The Impact of Financial Innovation on Financial and Operational Performance of Commercial Banks in Ethiopia

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The Impact of Financial Innovation on Financial and Operational Performance of Commercial Banks in Ethiopia

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Declaration

I, Feysel Abdo, hereby declare that the thesis work entitled **"The Impact of Financial Innovation on Financial and Operational Performance of Commercial Banks in Ethiopia"** submitted by me for the award of the Degree of Master of Business Administration in Finance at Addis Ababa University, 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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This is to certify that the thesis prepared by Feysel Abdo, entitled: **"The Impact of Financial Innovation on Financial and Operational Performance of Commercial Banks in Ethiopia"** and submitted in partial fulfillment of the requirements for the Degree of Masters of Business Administration in Finance complies with the regulations of the university and meets the accepted standard with respect to originality and quality.

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Abstract

The purpose of this study was to examine the impact of financial innovation on financial and operational performance of commercial banks in Ethiopia. This research, studied innovations in the area of mobile banking, internet banking and automated teller machines. These innovations were studied in relation to their effect on commercial banks' financial and operational performance. An explanatory design was used while a questionnaire was used to gather primary data. The study conducted a census of all 17 commercial banks instead of adopting a sampling methodology. The study sample in terms of the respondents covered purposively selected senior managers and senior officers in head office and a sample of 220 was administered with the questionnaire and a 77.7% response rate was achieved. The data collected was analyzed with the aid of descriptive statistical techniques such as frequencies, percentages and mean score. More so, multiple linear regressions were used to establish the relationship between study variables and to test the hypotheses using Statistical Package of Social Sciences Version 22. Key findings from the study confirmed that, financial innovations influence performance of commercial banks in Ethiopia positively. The adoption of innovations by commercial banks has a higher potential of improving operational performance than financial performance. Financial innovation has positive, strong and significant effect on operational performance. Each type of bank innovation (mobile, internet and ATM banking) significantly and positively influenced bank operational performance. On the other hand, financial innovation had showed positive but weak relationship with financial performance. Mobile banking has a positive and statistically significant effect on the financial performance of commercial banks; whereas internet and ATM banking had positive but insignificant effect on the financial performance of commercial bank. Some of positive but insignificant impact of variables (internet and ATM banking) on financial performance may be due to an early stage, slow and low level of adoption of financial innovation in Ethiopia banking industry. Based on the findings of the study, it can be concluded that bank innovations influence performance of commercial banks in Ethiopia positively. Thus, the study recommend commercial banks in Ethiopia should invest and engage in financial innovation and exert more on awareness creation about financial innovation in order to boost their performance and to compete in ever changing financial system.

Key Words: *Financial innovation; Operational Performance, Financial Performance, Commercial banks; Mobile banking, Internet banking and Automated Teller machines (ATM).*

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Abbreviations and Acronyms

ANOVA	Analysis of Variance
ATM	Automated Teller Machine
CBE	Commercial Bank of Ethiopia
E-banking	Electronic banking
EU	European Union
FP	Financial Performance
GPFI	Global Partnership for Financial Inclusion
GSMA	Global System for Mobile Communication Association
IB	Internet Banking
ICT	Information Communication Technology
IT	Information Technology
MB	Mobile Banking
MFI	Micro Finance Institution
NBE	National Bank of Ethiopia
NIM	Net Interest Margin
OLS	Ordinary Least Square
OP	Operational Performance
PIN	Personal Identification Number
POS	Points of Sale
ROA	Return on Asset
ROE	Return on Equity
ROI	Return on Investment
TTF	Task Technology Fit
US	United States
VIF	Variance Inflation Factor

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CHAPTER ONE
INTRODUCTION

1.1 Background of the study

The world today has undergone tremendous changes and innovation is on the front position and an important phenomenon in any sector of modern economy. Innovation permits firms to implement a novel and better process of performing their operations. According to Lawrence (2010), innovation is terrific development by firms in approaching with innovative products or the application of new operation or processes in production. It is characterized by the development of new ideas, products or new processes used to craft new, quality and convenience services and products by organizations (Kumar et al, 2011).

The financial industry is one of the sectors that have witnessed growing interest in adoption of continuous innovations that are made in order to match the ever-changing market place. In the financial service industry, innovation is viewed as the creation and popularization of new or improved technologies, financial instruments, institutions and markets which smooth the progress of access to information, trading and means of payment (Sloan, 2003). According to Nofie (2011), innovation in the financial sector is the coming of a latest or better product and process that lower the cost of producing existing financial services or transaction. Broadly speaking, financial innovation is the way of producing and then popularizing new financial instruments as well as new financial technologies, institutions and markets (SatyaSekhar, 2018).

A well-developed financial sector is vital importance to facilitate access to financial information with minimal costs, reduction of transaction costs, fair investment decision, technological innovation and growth stability (Qamruzzaman, & Jianguo, 2019). Financial innovation tends to accelerate the financial development by allowing risk minimization and investment diversifications and thus plays a crucial role in economic growth (Desai & Low, 1987). According to Schumpeter (1928), the financial innovation is crucially important for economic growth but the impact of financial innovation on economy be given little attention in empirical study. However, in recent period financial innovation and its potential impact has attracted immense interest among researchers and inspires further investigation by considering the various aspect of the economy such as the economic growth (Bara & Mudzingiri 2016; Bara et al. 2016;

and Qamruzzaman & Wei 2017, 2018b, 2018c & 2019), on firms performance (Valverde et al. 2016; and Muthinja & Chipeta 2018) and on banking sector growth (Kamau & Oluoch, 2016; and Chipeta & Moses, 2018), and many more.

Currently, financial innovations are used by financial institution as redoubtable strategic instruments to outperform the competition and have turn into crucial means for the bank to improve its efficiency and to get better its performance on the market (Batiz-Lazo and Woldesenbet, 2006). It seems obvious that financial innovation not only helps the bank to reduce costs, but also give a range of new opportunities and prospects that will help banks to improve their performance in several ways (Sujud & Hashem, 2017). Aduda & Kingoo (2012), points out that commercial banks used financial innovation to support them compete in financial markets and as a result it can get better their performance and keep up their success in market. In particular, decreasing the cost alone does not give a competitive advantage and the center of attention has shift to the profitability and revenue growth. From these facts, analysis devoted to the major effects of financial innovation on the performance of commercial banks seems to be of great relevance.

When we see our country context, financial system in Ethiopia is very much behind in the implementation of financial innovations compared to the rest of world and even Sub-Saharan region (Mengistu, 2018). Despite moderate effort undertaken by banks to offer financial products to attract clients and offer novel financial service, financial innovation has a long way to go in Ethiopia because the country was listed the last second for financial inclusion and innovation from 26 politically, geographically and economically same countries (GPFI, 2016). According to Global System for Mobile Communication Association (GSMA) 2017 report, Ethiopia is an outlier among its peers when it comes to access to and usage of digital financial Service. For example, in 2018 Ethiopia's had 0.46 ATMs per 100,000 adults, in contrast with Kenya had 9.2 ATMs per 100,000 adults, (World Bank, 2018). Similarly, mobile money account penetration in Ethiopia is also very low. According to GSMA 2017 report, only 0.3% of adults had a mobile money account, compared to 73% in Kenya, 31% in Rwanda and 22% for the region average in 2017. Likewise, almost all (98%) adults in Ethiopia pay utility bills with cash, compared to 12% of people in Kenya and 59% in the region as a whole (GSMA, 2017).

Different reasons may be attributable to laissez-faire attitude of commercial banks in Ethiopia toward the development of new financial innovations (Mengistu, 2018). Firstly, the payback period for the initial capital outlay may be longer and unacceptable to management and shareholders. Secondly, the lack of 'analog complements' to digital financial service – such as regulation, skills and institutions – could be another factors. Thirdly, these innovations may not have a positive correlation with banks performance in terms of profitability and efficiency. It is reasonable that whether banks get advantages and capture benefits of this new innovative technology based banking will eventually depend on their assessment of the performance. Thus, analysis devoted to the major effects of financial innovation on the performance of commercial banks in Ethiopia seems to be of great relevance.

