2013). For sustainable intermediation, banks need to be profitable and get necessary earnings to cover their operational cost they incur. Beyond the intermediation function, the financial performance of banks has critical implications

for economic growth of countries. Good financial performance rewards the shareholders for their investment. This in turn, gives confidence for additional investment and brings about economic growth. On the other hand, poor bank performance may lead to banking failure and crisis which have negative consequence on the economic growth (Okoth et al. 2013).

Electronic banking system like ATM, Pay direct, electronic check conversion, mobile banking and e-transact has a great impact on bank performance because they increase profitability, reduce bank cost of operations, and increase bank asset and bank efficiency (Ngango, 2015). Electronic banking has made banking transaction to be easier by bringing services closer to its customers hence improving banking industry performance (Josiah and Nancy, 2012).

Girma, (2016) conducted a research about the impact of ICT on the performance of Ethiopian banking industry using secondary data over the period 2010 – 2014. The study employed purposive sampling technique to select the required sample of banks from commercial banks in Ethiopia. Using ROA as a measure of performance in the study and the explanatory variables were ICT investment, ATM, POS, INF, BRAN and GDP. The finding shows that the ICT, ATM and POS have no statistically significant effect on return on asset on commercial banks in Ethiopia. Moreover the study result showed that the POS, ICT and number of branches have negative effect on return on asset on commercial banks in Ethiopia.

Despite the potential benefits of e-banking, there is debate about whether and how their adoption improves bank performance. Attempts have been made to investigate the role of electronic banking on bank performance. A research carried out by Kariuki (2005) showed the positive impacts of e-banking on their banking performance using bank turnover and profits as measure of performance. He established that those banks with high profit growth are more likely to be using greater numbers of e-banking services. He concluded that e-banking leads to higher profits though in long-term but not in short-term

due to high ICT investment cost. The study used profit and turnover as measures of bank performance.

Studies on the role of e-banking regarding the financial performance of commercial banks have been published although the outcomes of the research are contradicting each other. Such as (Abaenewe et al., 2013) Adoption of electronic banking has positively and significantly improved the returns on equity (ROE) of Nigerian banks. On the other hand and on the contrary, it also revealed that e-banking has not significantly improved the returns on assets (ROA) of Nigerian banks.

However, in Ethiopia as far as the knowledge of the researcher is concerned, there are few research conducted on adoption of e-banking (Gardachew 2010) and (Abenet, 2010), Challenges and Opportunities in adapting e-banking (Abreham, 2012), customer satisfaction to measure the efficiency of e-banking (Sintayehu, 2015) are conducted. There results of the studies in general agreed that e-banking in Ethiopia is slow and less adaptable. It creates and necessitates the researcher to carry out a study from Ethiopian context to establish the roles of e-Banking on banks financial performance.

1.3 Research Questions

Based on the above statement of the problems a research question is developed to answer that; what is the role of e-banking service on the financial performance of banks?

1.4 Objective and research questions, hypothesis

1.4.1 General Objective of the study

Objective of this study is to examine the role of electronic banking service on financial performance of commercial banks in Ethiopia, focusing on its role on return on assets.

1.4.2 Specific Objectives

A Bank financial performance can be measured in its profitability that evaluates the performance.

Specifically to detect:

- The roles of ATM on the financial performance of commercial banks
- The roles of POS on the financial performance of commercial banks
- The roles of Debit card on the financial performance of commercial banks
- The roles of market share on the financial performance of commercial banks

1.4.3 Research Hypothesis

In order to be more formal statement of research the researcher used to employs hypotheses. These hypotheses are predictions about the outcome of the results, and they may be written as alternative hypotheses specifying the exact results to be expected. They also may be stated in the null form, indicating no expected difference or no relationship between groups on a dependent variable as stated by. (Creswell J., 2009). Accordingly, the followings are hypothesis to be tested based on selected variables. The researcher assumed that:

$$ROA = \beta_0 + \beta_1 DC_{i,t} + \beta_2 NATM_{i,t} + \beta_3 NPOS_{i,t} + \beta_4 MS_{i,t} + \beta_5 VATM_{i,t} + \beta_6 VPOS_{i,t} + \epsilon_{i,t}$$

Where;-

ROA = Profit before tax / Total Asset

DC = Number of Debit Card

NATM= Number of ATM

NPOS = Number of POS

MS = the Market share index of bank (other control variable)

VATM = Value of transaction executed by ATM = (Natural logarithmic of value of ATM transaction)

VPOS = Value of transaction executed by POS= (Natural logarithmic of the value of POS transaction)

β_0 = Constant term

$\beta_1, 2, 3, \dots, 7$ are parameters to be estimated;

ϵ = is the error component for company i at time t assumed to have mean zero $E[\epsilon_{it}] = 0$

i = commercial banks $i = 1. \dots 10$; and

t = the index of time periods and $t = 1- 3$

Hypothesis 1: Number of ATM has positive and significant role on ROA of commercial banks in Ethiopia,

Hypothesis 2: Price of transaction of ATM has positive and significant role on ROA of commercial banks in Ethiopia,

Hypothesis 3: Number of transaction of POS has positive and significant role on ROA of commercial banks in Ethiopia,

Hypothesis 4: Price of transaction of POS has positive and significant role on ROA of commercial banks in Ethiopia,

Hypothesis 5: Using of debit cards has positive and significant role on ROA of commercial banks in Ethiopia,

Hypothesis 6: Market share has positive and significant role on ROA of commercial banks in Ethiopia,

1.5 Significance of the study

The research would have the following importance. Many researchers have conducted research related to adoption of electronic banking; however, there is no study was made regarding of the roles of electronic banking on banks financial performance in Ethiopian context.

The study is also important for those concerned government regulatory authorities like national bank for decision they made pertaining electronic banking and also for other related government and foreign banks too. Finally, the study helps other academic researchers as a source of reference and as a stepping stone for those who want to make further study on the area afterwards.

1.6 Scope and limitations of the study

The scope of the study would be limited to commercial Banks in Ethiopia pertaining electronic banking on banks financial performance. Even though, net income gives an idea of how well a bank is doing, it suffers from one major drawback: It does not adjust for the bank's size, thus making it hard to compare how well one bank is doing relative to another. Selection of dependent variables which fit the study was also part of limitation. Because, there are many variables which determinants of performance but not relevant for this study but cited by many researchers and the researcher needs to choose the more appropriate variables so that it is suitable with the dependent variable. It is necessary to highlight that return on asset as an indicator have been chosen to study the roles of the degree to which electronic banking have on financial performance of commercial banks in Ethiopia. And ten banks are considered for the study regarding adoption of electronic banking service. Three years data to include banks recently established and started e-banking service since 2013.

1.7 Organization of the paper

This study is organized into five chapters. Chapter one presents introductions of the study. The literature review part of the study is presented in chapter two. The literature review includes the theoretical review in its first section which is followed by the review of previous studies. Chapter three presents the research design and methodology and analysis and data interpretations are presented in chapter four. The final chapter presents summary, Conclusion and recommendation of the study.

CHAPTER TWO LITERATURE REVIEW

This chapter presents the literature related with e-banking. Accordingly, the review of the literature is divided into two parts. The first part discusses the theoretical foundation for the study, while the second part presents the empirical studies. Under the theoretical foundation, the definition of e-banking, overview of e-banking in Ethiopia, economic significance of banks and the measure of bank performance is presented. The review of empirical studies done on the e-banking service on developed and emerging market, studies in Sub-Saharan African countries, studies related to e-banking in Ethiopia, and the gaps that necessitates this study .

2.1 Theoretical Review

There are numerous theoretical foundations that serve as basis to formulate a model to practice a research. For instance, in determining the performance and profitability of the bank service employing high technology devices and machines there are four significant theories. These are innovation diffusion theory; task technology fit theory, theory of planned behavior, and technology acceptance model. According to (Ajzen 1991), a theoretical framework guides research, determining what variables to measure, and what statistical relationships to look for in the context of the problems under study. Thus, the theoretical literature helps the researcher to identify clearly the variables of the study; provides a general framework for data analysis; and helps in the selection of applicable research design.

2.1.1 Innovation diffusion theory

An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. There is a wide gap in many fields, between what is known and what is actually put into use. Many innovations require a lengthy period, often of some years, from the time when they become available to the time when they are widely adopted. Therefore, a common problem for many individuals and organizations is how to speed up the rate of diffusion of an innovation (Rogers 2003).

Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Diffusion, therefore, is a special type of communication in which the messages are concerned with a new idea. It is this newness of the idea in the message content of communication that gives diffusion its special character. In other words, diffusion is a kind of social change, defined as the process by which alteration occurs in the structure and function of a social system. Hence, diffuse an innovation into a system is a challenge. The theory on the diffusion of new ideas and practices was investigated by various scholars and few of them are discussed below.

According to Dillon et al. (1996, P.282) there are five factors which influence the diffusion of an innovation. These are “relative advantage (the extent to which a technology offers improvements over currently available tools), compatibility (its consistency with social practices and norms among its users), complexity (its ease of use or learning), trainability (the opportunity to try an innovation before committing to use it), and observability (the extent to which the technology's outputs and its gains are clear to see)”. These elements are not mutually exclusive thus unable to predict either the extent or the rate of innovation diffusion.

Further, Moore & Benbasat (1991) expanded the array of innovation characteristics to seven. In addition to the previously known four features they added relative advantage, compatibility, and trainability. The fourth characteristic, ease of use, is a close relative complexity. It is worth noting that both relative advantage and ease of use are subjective characteristics since they can be viewed differently depending on an individual's perceptions. Very further, Fishben and Ajzen (1975) concur, attitudes towards an object and attitudes regarding a particular behavior relating to that object can frequently differ. Explicitly, diffusion theory begins to describe the innovation-decision process within organizations, but not to the level of addressing whether and how the characteristics of an innovation interact to affect its adoption within organizations, or whether organizational type, size, or industry affect adoption. In addition, while there is an innovation-decision process described for individuals and

within organizations, there is no description of how the variables interact when innovations are diffused across organizations (Lundblad & Jennife, 2003).

2.1.2 Task Technology Fit (TTF) Theory

Task technology fit (TTF) theory contends that information technology (IT) is more likely to have a positive impact on individual performance and be used if the capabilities of the IT match the tasks that the user must perform (Goodhue & Thompson 1995). Further, Goodhue & Thompson (1995, P.141) mentioned the factors that measure task-technology fit as; quality, floatability, authorization, and compatibility, eases of use/training, production timeliness, systems reliability and relationship with users”. Their model is useful in the analysis of various context of a diverse range of information systems including electronic commerce systems and combined with or used as an extension of other models related to information systems outcomes.

According to TTF theory the success of an information system have a strong correlation between task and technology, hence success has been related to individual performance (Goodhue and Thompson 1995) and to group performance (Zigurs & Buckland 1998). For group support systems, a specific theory of TTF was developed Zigurs & Buckland (1998) and later tested by Wilson et al. (1999) and detailed the requirements of group support systems to fit group tasks. For mobile information systems, TTF has been shown to be generally relevant, but more specific questions regarding the applicability of task technology fit to mobile information systems remain unanswered (Gebauer and Shaw2004).

The theory of task-technology fit maintains that a match between business tasks and information technology is important to explain and predict the success of information systems (Goodhue and Thompson 1995; Zigurs & Buckland 1998). For various scenarios of task and technology, statistical significance has been established of a positive association between task-technology fit and information system success measures, such as use Dishaw & Strong (1999), and impact on individual performance Goodhue and Thompson (1995) and on group performance (Zigurs et.al 1999). The concept of task technology fit promises to help identify

aspects that are critical to support a given business task, and can, thus, contribute to the success of technology innovations (Junglas & Watson 2006). One such innovation is represented by mobile technology to support an increasingly mobile workforce (Barnes 2003).

2.1.3 Theory of planned behavior

The theory of planned behavior (TPB) started as the theory of reasoned actions in 1980 to predict an individual's intention to engage in a behavior at a specific time and place. The theory was intended to explain all behaviors over which people have the ability to exert self control. The key component to this model is behavioral intent; behavioral intentions are influenced by the attitude about the likelihood that the behavior will have the expected outcome and the subjective evaluation of the risks and benefits of that outcome.

However, the theory is ill-equipped to predict situations where people possess low volitional control. The common limitations of the theory are it assumed regardless of intention the person with opportunities and resources can easily acquired the desired behavior. This assumption set aside several variables such as fear, threat, mood or past experience. Further, the theory assumes that the behavior is the direct result of linear decision making process disregarding the change over time. Very further, it does not say anything about actual control over behavior nor the time frame between 'intent' and 'behavioral action' were not addressed. In the theory of planned behavior (TPB), Ajzen (1991) incorporates perceived behavioral control (PBC) as an antecedent of behavioral intentions to overcome the limitations.

Therefore, in the TPB, a person's performance of certain behavior depends on his or her intention toward that behavior; intention in turn relies on attitudes, subjective norms (SN), and PBC. Ajzen (2006, P.54) defines PBC as "people's perceptions of their ability to perform a given behavior", and empirical evidence suggests that it improves predictions of intentions (Ajzen 1991). Subjective norms (SN) refer to perceived pressures to perform a behavior; according to what important others say or do (Fishben and Ajzen 1975).

E-commerce acceptance research suggests mixed results regarding this variable; some researchers find that SN has no significant influence on intentions (e.g., Shim et al. 2001; Shih and Fang, 2004), whereas others reveal a significant relationship (Taylor & Todd 1995). Nevertheless, Vijayasathy (2000) suggests that perceptions of relevant others may differ according to the type of behavior. Likewise, Barki & Hartwick (1994), show that SN has a significant effect on intentions for mandatory system usage but not when usage is voluntary. However, Davis et al. (1989) fail to find a significant relationship between SN and intentions. Scholars tackle the confusion from different angles: Venkatesh, et.al (2003) discuss compliance; Moore & Benbasat (1991) raise issues of image and social influence; Barki & Hartwick (1994); Taylor & Todd (1995) argue that system experience decreases the direct effect of SN on intentions; and Cournega (2000) propose substituting SN with social support. Despite these efforts, ambiguity still surrounds the SN construct.

2.1.4 Technology acceptance model

User acceptance remains a barrier to the success of new information technologies (IT). In an attempt to explain the idea, Davis (1989) introduced Technology Acceptance Model (TAM) based on the attitude-behavior paradigm from cognitive psychology. Davis (1989, P.35) argues that “people adopt an application primarily because of the functions it performs and secondarily because of the ease or difficulty associated with making the system perform these functions”. The model provides a basis for tracking the impact of external factors on internal beliefs, attitude, and behavior (Davis et al. 1989).

TAM assumes that behavior “the manifest, observable response in a given situation” Ajzen (1991, P.60) is volitional. Behavioral intention indicates a person’s readiness to perform the given behavior Ajzen (2006), which makes it the main predictor of the actual behavior. In

TAM, intention is a function of attitude and perceived usefulness (PU). Attitude is “the degree of evaluative affect that an individual associates with using the target system” (Davis, 1993). It represents what a person feels about a concept, which may be any entity

about which persons can think and attach feeling (East 1997). Thus, attitude plays an important role in the decision to adopt a new computer technology (e.g., Davis et al. 1989; O'Cass and Fenech 2003). Fishben and Ajzen (1975) define attitude as (1) attitude toward objects, i.e. evaluation of a specified object, and (2) attitude toward action (behavior), or evaluation of a specified behavior. Little evidence supports the idea that attitude toward objects stimulates action (Bagozzi 1992). Previous IS research tends to treat attitude as a fragile and vague variable, although psychology research consistently recognizes its importance for individual behavior and social influence (e.g., Olson & Zanna 1993).

In the technology acceptance domain, some researchers emphasize the relationship between attitude and intentions (e.g., Hausman & Siekpe 2008), whereas others argue its little significance (e.g., Venkatesh, et.al 2003), suggesting that IS usage decisions might be dominated by cognitive beliefs, such as perceived usefulness, rather than affect, such as attitude. Yang and Yoo (2004) argue that researchers fail to distinguish between the two types of attitudes, where the potentially significant influence of cognition attitude gets offset by the insignificant influence of affect attitude. The originality of the TAM derives from two related beliefs, perceived usefulness (PU) and perceived ease of use (PEOU), which generalizes across different settings. TAM assumes that users engage in behaviors because they have evaluated the benefits and expect certain results (Dishaw & Strong 1999). Snoj et.al. (2004) find that users do not use a system for its own sake but instead use it because of its attributes that drive value, according to the utility provided by the combination of attributes, less the disutility represented by any sacrifices required to use the system.

As the ability of Internet users to find their way around a site and keep track of where they are (Richard & Chandra 2005), PEOU affects attitude either directly or indirectly through its effect on PU “even if potential users believe that a given application is useful, they may at the same time believe that the systems are too hard to use and that performance benefits of usage are outweighed by the effort of using the application” (Davis 1989, p.320). Both PEOU and PU are influenced by external stimuli, such as information richness, web quality, and experience.

2.1.5 Definition of E-Banking

Technological innovations have been identified to contribute to the distribution channels of Banks. The electronic delivery channels are collectively referred to as Electronic Banking. Electronic Banking is really not a technology, but an attempt to merge several different technologies. The Electronic banking is a systematic use of several technological products to facilitate the service of banking. In this section the electronic delivery channels used by banks to maximize their accessibility and profitability shall be discussed briefly.

Electronic banking service is the use of electronic and telecommunication networks to deliver a wide range of value added products and services to bank customers. E-banking thus involves collaboration (local and international) on payments systems, cashless transactions, digital cash and other electronic based projects.

E-banking refers to electronic banking. It is like e-business in banking industry. E-banking is also called as "Virtual Banking" or "Online Banking". E-banking is a result of the growing expectations of bank's customers. E-banking involves information technology based banking. (Shraddha and Mohsin, 2014)

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, (Goi, 2005).

E-banking is the term used for new age banking system. E-banking is also called online banking and it is an outgrowth of PC banking. E-banking uses the internet as the delivery channel by which to conduct banking activity, for example, transferring funds, paying bills, viewing checking and savings account balances, paying mortgages and purchasing financial instruments and certificates of deposits (Mohammed, et. al, 2009). It is difficult to infer whether the internet tool has been applied for convenience of bankers or for the customers' convenience. But ultimately it contributes in increasing the efficiency of the banking operation as well providing more convenience to customers. Without even

interacting with the bankers, customers transact from one corner of the country to another corner.

Electronic banking is an electronic payment system that enables customers of a bank or other financial institution to conduct a range of financial transactions remotely through the financial institution's website, ATM'S, using an electronic device (mobile phone, tablet, using software usually called an app, provided by the financial institution for the purpose).

Electronic banking is the use of electronic and telecommunication networks to deliver a wide range of value added products and services to bank customers (Steven, 2002).

Electronic banking is a high-order construct, which consists of several distribution channels. It should be noted that electronic banking is a bigger platform than just banking via the Internet.

However, the most general type of electronic banking in our times is banking via the Internet, in other words Internet banking. The term electronic banking can be described in many ways. In a very simple form, it can mean the provision of information or services by a bank to its customers, via a computer, television, telephone, or mobile phone (Daniel, 1999). Burr (1996), for example, describes it as an electronic connection between bank and customer in order to prepare, manage and control financial transactions. Internet banking allows consumers to access their bank and accounts to undertake banking transactions.

At an advanced level Internet banking is called transactional online banking, because it involves the provision of facilities such as accessing accounts, transfer of funds, and buying financial products or services online (Sathye, 1999).

2.1.6 Overview of banking in Ethiopia

Modern banking in Ethiopia started in 1905 with the establishment of Abyssinian Bank which was based on a fifty year agreement with the Anglo-Egyptian National Bank. In

1908 Socite Nationale d’Ethiope pour le Development Dei’ Agriculture et du and two other foreign banks (i.e Banque de l’Indochine and the Compagnie del’ Afrique Orientale) were also established (Degefe 1995 cited in Geda 2006). As noted in Geda (2006) these banks were criticized for being wholly foreign owned. In 1931 the Ethiopian government purchased the Abyssinian Bank, which was the dominant bank, and renamed it the Bank of Ethiopia. i.e., the first nationally owned bank on the African continent (Gedey 1990, pp. 83, cited in Geda 2006).

It operated for only a few years, being closed after the Italian invasion. During the Italian occupation, several Italian banks opened branches in Ethiopia. (Harvey, 1996).

After the liberation in 1942, the State Bank of Ethiopia was established. It became operational in 1943, with 43 employees and two branches, and acted as the country’s central bank. The first governor was a Canadian. The Bank also acted as the country’s main commercial bank, while a few much smaller foreign banks continued to operate.

In 1963, a new banking law split the functions of the State Bank of Ethiopia into central and commercial banking as the National Bank of Ethiopia and the Commercial Bank of Ethiopia respectively. Both were government-owned. The very interesting part of this law is it allowed other commercial banks to operate. This included foreign banks provided they were 51% owned by Ethiopians. The biggest of these was the Addis Ababa Bank. It was 40% owned by Grindlays Bank (British owned) and had 26 branches by 1975. There were also two foreign commercial banks: the Banco di Roma and the Banco di Napoli, which had eight branches and one branch respectively in 1975.

After the fall of the imperial government in 1974, since the remaining private sector commercial banks were relatively small; they were nationalized and concentrated into the Commercial Bank of Ethiopia (CBE). The new Ethiopian socialist government merely shifted, therefore, from owning most of the banking system to owning it completely (Harvey, 1996).

Even after the fall of DERGU regime, the financial sector reforms in Ethiopia do not allow private sector participation in existing government banks, nor do they allow the entry of foreign banks until 1994.

1994 is considered as another turning point in the history of banking business whereby local private commercial banks are allowed to operate in the country. Awash

international bank S.c is the first indigenous private commercial bank in Ethiopia which was established by 486 founder shareholders with a paid-up capital of Birr 24.2 million. It was licensed on November 10, 1994, and started banking operations on February 13, 1995.

Currently, the industry comprises one state-owned development bank and 17 commercial banks, one of which is state-owned, which is the dominant Commercial Bank of Ethiopia (CBE). After the merger of Construction and Business bank, with CBE that make the composition of the sector to two state owned banks; Commercial bank of Ethiopia and Development bank of Ethiopia and 16 private commercial banks. The private commercial banks currently operating in Ethiopia alphabetically: Abay bank, Addis International Bank, Awash International bank, Bank of Abyssinia, Birhan International bank, Bunna International bank, Cooperative bank of Oromia, Dashen bank, Debub global bank, Enat bank, Lion International bank, Nib international bank, Oromia International bank, united bank, Wegagen bank, and Zemen bank. (www.nbe.gov.et)

Studies made regarding the financial sectors in Ethiopia witness its infancy and dominance by the state owned Commercial bank. Keatinge(2014) strengthen this claim declaring, State owned CBE dominate the sector with assets accounting for approximately 70 percent of the industry's total holdings. The dominance of public sector banking certainly restricts financial intermediation and economic growth. It contrasts with regional and international peer countries where banking industries have a much higher share of private sector and foreign participation. (Keatinge, 2014)

Literatures reveal, compared to most countries, Ethiopia has taken a cautious approach toward the liberalization of its banking industry. For all intents and purposes, its industry is closed and generally less developed than its regional peers. (Keatinge 2014 and Harvey 1996).

The Ethiopian financial sector is dominated by the banking sector. Banks are the important component of any financial system. They play important role of channeling the savings of surplus sectors to deficit sectors. The efficiency and competitiveness of banking system defines the strength of any economy. Like other developing countries in Ethiopia banks plays a vital role in the process of economic growth and development.

2.1.6.1 Overview of e-banking in Ethiopia

The appearance of E-banking in Ethiopia goes back to the late 2001, when the largest state owned, commercial bank of Ethiopia (CBE) introduced ATM to deliver service to the local users. Despite being the pioneer in introducing ATM based payment system, CBE lagged behind Dashen Bank, which worked aggressively to maintain its lead in E-payment system. As CBE continued to move at a snail's pace in its turnkey solution for card based payment system, Dashen Bank remained so far sole player in the field of E-banking since 2006 (Gardachew, 2010). By the end of 2008 Wegagen Bank has signed an agreement with Technology Associates, a Kenyan based information technology firm, for the development of the solutions for the payment system and installation of network of ATM. While Zemen Bank, the only Ethiopian bank anchored in the idea of single branch banking, by launching full-blown internet banking in 2010, which is new to Ethiopian banking industry (Asrat 2010).

Binyam (2009), claimed United Bank being the first to introduce telephone and internet banking systems including text messages (SMS) by the end of the year 2008 which continued launching ATM and POS services in collaboration with Awash International Bank and Nib International Bank in the year 2012 later joined by Birhan International Bank, Addis International bank and Cooperative Bank of Oromia. The three banks planned to install over 140 ATM machines and over 340 POS across Ethiopia. And there will be one ATM at every branch of the consortium banks, all domestic airports and shopping complexes. Binyam (2009), also stated that this agreement is the first significant cooperation between competing banks in Ethiopia, which others should be encouraged to follow as there is no single bank in Ethiopia that can afford to provide extensive geographical coverage and access

2.1.6.2 Economic Significance of Banks

Performance of commercial banks in Ethiopia grew impressively between years 2013 to 2015 where total assets grew by 49% from 49,910.7 million to 74,547.5 million while net profit grow from 10.2 billion to 14.7 billion (NBE, 2015). According to National Bank Supervision Report (2015), the banking sector reflected solid performance in 2014. This

performance can partly be attributed to improvement in the GDP growth which grew to 10.2%.

The Ethiopian economy continued to register a notable growth. In fiscal year 2014/15, the real GDP grew by 10.2 percent relative to 11.2 percent growth target set in the first GTP for the fiscal year. The growth of the economy has also been remarkable compared to the 4.4 percent growth estimated for Sub - Saharan Africa in 2015 (IMF, 2015).

The existence of a strong and effective banking system is very important for the economic development of a country. According to Li yuqi (2007) banks through acceptance of deposit of money from persons who do not need it at the present and lending it to persons who want it for investment, serve as financial intermediaries thereby providing ideal source of fund for investment that is crucial in increasing production, exports, creation of jobs and foreign exchange earnings of the country. Similarly, bank lending to customers who need the money for consummation, purchase of various goods and services, construction of houses, and education increases demand for those goods and services, thereby encouraging producers and service providers to expand their undertakings and increase production (Fasil and Merhatibeb, 2009). Expansion and increase in production requires employment of additional workers, thereby creating new jobs, encourage producers and suppliers of raw materials to increase their production and supply. Banks also play a positive role in encouraging savings by providing an incentive to save through payment of interest on deposits/savings and providing safety and security. Saving is also an important source of future investment and the improvement of the living standards of the society (Wubitu, 2012).

The power of the national bank in fixing interest rates is particularly crucial in both investment and saving. If the rate of interest fixed by the bank on deposits /i.e. the interestbanks pay on money deposited on saving and other accounts / is attractive, it will encourage people to save their money rather than spend it (Fasil and Merhatibeb, 2009). However, such interest should not discourage people from investment and productive

activities and turn them to rent collection /potential investors may decide to deposit their money and collect interest.

According to (Fasil and Merhatibeb, 2009) if the rate of interest charged by banks on money given on loan to borrowers is lower, it may encourage potential borrowers and investors to borrow and invest, thereby contributing their part in the expansion and increase of production of goods and services, creation of employment opportunities, increase in exports and foreign exchange earnings of the country. The existence of a network of banks covering all parts of a country facilitates business transactions in the country by making payments easier, safer and cheaper. Payment through banks also avoids the risk of loss or theft of money.

2.1.7 Types of E-Banking Service

2.1.7.1 Debit card

A debit card (also known as a bank card or cheque card) is a plastic card that provides an alternative payment method to cash when making purchases. Functionally, it can be called an electronic cheque, as the funds are withdrawn directly from either the bank account or from the remaining balance on the card. In some cases, the cards are designed exclusively for use on the internet, and so there is no physical card (Mavri & Ioannou, 2006).

In many countries the use of debit cards has become so widespread that their volume of use has overtaken or entirely replaced the cheque and, in some instances, cash transactions. Like credit cards, debit cards are used widely for telephone and Internet purchases and, unlike credit cards, the funds are transferred immediately from the bearer's bank account instead of having the bearer pay back the money at a later date. Debit cards may also allow for instant withdrawal of cash, acting as the ATM card for withdrawing cash and as a check guarantee card.

2.1.7.2 Credit Card

A credit card is a small plastic card issued to users as a system of payment. It allows its holder to buy goods and services based on the holder's promise to pay for these goods and services. The issuer of the card creates a revolving account and grants a line of credit to the consumer (or the user) from which the user can borrow money for payment to a merchant or as a cash advance to the user (Mavri & Ioannou, 2006). A credit card is different from a debit card in that it does not withdraw money from the users account after every transaction. The issuer lends money to the consumer to be paid to the merchant. Holders of a valid credit card have the authorization to purchase goods and services up to a predetermined amount, called a credit limit. The vendor receives essential credit card information from the cardholder, the bank issuing the card actually reimburses the vendor, and eventually the cardholder repays the bank through regular monthly payments. If the entire balance is not paid in full, the credit card issuer can legally charge interest fees on the unpaid portion.

2.1.7.3 Automated Teller Machine (ATM)

Rose (1999) describes ATMs as follows: it combines a computer terminal, recordkeeping system and cash vault in one unit, permitting customers to enter the bank's book keeping system with a plastic card containing a Personal Identification Number (PIN) or by punching a special code number into the computer terminal linked to the bank's computerized records, 24 hours a day". Once access is gained, it offers several retail banking services to customers. They are mostly located outside of banks, and are also found at airports, malls, and places far away from the home bank of customers. At the outset they were function as cash dispensing machines. However, because of the advancement of technology, ATMs are able to provide a wide range of services, such as making deposits, funds transfer between two or more accounts and bill payments.

The primary advantages of ATMs are they save the customer's time in service delivery and it is cost efficient way of yielding higher productivity per period of time than human tellers.

Furthermore, as the ATMs continue when human tellers stop, therefore, there is continual productivity for the banks even after banking hours.

2.1.7.4 Point of sale (POS)

POS also sometimes referred to as point of purchase (POP) or checkout is the location where a transaction occurs. A "checkout" refers to a POS terminal or more generally to the hardware and software used for checkouts, the equivalent of an electronic cash register. A POS terminal manages the selling process by a salesperson accessible interface. The same system allows the creation and printing of the receipt. POS systems record sales for business and tax purposes (Shittu, 2010).