Despite the fact that Ethiopian financial system is very much behind in the implementation of financial innovations compared to the rest of world, the Ethiopian financial sector cannot remain an exception in expanding the use of the system (Gardachew, 2010). The emergence of new technologies, products, processes, markets and competition puts demand on any commercial bank in Ethiopia to employ skills and technology necessary to remain competitive (Solomon, 2016). NBE annual report (2017/18) also stressed that the importance of implementation of financial inclusion strategy which has leads to improving the use of electronic money and new financial products. The banking sector is championing digital banking with mobile technology and offered digital banking products such as Hello Cash, M-Birr, CEB-Birr, Amole and other user interfaces digital banking product in multiple languages, offline capabilities, and multilingual customer service centers. The prominent innovations in banking and financial industry in Ethiopia include the emergence of ATM, mobile banking, internet banking, card banking, agency banking, free advisory services and others (Rukiya, 2018). Accordingly, the questions relates to whether the emergence of such types of financial innovative channels represented positive change and are affecting the financial and operational performance of the banks will have greater importance. Thus, the study therefore seeks to examining to what extents the adoption of financial innovation affect performance of commercial banks in Ethiopia.

1.2 Statement of the problem

In present day economy, innovation has become a key contributor to productivity and economic performance, not only for manufacturers but also for the service industries, most notably financial service (Victor, 2015). The fast-changing competitive environment, rapid changing consumption patterns, globalization, regulation, economic changes, privatization and the likes, insist that commercial banks to run effectively and efficiently by constantly engaging in financial innovations (Auta, 2010). As such financial innovation has already revolutionized the financial industry and has brought new products and processes and far-reaching organizational and institutional changes (Frame, et al., 2002). Akamavi (2005) also notes that innovation in the financial services sector has led to recent fundamental changes including; deregulation, increasing competition, higher cost of developing new products and the rapid pace of technological innovation, more demanding customers and consolidation of corporations.

Despite the fact that it is indisputable that financial innovation is essential in rising financial inclusion and deepening, there are still debates about how and to what extents the adoption of financial innovation improves bank performance (Mabrouk and Mamoghli, 2010; Solomon, (2016). According to Mabrouk and Mamoghli (2010), the influence of financial innovation on banks performance is still misunderstood for two main reasons. First, there is low level of understanding about the determinants of adoption of financial technological innovation. Secondly, the influence of financial innovations on banks performance remained inadequately studied. Similarly, Chimwemwe & Moses (2018) stressed that studies which have tried to link financial innovations to firm performance have created a bypass around empirical approaches. The contention of this situation is that for the most part of the findings are largely anecdotal, owing to variance the operating environment and the level of adoption.

More so, the global financial crisis from 2007 to 2009 has stimulated renewed widespread discussions about the "bright" and "dark" sides of financial innovation (Thorsten, 2013). The customary *innovation-growth view* advocates that financial innovations support to facilitate risk sharing, reduce operational costs, improve efficiency of the market, and ultimately improve economic growth. On the contrary to this, the rising *innovation-fragility view*, has categorized financial innovations as the root cause of 2008 Global Financial Crisis, by engineering securities

perceived to be safe but exposed to neglected risks, by leading to an unprecedented credit expansion fueling a boom-bust cycle in housing prices, and by helping banks and investment banks design structured products to exploit investors' misunderstandings of financial markets and exploit regulatory arbitrage possibilities (Thorsten, 2013).

Even though there is broad descriptive literature that discusses recent financial innovations, the previous studies are in disagreement in their findings and produced mixed results regarding the effect of financial innovations on banks' financial performance (Catherine & Herick, 2016). Some scholars observed positive impact, some observed negative while other researchers have drawn mixed conclusions. Scholars (Batiz and Woldesenbet (2006); Hernando and Nieto (2007); Mwania and Muganda (2011); Aduda and Kingoo (2012); Karimzadeh et al. (2014); Cherotich, et, al (2015); Sujud and Hashem (2017) in their studies concluded that financial innovation had significant contribution to bank performance. On the other hands, studies by Malhotra and Singh, (2010); Francesca and Claeys (2010); Al-Smadi and Al Wabel (2011), Mugane & Ondigo (2016); found that financial innovations had least, insignificant or negative impact on bank performance. There are also a research studies that found mixed result (Abaenewe et al. (2013); Onay et al. (2013); Nkem and Akujinma, (2017). It could be seen from previous empirical literatures that the impact of financial innovation on the performance of banks provides mixed evidences and thus inconclusive. It is at the center of such mixed finding and conclusion that motivated and calls for the need to carry out a study.

In Ethiopia, although many researchers have studied in the field of electronic banking, from survey of relevant literature, it was evident that very few studies have been found to empirically investigate the impacts of financial innovation on the performance of commercial banks. Girma (2016) conducted a research about the impact of Information Communication Technology (ICT) on the performance of Ethiopian commercial banks. Solomon (2016), Tilahun (2016) and Rukiya (2018) are conducted a study to examine the impact of electronic banking on financial performance of commercial banks in Ethiopia. However, these studies in the area of financial innovations have not been done in a comprehensive approach on Ethiopia. It came out strongly that there was of lack of comprehensive analysis of multiple innovations as the previous literature indicated that only financial product innovations have been considered. The previous

studies concentrated only on variables of electronic banking concerning product innovations like ATM, POS and Debit card, while this study examine financial innovation in wider perspective (process and organizational innovation) and as such additional important variables that were omitted by previous studies like mobile and internet banking are included. More than that, as far as the researcher assessment is concerned, the previous studies focused only on assessing the impact of financial innovation on financial performance/profitability of bank/ and as such Return on Asset (ROA) was used as the only dependent variable to measure the banks performance. However, this study is unique in sense that it makes investigation of impact of financial innovation on both financial and non-financial/operational/ performance measures of banks. The study therefore aimed to fill this gap in the literature by examining to what extents the adoption of financial innovation affect financial and operational performance of commercial banks in Ethiopia in more inclusive manner.

1.3 Objectives of study

"1.3.1 General objective

The general objective of this study was to investigate the effect of financial innovations on financial and operational performance of commercial banks in Ethiopia.

1.3.2 Specific objectives

The specific objectives of this study were:-

- ✓ To examine the effect of mobile banking on financial performance/profitability/ of commercial banks in Ethiopia.
- ✓ To assess the extent to which internet banking affects financial performance /profitability/ of commercial banks in Ethiopia.
- ✓ To inspect the influence of ATM banking on financial performance /profitability/ of commercial banks in Ethiopia.
- ✓ To find out the effect of mobile banking on operational performance of commercial banks in Ethiopia.
- ✓ To establish the effect of internet banking on operational performance of commercial banks in Ethiopia.

- ✓ To investigate the extent to which ATM banking affects operational performance of commercial banks in Ethiopia.

1.4 Research Hypothesis

In order to address the above objectives, the following hypotheses to determine the impacts of financial innovation on performance of Ethiopian commercial banks were tested.

Hypothesis 1: Mobile banking has positive and significant effect on financial performance of commercial banks in Ethiopia.

Hypothesis 2: Internet banking has positive and significant effect on financial performance of commercial banks in Ethiopia.

Hypothesis 3: ATM banking has positive and significant effect on financial performance of commercial banks in Ethiopia.

Hypothesis 4: Mobile banking has positive and significant effect on operational performance of commercial banks in Ethiopia.

Hypothesis 5: Internet banking has positive and significant effect on operational performance of commercial banks in Ethiopia.

Hypothesis 6: ATM banking has positive and significant effect on operational performance of commercial banks in Ethiopia.

1.5 Significance of Study

The study becomes significant in view of the current development and trend in global financial sector where technology culture is in style and various governments are embarking on financial innovative and reformative progression. The study assesses the nexus between financial innovation and performance of commercial banks in Ethiopia. This may improves knowledge on the concept of financial innovation and provide more empirical findings on the link between financial innovation and performance. This becomes vital in view of the government involvement and concern in financial inclusion and deepening; more so the level of resources commitment by banks to boost financial innovation and enhance their competitive advantage. The study may also relevant for various stakeholders including researchers, practitioners and policy makers. This study can also be used as a basis of further researches.