2.1.7.5 Mobile Banking Service

Mobile banking also known as M-Banking is a term used for performing balance checks, account transactions, payments, credit applications and other banking transactions through a mobile device such as a mobile phone or PDA. The earliest mobile banking services were offered over

Short Message Service (SMS), a service known as SMS banking. Mobile banking is used in many parts of the world with little or no infrastructure, especially remote and rural areas. This aspect of mobile commerce is also popular in countries where most of their population is unbanked.

In most of these places, banks can only be found in big cities, and customers have to travel hundreds of miles to the nearest bank. The scope of offered services may include facilities to conduct bank and stock market transactions, to administer accounts and to access customized information (Tiwari et al., 2007).

2.1.7.5.1 M-PESA

A mobile money service called M-PESA was introduced into the market by Safaricom, Kenya's largest mobile operator (MO). Within eight months of its inception in March 2007, over 1.1 million Kenyans had registered to use M-PESA, and over US\$87 million had been transferred over the system (Safaricom, 2007). M-PESA registered

customers reached 19.34 million by the end of March 31, 2014 (Safaricom , 2014). The application facilitates a variety of financial transactions through the mobile phone. This includes account balance checks, deposits and withdrawals, bill and merchant payments, airtime purchases, and money transfers (Hughes & Lonie, 2007; Vaughan, 2007, cited in Morawczynski, 2009). M-PESA is designed in such a way that people without bank accounts can use it.

Customers' money is held safely in a bank account run by M-PESA on behalf of the customer. A customer does not have any contact with the bank and the bank does not have customers' details. An individual who have M-PESA account can have a balance between 0 ksh and 100,000 ksh (Kenyan Shilling). M-PESA is driven by a secure application on Safaricom SIM cards. Registered customers have a menu on their phone giving them the ability to move money to other phone based accounts. To load money into M-PESA account a customer need to go to an M-PESA Agent and make a cash deposit which results in electronic money being transferred into customers' M-PESA account (This is confirmed by an SMS received by both the Agent and the Customer). Then, a customer can conveniently transfer money to other mobile phone users by SMS transaction.

To withdraw cash from M-PESA account or (for unregistered customers to get cash), a customer need to go to an M-PESA agent and make an electronic transfer to the agent who will exchange this for cash. An M-PESA agents are Safaricom dealers, selected Banks & Micro-Finance Institution, and other retailers with a substantial distribution network like petrol stations, distributors, supermarkets & registered SMEs. Wrong transfers are reversible on the M-PESA system, upon rigorous vetting of the sender & recipient and if the money has not yet been cashed or withdrawn. If a customer makes an incorrect transaction, there is a free assistance call service. According to Morawczynski (2009) the liberalization of the telecommunications sector, among other things, plays a crucial role for the success of M-PESA. The government has taken numerous strategies to increase the penetration rates of ICTs in general and the mobile phone in particular. This includes instigating competition in the market and including universal service stipulations in license agreements. Such stipulations

made it easier for M-PESA to penetrate rural areas, which are under-served by financial institutions. In addition, the super and retail agents were aligned to facilitate the scalability of the agent network and to make it easier to move cash and e-money around the system. The main function of the retail agents is to provide cash-in & cash-out services to the customers and provide customer support. The super-agents are responsible for balancing cash and e-money requirements of the retail agents.

2.1.7.6 Internet Banking Service

Internet banking is a new age banking concept. It uses technology and brings the bank closer to the customer. Internet banking refers to systems that enable bank customers to get access to their accounts and general information on bank products and services through the use of banks website, without the intervention or inconvenience of sending letters, faxes, original signatures and telephone confirmations (Thulani et al, 2009). For those that have access to the internet and a computer all you need to do is proceed to your banks website and login. From there you have access to all of your accounts that you have at that bank. Transfer funds between your accounts with ease. You can also use online banking to see how much money you have in your accounts and where the money you have spent has gone.

Broadly, the levels of banking services offered through internet can be categorized in to three types:

1. The Basic Level Service is the bank's websites which disseminate information on different products and services offered to customers and members of public in general. It may receive and reply to customers' queries through e-mail.
2. In the next level are Simple Transactional Websites which allows customers to submit their instructions, applications for different services, queries on their account balances, etc, but do not permit any fund-based transactions on their accounts.
3. The third level of Internet banking services are offered by Fully Transactional Websites which allows the customers to operate on their accounts for transfer of funds, payment of different bills, subscribing to other products of the bank and to transact purchase and sale of securities. The above forms of Internet banking services are offered

by traditional banks as an additional method of serving the customer. There are also banks that deliver banking services primarily through Internet or other electronic delivery channels.

Some of these banks are known as virtual banks or Internet- only banks and may not have any physical presence in a country despite offering different banking services (Adriana, 2006)

Internet banking allows customers of a financial institution to conduct financial transactions on a secure website operated by the institution, which can be a retail or virtual bank, credit union or society. It may include any of transactions related to online usage. Banks increasingly operate websites through which customers are able not only to inquire about account balances, interest and exchange rates but also to conduct a range of transactions. Unfortunately, data on Internet banking are scarce, and differences in definitions make cross-country comparisons difficult (Alabar, 2012)

2.1.7.7 Agent Banking Service

A banking agent is a retail or postal outlet contracted by a financial institution or a mobile network operator to process clients' transactions. Rather than a branch teller, it is the owner or an employee of the retail outlet who conducts the transaction and lets clients deposit, withdraw, and transfer funds, pay their bills, inquire about an account balance, or receive government benefits or a direct deposit from their employer. Banking agents can be pharmacies, supermarkets, convenience stores, lottery outlets, post offices, and many more. (NBE, 2015)

Banking agents are usually equipped with a combination of POS card reader, mobile phone, barcode scanner to scan bills for bill payment transactions, PIN pads, and sometimes personal computers (PCs) that connect with the bank's server using a personal dial-up or other data connection. Clients that transact at the agent use a Magnetic Stripe bank card or their mobile phone to access their bank account or e-wallet respectively. Identification of customers is normally done through a PIN. With regard to the transaction verification, authorization, and settlement platform, banking agents are similar to any other remote bank channel (NBE, 2015)

Banking agents are the backbone of mobile banking, i.e., performing transactions over a mobile device, most often a mobile phone. To enable clients to convert cash into electronic money and vice versa which can be sent over their mobile phone, clients will have to visit a branch, ATM, or banking agent. Especially in remote and rural locations, where cash is still the most important way to pay and transact, a mobile banking service is dependent on banking agents to enable clients to effectively use the service. (NBE, 2015)

- ***Hibir Agent Banking***

According to NBE Directive, agent banking is the conduct of banking business on behalf of a financial institution through an agent using various service delivery channels. Mobile banking is performing banking activities which primarily consists of opening and maintaining mobile/regular accounts and accepting deposits; furthermore, it includes performing fund transfer or cash in and cash out services using mobile devices.

Following the permission of mobile and agent banking, United bank established a team responsible for the implementation of the service in line with the Bank's strategic focus on technology led banking which synchronize with its new motto "Beyond Core Banking to Technology Led Excellence".

The service enables the Bank to use Banking agents that double as a kind of branch to process basic banking services including opening M-wallet account, making deposits and withdrawals, transferring funds as well as sending and receiving money. United bank received the approval to go on delivering the service on March 31, 2015. In its Agent Banking Services, United will provide branchless services banking especially for the unbanked society. It provides the following banking service packages using agents.

Financial Services

- Cash-in (Deposit accepting)
- Cash-out (Withdrawal)

- Person to Person (P2P) Money Transfer
- Send cash to Walk-in customer
- Receive cash by Walk-in customer
- Money transfer between own accounts (internal) that is from physical account to m-wallet and vice versa
- Bulk payment dispatch (Bank payment dispatch to customers) – B2P like case of salary, remittance, etc.

Non-financial services

- Account opening /Customer registration
- Account balance inquiries
- PIN change

2.1.8 Measure of Bank performance

There are various types of bank performance measures in order to understand them it is better to classify them in terms of internal and external factors. Internal factors described as efficiency, productivity and profitability of the bank concerning size optimizes and capital structures.

External factors are that reflect the economic and legal environments where the financial institutions operate. They represent events outside the influence of the bank. The management can anticipate changes in the external environment and try to position the institution to take advantage of anticipated developments (Anna p.I Vong, 2008).

Performance: Performance is deemed to be the fulfillment of an obligation. Bank performance: Is a combination of various aspects which cannot be observed directly but economically important. However, stockholders are view performance in terms of the profits made on their behalf, whether or not adjusted for risks taken. There is also contribution financial institutions make to the common wealth, on behalf of consumers and businesses.

Financial performance has been studied under different yardsticks of performance i.e., size, profitability, financing pattern, economic efficiency, operational efficiency, asset quality, diversification and cost of operations (DeYoung 2001).

Profitability offers clues about the ability of the bank to undertake risks and to expand its activity. The main indicators used in the appreciation of the bank profitability are: Return on equity, ROE ($\text{Net income} / \text{Average Equity}$), Return on Asset, ROA ($\text{Net income} / \text{Total assets}$) and the indicator of financial leverage or ($\text{Equity} / \text{Total Assets}$) (Rose, 1999).

Many studies have attempted to explain the contribution of a particular variable on the performance of banks. It should be noted that very often, the authors found different results even contradictory. This is mainly due to the different data they use, which covers different areas and periods. Following the above literatures argument and also others scholars. However, this study uses ROA and ROE as the dependent variable.

Return on asset: Is one of measure of Bank performance which measured by the ratio of the return on average assets (ROA), calculated as net profit before tax divided by total assets. It is the most common profitability ratio of performance measure used by banks in order to evaluate performance comparing the efficiency of a number of different investments.

The ROA reflects the ability of a bank's management to generate profits from the bank's assets. It shows the profits earned per birr of assets and indicates how effectively the bank's assets are managed to generate revenues, although it might be biased due to off-balance-sheet activities. This is probably the most important single ratio in comparing the efficiency and operating performance of banks as it indicates the returns generated from the assets that bank owns (Tan et al. 2012).

Return on equity: ROE is more concerned about how much the bank is earning on their equity investment, the net income per birr of equity capital. The amount of net income returned as a percentage of shareholders equity. It measures how efficiently a bank can use the money from shareholders to generate profits and grow. Unlike return on Assets

ratios, ROE is a profitability ratio from the investor's point of view. This ratio calculates how much Investment is made based on the investors' investment in the bank, not the company's investment in assets or something else.

Return on equity is the return to shareholders on their equity. This means that, return on equity reflects the capability of a bank in utilizing its equity to generate profits (Tan et al. 2012). According to Dietrich et al. (2009), banks with a lower leverage ratio (higher equity) report a higher ROA, but a lower ROE. However, the ROE disregards the higher risk that is associated with a higher leverage. Even if ROE is commonly used in different studies, it is not the best measure of profitability (Ghazouani et al. 2013).

Kumbirai and Webb (2010) use financial ratio analysis to measure the performance of commercial banks in South Africa. They mainly investigate the profitability performance, liquidity performance and credit performance of commercial banks in South Africa during the period 2005-2009.

According to Kumbirai and Webb (2010), financial ratio analysis that primarily based on accounting data permits a historical sketch of bank returns and risks which are the only source of information for evaluating the management's potential to generate satisfactory returns in future.

2.1.8.1 Measurement of Bank's Financial Performance

Financial performance has been studied under different yardsticks of performance i.e., size, profitability, financing pattern, economic efficiency, operational efficiency, asset quality, diversification and cost of operations (DeYoung 2001).

Nowadays banks contribute the lion share to the growth of the economy. Enormous studies have been conducted to find out the reason behind the alarming profitability of banks whether it is due to either internal or external factors. Various researches employed various characteristics and the external variables of bank level data across countries Williams (2003) employed key performance indicators (KPIs) and argued that it provide intelligence in the form of useful information about a public and private agency's

performance. Scholar like Modell (2004) have maintained that the implementation of performance measurement systems possess important symbolic value.

Profitability offers clues about the ability of the bank to undertake risks and to expand its activity. The main indicators used in the appreciation of the bank profitability are: Return on equity, ROE (Net income / Average Equity), Return on Asset, ROA (Net income /Total assets) and the indicator of financial leverage or (Equity / Total Assets) (Rose 1999).

A commonly used measure of bank performance is the level of bank profits (Ceylan, *et.al* 2008). Bank profitability can be measured by the return on a bank's assets (ROA), a ratio of a bank's profits to its total assets. In other words, the income statements of commercial banks' profits report before and after taxes. Another good measure on bank performance is the ratio of pre-tax profits to equity (ROE) rather than total assets since banks with higher equity ratio should also have a higher return on assets (Ceylan, *et.al* 2008).

$$ROA = \beta_0 + \beta_1 DC_{i,t} + \beta_2 NATMi_{i,t} + \beta_3 NPOSi_{i,t} + \beta_4 MSI_{i,t} + \beta_5 VATMi_{i,t} + \beta_6 VPOSi_{i,t} + \epsilon_{i,t}$$

2.2 Review of Empirical studies

2.2.1 Studies in Developed and emerging market countries

Elisha (2010) studied e-banking in developing economy: empirical evidence from Nigeria. States due to emergence of global economy, e-business has increasingly become a necessary component of business strategy and a strong catalyst for economic development. E-banking has become popular because of its convenience and flexibility, and also transaction related benefits like speed, efficiency, accessibility, etc.

Ngango (2015) conducted a research on Electronic Banking and Financial Performance of Commercial Banks in Rwanda, a Case Study of Bank of Kigali from 2008 to 2012 using descriptive research design based on qualitative and quantitative approach then

their findings was established that Electronic banking system like ATM, Pay direct, electronic check conversion, mobile telephone banking and E transact has a great role on bank performance because they increase profitability, reduce bank cost of operations, and increase bank asset and bank efficiency.

A research conducted by Hannington (2013) the effect of electronic banking on the financial performance of commercial banks in Kenya from 2008 to 2012 using descriptive survey research design, the study investigated the relationship between e-banking and performance of commercial banks in Kenya. Specifically, the study was meant to establish whether there exists a relationship between the dependent variable, performance measured by profit after tax and the independent variables consisting of number of ATMs, number of debits and credit cards issued to customers, number of point of sales terminals and the usage levels of Mobile banking, Internet banking and Electronic funds transfer, as components of e-banking. The findings of the study were that e-banking has a strong and significant effect on the profitability of commercial banks in the Kenyan banking industry. Thus, there exists positive relationship between e-banking and bank performance.

Josiah and Nancy (2012) studied the Relationship between Electronic Banking and Financial Performance among Commercial Banks in Kenya from 2006 to 2010 using descriptive and inferential statistics. The study established whether there is relationship between the dependent variable return on assets and the independent variables: investments in e-banking, number of ATMS and number of debits cards issued to customers as proxy for e-banking. The study revealed that e-banking has strong and significance marginal effects on returns on asset in the Kenyan banking industry. Thus, there exists positive relationship between e-banking and bank performance.

A study conducted on electronic banking and bank performance in Nigeria using Judgmental sampling method was adopted by utilizing data collected from four Nigerian banks. The study revealed that the adoption of electronic banking has positively and significantly improved the returns on equity (ROE) of Nigerian banks. On the other hand and on the contrary, it also revealed that e-banking has not significantly improved the returns on assets (ROA) of Nigerian banks. (Abaenewe et al., 2013)

In the recent years, mobile banking has gained competitive advantage through diversification, maintaining customer loyalty. It has also assisted in increasing market share to grow their profitability and improve financial position. The study focused on mobile banking technology in relation to its effect on commercial banks' financial performance indicators namely: Return on Assets (ROA) and Return on Equity (ROE). The study established that the number of mobile banking transactions has tremendously increased in the last five years since the introduction of M-banking. The study thus concludes that, banks that have adopted M-banking services have to a large extent increased their customer outreach, and hence have improved their financial performance. The findings revealed that many mobile banking products are being offered by banks such as Fund Transfer between Accounts/ E-funds transfer, Bill Payment, order for cheque books and bank statements and therefore concluded that the financial performance of the banks that provide these mobile banking products has improved because they ensure efficiency of the banking services. (Kathuo et. al., 2015).