1.6 Scope of the Study

The conceptual scope of this study concerned on the effects of financial innovations on performance of commercial banks in Ethiopia. The study covered all commercial banks that were in operation by close of business on 31st of June 2019 as they appeared in the website of National Bank of Ethiopia. The area of concentration was Addis Ababa, where the head offices of all commercial banks of Ethiopia are located and which is also the hub of commercial and business activities in Ethiopia. But the result of the study can be relevant to the whole nation. Senior bank managers and senior officers that were currently employed in the head offices were sampled for their views and opinion on effect of financial innovations on performance of commercial banks. The types of financial innovations that were investigated in this study were; mobile banking, internet banking and ATM banking. The performances of commercial banks were measured with profitability and operational performance.

1.7 Limitation of study

Even though the study was designed to enable the researcher collect accurate and reliable data that can be used to make some inferences, it was however not free from limitations. The study only encompassed the view and opinion of senior managers and senior officers in head office in Addis Ababa. Though the study targeted all commercial banks currently under operation, data were collected from samples drawn from the bank head office in Addis Ababa. Thus those commercial banks outside head office in Addis Ababa and other financial regulatory agencies like National Bank of Ethiopia are omitted in this study as finances and distances are the limiting factors that inhibit collecting the data from all the commercial banks across the country.

1.8 Organization of the study

The study was organized into five chapters. Chapter one discussed the introduction part. It contains the background to the research study, presents the statement of problem, objectives and research hypotheses. Also, the chapter has the significance, scope, and limitations of the study. Chapter two contains theoretical review, empirical review of previous studies and conceptual framework of study. Chapter three outlines the research methodology adopted in this study. Chapter four discusses about the data analysis and interpretation of the outputs. Chapter five

outlines the summary of the finding, conclusions, recommendations and further research suggestions.

Chapter Two

LITERATURE REVIEW

2.1 Theoretical Framework

Theories give a general explanation and rationalization to events. Hence a researcher should be familiar with those theories relevant to his area of research (Kombo & Tromp, 2009). Muiruri & Ngari (2014), note that a theoretical framework guides research, assist in identification of the variables to be measured, and determining what statistical relationships to look for in the context of the problems under study. Hence, the theoretical review of literature helps the researcher to detect clearly the variables of the study; assists in the selection of applicable research design; and provide a general framework for data analysis. Several theories have been designed by different scholars to explain financial innovation. These includes; Schumpeter Theory of Innovation, Transaction Cost Theory, Constraint-induced Financial Innovation Theory, Task Technology Fit Theory, Circumvention-Innovation Theory, and Rogers' Diffusion Innovation Theory among others.

2.1.1. Schumpeter Theory of Innovation

According to Schumpeter (1928), entrepreneurs, who could be independent inventors, have abilities of expanding the opportunity for new profits with their innovations. Nevertheless, Schumpeter idealized that before the economy reached at equilibrium, a new set of innovations, conceptualized by Schumpeter (1934) as "Kondratiev cycles", would emerge to begin the business cycle over again. Accordingly, Schumpeter (1934) puts it that innovations are always happening in the industry and at any instance of time, there is something new being innovated in the economy and for this reason, institutions needs to be cognizant of them and the financial sector is not exempted from this. It is due to this fact that there are a variety of innovations that commercial banks adopt and implement in order to boost up their financial performance.

Accordingly, Schumpeter (1934), innovation is not merely coming up with innovative ideas; it is the process of increasing their practical use. In other words, innovation is defined as terrific development by firms in approaching with innovative products or the application of new operation or processes in production (Lawrence, 2010). Financial innovations are crucial tool for strategic transformation of commercial banks because they enable banks to coup up with changes

that are presented by the environment. Schumpeter (1939) categorized it into two major dimensions: product and service innovations. Product innovations consist of the creation of a new good or entirely new product, which more sufficiently satisfy existing or previously satisfied needs. Process innovation encompasses the adoption of a new or considerably improved operation or production.

Schumpeter's contentions have been support by Porter (1992) assertion that innovation is very crucial for securing a country's competitive advantage and long-run economic growth. According to Porter (1992), to compete successfully in international trade; a nation's businesses must constantly innovate and improve and upgrade their competitive advantages. For ensuring continues innovation and upgrading, it is important to make sustained investment in physical as well as intangible assets. Financial institutions and markets make significant tasks in mobilizing savings, monitoring fund movements, facilitating transactions, evaluating projects, and managing risk. From this theory, financial innovation by banks is a strategic choice to boost up performance, enhance relevance and competition (Akinyele, 2016). Therefore banks must be continually responding to the need of the customers and consistently meet society's evolving need. This means banks must be watchful of what customers need, be aware of what they want and also innovate as appropriate, at a gain.

2.1.2. Constraint-induced financial innovation theory

Constraint-induced financial innovation theory was developed by American economist Silber (1983). This theory point out that the central reason adoption of financial technological innovation is to improve its financial position or to maximize profit of commercial banks which work in market with more constraints have the utmost incentive of accepting and implementing financial innovation that support in bust up their financial performance as it reduce transaction cost (Lerner, 2006).

According to Sibler (1983), the banking sector is firmly regulated and thus has restrictions towards innovations and thus may limit innovations. The existence of these limitations is resulted in to twofold effect: reduced the banks' ability to venture into new innovations and also may lessen the efficiency of the banking institutions. It is because of this fact that commercial banks will always frequently act to keep them off through financial innovation. Silber (1983) argued

that financial innovation occurs to remove or lessen the constraints imposed on firms. Firms facing imperfections like regulation and entry barriers have the greatest incentive to innovate and boost profits because of the high shadow costs of such constraints. Lerner (2006) found that more highly leveraged firms are less innovative. He also reports that less profitable firms are significantly more innovative.

The theory thus is important in that it help shed light on the reasons that make banks venture into financial innovations. More so, commercial banks in Ethiopia are strictly regulated by the national banks of Ethiopia and may not be free to adopt all financial innovations without the express approval of the regulator. Financial innovations have been noted as per the theory to be a move to bust up the profits or the financial position of the financial institutions.

2.1.3. Transaction cost innovation theory

The transaction cost innovation theory was developed by Hicks and Niehans in 1983, and the theory stated that the main motive for embracing financial innovation in firm is the reduction of transaction cost. According to the theory, transaction costs play an essential role with respect to innovation and innovation is the response of the advance in technology which caused the transaction cost to reduce. In this case, the theory clarifies its connection to other feature of business development, that the main rationale of financial innovation in financial organization is profit maximization. According to Hick and Niehans (1983), the reduction of transaction cost could inspiring financial innovation and they also believes that money related innovations decreases the costs involved in making transactions.

The theory explained from another perspective that the radical motive of financial innovation is the firms' purpose of earning/increasing shareholders' wealth or benefits. Transaction costs Innovation theory is also relevant in different context. For example, the application of Internet-connected Information Technology (IT) can significantly trim down a firm's transaction costs as it facilitate efficient coordination, management and use of information. Mobile or Internet-connected IT may further lower transaction costs as it offer also virtual access to the firm's internal database and other relevant sources of information.

Efficiency in transaction cost theory is conceptualized as Pareto efficiency where governance modes are evaluated based up on to their ability to smooth the progress of transactions until the point at which it is impossible to make one party better off without making the other party worse off (Jones, 1998). The theory declared that the firm, in many instance, provides a comparatively more efficient system of organizing relative to the market for the reason that optimization of transaction costs or overall value. Thus, transaction cost theory is about efficiency and views business organization as being predominantly concerned with the relative efficiency of optimizing on transaction costs. This theory is therefore significant to this study as it will help the researcher in articulating the relationship between financial innovations and performance of commercial banks in Ethiopia with respect to improving efficiency of operation as the result of reducing transaction cost.

2.1.4. Task-technology fit (TTF) theory

Task technology fit theory was pioneered by Dishaw and Strong in 1999, advocated that new technological innovations is more likely to be adopted by if it has positively influences the performance of the users and be used if the capabilities of the information technology match the tasks that the user must perform (Goodhue & Thompson, 1995). Goodhue and Thompson (1995) developed a measure of task-technology fit that consists of 8 factors that can be used to presume if the technology fits the task at hand. The factors include compatibility, quality, systems reliability authorization, production timeliness and, eases of use/training, and relationship with users. Since the initial work, the theory is applied in the describing of a variety of context of a diverse range of information systems including electronic commerce systems and combined with as an extension of other models related to Information System (IS) outcomes such as the technology acceptance model (Gebauer & Shaw, 2004).

The theory of task-technology fit plays a crucial role in influencing individual impact and performance in the use of information systems. According to Dishaw & Strong (1999), in order to have a positive impact on performance, an information system must be utilized *and* fit the task that is supported. User assessments based on task-technology fit have been effective measures of information systems success and statistical significance has been found of a positive relationship between task-technology fit and information system success measures, such as impact on

individual performance Goodhue & Thompson (1995) and on group performance (Zigurs et.al, 1999).

2.1.5. Rogers Innovation Diffusion Theory

Rogers' Diffusion of Innovation Theory wants to describe how innovations or new ideas are adopted, and this theory suggests that there are five attributes of an innovation that influence adoption: relative advantage, complexity, compatibility observability, and trialability (Rogers, 1995). Relative advantage is the extent that an innovation is perceived as being better than the idea it surpasses. Rogers' theory advocates that innovations that have a clear, definite advantage over the former method will be more easily adopted and implemented. Existing research evidence also shows that if a potential user realizes that there is no relative advantage in using the innovation, it will not be adopted and implemented (Greenhalgh et al, 2004). Complexity is the extent that an innovation is perceived as being difficult to understand and use. Compatibility is the extent that an innovation fits with the prevailing standards and values, past experiences, and needs of potential adopters. Existing research evidence also shows that the more compatible the innovation is the better the chance of adoption (Greenhalgh et al, 2004). Trialability is the extent that an innovation may be experimented with on a limited basis. For the reason that new innovations entail investing time, energy and resources, innovations that can be tried before being fully implemented are more readily adopted. Finally, observability is the extent that results of an innovation are noticeable to the adopters. If there are observable positive outcomes from the implementation of the innovation then the innovation is more adoptable.

2.2 Financial Innovation

Financial innovation is the delivery channel for banking services. It is the act of crafting and then popularizes new financial instruments as well as new financial technologies, institutions, and markets (Lemo, 2005). It may be viewed as several types of services through which bank customers can ask for information and carry out most retail banking services via computer (Idowu, 2013). Broadly speaking, financial innovation is the way of producing and then popularizing new financial instruments as well as new financial technologies, institutions and markets (Frame & White, 2009)

According to Victor (2015), financial innovations, unlike industrial innovations, do not refer to completely new products and for the most part, their base originates from financial instruments or institutions that are already in existence. Stiglitz (2010) point out that modern financial vehicles are often produced by removing certain existing product features or by toting up a number of new features to them. According to Tarczynski and Zwolankowski (1999), financial market products and instrument innovation have a number of characteristics, including (1) flexibility (e.g. introduction of secondary markets, liquidity in capital and foreign exchange markets, adjustable rate instruments), (2) fortification against changeability of market parameters (e.g. exchange rates, interest rates, etc) such as in standardized (e.g. futures) and non-standardized (e.g. OTC options) hedging contracts, and (3) higher combination of different instruments (e.g. exotic options).

Successful innovators are capable of capturing advantage of the new environment to grow up at a more rapid pace than their competitors (Peat, 2009). According to Frame and White (2009), for financial innovation to be successful, it will have to make improved and enhanced investment environment for market participants (customers and investors) and should lead to a further adequate accomplishment of the expectations and financial objectives of market participants compared to traditional forms of investment. Financial institutions engage in innovation to gain the following benefits: reduced transaction costs, reduced agency costs, increased risk sharing opportunities, avoidance of regulations and taxes, increased liquidity, capturing temporary profits and changing prices (Allen & Gale, 1994).

In many advanced economies, innovation has become a key contributor to productivity and economic performance, not only for manufacturers but also for the service industries, most notably financial services. Financial innovation makes important contributions to economic growth and to the stability of financial systems and it led to a revolution in the way the bank undertaken the business. Lerner and Tufano (2011) showed the evidence that Chinese commercial banks have moved from the conventional business operation mode of the wholesale credit operations to the retail mode as result of technological innovation. In India, Pooja and Singh (2009) point out that compared to the non- internet banks, internet banks had provided superior quality products, relatively more profitable, and more efficient. In Jordan, electronic

banking services produced more satisfied customers and better long term cost savings strategies (Siam, 2006). The importance financial innovation has increased in Ghana banks as it has altered the way banks serve their clients more conveniently (Joshua, 2010).

As noted by Frame and White (2002), there are three types of financial innovations; product, process and institutional. Product innovation is the introduction of a good or service that is new or considerably improved concerning its character or intended uses (Ignazio, 2007). Process innovations is the introduction of new business operation or processes leading to improved efficiency, reduce in unit costs of production, and deliver novel or considerably superior products (Frame & White, 2002). Examples include on-line securities trading and Internet banking. Institutional innovation covers launching new institutions or organizational structures or the implementation of new methodologies in the organization's business practices within institutions where the production process is held (Ignazio, 2007). Internet-only banking is a principal model of this type of innovation. In Ethiopian context the most widely accepted and adopted form of financial innovation includes, Mobile, Internet and ATM banking. Therefore, the financial innovations that are used in the study are; Internet banking, Mobile banking and ATM.

2.2.1 Mobile Banking

With rapid advance of internet technologies and diffusion of mobile phones, mobile banking has gained attention as a viable option in delivering financial services. Recent innovations in telecommunications have enabled the launch of mobile banking as a new access method for banking services; whereby a customer interacts with a bank via mobile phone (Barnes & Corbitt 2003). Mobile banking is defined by Tiwari, Buse & Herstatt (2006) as any transaction (including the transfer of right or ownership to use goods and services) which is started and/or completed by using mobile access to computer networks with the assistance of an electronic gadget. Mobile banking is terms used in carrying out banking transactions through mobile gadget such as a mobile phone (Anyasi & Otubu, 2009). It is concerned with the provision of bank-related financial services with the assistance of mobile telecommunication devices.

The services of mobile banking can be used to raise proficiency and help business develop through efficient, cheap and reliable money service support system that lessen the need for cash

transaction and the associated risks (Anyasi & Otuba, 2009). It provides the benefits of banking services such as being able to save and borrow in a cost-efficient and secure way. The services include opening bank accounts, viewing account balances, making cash transfers between accounts, or paying bills via a mobile device.

2.2.2 Internet Banking

Internet banking refers to platform that allow bank customers to get access to their accounts through the use of banks website, without the intervention or inconvenience of sending letters, faxes, original signatures and telephone confirmations (Sathye, 2009). It is the use of internet and telecommunication networks to deliver a wide range of value added products and services to bank customers. Using internet banking, registered customers are able to log on to the bank's website and carry out banking dealings on their accounts. It is also referred to as online banking.

To date, the rapid spread of Internet banking all over the world its acceptance as an extremely cost effective and efficient delivery channel of banking services as compared to other existing channels (Zarei, et al., 2008). The development of Internet banking has transformed the distribution channel structure in bank sector (Giannakoudi, 1999). Banking through internet has emerged as a strategic resource for achieving higher efficiency, control of operations and reduction of cost by replacing paper based and labor intensive methods with automated processes thus leading to higher productivity and financial performance (Malhotra, 2009). The modern internet banking methods are new to the Ethiopian banking sector, and all banks in Ethiopia are too late to move with technological advancement and they should clearly chart out the time plan for their integration and technological advancement (Gardachew, 2010).

2.2.3 Automated Teller Machine (ATM)

Automated Teller Machine (ATM) is the first well known machines to provide electronic access to customers. With the advent of ATM, banks are able to serve customers outside the banking hall. ATM system is system that links banks and other financial organizations to retail banking customers for numerous types of routine banking transactions (Dossantos and Peffers, 1993). These include inquiries, deposits, cash withdrawals, cash transfers and payments. It does all through an access to personal identification number (PIN), and a plastic that contains magnetic chip which the customers identified through (Mwatsika, 2014).

Literature shows that ATM banking has received customer preference to become the second most popular channel for accessing banking products/services behind branch banking (Charles, 2016). ATM is the most dominant innovation channel among those banks which are currently providing the service in Ethiopia (Mattewos, 2016). ATMs enable bank customers to have 24 hour access to banking services and it is convenient and easy to use (Charles, 2016).