Financial institutions have been in the process of significant transformation. The force behind the transformation of these institutions is innovation in information technology. The study sought to determine the impact of mobile and internet-banking on performance of financial institutions in Kenya where the survey was conducted on financial institutions in Nairobi. The study also sought to identify the extent of use of mobile and internet banking in financial institutions. The study investigated 30 financial institutions. The study found that the most prevalent internet banking service is balance inquiry while the least is online bill payment. Cash withdrawal was the most commonly used mobile banking service whereas purchasing commodities was the least commonly used (Kennedy, 2013)

A study called "Does Internet Banking Affect the Performance of Community Banks?" shows that banks that provide extensive online banking services tend to perform better than those who lag behind. Results show that online banking helps community banks improve their earning ability as measured by return on equity and improve asset quality by reducing the proportion of overdue or underperforming assets. (Albert et al 2015)

The resultant of technological advancement has been the transformation in operational dimension of banks over some decades. Internet technology has brought about a paradigm shift in banking operations to the extent that banks embrace internet technology to enhance effective and extensive delivery of wide range of value added products and services. Consequently, the study examined the role of electronic banking on banks' performance in Nigeria. Panel data comprised annual audited financial statements of eight banks that have adopted and retained their brand name banking between 2000 and 2010 as well as macroeconomic control variables were employed to investigate the role of e-banking on return on asset (ROA), return on equity (ROE) and net interest margin (NIM). Result from pooled OLS estimations indicate that e-banking begins to contribute positively to bank performance in terms of ROA and NIM with a time lag of two years while a negative impact was observed in the first year of adoption. It was recommended that investment decision on electronic banking should be rational so as to justify cost and revenue implications on bank performance. (Oginni et al 2013)

Banking industry has been in a process of significant transformation. The force behind this transformation of the banking industry is innovation in information technologies. Information and communication technology is at the centre of this global change curve of electronic banking system in Kenya today. Specifically, the study established whether there is relationship between the dependent variable i.e., performance measured by return on assets and the independent variables: investments in e-banking, number of ATMS and number of debits cards issued to customers as proxy for e-banking. The study used secondary data. The data was collected from annual report of target banks and Central Bank of Kenya. The study used both descriptive and inferential statistics in analyzing the data. In general the study revealed that e-banking has strong and significance marginal effects on returns on asset in the Kenyan banking industry. Thus, there exists positive relationship between e-banking and bank performance. In general conclusion the electronic banking has made banking transaction to be easier by bringing services closer to its customers hence improving banking industry performance. (Josiah and Nancy 2012)

2.2.2 Studies in Sub-Saharan African countries

A research by Isaac and David, 2011 on M-Pesa a mobile phone based money transfer system in Kenya which grew at a blistering pace following its inception in 2007. The researchers examine how M-Pesa is used as well as its economic impacts. Analyzing data from two waves of individual data on financial access in Kenya, they found that increased use of M-Pesa lowers the propensity of people to use informal savings mechanisms such as ROSCAs, but raises the probability of their being banked. Using aggregate data, researchers calculated the velocity of M-Pesa at between 11.0 and 14.6 person-to-person transfers per month. In addition M-Pesa causes decreases in the prices of competing money transfer services such as Western Union. While they found little evidence that people use their M-Pesa accounts as a place to store wealth, their results suggest that M-Pesa improves individual outcomes by promoting banking and increasing transfers.

According to Assalam Bank (2013), and Faisal Islamic Bank (2013), cited in Tingari and Mahmoud (2014), m-banking in Sudan was firstly adopted in 2009 that could be categorized to informational m-banking services (such as exchange rate, balance inquiry, check status inquiry and short statement), and interactive m-banking services (including e-payments, money transfer, account management).

Tingari and Mahmoud (2014) studied about the revolution of ICT. It deals with the evolution of BT, e-banking and m-banking in Sudan. It intends to explore the practice of m-banking in Sudan. The focus is on the availability of adequate infrastructure and on the challenges and risks that face m-banking services in Sudan. Their findings showed that although m-banking is believed to be essential, still the services provided are at an infant stage. It is also found that concerned parties are not fully cooperating. This raises risks and constitutes challenges that hinder full utilization of m-banking in Sudan.

Faisal (2013) in Ghana showed that the main rejection factors in using m-banking technology by customers were m-banking requires knowledge & learning, attracts additional banking charges, and Poor telecommunication technology.

Ayo et al., (2010) in their study on “the state of e-banking implementation in Nigeria” investigated into the influence of trust on e-payment using the extended Technology Acceptance Model (TAM). Similarly, they also evaluated the influence of Perceived Trust, Perceived Risk and Organizational Reputation on Customer Loyalty to technology diffusion. According to Chemekie et al. (2006), cited in Ayo et al. (2010); most of the Nigerian banks ability to sustain; retain and satisfy their customers even after the era of considerable consolidation of the commercial banks depended largely on their ability to develop their information infrastructure mechanisms.

Another empirical study done by Korir (2012) revealed that there were losses to customers of Kenya Commercial Bank (KCB), who use the M-Banking services, due to fraudulent access of customers’ accounts through hacking. Since an incident like this will have a ruinous impact on the reputation of the bank there is need to employ disciplined, qualified and well remunerated ICT in the bank and at the level of mobile provider.

The qualitative studies on M-Pesa such as Morawczynski and Pickens (2009) have suggested that M-Pesa serves as a partial substitute for the formal banking system. Prior to the introduction of M-Pesa, most Africans were excluded from modern financial services. Using data ranging between 2001 and 2005, Beck et al. (2007) show that African countries lagged in financial access. During those periods they show that Ghana had 1.6 branches per 100,000 and Kenya had 1.3 branches per 100,000, while Uganda and Tanzania both had less than 0.6 branches per 100,000. The ATM penetration of these countries was even lower ranging from 1 per 100,000 in Kenya to less than 0.20 per 100,000 in Tanzania. In contrast, the U.S. had 31 bank branches and 120 ATMs per 100,000 people during that period.

A study done by Shakila and Faria (2012) on practice of E-banking in commercial bank focused on prospects and some drawbacks of E-banking in banking sector of Bangladesh. The study used structured questionnaire and conversation with bankers and found out that prospect of E-banking in Bangladesh were expansion of market for new banking products and services, and reduction in operation costs for banks. More broadly,

the continued development of E-banking contributes to improving the efficiency of the banking and payment system and reduces the cost of retail transaction. The government emphasis of raising allocation for developing ICT infrastructure, waving taxes on computer peripherals and competition among banks in improving customer services have accelerated the prospects of E-banking in Bangladesh. The study also mentioned that E-banking can play a significant role in uplifting the entire banking services and thus positively affect the country's economy. Some of the short term advantages found by the study include increase in productivity and efficiency, avoidance of duplication of work and wastage and reduction in service delivery time. While the long term advantages are proper use of resources, planning and monitoring. The study also found constraints of E-banking being limited availability and growth of telecommunication infrastructure, culture of using E-banking, legal and regulatory framework, the user of E-banking being limited to urban areas and infrastructure of villages being not suitable for E-banking.

A study conducted towards effective implementation of E-banking in Nigeria by (Pedro 2012), focused on issues of E-banking as well as strategies that may help to strengthen customer-bank relations for a better public service delivery and to close the design-reality gaps and thus improve E-banking project success rate in Nigeria. The study concluded, for an effective E-banking, the strategic response should be built on institutional, technological, data systems' awareness and commitment, human legislative and leadership. The design-reality gap challenge associated with E-banking initiatives, western E-banking models and systems should be addressed by customizing the match between Nigerian reality and the design. Thus it will certainly reduce the failure rate and increase the success of E-banking initiatives.

2.2.3 Empirical studies related to E-Banking in Ethiopia

Girma, 2016 conducted a research about the impact of ICT on the performance of Ethiopian banking industry using secondary data over the period 2010 – 2014. Data analysis is carried out in panel environment. The study employed purposive sampling

technique to select the required sample of banks from commercial banks in Ethiopia. Using ROA as a measure of performance in the study and the explanatory variables were ICT investment, ATM, POS, INF, BRAN and GDP. The finding shows that the ICT, ATM and POS have no statistically significant effect on return on asset on commercial banks in Ethiopia. Moreover result showed that the POS, ICT and number of branches have negative effect on return on asset on commercial banks in Ethiopia.

A research undertaken by Ayana (2014) on factors affecting adoption of E-banking system in Ethiopian banking industry, focused on factors that affect adoption of E-banking in Ethiopian banking industry. The study statistically analyzes data obtained from survey of staffs of 4 purposely selected banks using qualitative and quantitative research approach on a research framework developed based on Technology Organization Environment mode (TOE). And conclude E-banking system such as ATM, mobile banking, internet banking and others were not well adopted by Ethiopian banking industry, due to low level of ICT infrastructure and lack of legal frameworks at NBE. In addition to this the result of the study also showed that security risk and lack of trust on the use of technological adoption are other major barriers for the system. Limited technical and managerial skills available in Ethiopian banks were also mentioned as an influential factor for the choice of technology in Ethiopian banks.

A study conducted by Gardachew (2010) on practices, opportunities and challenges of E-banking in Ethiopia, analyzed the main challenges and opportunities of E-banking. After conducting a survey he came up with the challenges being low level of internet penetration and poorly developed telecommunication infrastructure, lack of suitable legal and regulatory framework for e-commerce and e-payment, high rates of illiteracy, high cost of internet, absence of financial networks that link different banks, lack of reliable power supply and cyber security issues. And mentioned opportunities offered by ICT through e-learning programs, the help of nongovernmental agencies like ECA and World Bank to developing countries to design national strategies like e-commerce and commitment of the government on ICT as prospects for Ebanking development.

A study undertaken by Senait (2007) on prospects and challenges of E-banking, focused on prospects and challenges of E-banking in Ethiopia from the banks perspective and aims to gain a deep understanding of the factors influencing the adoption of E-banking by banks operating in Ethiopia. She used a model of perceived influential factors and tested using questionnaire using a sample drawn from Ethiopian banks' officials who believed to have exposure to the subject matter. In her study she mentioned determinant factors of E-banking in Ethiopia include technological and infrastructural requirement, customers' attitude, capacity of existing banks, capacity of regulatory and supervisory organs in relation to authorization and security and risk management capacity of banks. She also revealed benefits of E-banking which includes reduction of transaction cost, perfect information about customer, increased profitability, variety of products enhancing cross selling, customer loyalty (branding) and wider geographical reach. And the risks involved include strategic risk, compliance risk, and total reliability risk. Thus she concluded the factors tested for the risks involved towards E-banking and the determinant factors of E-banking are found to be effective and recognized as the challenges of e-banking for its successful adoption in Ethiopian market.

Abraham (2012) described that among the common problems known in Ethiopian which are related to electronic banking few of them are lack of banking services through the web or other electronic means such as using mobile phone, weak telecommunications, lack of Internet awareness, broken and slow Internet connections, data and network security and privacy, lack and limitation of government policies, regulations and e-commerce laws, as well as legislation to protect workers and to make the Internet secure.

Banking in Ethiopia faces numerous challenges to fully adopt and adopt E-banking application and seize the opportunities presented by ICT applications in general. Part of key challenges for e-banking applications are low level of internet penetration and poorly developed telecommunication infrastructure, lack of infrastructure for telecommunications, lack of suitable legal and regulatory framework for e-commerce and e-payment, high rate of illiteracy, high cost of internet, absences of financial

institutions networks that link different banks, frequent power interruption, resistance to changes in technology among customers and staff due to lack of awareness on the benefits of new technologies, fear of risk, lack of trained personnel in key areas, tendency to be content with the existing structures and people may be resistance to new payment systems (Gardachew,2010). in Ethiopia; their objective was studying of E-payment practices in developing countries, Africa and Ethiopia and found that, the main obstacles to the development of E-payments are, lack of customers trust in the initiatives, unavailability of payment laws and regulations particularly for E-payment, lack of skilled manpower and Frequent power disruption.

Ayana (2010) explored in his study on “Adoption of Electronic banking system in Ethiopian Banking industry: Barriers and Drivers” that E-banking system, such as ATM, mobile banking, internet banking and others were not well adopted by Ethiopian banking industry. This is due to low level of ICT infrastructure and lack of legal frame work at NBE, which can initiate banking industry to implement the system. In addition to the above two basic factors affecting adoption of E banking in Ethiopia, result of the study also shows that security risk and lack of trust on the use of technological adoption are other major barriers for the system. The level of security risk associated with E-banking product or service, such as ATM, internet banking, mobile banking and others, pose different challenges to different banks. Improvements are required to ensure client confidence. Lack of competition among local and foreign banks is also another challenge for the adoption of E-banking in the country. Technical and managerial skills available in Ethiopian banks for the adoption of E-banking are also limited.

2.2.4 Gaps in literature

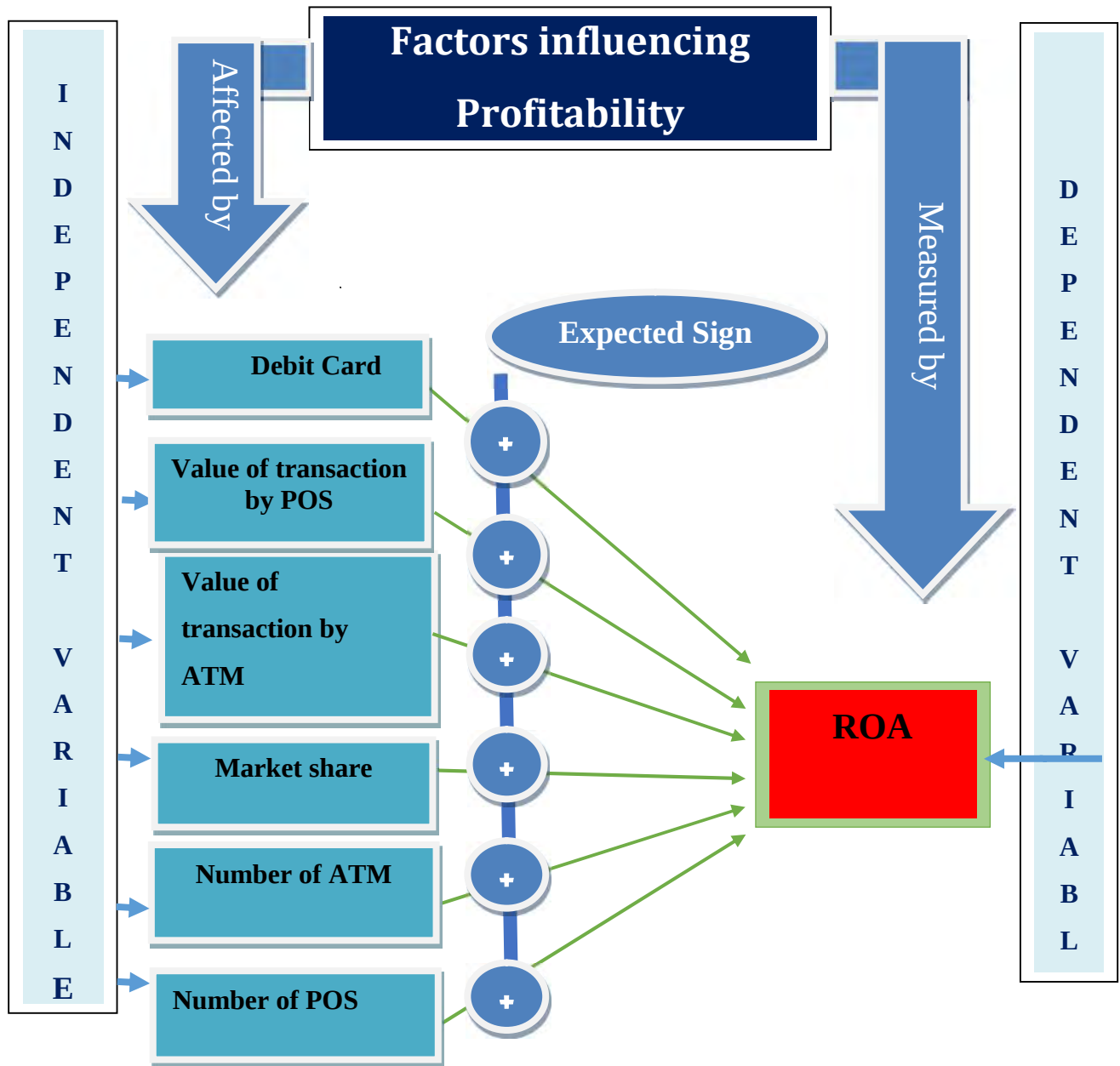
The literature review shows that research in the area of e-banking has been done but not on the roles of financial performance of banks. The literature reviewed indicated that

previous researchers concentrated on e-banking adoption, Barriers and Benefits, Challenges and Prospect, customer satisfaction and behavior towards e-banking but, this research focused on the roles of e-banking on the financial performance of banks. This makes the study more relevant. From survey of relevant literature, it has been found that there are a few studies conducted in Ethiopia on the area of e-banking and IT adoption and its impact towards customer behavior of commercial banks. This study therefore intends to fill these relevant gaps in literature by studying the roles of e-banking service on return on asset as a financial performance indicator of commercial banks in Ethiopia.