2.3 Bank Performance

In this study, researchers made an attempt to empirically investigate the impact of financial innovation on bank performance in the context of commercial banks operating in Ethiopia. Thus dependent variable of the study was bank performance. Performance is the ability of an organization to cope with all four systemic processes (inputs, outputs, transformations, and feedback effects) relative to accomplish its goals (Damanpour & Arvind, 2011). External parties normally evaluate a firm s ability based on its performance. This implies why performance is like a mirror to a firm. According to Richard et al (2009), performance contains the actual output or results of an organization as measured against its intended outputs (or goals and objectives). It may be viewed as the efficiency and productivity of the business in the context of the market where it operates. It is subject to how efficiently a firm uses its assets from its principal role of conducting business and its subsequent generation of revenues (Omondi & Muturi, 2013). Performance is the outcomes achieved in meeting internal and external goals of a firm (Liao et al., 2010).

According to Alam et al (2011), performance is a multidimensional construct that consists of four elements that includes financial and market performance, customer-focused performance, human resource performance, and product or service performance. Financial and market performance indicators includes, revenue, profits, earnings per share, market position, and the like. A customer-focused performance indicator includes customer satisfaction, and human resource performance indicators, including employee satisfaction. According to Richard et al. (2009) organizational performance includes three specific areas of firm outcomes: financial performance (profits, return on assets, return on investment, etc.); product market performance (sales, market share, etc.); and shareholder return (total shareholder return, economic value added, etc.). Santos and Brito (2012) offered a firm performance measurement model based on

subjective indicators. This model contains six dimensions: growth, profitability, employee satisfaction, customer satisfaction, social performance, and environmental performance.

Different firms are implemented different methods of measuring their performance based on their organizational objectives as a basis. This performance indicator may be measured in financial and non-financial terms (Bergin-Seers & Jago, 2007). Majority of firms, however, choose to use financial indicators to measure their performance (Beccalli, 2007). According to Omondi & Muturi, 2013, financial performance is the application of financial indicators to measure the extent of objective accomplishment, contribution to support of the bank with investment opportunities. It evaluates of how sound a company can employ assets from its primary mode of business and generate revenues (Heremans, 2007). Simpson & Kohers (2012) point out a few of the financial measures to include revenue, profit margins, sales growth, return on equity, return on assets, net interest income, stock prices, Operating Expenses/Operating Incomes, liquidity ratio and capital adequacy.

Generally, firm performance measures can play key function in instigating and adopting financial innovations through incentive for improving performance and measurements to evaluate progress toward this goal (Omondi & Muturi, 2013). Nonetheless, financial factors are not the only indicator for measuring firm performance. It needs to combine with nonfinancial measurement in order to adjust to the changes of internal and external environments. The most of previous studies adopted only financial indicators to measuring firm performance, but it is not enough, so it must use non-financial indicators through an integrated approach (Hansen & Wernerfelt, 1989). According to Bergin-Seers and Jago (2007) recommended to use a combine financial and non-financial indicators. After reviewing previous studies, the study adopted operational definition for measuring firm performance as the sum of financial (profitability) and non-financial measures (operational performance) that assess organization's performance.

2.3.1 Financial (profitability) measure

According to Heremans (2007) financial measures refer to the extent to which the organization performs in relative profitability and return on investment. A firm financial performance is reflected in the amount of success as regards to its output in terms of return on investment, return on assets, annual profit, total income, payback period, value added among others (Simpson &

Kohers, 2012). Return on Asset (ROA) and Return on Equity (ROE) are the two most commonly used techniques of measuring firm financial performance. ROA is a ratio of income to its total asset and it measures the ability of the bank management to generate income by employing firm assets at their disposal. ROE is a financial ratio that refers to what the shareholders look in return for their investment and how much profit a business earned compared to the total amount of shareholder equity invested (Heremans, 2007)

2.3.2 Non-financial measures (operational performance)

Non-financial measures refer to the extent to which the organization performs in relative quality and speed delivery of service and satisfaction to clients (Uzkurt et al., 2013). It is mainly measured through operational performance. Operational performance is a process of assessing progress toward achieving predetermined goals, including information on the efficiency with which resources are transformed into outputs both goods and services whose quality depend on delivery and satisfaction to clients (Muthami, 2015). Operational performance of service delivery comprises three critical performance factors (quality, cost, and speed) that are usually present in a service delivery system (Tseng et al., 2008). Consistent quality, dependability of delivery, and prompt delivery (speed) are critical operations performance factors in service delivery systems (Kumar, et al., 2011) and reflects more directly to the efficiency and effectiveness of the operations within the firm (Gizaw, 2016). These categories of performance reflect competencies in specific areas of supply chain including cost, quality, and conveniences.

2.4 Empirical Review

Even though there were lots of empirical studies concerning the effects of implementation of financial innovative technology on the performance of bank, the existing literatures provides mixed evidences and reached to inconclusive results. Most study observed positive impact and other found negative impact, while some other observed mixed impact. This section reviews literature from previous research regarding the effect of financial innovations on the performance of commercial banks.

2.4.1 Empirical studies on developed and emerging market countries

There are plenty of empirical studies in developed and emerging market countries concerning the impact of financial innovation on the bank performance. Most of the previous study found empirical findings of positive impact of financial innovation on the performance of the banks.

In Spain, Hernando and Nieto (2007) conducted study to determine the relationship between internet banking channels and performance of Spain Retail Banking and they found out that the impact of adoption financial innovative in a form of internet delivery channel takes time to contribute to performance of banks. They found that after three years of adoption of digital banking in form of internet banking channels there exists significant positive impact on the performance measured in terms of ROA and Return on Equity (ROE), of the sample bank. Similarly, Rauf and Qiang (2014) undertook a study to examine the effect of electronic banking on the performance of Pakistani commercial banks. They found electronic banking has significant positive impact on interest margin, ROA and ROE of the recent adopters whereas for the early adopters significant positive impact on ROE and interest margin but slightly on ROA.

In addition to the above studies, there are also other studies conducted by various authors that found positive impact. Karimzadeh et al. (2014) undertook study to investigate the effects of electronic banking expansion on profitability of a commercial bank in Iran and they found that expansion of electronic banking has significant positive association to the profitability, measured in terms of ROA, of the sample bank. Roberts and Amit (2003) conducted study to determine the relationship between innovation and the emergence of differentiated competitive positions in Australian Retail Banking and they found out that financial innovative activities have significantly impact on current financial performance of banks. Similarly, De Young et al. (2007) found out that the adoption of internet banking improved community bank profitability, for the most part through increased revenues from deposit service charges. Besides, Rahman (2007) undertook study to determine the impact of innovative technology on the profitability of the banks operating in Bangladesh and found that banks that adopt innovative technology are experienced improved performance as they gain maturity. Likewise, Lerner and Tufano (2011) found that financial innovations like venture capital, mutual fund, exchange traded funds, equity funds and securitization lead the way to financial deepening and growth.

Contrary to the empirical findings of positive impact of financial innovation on the performance of the banks, there are researchers that found negative impact. In Jordan context, Al-Smadi and Al Wabel (2011) undertook a study to examine the influence of electronic banking channels on the performance of Jordanian banks. In their study, they used a panel data of 15 Jordanian banks for the period of 2000–2010. They found significant negative impact of electronic banking on financial performance of banks.

In India context, Malhotra and Singh (2010) conducted a study to examine the effect of financial innovations specifically internet banking on performance of India commercial banks. In their study, they used a panel data of 82 scheduled commercial banks for the period of 1998 – 2007. The result indicated that there is no significant association between adoption of internet banking by banks and their performance. The reasons of lower profitability of these banks were pointed out to be higher cost of operations, including fixed cost and labour cost. Likewise, Francesca and Claeys (2010) studied the determinants of banking groups' strategic choices with respect to the offer of on-line services. In their study, they used a panel data of the 60 largest European Union banking groups for the period 1995-2005. They concluded that Internet banks fall short of forming synergies with other banking activities and so financial innovations in the form of internet banking does not improve banks financial performance.