2.2.5 Conceptual framework

From the theoretical and empirical literature reviews, the following conceptual framework of the study is developed by the researcher.

Figure 2.1 The conceptual framework or model of the study



Source: - Compiled by the researcher

CHAPTER THREE RESEARCH METHODOLOGY AND DESIGN

This chapter deals with research design and methodology used to carry out the research. The chapter is organized in six sub sections. In its introduction part highlight the research paradigms, then the chapter concisely present study design, data type, data collection & sampling technique, data analysis and model specification. The final two sub parts present variables definition & Hypothesis development and operationalization of study variables.

3.1 Research Design

The primary aim of this study is to examine the role of electronic banking on bank's financial performance. To achieve this objective explanatory type of research design with a quantitative approach is used. The explanatory type of research design helps to identify and evaluate the causal relationships between the different variables under consideration Marczyk et al., (2005). So that, in this study the explanatory research design has employed to examine the relationship of the stated variables. A panel data study design which combines the attributes of cross-sectional (inter-firm) and time series data was used. The advantage of panel data analysis is that more reliable estimates of the parameters in the model can be obtained (Gujarati, 2004). EViews 8 statistical software; panel least square regression method was used to analyze the data. Furthermore, descriptive analysis, normality test, the autocorrelation matrix analysis, F-test and the regression analysis has conducted.

3.1.1 Population of the study and Sampling Techniques

The target population of the study is all commercial banks adopting e-banking service in Ethiopia. The annual audited financial statement of selected commercial banks in Ethiopia for a period covering from 2013-2015 are used as a main source of data to gather important information for the study. However to conduct the research commercial banks operating in Ethiopia, have no complete data of all the e-banking service is

available before 2013. Therefore, banks those having organized e-banking service report to NBE since 2013 are considered as a sample. Due to this reason, by using purposive sampling technique from seventeen Commercial banks operating in Ethiopia this study took ten banks which are the banks that have invested heavily in e-banking based on information available from their annual reports and apply ATM and POS. Those are commercial bank of Ethiopia, Awash International bank, Dashen Bank, Bank of Abyssinia, Wegagen Bank, United Bank, Nib International bank, Cooperative bank of Oromia, Oromia International Bank and Zemen Bank.

3.1.2 Source and types of Data

The study employed a quantitative research approach by using secondary data gathered from National Bank of Ethiopia and published annual reports of commercial banks. Financial statements and other published and unpublished documents also used to construct the literature part of this thesis and cited accordingly. The Panel data involves the pooling of observations on a cross section of units over several time periods and provides results that are simply not detectable in pure cross sections or pure time series studies Brooks, (2008). In addition Hsiao, (2003) described panel or a longitudinal data set is one that follows a given sample of individuals over time, and thus provides multiple observations on each individual in the sample.

Brooks, (2008), states that, panel data set has two major advantages; first, it can address a broader range of issue and tackle more complex problem than pure time series or pure cross-sectional data alone and by structuring the model in appropriate way, the researcher can remove the impact of certain forms of omitted variable bias in the regression result. Second, it is often examined how the relationships between variables change. Hence, by combining cross-sectional data and time series data, the researcher can increase the number of degree of freedom, and thus the power of test, by employing information on the dynamic behavior of a large number of entities at same time.

A multiple linear regression tests used to determine the significance level of each independent and control variable in influencing financial performance. The multiple linear regressions model using OLS through E-Views 8.0 econometric software package,

to test the casual relationship between the banks' financial performance and electronic banking in order to determine the most significant and influential indicators and other control variables affecting the financial performance of commercial Banks in Ethiopia.

3.1.3 Data analysis

The data collected using data collection sheet are edited, coded and cleaned. To achieve the broad research objective, the paper was primarily based on panel data, which was collected through structured document review. Thus, the collected panel data was analyzed using descriptive statistics, correlations and multiple linear regression analysis. Mean values and standard deviations were used to analyze the general trends of the data from 2013 to 2015 based on the sector sample of ten banks and a correlation matrix was also used to examine the relationship between the dependent variable and explanatory variables. For this study, the regression analysis known as OLS was used to estimate the relationship between return on asset and its determinants. The multiple linear regressions model was run, and thus OLS was conducted using E-views 8 econometric software package, to test the casual relationship between the bank's financial performance and their potential determinants and to determine the most significant and influential e-banking explanatory variables affecting the financial performance of commercial banks.

Regression is concerned with describing and evaluating the relationship between a given variable (usually called the dependent variable) and one or more other variables (usually known as the independent variables) Brooks, (2008).

Descriptive statistics including minimum, mean, maximum and standard deviation is used to describe and provide detailed information about selected variables; diagnostics tests of CLRM assumptions including Multicollinearity, Heteroskedasticity and autocorrelation tests were conducted to ensure safe application of least square method; this study also conducted correlation analysis, specifically Pearson correlation to measure the degree of association between the variables under considerations; F-test is used to test more than one coefficient simultaneously different from zero and to check the significance level of all explanatory variables in this research models; and panel data regression analysis (panel least square method) is used to examine the relationship between dependent and

independent variables in order to conclude based on the collected data about the roles of e-banking on financial performance in commercial banks in Ethiopia; the P-value was used to determine the significance of the constant term and the coefficients terms for the regressions. The importance of each of the regressions was determined by carrying out the F-test at 95% confidence level. The coefficient of determination R^2 was used to measure the strength to which independent variables explain the variations in the dependent variables. The data collected for the study has the dimension of both time series and cross sections. Therefore, panel data regression technique is used to conduct the analysis and EViews 8 statistical software has employed.

3.2 Model Specification

A regression with only one independent and one dependent variable is a simple linear regression model, used to identify whether the independent variable has an effect on dependent variable. Whereas, if there are more than one independent variables, the model appropriate to test the significance of these variables to explain about the change on dependent variable would be multiple linear regression model (Brooks, 2008)

The literature reviewed in the previous chapter identified the roles influencing financial performance of e-banking. This chapter presents a framework of analysis on the basis of these studies, and involves adopting a model that would help demonstrate the responsiveness of certain key variables that influence financial performance of commercial banks in Ethiopia.

Although the data consists of both cross sectional and time series information, it does not contain equal information of all commercial banks in the sample for the entire period. Therefore, unbalanced panel estimation techniques are used in this study. Panel techniques take into account the heterogeneity present among individual commercial banks, and allow the study of the impact of all factors with less co linearity among variables, more degree of freedom and greater efficiency (Christopher and Rim, 2014).

The process of measurement is central to quantitative research because it provides the fundamental connection between empirical observation and mathematical expression of quantitative relationships Brooks, (2008).

Similar model is use in the studies like Al-Smadi and Al-Wabel (2011), Itah and Emmanuel (2014), Rauf and Qiang (2014), Karimzadeh (2014), Valahzaghari and Bilandi (2014) to examine the effect of cashless banking on banks in different countries of the world.

According to Brooks, (2008), the general multivariate regression model with K independent variables can be written as follows:-

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + \epsilon_i \quad (i = 1, 2, 3, \dots, n)$$

Where Y_i is the i^{th} observation of the dependent variable, $X_{1i}, \dots, X_{ki}$ are the i^{th} observation of the independent variables, $\beta_0, \dots, \beta_k$ are the regression coefficients, ϵ_i is the i^{th} observation of the stochastic error term, and n is the number of observations. Hence, the roles of e-banking on profitability of commercial banks can be modeled as described below:-

$$ROA = \beta_0 + \beta_1 DC_{i,t} + \beta_2 NATM_{i,t} + \beta_3 NPOS_{i,t} + \beta_4 MS_{i,t} + \beta_5 VATM_{i,t} + \beta_6 VPOS_{i,t} + \epsilon_{i,t}$$

Where:-

ROA = Profit before tax / Total Asset

DC = Number of Debit Card

NATM= Number of ATM

NPOS = Number of POS

MS = the Market share index of bank

VATM = Value of transaction executed by ATM = (Natural logarithmic of value of ATM transaction)

VPOS = Value of transaction executed by POS= (Natural logarithmic of the value of POS transaction)

β_0 = Constant term

$\beta_1, 2, 3 \dots 7$ are parameters to be estimated;

ϵ = is the error component for company i at time t assumed to have mean zero $E[\epsilon_{it}] = 0$

i = commercial banks $i = 1 \dots 10$; and

t = the index of time periods and t = 1- 3

3.3 Variables Definition and Hypothesis development

According to Creswell, (2009), to make it is clear to readers what groups are receiving the experimental treatment and what outcomes are being measured, the variables need to be specified in quantitative researches.

3.3.1 Dependent Variable

Return on Asset; bank performance has often been measured using return on asset (ROA) and profit before tax. Return on asset is defined as net income before tax divided by total assets. This ratio is an indicator of managerial efficiency; it indicates how capable the management of the bank's assets in to net earnings (Adegbaaju, 2008). Thus, in this research use return on asset will be used as a proxy on bank's financial performance.

Return on Asset (ROA) represents efficiency in asset utilization and shows how much net income is generated out of assets. It indicates the ability of bank management to generate profits by utilizing the available assets of the bank. Thus, if the ratio of ROA is high, it indicates that it is better performance in order to generate profit. It is measured by the ratio of net profit to total asset as follows: $ROA = \text{Net Profit before tax} / \text{Total Asset}$

Measurement of bank performance is complicated activity. Researchers used different approaches to assess the performance of banks in various times. However, some of the most reliable yardsticks that have been used in the past to measure financial performance of bank are return on assets (ROA).

According to Ross et al., (2006) return on asset (ROA) is a comprehensive measure of overall bank performance from an accounting perspective. It is a primary indicator of managerial efficiency. It indicates how capable the management of the bank has been converting the bank's assets in to net earnings.

The ROA reflects the ability of a bank's management to generate profits from the bank's assets. It shows the profits earned per birr of assets and indicates how effectively the bank's assets are managed to generate revenues, although it might be biased due to

off-balance-sheet activities. This is probably the most important single ratio in comparing the efficiency and operating performance of banks as it indicates the returns generated from the assets that bank owns (Tan et al. 2012).ROA is the most comprehensive accounting measure of a bank's overall performance (Birhanu, 2012). Because of this, the bulk of studies employed ROA as performance measure, for instance, (Amdemikael, 2012, Belayneh 2011, Mohana et. al., 2012, Li Yuqi 2006, Sufian 2011, Syafri 2012).

3.3.2 Independent other control Variable

Banks performance is affected by both internal and external factors. Internal factors are factors over which banks management has control whereas external factors are factors over which the management of the bank lacks control.

Internal factor that is called the bank specific factors is determinants that are mainly influenced by a bank's management and policy objectives. That is, according to Mohana et al, 2012 the bank specific factors reflect the difference related to policies and decisions of a bank's management. Such performance determinants are capital structure, bank size, income diversification and operating costs which are derived from balance sheet and income statement.

The independent variables are number of ATM, value of transaction executed by ATM, number of POS, value of transaction executed by POS, debit Card, and market share of commercial banks there are also many e-banking service that can be considered as independent variables but due to lack of organized data the researcher obliged to exclude.

3.3.2.1 Value of transaction of Automated Teller Machine (VATM)

Kashif and Muhammad (2016) used value of transaction of ATM to examine the impact of cashless banking on profitability of Pakistani banking industry. To measure cashless banking in the country proxies of Automated Teller Machines Transactions (ATMT), Point of Sales Transactions (POST), Call Center Banking Transactions (CCT) and Mobile Banking Transactions (MOBT) are used to examine their impact on aggregate

Return on Equity (ROE) of the banking industry, Ordinary Least Square (OLS) multiple regressions.

Price of transaction of ATM was undertaken as independent variable by Hamed et al., 2016 the results of study showed that the effect of price of ATM, POS on ROA of selected banks is positive and significant. The effect of POS on bank ROA is higher than that of ATM, insofar as ATMs have the lowest effect.

3.3.2.2 Value of transaction of Point of sale (VPOS)

Value of transaction of POS (price of transaction) was included as independent variable to study profitability (return on asset) of Iranian banks by Hamed et al., 2016 the results of study showed that the effect of price of ATM, POS on ROA of selected banks is positive and significant. The effect of POS on bank ROA is higher than that of ATM, insofar as ATMs have the lowest effect.

3.3.2.3 Debit Card (DC)

Debit card issued by banks to customers with accounts and they can be at cash machines ATMs to withdraw money from bank account and used to purchase items at stores and online (Nyanamba and Steve 2014). In this section Debit Card is proximate by total number of Debit Card users.

3.3.2.4 Number of Automated Teller Machine terminals (NATM)

Saeid et.al, (2014) have done a research entitled “The effects of e-banking on banking expansion on profitability of a commercial bank in Iran”. For this study, they have used return on asset considering as dependent variables and the number of ATM machines, terminal branches, and point of sales, market concentration and bank size were considered as independent variables covering the period from 2004 to 2012. Results

showed that the number of terminal branches, ATMs, POSs, bank size and market concentration have positive effects on the bank profitability; the number of terminal branches had more effect on the bank profitability than other variables has significant and positive effect on profitability of Sepah bank.

Delgado et al., (2004), argues that the development of electronic communication channels has had a profound impact on the banking industry. The electronic distribution of retail banking services for example, emerged with the introduction of automated teller machines (ATM), a technology pioneered by Barclays Bank in 1967.