There were researchers that found mixed result. In Nigeria context, Oyerinde (2011) undertook a study to examine the effect of electronic banking on performance of Nigerian bank. He found that electronic banking has significant positive impact on the banks performance measured in terms of Return on Assets (ROA) and Net Interest Margin (NIM). However, the study found no impact on ROE. Similarly, Onay and Ozsoz (2013) undertook a study to measure the effect of electronic banking on bank performance in Turkey by using panel data over the period of 1990 – 2008 of eighteen retail banks and they found that Internet banking adoption is positively associated with the level of profits, deposits and loans per branch. On the contrary, the study also found that implementation of internet banking services has a negative effect on bank profitability after 2 years of adoption. According to the authors, the reasons for such negative impact are internet banking increases competition and results in lower interest income. Likewise, Sadr (2013) undertook a cross country study on four banks of selected Asian countries by using a fully

modified OLS and the author empirically found that internet banking has contributed to improve ROE with a time lag of three years while a negative impact is observed for one year lagged.

2.4.2 Empirical studies in Sub-Saharan Africa countries

The financial industry in Sub-Saharan African countries is moderately strengthened due to financial innovations in various payment methods, such as the use of automated teller machines, mobile banking, and electronic banking. This technological progress has increased competition in the banking sector as the numbers of institutions have grown. Empirical studies have also existed in Sub-Saharan African countries concerning the effect of financial innovation on the bank performance.

The majority of these studies have found a positive relationship between financial innovation and bank performance. In the Kenyan context, Kimingi (2010) undertook a research to examine the effect of technological innovations on the financial performance of the Kenyan commercial banks and he found that the adoption of technological innovations by banks had improved financial performance of Kenyan commercial banks through profits increment, increased bank sales, and improvement on return on equity. Similarly, Okiro & Ndungu, (2013) found that financial innovation has a positive and significant impact on the profitability of Kenyan commercial banks.

In the same way in Nigerian context, Jegede (2014) undertook a study to determine the effect of ATM on the performance of Nigerian banks based on a questionnaire that served 125 employees of the five chosen banks in Lagos State. The result of the study showed that the adoption of ATM terminals have averagely improved the performance of Nigerian banks. Gbalam et al. (2017) aimed to determine the impact of electronic banking on profitability of commercial banks in Nigeria. Four E-banking channels (automatic teller machines, electronic mobile banking, internet banking transactions, and point of sales services) were identified and regress against the profit before tax of commercial banks operating in Nigeria between 2006 and 2014. The results revealed that the over impact of electronic banking on the profitability of commercial banks was significant; whereas, the impact of the individual channels was varied.

In the Ghanaian context, Paul et al. (2015) aimed to conduct a research to examine the impacts of financial innovations on the profitability of Fidelity Bank in Ghana by using annual financial data for the period of five years 2009 – 2013. They concluded that growth in the adoption of financial innovations, eventually leads to an increase in the profitability of a bank in Ghana. Similarly, Mensah (2016) undertook a study to determine the effects of Information Communication Technology (ICT) on the performance of twenty selected rural banks in Ghana by using annual financial data for the period from 2011 to 2014 and the results revealed that ICT has a significant impact on the performance of the rural banks. The results further revealed that investment in ICT has little effect on the performance of the rural banks. Thus, as opposed to investing in new ICT facilities, the rural banks can use their existing capacities by altering the financial innovative products and services they provide to their customers and this will have more impact on their performance than making new investment taking into consideration competition from the rural banking industry.

There are also a research studies that found mixed result. In Nigera context, Abaenewe et al. (2013) aimed to conduct a research to examine the relationship between the adoption of electronic banking and the profitability of Nigerian banks. The result of the study revealed that that the adoption of electronic banking had showed significantly and positively relationship with the returns on equity (ROE) of Nigerian banks. On the same study, they also found that the adoption of electronic banking by commercial banks has not significantly improved the returns on assets (ROA) of Nigerian banks. In the same token, Nkem and Akujinma, (2017) aimed to conduct a research to examine impact of financial innovation on efficiency of Nigerian commercial bank and they found an inverse relationship between bank efficiency ratios and transaction value on automated teller machines and point of service and the value of transactions. However, a significantly positive relationship between the variables was observed while the relationship between bank efficiency and mobile and internet banking was tested.

2.4.3 Empirical studies in Ethiopia

In Ethiopia, although many researches have been studied in the field of electronic banking, very little research has been done to understand the impact of financial innovation on bank performance. Like mixed and inconclusive empirical evidence from emerging and developing

market context, also in Ethiopia, there are mixed empirical findings of impact of financial innovation on the performance of the banks.

Girma (2016) conducted a research to examine the impact of ICT on the performance of Ethiopian banking industry using secondary data over the period 2010 – 2014. The research had taken five variables namely, the amount of investment on ICT, ATM, POS, as an independent variable to represent electronic banking whereas number of branch and GDP were used as controlling variable and profit before tax and Return on Asset (ROA) are used as dependent variable to measure profitability. The finding of the study showed that the amount of investment on Information Communication Technology, Automated Teller Machine, Point of Sale terminal have no statistically significant effect on ROA on commercial banks in Ethiopia. Rather, result revealed that investment on the POS, ICT and number of branches have negative effect on ROA of commercial banks in Ethiopia.

Besides, Solomon (2016) undertook a study to determine the role of electronic banking on financial performance of commercial banks in Ethiopia by using panel data nine commercial banks for the period from 2013 to 2015. For measuring bank financial performance the study used Return on Asset (ROA) as dependent variable and 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 were used as independent/explanatory variable while market share was used as a control variable. The result of the study revealed that increased number of ATM, POS and market share had a positive role on the financial performance of commercial banks. However, the number of debit card had negative role on the financial performance of commercial banks.

Similarly, Tilahun (2016) aimed to conduct a research to determine the impact electronic banking on financial performance of commercial banks in Ethiopia. In this study the researcher used secondary data of financial information for the period from 2013 to 2015 from 10 commercial banks in Ethiopia. The research had taken three variables namely, number of ATM, number of POS and number of Debit cardholders as an independent variable to represent electronic banking while profit before tax and ROA are used as dependent variable to measure

profitability. Finally the finding of the study revealed that electronic banking had statistically significant impact on ROA and profitability of commercial banks of Ethiopia.

Similarly, Rukiya (2018) aimed to conduct a research to examine the effect of financial innovation of performance of commercial banks in Ethiopia by using secondary data of nine commercial banks for the periods from 2015 to 2017. For measuring bank financial performance the study used Return on Asset (ROA) as dependent variable and number of mobile banking users, number of automated teller machine terminals, number of new saving accounts, number of point of sale terminal, debit cardholders were used as independent/explanatory variable while managerial efficiency was used as a control variable. The finding of study shows that increased number of mobile banking users and number of new saving accounts had a positive effect on the financial performance of commercial banks by reducing transaction cost and mobilizing deposit. However, numbers of ATM terminals have a negative and significant effect on financial performance of commercial banks due to high initial investment as compared to income generated. Number of point of sale terminals and number of debit cardholders are insignificant to profitability of Ethiopia. In addition, management efficiency shows a negative relation that was indication of management was not cost effective in commercial banks of Ethiopia. This is however contradictory to Solomon (2016) finding that increased number of ATM, and POS had a positive role on the financial performance of commercial banks.

2.5. Summary and gap in literature

It could be seen from the above explained empirical literatures that the impact of financial innovation on the performance of banks provides mixed evidences and inconclusive. Thus it is important to consider that research on financial innovation and its effect on banks performance are relatively in the beginning stages and have no or inadequate systematic evidence with globally accepted results. Therefore, it brings an open ground for the researchers, academicians, bankers, regulators and supervisors to know empirically the impact of financial innovation on the performance of banks.

Furthermore, from the reviewed relevant literature, it was evident that very few studies have been found to empirically examine the effects of financial innovation on the performance of banks in Ethiopia. More than that, research in the area of financial innovations has not been done

in a comprehensive approach on Ethiopia. It came out strongly that there was of lack of comprehensive analysis of multiple innovations as the previous literature indicated that only a few financial product innovations have been considered. The previous studies concentrated only on a few variables of electronic banking concerning product innovations like ATM, POS and Debit card, while this study examine financial innovation in more wider perspective (process and organizational innovation) and as such covers additional important variables that were omitted by previous studies like mobile banking and internet banking. More than that, the previous studies focused only on assessing the impact of financial innovation on financial performance/profitability of bank/ and as such Return on Asset (ROA) was used as the only dependent variable to measure the banks performance. However, this study is unique in sense that it makes investigation of impact of financial innovation on both financial and non-financial/operational/ performance measures of banks.