Evidence from other empirical studies conducted on the contribution of automated teller

machines (ATM) to bank's profitability reveal that investment in ATMs increases both the volume and value of deposit accounts, reduces banking transaction costs, reduces number of staff and the number of branches and consequently improves bank's profitability (Abdullah, 1985).

In this section ATM is proximate by total number of ATM terminals and value of transaction executed by ATM (VATM)

3.3.2.5 Number of Point of sale terminals (NPOS)

According to Dieterich (2014), POS covers a variety of services rendered through machines located at retail establishments. POS terminals are generally clerk generated devices located at the checkout or convenience counter or retail establishment. Electronic cash register versions of these terminals have been in operation for several years, maintaining store records on sales, inventories, accounts receivable and the like. Now, POS devices have been linked to financial institution computers, allowing retail customers to receive approval for check cashing and electronically initiate transfers from their accounts to the retailer's. In some installations, customers can make deposits to their accounts. POS devices accept either a plastic credit card or a plastic debit card, depending on whether the customer wants to delay payment by charging the purchase

deducted directly from customer's account. As electronic POS systems proliferate, their use will probably replace many of the paper transactions accomplished through cash payments and check and credit transactions.

In this section POS is proximate by total number of POS terminals and value of transaction executed by POS (VPOS)

Ngumi (2013) research conducted in Kenya on effects of innovation on financial performance of commercial banks in Kenya; Mabrouk & Mamoghli (2010) employed in Tunisia so called financial innovation for banks profitability; Nofie (2011) study on the diffusion of electronic banking in Indonesia and Kemppainen (2003) Competition and regulation in European retail payment systems used number of ATM terminals, number of POS terminals and number of debit card used as independent variables.

External factors are variables that reflect the economic and legal environments where the financial institutions operate. They represent events outside the influence of the bank. The management can anticipate changes in the external environment and try to position the institution to take advantage of anticipated developments (Anna p.I Vong, 2008).

3.3.2.6 The bank market share (MS)

The market share of each bank is equal to the ratio of bank deposit to the total deposit of selected banks, the researcher employed as a control variable. The higher market share means higher deposit (Asadzade and Kiani, 2012, 191) [2]

$$\text{The bank market share} = \frac{\text{Deposit of each bank}}{\text{Total deposit of studied banks}} \quad (Eq1)$$

Both Vong et al (2009) and Devinaga Rasiah (2010) included market share in their studies. According to Devinaga Rasiah (2010) market share could be included in the profitability model as an external determinant because if commercial banks could be able to expand their market share then they may be able to increase their income as well hence profit. This is because the ability to increase market share requires selling more so in the case of banking if commercial banks are able for example offer more loans to more

customers then they stand a greater chance of increasing interest income as well as profits. More over being able to sell more in order to increase your market share requires efficiency and low cost in your operation and Smirlock (1985) with his efficient structure hypothesis advocate that commercial banks that are in the position to ensure superior efficiency and having low cost structures stand the chance of achieving supernormal profits.

Furthermore, according to Karkrah and Ameyaw (2010) market share or size of banks is normally used to capture potential economies or diseconomies of scale in the banking sector. Secondly, the size of banks as a variable control for cost differences and product and risk diversification. They argue that the first factor (economies or diseconomies of scale) is expected to lead to a positive relationship between bank size and profitability if there are significant economies of scale and their argument was based on the empirical evidence of Akhavein, Berger & Humphrey (1997) Bourke (1989), Molyneux & Thornton (1992), Bikker & Hu (2002), Goddard, Molyneux & Wilson (2004) which they cited.

3.4 Operationalization of study variables

Table 3.1 Definition, notation and expected sign of the study variables

	Variables	Notation	Measure	Used By (Source)	Expected Result
Dependent Variables	Return on Asset	ROA	Net Income before tax / Total Asset	(Amidu & Abor, 2006).	
Independent Variables	Debit card	DC	Natural logarithmic of number of Debit card users	Sundas, 2014	+
	Value of transaction executed by ATM	VATM	Natural logarithmic of Value of transaction by ATM	Hamed et al., 2016	+
	Number of ATM	NATM	Natural logarithmic of number of ATM deployed	Mohammed, 2006	+
	Value of transaction executed by POS	VPOS	Natural logarithmic of Value of transaction by POS	Hamed et al., 2016	+
	Number of Point of Sale	NPOS	Natural logarithmic of number of POS deployed	Hamed et al., 2016	+
	Market Share	MS		Hamed et al., 2016	+

Source: Compiled by researcher

CHAPTER FOUR DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and presentation of the results of the study. The data were analyzed by using E-view software version 8. The descriptive statistics and the correlation analysis were discussed. Followed by the diagnostic test, which is necessary to fulfill the assumption of the classical linear regression model. Then, econometric analysis and discussion of the main finding of the study were presented. Finally, the results of the regression analysis were discussed by supporting empirical evidence.

4.1 Descriptive Statistics

Table 4.1 provides a summary of the descriptive statistics of the dependent and independent variables for ten commercial banks from the year 2013 to 2015 with a total of 30 observations. The table shows the mean, minimum, maximum, standard deviation and number of observations for the dependent variable Return on asset (ROA) and independent variables Number of Debit Cards (DC), Number of POS (POS), Number of ATM (ATM), Value of transaction executed by ATM (VATM) Value of transaction executed by POS (VPOS), and market share of banks (MS).

Table 4.1 Descriptive statistics (Source: E-Views output)

	ROA	DC	NATM	NPOS	MS	VATM	VPOS
Mean	0.037667	4.809333	1.931000	2.240667	0.103500	3.098333	0.220333
Median	0.040000	4.780000	2.020000	2.305000	0.030500	3.615000	-0.235
Maximum	0.060000	6.210000	2.810000	3.280000	0.664000	4.310000	3.170000
Minimum	0.020000	3.510000	0.000000	1.000000	0.010000	0.310000	-1.52
Std. Dev.	0.010063	0.635496	0.567756	0.576595	0.196082	1.353848	1.484421
Skewness	0.066693	0.164775	-1.24494	-0.46489	2.399230	-1.39458	0.545024
Kurtosis	3.309129	2.581084	5.795870	2.669883	7.028021	3.143460	2.019197
Jarque-Bera	0.141691	0.355117	17.52049	1.216816	49.06272	9.749946	2.687725
Probability	0.931606	0.837312	0.000157	0.544217	0.000000	0.007635	0.260836
Sum	1.130000	144.2800	57.93000	67.22000	3.105000	92.95000	6.610000
Sum Sq. Dev.	0.002937	11.71179	9.348070	9.641387	1.114996	53.15422	63.90170
Observations	30	30	30	30	30	30	30

Table 4.1 shows the average indicators of variables computed from the financial

statements and the standard deviation that shows how much dispersion exists from the average value. According to Brooks, (2008), a low standard deviation indicates that the data point tend to be very close to the mean, whereas high standard deviation indicates that the data point are spread out over a large range of values.

It shows the summary data for the variables used in the analysis. The data are average values across years and reported showing the trend of the key variables over the period 2013 to 2015. The data shows that during 2013 to 2015 the average profit level; ROA of Ethiopian banks are 3.78 percent. However, there is much difference in profitability among the banks as witnessed by the values of the standard deviations which is 0.010 as indicated in table 4.1. This implies that the volatility of ROA ratio varies from the mean by 1%.

4.2 Correlation Analysis

Table 4.2 Correlation Analysis of Variables

Correlation Probability	ROA	DC	NATM	NPOS	MS	VATM	VPOS
ROA	1.00000						
DC	-0.21162	1.0000					
NATM	0.368587	0.554134	1.0000				
NPOS	0.309906	0.655922	0.530282	1.0000			
MS	0.140068	0.581628	0.408532	0.28776	1.0000		
VATM	0.158656	0.504452	0.21451	0.676045	0.352045	1.0000	
VPOS	0.01657	0.653768	0.227724	0.417845	0.709595	0.624961	1.0000

Source: EViews output

The most widely-used type of correlation coefficient is Pearson r, also called linear or product-moment correlation. The significance level calculated for each correlation is a primary source of information about the reliability of the correlation. The significance of a correlation coefficient of a particular magnitude will change depending on the size of

the sample from which it was computed. The values of the correlation coefficient are always between -1 and +1. A correlation coefficient of +1 indicates that the two variables are perfectly related positively; while a correlation coefficient of -1 indicates that two variables are perfectly related in a negative linear sense. A correlation coefficient of 0, on the other hand indicates that there is no linear relationship between two variables (Gujarati, 2004).

The correlation result in Table 4.2 shows that debit card and value of transaction by POS are negatively related to ROA of Banks. It shows that when the increase in these factors leads in the decrease in ROA.

The matrix showed that in general the correlation between the explanatory variables is not strong suggesting that multicollinearity problems are either not severe or non-existent. According to Kennedy (2008), multicollinearity will be a severe problem when the correlation is above 0.80.

In general, even though the correlation analysis shows the direction and degree of associations between variables, it does not allow the researcher to make cause and effect inferences regarding the relationship between the identified variables. Thus, in examining the effects of selected independent variables on dividend payout ratio, the econometric regression analysis which is discussed in the forthcoming section of the paper gives assurance to overcome the shortcomings of correlation analysis.

4.3 Regression model tests

For valid hypothesis testing and to make data available for reliable results, the test of assumption of regression model is required. Accordingly, the study has gone through the most critical regression diagnostic tests consisting of Normality, Multicollinearity, heteroskedasticity, and autocorrelation and model specification accordingly.

4.3.1 Classical linear regression model (CLRM) Assumptions

To maintain the data validity and robustness of the regressed result of the research, the basic classical linear regression model (CRLM) assumptions must be tested for identifying any misspecification and correcting them so as to augment the research quality Brooks, (2008). There are different CLRM assumptions that need to be satisfied and that are tested in this study, which are: errors equal zero mean test, normality, homoscedasticity, autocorrelation, and multicollinearity.

4.3.1.1 Constant Assumption 1: $E(u_t) = 0$

The first assumption required is that the average value of the errors is zero. In fact, if a constant term is included in the regression equation, this assumption will never be violated (brook, 2008). In chapter three the researcher expected a constant term in his regression model. Similarly, according to the random effect result this study has a constant term (i.e. 0.011528). Which means the mean value of the errors is zero, and the estimates of slope coefficients are not biased. Therefore, this assumption is not violated.

4.3.1.2 Test for heteroskedasticity assumption ($\text{var}(u_t) = \sigma^2 < \infty$)

The condition of classic linear regression model implies that there should be homoskedasticity between variables. This means that the variance should be constant and same. Variance of residuals should be constant otherwise, the condition for existence of regression, homoskedasticity, would be violated and the data would be heteroskedastic Brooks, (2008). To check for this, Breusch-Pagan-Godfrey test were applied. The Breusch-pagan tests of the null hypothesis that the error variances are all equal versus the alternative that the error variance are a multiplicative function of one or more variables.

Hence, following the general null hypothesis of Breusch-pagan tests, the researcher develops the following hypothesis to check the presence of heteroskedasticity:

- H_0 : homoskedastic error term
- H_1 : heteroskedasticity error term

Table 4.3 Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.264487	Prob. F(6,23)	0.9479
Obs*R-squared	1.936298	Prob. Chi-Square(6)	0.9255
Scaled explained SS	1.363469	Prob. Chi-Square(6)	0.9680

Source: EViews output

Both F-statistic and chi-square (χ^2) tests statistic were used. As can be presented in the above Heteroskedasticity test both the F - and χ^2 -test statistics give the same conclusion that there is no significant evidence for the presence of Heteroskedasticity. Since the p -values in all of the cases were above 0.05, the null hypothesis of homoskedasticity is failed to reject at 5 percent of significant level. This implying that there is no significant evidence for the presence of heteroskedasticity in these research models. The third version of the test statistic, “scaled explained SS”, which as the name suggests is based on a normalized version of the explained sum of squares from the auxiliary regression, also give the same conclusion. (See Appendix A for detail).

4.3.1.3 Test for absence of autocorrelation assumption ($cov(u_i, u_j) = 0$ for $i \neq j$)

Another basic assumption of regression model says that the covariance between error terms should be zero. This means that error term should be random and it should not exhibit any kind of pattern. If there exists covariance between the residuals and it is non-zero, this phenomenon is called autocorrelation Brooks, (2008). To test for autocorrelation, three methods can be used.

Breusch–Godfrey Serial Correlation LM test

The Breusch–Godfrey serial correlation LM test was run. Breusch–Godfrey tests area joint test for autocorrelation that will allow examination of the relationship between $\hat{u}_t$ and several of its lagged values at the same time. According to Brooks (2008), The Breusch--Godfrey test is a more general test for autocorrelation up to the r^{th} order.

Hypothesis of this test are:-

Following the general null hypothesis of Breusch–Godfrey serial correlation LM test, the researcher develops the following hypothesis to check the absence of autocorrelation:

$$H_0 = \text{No autocorrelations errors}$$

$$H_1 = \text{Autocorrelations errors}$$

Table 4.4: Breusch-Godfrey Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.020590	Prob. F(2,21)	0.9796
Obs*R-squared	0.058713	Prob. Chi-Square(2)	0.9711

Source: EViews output

As can be seen in the above table 4.4, F test result and the P value of F-statistic 0.97 which is beyond the significance level of 5%. Hence, the null hypothesis of no autocorrelation is failed to reject at 5 percent of significant level. This implying that there is no significant evidence for the presence of autocorrelation in this model. The Chi-Square P-value of the model also supports the absence of autocorrelation. (See Appendix B for detail). Therefore, can be concluded that, the covariance between residuals is zero, data is normal and absence of autocorrelation problem was found conclusively from the LM test.

4.3.1.4 Test of normality ($ut \sim N(0, \sigma^2)$)

Normality test was applied to determine whether a data is well-modelled by a normal distribution or not, and to compute how likely an underlying random variable is to be normally distributed. If the residuals are normally distributed, the histogram should be bell-shaped and the Jarque-Bera statistic would not be significant. This means that the p-value given at the bottom of the normality test screen should be greater than 0.05 to support the null hypothesis of presence of normal distribution at the 5% level.

Theoretically, if the test is not significant, then the data are normal, so any value above 0.05 indicates normality. Jarque-Bera formalizes this by testing the residuals for normality and testing whether the coefficient of skeweness and kurtosis close are zero and three respectively. Skewness refers to how symmetric the residuals are around zero.