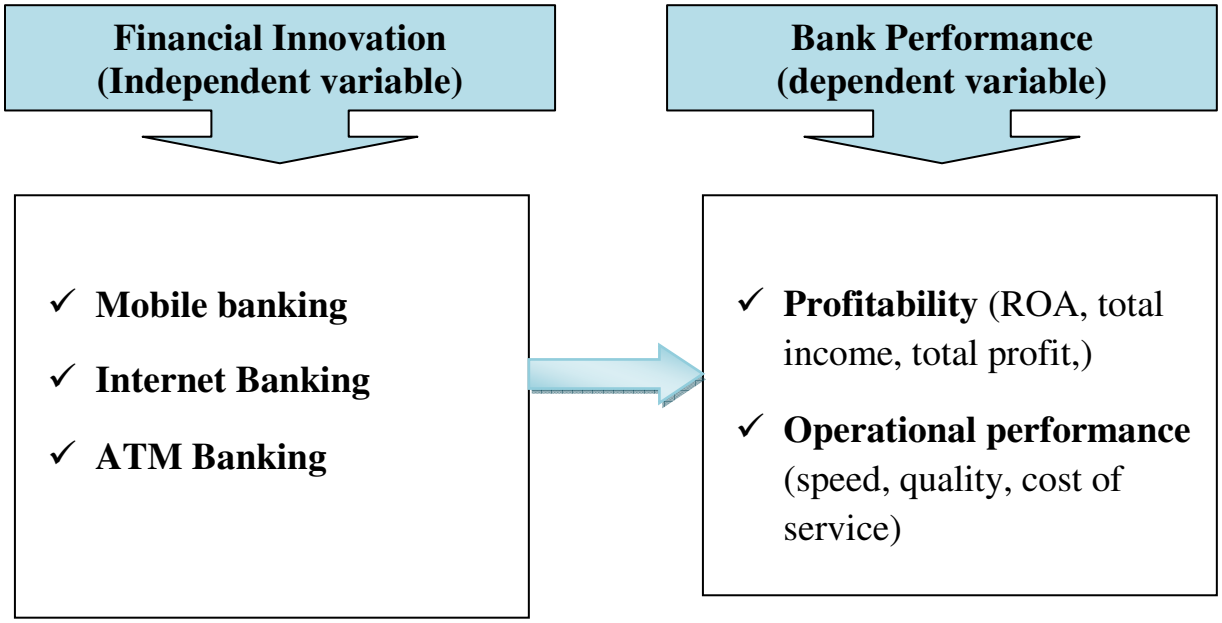
More importantly, the analytical tools used in most previous studies looked at each variable individually. That is why this study used multiple regressions analysis because of their ability to combine and test multiple independent and multiple dependent variables simultaneously. This work considered all these gaps and study the implication multiple innovations factors- Mobile banking, Internet banking, and Automated Teller Machine (ATM) on financial and operational performance mainly based upon primary data. This makes the study more comprehensive. The study therefore aims to fill this gap in the literature by studying the relationship between financial innovation and performance of commercial banks in Ethiopia in terms of a wide-ranging variables and more inclusive manner.

2.6 Conceptual Framework

A conceptual framework is a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation (Kombo & Tromp, 2009). It is a research instrument that helps a researcher to develop awareness and understanding of the situation under inquiry and to communicate it. Unlike theory, a concept is an abstract or overall impression inferred or deduced from specific instance. From the theoretical and empirical literature reviews, the following conceptual framework of the study is developed by the researcher.

In this framework, financial innovation is independent variable and bank performance is dependent variable. The independent variable financial innovation is operationalized through: mobile banking, internet banking and ATM banking while the dependent variable bank performance is operationalized through; profitability and operational performance.

Figure 2.1 Conceptual Framework



Source: Compiled by the researcher

CHAPTER THREE

RESEARCH METHODOLOGY AND DESIGN

3.1 Introduction

In this chapter, the researcher describes the procedures to ensure a methodical and well-informed investigation, focusing on sampling procedure, data collection and analysis methods. Data collection instruments and procedures are discussed as well as the target population and sampling procedures. Research methodology is described as method of illuminating scientific procedures in a way suitable for the purpose. It is the general standard which direct the description of the methods applied in conducting the research study, how to and what analysis to be done to the data so collected (Akinyele, 2016). These are realized in address research methods used for the study, the data collection and how the field work for the study was conducted.

3.2 Research design

Newing (2011) defined research design as the arrangement of conditions for collection and analysis of data in a way that intend to combine importance to the research purpose with economy in procedure. Kothari (2004) further emphasizes that research design assist the smooth performance that carrying out the various research operations, thus enabling the exercise as efficient as possible, comprehending utmost outcome with minimum resources. Thus a research design is the arrangement or the blue-print of research that direct the procedure of research from the formulation of the research questions and hypothesis to reporting the findings that seeks to meet the purpose of the study (Kombo & Tromp, 2009).

The choice of research design depends on objectives that the researchers want to achieve (Newing, 2011). The primary aim of this study was to examine the impact of financial innovation on financial and operational performance commercial banks in Ethiopia. To achieve this objective, explanatory research design was used. Even though the study begins with the description about each type of financial innovation and performance of commercial banks, the ultimate goal of the study is to test if the relationship exists and how the financial innovation could impact on operational and financial performance of commercial banks in Ethiopia. Hence, explanatory research design enabled the researcher to examine the effect of financial innovation on operational and financial performances of commercial banks in Ethiopia.

3.3 Target Population

In this study, there were two types of population. There were the target population and study population. Target population of survey is the entire set of units for which the survey data are used to make inferences (Smyth, 2004). It is the population that a researcher wants to generalize the results of the study. The target population of the study consisted of all commercial banks in operation in Ethiopia at June 30, 2019 as they appear in the National Bank of Ethiopia database. The lists of commercial banks are displayed in appendix III.

The study population can be defined as the entire collection of cases or units about which the researcher wishes to draw conclusions (Castilo, 2009). The study population, which is also known as accessible population, is the population that is derived from the target population for the smooth condition of the research in specific term. It is from the study population that researchers draw the sample. According to Smyth (2004), the geographic characteristics of the target and study population need to be delineated, as well as, types of units being included. Accordingly, the study population for this study was target at two units. The first unit was target at institutional level where the study considered the head offices of all commercial banks in operation in Ethiopia at 30 June, 2019. The study chose the head offices mainly because of the fact that these are where the bulk of transactions and decisions on financial innovation process are normally concluded or performed. Issues relating to innovation products and services are normally directed from the head office of all the banks. More so, for the smooth conditioning of conducting research the study geographically delineated at head office in Addis Ababa.

The second unit of study population was target at departmental and staff level with in institution where the study targeted only selected relevant head office departments and their senior managers and senior officers who are responsible for policies related to financial innovation and have higher level of appreciation on how innovations influence financial performance. The main reason for choosing senior managers and senior officers was because they have firsthand and sufficient knowledge about financial innovation better than other employees. They are also responsible for managing performance of their units through the departmental budgets and action plans. More so, only senior managers and senior officers of relevant departments (ICT, Research & Development, Operation, Marketing and finance) were considered. These departments were

selected mainly because they are relatively better understandings on how innovations influence performance of bank. The unit of observation was five senior managers or senior officers in these departments. In order to represent respondents from various teams or divisions within each department in sample selection, the study targeted five senior management or senior officers from each relevant department. Thus the study population targeted for this research was 425 drawn from all 17 commercial banks. Relevant head office departments and their senior managers and senior employees who were responsible for policies on their respective banks financial innovation products and services were captured in the sampling frame.

Table 3.1 study Population

Categories	Study population
ICT/Information system	85
Research and Development	85
Marketing	85
Operation	85
Finance	85
Total study population	425

3.5 Sample Size and Sampling Procedure

Lavrakas (2008) explains a sample in a survey research as a subset of elements drawn from a larger population. Obviously such a sample should be typically identical with the population thus provide adequate representation. If a sample is not precise and inadequate both in characteristic and size, it may lead to rejection of false null hypothesis, wrong result and therefore a waste of resources (Gerstman, 2003). Likewise a study that collects too much data is wasteful. Therefore it is essential to establish adequate sample size before going on data collection for a study. In recognition of this fact, model to determine sample size as developed by Yamane (1968) was used for this purpose. The Taro Yamane's formula applied for determining sample size when the population size is finite and homogenous and when the original sample collected is more than 5% of the population size, and all these conditions are fulfilled hence applying it to determine a sample size. Using this formula for the population size of 425, the sample size would be 206. Below is the mathematical illustration for Taro Yamane method.