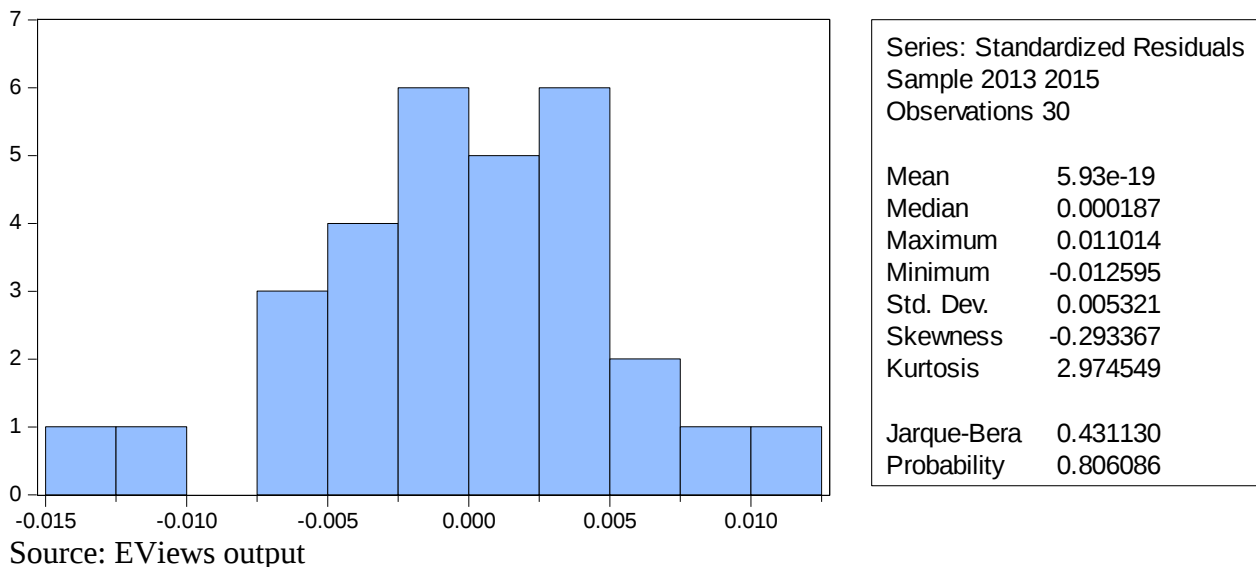
Perfectly symmetric residuals will have a skewness of zero. Skewness measures the extent to which a distribution is not symmetric about its mean value. Kurtosis refers to the “peakedness” of the distribution. For a normal distribution the kurtosis value is 3. Kurtosis measures how fat the tails of the distribution are, the Jarque–Bera test for normality is based on two measures, skewness and kurtosis.

The hypothesis of normality distribution is:

H_0 = residuals follows a normal distribution

H_1 = residuals do not follows a normal distribution

Figure 4.1 Normality test for residuals



As shown in the histogram above in the figure 4.1 kurtosis close to 3 (i.e. 2.974549) and skewness approaches to 0 (i.e.-0.293367). Violation of normality might affect the estimation process or the interpretation of results especially in Ordinary Least squared analysis. For instance, it may increase the chi-square value and may possibly cause under estimation of fit indices and standard errors of parameter estimates (Hair et al., 2006). One approach to diagnose normality is through visual check or by graphical analyses such as the histogram and normal probability plot that compare the observed data values with a distribution approximating the normal distribution. If the

observed data distribution largely follows the diagonal lines then the distribution is considered as normal (Hair et al., 2006). Beside the shape of distribution, normality can also be inspected by two multivariate indexes i.e. Skewness and kurtosis.

Hence, null hypothesis of the residuals follows a normal distribution is failed to reject at 5 percent of significant level. Hence, it seems that the error term in all of the cases follows the normal distribution and it implies that the inferences made about the population parameters from the samples tend to be valid.

4.3.1.5 Test for multicollinearity

Multicollinearity indicates a linear relationship between explanatory variables which may cause the regression model biased (Gujarati, 2004). If an independent variable is an exact linear combination of the other independent variables, then we say the model suffers from perfect collinearity, and it cannot be estimated by OLS Brooks (2008). When independent variables are multicollinear, there is overlap or sharing of predictive power. This may lead to the paradoxical effect, whereby the regression model fits the data well, but none of the explanatory variables (individually) has a significant impact in predicting the dependent variable Gujarati, (2004). According to Lewis-Beck, (1993) suggestion in order to find out the multicollinearity problem, the bivariate correlations among the independent variables should be examined and the existence of correlation of about 0.8 or larger indicates a problem of multicollinearity. Also, Cooper and Schendlar, (2003) suggested that a correlation above 0.8 should be corrected.

Table 4.5: Correlations matrix of explanatory variables

Correlation Probability	ROA	DC	NATM	NPOS	MS	VATM	VPOS
ROA	1.000000						
DC	-0.21162	1.0000					
NATM	0.368587	0.554134	1.0000				
NPOS	0.309906	0.655922	0.530282	1.0000			
MS	0.140068	0.581628	0.408532	0.28776	1.0000		
VATM	0.158656	0.504452	0.21451	0.676045	0.352045	1.0000	
VPOS	0.01657	0.653768	0.227724	0.417845	0.709595	0.624961	1.0000

Source: EViews output

The Pearson correlation, which varies between -1 and 1, if the p-value is 0, there is no linear correlation, and if the p-value is -1 or 1 we have a perfectly negative or positive relationship between the variables. According to Pallant (2005), the results in the above correlation matrix table 4.5 show that the highest correlation of 0.709595 which is between market share and value of transaction by POS. Since there is no correlation above 0.8 in this study according to Cooper and Schendlar (2003) and Lewis-Beck (1993), it can be concluded in this study that there is no problem of multicollinearity, thus enhanced the reliability for regression analysis.

4.3.1.6 Choosing Random effect (RE) Vs. fixed effect (FE) models

Panel data may have unobserved group effects, time effects or both included in the error term. These effects are either fixed effects, random effects or both. These effects may lead to heterogeneity or even endogeneity and the OLS estimators will be biased and inconsistent. The panel data models, fixed effects (FE) model and random effects (RE) model, allow for heterogeneity across panel units (and possibly across time) but confines that heterogeneity to the intercept terms of the relationship (Brooks, 2008).

There must be determined model, the random effects (RE) model or the fixed effects (FE) model is most suitable for this dataset. The RE model assumes that the unobserved effect is uncorrelated with the independent variables; the individual-specific effects are parameterized as additional random disturbances. In the FE model the unobserved effects are permitted to correlate with the explanatory variables, hence this model allows a limited form of endogeneity (Gujarati, 2004). The fixed effects model can be used to control for omitted variables that differ between the banks but are constant over time, hence it is bank fixed effects. The random effects model can be used to control for some omitted variables that are constant over time and vary between banks and other omitted variables that vary over time and are constant between banks. The Housman test has conducted to test which model, RE or FE, fits the data best.

The results so far indicate that all CRLM assumptions are not violated, so the ordinary least square regression can be safely applied. However, since this study uses a panel data, there are two types of panel estimator approaches that can be employed, namely: fixed effects models (FEM) and random effects models (REM) Brooks, (2008).

The simplest types of fixed effects models allow the intercept in the regression model to differ cross-sectionally but not over time, while all of the slope estimates are fixed both cross-sectionally and over time. The random effects approach proposes different intercept terms for each entity and again these intercepts are constant over time, with the relationships between the explanatory and explained variables assumed to be the same both cross-sectionally and temporally Brooks, (2008). To examine whether individual effects are fixed or random, a Hausman specification test was conducted providing evidence in favor of the REM model Baltagi (2005). The null hypothesis for this test is that unobservable heterogeneity term is not correlated or random effect model is appropriate, with the independent variables. If the null hypothesis is rejected then we employ Fixed Effects method. Brooks, (2008).

The Hausman test hypothesis is

H_0 = Random effect model is appropriate

H_1 = Fixed effect model is appropriate

Table 4.6 Hausman test

Correlated Random Effects - Hausman Test
Equation: RANDOMRESULTFINAL
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.694756	6	0.8461

Source: EViews output

Table 4.6 above shows Hausman specification test, the P-value of a model is 0.8461, which is more than 5% level of significance. Hence, the null hypothesis of the random effect model is appropriate is failed to reject at 5 percent of significant level. This implying that, random effect model is more appropriate than fixed effect model and gives more comfort that random effects model results are valid (see Appendix C for detail).

4.4 Result of the regression analysis

EViews regression output is divided into three panels. The top panel summarizes the input to the regression, the middle panel gives information about each regression coefficient, and the bottom panel provides summary statistics about the whole regression equation. The two most important numbers, “R-squared” (the one who answered how much percent of the variance in the dependent variable in the regression accounted for) and “S.E. of regression.” and the one that shows how far is the estimated standard deviation of the error term. Five other elements, “Sum squared residuals,” “Log likelihood,” “Akaike info criterion,” “Schwarz criterion,” and “Hannan-Quinn criter.” are used for making statistical comparisons between two different regressions. The next two numbers, “Mean dependent var” and “S.D. dependent var,” report the sample mean and standard deviation of the left hand side variable Brooks, (2008).

“Adjusted R-squared” makes an adjustment to the plain-old to take account of the number of right hand side variables in the regression. Measures what fraction of the variation in the left hand side variable is explained by the regression. The adjusted, sometimes written, subtracts a small penalty for each additional variable added.

“F-statistic” and “Prob (F-statistic)” come as a pair and are used to test the hypothesis that none of the explanatory variables actually explain anything. Put more formally, the “F-statistic” computes the standard *F*-test of the joint hypothesis that all the coefficients, except the intercept, equal zero. “Prob (F-statistic)” displays the *p*-value corresponding to the reported *F*-statistic.

The final summary statistic is the “Durbin-Watson,” the classic test statistic for serial correlation. A Durbin-Watson close to 2.0 is consistent with no serial correlation, while a number closer to 0 means there probably is serial correlation Brooks, (2008). Hence, as concluded in the Hausman test (Table 4.6) above the random effects model is appropriate regression analysis to this study.

4.4.1 Operational model

The operational panel regression model used to find the significant factors of financial performance of commercial banks in Ethiopia measured by Return on Asset (ROA) was:

$$ROA = \beta_0 + \beta_1 DC_{i,t} + \beta_2 NATM_{i,t} + \beta_3 NPOS_{i,t} + \beta_4 MS_{i,t} + \beta_5 VATM_{i,t} + \beta_6 VPOS_{i,t} + \epsilon_{i,t}$$

Table 4.7 Random effects model regression results

Dependent Variable: ROA

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.085820	0.012455	6.890525	0.0000
VATM	8.50E-05	0.001462	0.058148	0.9541
VPOS	0.001245	0.001552	0.802572	0.4304
DC	-0.019570	0.003234	-6.052106	0.0000
NATM	0.010189	0.002822	3.610275	0.0015
NPOS	0.010648	0.003707	2.872467	0.0086
MS	0.016659	0.009651	1.726105	0.0977
R-squared	0.731549	Mean dependent var		0.034660
Adjusted R-squared	0.661518	S.D. dependent var		0.009504
S.E. of regression	0.005529	Sum squared resid		0.000703
F-statistic	10.44609	Durbin-Watson stat		2.116567
Prob(F-statistic)	0.000013			

Source: Eviews output

Rationale why OLS model is selected: OLS methods involve data observations with minimum of 30 observations in order to regression the data. In Ethiopia the number of banks and hardly able to collect sufficient data as indicated in this research. Further, a number of similar research topics with this research idea were conducted using OLS and the results were relevant and accepted by numerous scholars. For instance, the study conducted by Nader (2011) to assess financial performance of Saudi Arabia banks reported results that are both statistically significant but with mixed coefficient variables. Likewise Agboola (2006) results on the performance of Nigeria banks showed significant and positive coefficient variables it also holds true for Iftekhar, et.al. (2009) study results across the European Union and Ngumi (2013) study conducted in Kenya that used OLS model to measure the financial performances of commercial banks used PBT as dependent variable

In the following section it was attempted to explain about the significance of the OLS model by taking results of the study and explain what the model says about the variable results and the discussion on scholars that explain about the significance of OLS figures.

4.4.2 Interpretations on regression results and research Hypothesis

This section discusses in detail the analysis of the results for each explanatory variable and their importance in determining financial performance. Furthermore, the discussion analyzes the statistical findings of the study in relation to the previous empirical evidences. Hence, the following discussions present the interpretation on the Random effects model regression results and relationship between explanatory variables and ROA.

As shown from the above table the R-square and Adjusted R-squared values of the model was of 0.73 and 0.66 respectively the result indicates that about 73.15 % of the variability in the dependent variable (Return on Asset) is explained by the independent variables used in the model. That is Number of Debit Cards, Number of POS, Number of ATM, Value of transaction executed by ATM Value of transaction executed by POS, and

market share of banks collectively explain 66.15% of the change in ROA. The remaining 33.85% of the variability in the dependent variable is left unexplained by the explanatory variables used in the study. This means that the remaining 33.85% of the changes was explained by other variables which are not included in the model.

In this study ROA was used as a main financial performance measure. The reason for using ROA as the measurement of bank performance was because the ROA reflects the ability of a bank's management to generate profits from the bank's assets and also indicates how effectively the bank's assets are managed to generate revenues. Moreover, performance is best measured by ROA (Tan et al., 2012). The regression analysis result is presented by using separate table for each model. Table 4.7 shows the regression analysis for ROA. In this regression analysis the dependent variable is ROA while the independent variable is Number of Debit Cards (DC), Number of POS (POS), Number of ATM (ATM), Value of transaction executed by ATM (VATM) Value of transaction executed by POS (VPOS), and market share of banks (MS).

Furthermore, the F-statistic was 10.44 and the probability of not rejecting the null hypothesis that there is no statistically significant relationship existing between the dependent variable (ROA) and the independent variables, is 0.0000 indicates that the overall model is highly significant at 1% and that all the independent variables are jointly significant in causing variation in return on asset.

The panel random effect estimation regression result in the above table 4.7 shows that, coefficient intercept (α) is 0.085820. This means, when all explanatory variables took a value of zero, the average value ROA would be take 0.085820 unit and statistically significant at 5% level of significance.

4.4.2.1 Number of ATMs and Return on Assets

According Table 4.7 the regression coefficient of number of ATMs is 0.010 and its P-value is 0.0015. It indicate that where other explanatory variables remain constant number of ATMs terminals have a positive influence on ROA and implies that when number of ATM increase by 1% then the ROA will increase proportionally with

statistically significant at 1%. This means commercial banks with high number of ATM are more profitable than commercial banks with low number of ATM.

The result agrees with previous researches (Rahimzadeh et al.,2015), (Josiah and Nancy, 2012), (Ngango, 2015), (Jegade, 2014) found that the number of ATMs service had positive and significant effect on profitability of studied banks. Accordingly Saeid et.al., (2014) and Salehmanesh et al., (2014) also concluded that there was a positive and significant association between the number of ATM and profitability.

Akram & Allam (2010) conducted a study in Jordan and found that use of information technology which is embodied in ATMs improved the matrix of financial and operational performance. The study concluded that number of ATM had role on return on assets which is consistent to the findings of this study. Likewise Ngumi (2013) the study conducted in Kenya “impact of e-banking on financial performance” conclude that ATMs have a positive significant impact on ROA. Furthermore, in the study done in the US by Nadia et.al.(2003) it was observed that use of ATMs led to responses on internal cost cutting leading to better return on assets; based on the regression result, this study accepts the null hypothesis which states number of ATM has positive and significant impact on ROA of commercial banks in Ethiopia.

The possible reason are the bank customers can easily access their account at any time irrespective of banking hours, ATM is a modern convenience that seems to be on every street corner, in every retail store and attached to every bank buildings and customers by using bank card either withdrawing or transferring money. ATMs facilitate bank customer’s cash faster than going to the bank without long lines. These led banks in Ethiopia to get more foreign currency and return in the form of charge fee and customer attraction.

4.4.2.2 Number of POS and Return on Assets

Table 4.7 shows that the regression coefficient of number of POS is 0.010 and its P-value is .0086 implies that when number of POS terminals increase by 1% then the ROA will increase proportionally. It indicated in the result where other explanatory variables remain constant number of POS terminals have a positive influence on ROA and

statistically significant at 1%. Which means commercial banks with high number of POS terminals have more profitable than commercial banks with low number of POS terminals. According to the regression result number of POS from the random regression result reveals that a significant positive relationship with return on asset of sampled commercial banks.

The analysis is in agreement with Asadzade and Kiani (2012) in a study “The effect of using ATM, POS and branches on profitability of selected banks during 2002-2009. They found that ICT and the mentioned e-banking branches had positive effect on performance and profitability of Iranian banks.

The result findings of this research is also agree with the result of Kemppainen (2003 & 2008) the study done among the EU countries found that POS terminals were capable of improving banks’ profitability and hence return on assets. The findings are further supported by Nofie (2011) and Iftekhar et.al. (2009), which was in line with findings of this study, as observed from the study that POS terminals contributed to banks’ income and return on assets where there is more retail payments transaction equipment like the POS terminals.

The possible reasons are bank customers can easily access their account to transfer money from cardholder to the merchant’s bank account at market centers, hotels and restaurants and etc. Bank customers can save the time no need for counting, specialized transport or cashiers commissions and the payment is guaranteed as the bank becomes a part of the payment process. Better reporting and accounting due to merchants statements in the bank. These led banks get more return in the form of charge fee and customer attraction.

4.4.2.3 Market share and Return on Asset

Table 4.7 also shows that; the Regression coefficient of market share is 0.016659 and its P-value is 0.0977. Market share of banks from the random regression result reveals that a significant positive relationship with return on asset of sampled commercial banks. This variable has been included to provide information on the impact of the size or market share of the banks and profitability. Empirical evidences shows that this variable has a

role on profitability. A positive relationship indicates that the bank enjoys economies of scale; Hanweck & Humphrey (1987); Boyd & Runkle (1993); Miller & Noulas (1997); Athanasoglou, Brissimis & Delis (2008) who were cited by Sufien et al., (2008). While a negative relationship implies that the bank suffers from diseconomies of scale when it expands to a larger size; Sufian et al. (2008). Therefore, the study found that increased market share had a positive effect on the financial performance of commercial banks with many banking institutions indicating that increased market share allowed a company to achieve greater scale in its operations which generally improved its profitability.

The result is consistent with the previous studies of Gul (2011), Athanasoglou et al. (2006), Sufian et al. (2009), Weersainghe et al. (2013), Yadollahzadeh et al. (2013), Sarita et al. (2012), Masood et al. (2012) suggesting that large banks may benefited from economies of scale. In contrast, Dietrich et al. (2009) and Ezra (2013) found negative relationship between bank size and performance suggesting that the smaller the bank, the more efficient the bank will be. Therefore, the finding of this study shows that in Ethiopian banking industry the large bank size perform better than the smaller banks due to the existence of economies of scale. Thus, this study accepted the hypothesis which stated there is a positive relationship between bank size and bank performance in Ethiopia. Based on the regression result, this study accepts the null hypothesis which states effective tax rate negatively affects performance.

The possible reasons are the more deposit collected the highest would be the lending capacity of commercial banks.

4.4.2.4 Value of transaction of ATM and Return on Assets

As the above random effect regression output table 4.7 presented that, the coefficient of Value of transaction executed by ATM (VATM) measured by return on asset is 8.5 and its P-value is 0.95. Holding other independent variables constant at their average value, when value of transaction of ATM (VATM) increased by one percent, return on asset (ROA) of sampled commercial banks would be increased by 8.5 percent but statistically

insignificant at 5% level of significance. Even though probability value is insignificant at 5% the researcher failed to reject the null hypothesis that value or price of transaction of ATM has a positive role on return on asset. This means, there is no sufficient evidence to reject the null hypothesis.

The relationship is positive as expected and this positive relationship between value of transaction of ATM and return on asset could be attributed to the fact that more transaction of ATM tend to more return on asset.

This finding is similar to the finding of (Hamed et al., 2016) Price of transaction of ATM studied as independent variable the results of study showed that the effect of price of ATM of selected banks is positive role on return on asset.

The possible reasons are increasing in amount of ATM transaction executed the more commission will generated by commercial banks.

4.4.2.5 Value of transaction of POS and Return on Assets

Table 4.7 also presented that, the coefficient of value of transaction of POS (VPOS) measured by ROA is 0.001245 and its P-value is 0.4304. Holding other independent variables constant at their average value, when value of transaction executed by POS (VPOS) increased by one percent, return on asset (ROA) of sampled commercial banks will be increased by 0.12 percent but statistically insignificant at 5% level of significance. Therefore, the researcher failed to reject the null hypothesis that value of transaction of POS has a positive effect on return on asset. This means, there is no sufficient evidence to support the negative relationship between value of transaction of POS and ROA. This finding is similar to the finding of (Hamed et al., 2016) Price of transaction of POS studied as independent variable the results of study showed that the effect of price of POS of selected banks is positive role on return on asset.

The possible reasons are increase in amount of POS transaction will increase banks depositors (i.e. merchants like Hotels and marketing centers).

4.4.2.6 Debit card and Return on Assets

The results of random effect regression model in the table 4.7 above indicated that debit card had coefficient of -0.019570 and its P-value is 0.0000. Holding other independent variables constant at their average value, when number of debit card user increased by one percent, return on asset (ROA) of sampled commercial banks will decrease by 0.12 percent and statistically significant at 1% level of significance. The result has negative role on financial performance of the sampled commercial banks measured by ROA, which is in contrary to the expected sign. Therefore, the researcher failed to accept the null hypothesis that debit card has a positive role on return on asset. This means, there is no sufficient evidence to support the positive relationship between debit card and return on asset.

In contrary to this finding (Sundas et. al., 2014), (Ngumi, 2013), (Nofie, 2011) and (Kemppainen, 2008) studied that increased in debit card usage enhance the profitability of banking industry in form of return on banks asset.

The possible reasons are Lack of awareness by customer even holding bank card, cost of produced and undelivered cards in a bank, discouraged users because of long lines around campus and salary pay days.

Table 4.8 Comparison of test result with expectation

Independent Variables	Expected Relationships with ROA	Actual result	Statistical Significance test	Hypothesis Status
Value of transaction of ATM	+	+	insignificant	Failed to Reject
Value of transaction of POS	+	+	Insignificant	Failed to Reject
Debit card	+	-	Significant at 1%	Failed to accept
Number of ATM terminals	+	+	Significant at 1%	Failed to Reject
Number of POS terminals	+	+	Significant at 1%	Failed to Reject
Market share of bank	+	+	Significant at 10%	Failed to Reject

CHAPTER FIVE CONCLUSION AND RECOMMENDATIONS

On this chapter based on the finding of the study conclusions were drawn and possible recommendations were forwarded. Accordingly, the first section presents the conclusion part and the second section presents the possible recommendation.

5.1 Conclusion

This study originated from the researcher's aim of examining the roles of e-banking service on financial performance of commercial banks in Ethiopia. Using a non-random sampling method (purposive sampling) selected ten commercial Banks in Ethiopia for the period covering 2013 to 2015, the study was carried out by constructing a balanced panel regression model based on OLS and random effects estimates of the secondary data obtained from the financial statements, mainly Annual Audited report of the commercial Banks in Ethiopia under the study.

Accordingly, the roles of e-banking service (such as value or price of transaction of ATM, value or price of transaction of POS, debit card, number of automated teller machine terminals, number of point of sale terminal and market share of banks) as an independent variable on financial performance measured by return on asset (dependent variable) on commercial banks in Ethiopia were carefully analyzed. The regression result showed that numbers of ATM terminals, number of POS terminals and bank market share have significant and positive roles on financial performance of commercial banks measured by return on asset. The researcher summarized that increased number of ATM, POS and market share had a positive roles on the financial performance of commercial banks with many banking institutions indicating that increased market share allowed a company to achieve greater scale in its operations which generally improved its financial performance.

The result from the F-statistic and R-square show that the model is stable over the study period thus become a formidable policy reference point in banking reform planning

To sum up the e-banking fuelled the Commercial Banks of Ethiopia a great deal of cash capital flow that increase the ROA of the banks. Although the result indicated some negative influences by the selected variables, it is very clear that e-banking is promising activity to increase the performance of Ethiopian Commercial Banks. Further, although evidences from previous studies on whether E-banking influence bank performance showed that there was mixed results based on the operating environment and the level of adoption. In Ethiopia where there is a low level of adoption of e-banking service in the banking sector the results on performance of banking is not controversial and confusing.

5.2 Recommendations

Based on the positive roles of e-banking on ROA of sampled banks in Ethiopia, this issue should be focused more. For high profitability and attraction of their share and increase of satisfaction of customers and absorbing more deposits, the bank managements should focus their attempts on development of E-banking service.

Also, by increase of services via e-banking points and increase of quality of presenting e-banking services, by updating equipment and software and increase of ATM numbers, POS and optimal location, banks can achieve the mentioned goals.

Therefore, this study recommends for enhancing return on asset of commercial banks, should exert more on awareness creation about e-banking service and timely support for users will cause an increase in e-banking practice.

5.3 Further research suggestions

This research is an important contribution to the literature due to the findings of the study which will help policy makers to formulate policy. Due to rapid changes, e-banking service is a good field for study. Thus, by data mining and detection of relations, the researchers should choose the results of applied knowledge. Some items are proposed for further study:

- Comparative comparison of the effect of other new electronic-bank tools on profitability of commercial banks and other financial institutions.
- Investigation of the effect of e-banking on banks concentration index.
- Investigation of the effect of e-banking on commercial banks Deposit
- Study on innovations like agency banking, mobile banking and internet banking role on the financial performance of commercial banks.

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Appendices

Appendix A: - Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.264487	Prob. F(6,23)	0.9479
Obs*R-squared	1.936298	Prob. Chi-Square(6)	0.9255
Scaled explained SS	1.363469	Prob. Chi-Square(6)	0.9680

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 12/19/16 Time: 14:39

Sample: 1 30

Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.97E-05	9.99E-05	-0.397657	0.6945
DC	1.00E-05	2.72E-05	0.368097	0.7162
NATM	2.65E-06	2.54E-05	0.104160	0.9179
NPOS	1.61E-06	2.65E-05	0.060895	0.9520
VATM	5.33E-06	1.14E-05	0.469635	0.6430
VPOS	-3.96E-06	1.20E-05	-0.329194	0.7450
MS	-4.68E-05	7.11E-05	-0.658130	0.5170

R-squared	0.064543	Mean dependent var	2.78E-05
Adjusted R-squared	-0.179489	S.D. dependent var	4.37E-05
S.E. of regression	4.75E-05	Akaike info criterion	-16.87230
Sum squared resid	5.18E-08	Schwarz criterion	-16.54535
Log likelihood	260.0845	Hannan-Quinn criter.	-16.76771
F-statistic	0.264487	Durbin-Watson stat	2.412235
Prob(F-statistic)	0.947889		

Appendix B: - Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.020590	Prob. F(2,21)	0.9796
Obs*R-squared	0.058713	Prob. Chi-Square(2)	0.9711

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 12/19/16 Time: 14:37

Sample: 1 30

Included observations: 30

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.001017	0.014248	-0.071350	0.9438
DC	0.000186	0.003786	0.049090	0.9613
NATM	5.58E-05	0.003630	0.015379	0.9879
NPOS	5.68E-05	0.003558	0.015970	0.9874
VATM	-2.09E-05	0.001522	-0.013716	0.9892
VPOS	3.49E-05	0.001611	0.021653	0.9829
MS	-0.000562	0.009929	-0.056634	0.9554
RESID(-1)	-0.047307	0.249902	-0.189301	0.8517
RESID(-2)	-0.022010	0.251804	-0.087408	0.9312
R-squared	0.001957	Mean dependent var		-9.53E-18
Adjusted R-squared	-0.378250	S.D. dependent var		0.005359
S.E. of regression	0.006291	Akaike info criterion		-7.056047
Sum squared resid	0.000831	Schwarz criterion		-6.635688
Log likelihood	114.8407	Hannan-Quinn criter.		-6.921570
F-statistic	0.005147	Durbin-Watson stat		1.964669
Prob(F-statistic)	1.000000			

Appendix C: - Correlated Random Effects - Hausman Test

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.694756	6	0.8461

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
VATM	0.021144	0.000085	0.002637	0.6817
VPOS	-0.003231	0.001245	0.000435	0.8300
DC	-0.019272	-0.019570	0.000171	0.9818
NATM	0.009035	0.010189	0.000003	0.4907
NPOS	0.005774	0.010648	0.000048	0.4818
MS	0.028044	0.016659	0.000618	0.6471

Cross-section random effects test equation:

Dependent Variable: ROA

Method: Panel Least Squares

Date: 12/20/16 Time: 13:49

Sample: 2013 2015

Periods included: 3

Cross-sections included: 10

Total panel (balanced) observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.032118	0.111527	0.287985	0.7776
VATM	0.021144	0.051372	0.411586	0.6869
VPOS	-0.003231	0.020907	-0.154526	0.8794
DC	-0.019272	0.013456	-1.432256	0.1740
NATM	0.009035	0.003282	2.752981	0.0156
NPOS	0.005774	0.007859	0.734705	0.4746
MS	0.028044	0.026674	1.051352	0.3109
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.829791	Mean dependent var	0.037667	
Adjusted R-squared	0.647424	S.D. dependent var	0.010063	
S.E. of regression	0.005975	Akaike info criterion	-7.097862	
Sum squared resid	0.000500	Schwarz criterion	-6.350556	
Log likelihood	122.4679	Hannan-Quinn criter.	-6.858792	
F-statistic	4.550119	Durbin-Watson stat	2.801486	
Prob(F-statistic)	0.003585			

Appendix D: - [Random Effects test result](#)

Dependent Variable: ROA

Method: Panel EGLS (Cross-section random effects)

Date: 12/20/16 Time: 13:49

Sample: 2013 2015

Periods included: 3

Cross-sections included: 10

Total panel (balanced) observations: 30

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.085820	0.012455	6.890525	0.0000
VATM	8.50E-05	0.001462	0.058148	0.9541
VPOS	0.001245	0.001552	0.802572	0.4304
DC	-0.019570	0.003234	-6.052106	0.0000
NATM	0.010189	0.002822	3.610275	0.0015
NPOS	0.010648	0.003707	2.872467	0.0086
MS	0.016659	0.009651	1.726105	0.0977
Effects Specification				
		S.D.	Rho	
Cross-section random		0.001468	0.0569	
Idiosyncratic random		0.005975	0.9431	

Weighted Statistics

R-squared	0.731549	Mean dependent var	0.034660
Adjusted R-squared	0.661518	S.D. dependent var	0.009504
S.E. of regression	0.005529	Sum squared resid	0.000703
F-statistic	10.44609	Durbin-Watson stat	2.116567
Prob(F-statistic)	0.000013		

Unweighted Statistics

R-squared	0.751372	Mean dependent var	0.037667
Sum squared resid	0.000730	Durbin-Watson stat	2.045150

Appendix E: - [Commercial banks in Ethiopia](#)

No.	Commercial Banks in Ethiopia	Year of Establishment
1	Commercial Bank of Ethiopia	1963
2	Awash International Bank	1994
3	Dashen Bank	1995
4	Bank of Abyssinia	1996
5	Wegagen Bank	1997
6	United Bank	1998
7	Nib International Bank	1999
8	Lion International Bank	2006
9	Oromia International Bank	2008
10	Buuna International Bank	2009
11	Zemen Bank	2009
12	Abay Bank	2010
13	Berhan International Bank	2010
14	Addis International Bank	2011
15	Cooperative Bank of Oromia	2011
16	Debub Global Bank	2012
17	Enat Bank	2012