That is n= N/1+ N (e)² Where: n is the sample size, N is the population size and e is the error of sampling. For this study the error of sampling is set at 0.05.

N = 425/1+ 425(0.05)²

= 2 55/1.64 = 206 respondents

We can see from the result above that the sample size was 206 from the total study population of 425 to maintain a 95% confident interval. In order make important adjustments for unresponsive questionnaires and to make the finding all-embracing, the respondents were enlarged to 220.

Table 3.2: Sample Size

Categories of respondent	**Study population**	**Sample**
ICT or Information System	85	66
Research and Development	85	55
Operation	85	33
Marketing	85	33
Finance	85	33
Total	425	220

The study conducted a census of 17 commercial banks instead of adopting a sampling methodology. This was justified on the basis that the numbers of banks are few and all banks currently in operation are involved in various forms of financial innovation products and service. Since all operating banks (17) were captured, a combination purposive and quota sampling methods were used to select respondent and distribute the questionnaires. The respondents were grouped into five categories: ICT, operations, Research & Development, Marketing and Finance department. These departments were purposively selected because of relevance of the strata/departments for the research inquiry. The quota sampling is used for selection and distribution of samples among various department/subgroups. The main reason why researchers choose quota samples is that it allows the researchers to sample a subgroup that is of great interest to the study. More quotas are assigned for those departments that have relatively more relevance for the research inquiry. As the research was concerned about financial innovation which is more concerned with ICT and Research & Development department more sample size were allocated for these departments. Thus 30% and 25% of total sample were allocated for ICT

and Research & Development department respectively. For the remaining each three department (operation, marketing and finance) 15% of total sample was allocated for each.

The selection and distribution of samples among various banks were based on total capital base of each bank which was also used to determine their market share percentage according to NBE report (NBE, 2018). In essence market share percentage was used to distribute sample selection and questionnaire distribution within the target department of each bank. For determine the sample size the market share of customers amongst the banks in Ethiopia is distributed into four groups: A=7%, B=5%, C=3% and D=2%. This was computed based National Bank of Ethiopia 2017/18 report on total capital base of each bank and little adjustment was made for the purpose of computing the sample size. Within each of the department of target bank, the respondents were purposively selected based on their level of management position, seniority and division/team on which they represent. For the information to be important and valid for research inquiry, the targeted sources of information were senior managers and senior officers' staffs who had been in the banking industry for a minimum of three years so that they have substantial information on the topic of study. The sample size and strata is displayed in appendix II.

3.6 Data Collection Instrument

For this study both primary and secondary sources of data were used. Kothari (2004) describes primary data as those which are collected a fresh and for the first time and thus happen to be original in character. Dawson (2009) states that secondary research data involves the data collected using information from studies that other researchers have made of a subject. Both sets of data are used in this study.

The study utilized questionnaire as major instrument for collecting primary data. Schwab (2005) defined questionnaire as measuring instruments that ask individuals to answer a set of questions or respond to a set of statement. A questionnaire is research instrument that is used in data collection when dealing with a large sample (Kombo, et a1.2002). A questionnaire is preferred because of its convenience and ease of administration. Kothari (2004) stated that questionnaires have various advantages, like; it is free from the bias of the interviewer; it is low cost even when the universe is large and is widely spread geographically; respondents have adequate time to give well thought out answers; respondents who are not easily approachable can also be reached

conveniently; large samples can be made use of and thus the results can be made more dependable and reliable. In view of the advantages and the need to gather more information, questionnaires were administered to senior managers and senior officers and to solicit their views concerning the effect of bank innovations on performance of commercial banks. Sample copy of questionnaire is provided in appendix I.

Both structured close and open ended questionnaire was administered for primary data collection. However, the study largely used closed-ended questions. This is due to the fact that closed-ended questions are often good for surveys, because one can get higher response rates. Beside, answers to closed-ended questions can easily be coded and analyzed makes them particularly useful when trying to prove the statistical significance of a survey's results. Some open ended questions were also included to obtain qualitative data from specified respondents soliciting their hidden insights into the intricate relationship between financial innovation and performance of banks. In this study many questions begin with a series of closed questions, with boxes to tick the chosen option, these were at times mingled with a section of open ended questions for more detailed response.

The questionnaire was carefully designed and tested with a few members of the population for further improvements. Each item was cautiously created so as to collect the target information, address research objectives and tied into the overall research problem. The questionnaire was structured into 3 sections. Section A of the questionnaire was about general information of the respondents. Section B of the questionnaire measured the independent variables i.e. financial innovation (mobile, internet and ATM mobile banking). Section C was the last section of the questionnaire and it measured the dependent variables i.e. bank performance. Overall there were forty eight (51) questions (most in Likert scale format), in each set of questionnaires which were concisely designed in such a way that they would be easily comprehended and responded to.

3.7 Data Collection Procedure

Primary data was collected through the administration of questionnaires to senior managers and employees. Five (5) trained data collectors were engaged; on average of one for three banks to assist in the administration and collection of the questionnaires. These field data collectors were also served as a liaison officer in case of problems during the period their exercise at field. The

entry points to the banks were through the human resource and ICT departments. Organization's and staffs' permissions to do this were sought and approval received. The researcher also worked in collaboration with trusted internal informants in each of the banks, and supported with letter of introduction from the University.

3.8 Pilot Test

For primary data, a pilot test was carried out before the main data collection, in order to fix the validity and reliability of the questionnaire, vagueness and clarity of items. Babble (2002), indicated that pilot testing is a trial run of procedure and instruments that someone plans to use in undertaking a research. The purpose is to get feedback on the clarity, simplicity and adequacy of the questions in collecting the target information. The rule of the thumb suggests that 5% to 10% of the target sample should constitute the pilot test (Cooper & Schilder, 2011). The pilot test therefore was performed using fifteen (15) management staff in the headquarters of selected banks and due care were given to exclude these piloted respondents from the main study. The pilot test sample was within the recommendation. The response of the pilot administration of the questionnaire was used to improve the content values of the questions used in the main administration. In addition, result of pilot questionnaires was used to make validity and reliability test.

3.9 Instrument Reliability and Validity

There is always more than one way to measure any variable, a researcher has to attempt to construct the best measure or measures for each variable. Considering this, data were first analyzed to ensure instrument quality. Reliability and validity are the major criteria used to evaluate measurement. Reliability was used to ensure consistence of data whereas validity was used to test the accuracy of the measurement process.

3.9.1 Instrument Validity

Validity refers to the extent to which the scores from a measure represent the variable they are intended (Gakure, 2010). It is the extent to which the scores from a measure signify the variable they are intended to. Weber (1990) indicated that in order to draw valid inference from a test, it is important that the classification procedure be reliable and consistent. As errors are likely to

occur, whether intentionally or not, therefore every measurement result should include measurement error to ensure the validity of such measurement.

Content validity measures the extent to which a test acts to measure a concept analysis of the items so as to confirm adequate coverage of the scope of the study by the measuring instrument (Oyerinde, 2011). In order to ascertain the relevance of each question to variables being measured and to ensure that the content of the instrument provide answers to the objectives of the study and the formulated hypotheses, content validity of the pilot questionnaire was tested. This was done by experts in the field and then necessary corrections were made on the instrument. The items used in the questionnaire were assessed by three academicians from different universities in addition to one expert from USA; all of them have sufficient knowledge and experiences in the field of business administration. Many modifications were applied to the original questionnaire based on their comments and suggestions. Most open ended questions were not adequately answered and the researcher dropped most them from the instrument during the main data collection.

3.9.2 Instrument reliability

In addition, reliability test was carried out in order to ensure the consistency of the instruments used in main administration. The reliability is consistency of the measurement; that is, to what extent a measuring device will produce the same results when applied multiple times to the same person under similar conditions (Gakure & Ngumi, 2010). The most straightforward method of testing reliability is to replicate; either by asking the same questions to the same respondents at different times and evaluating the degree of correlation, or by asking the same question in different ways at different points in the questionnaire (Johnson & Turner, 2003).

The study was employed Cronbachs' alpha to assess reliability of the questionnaire. Cronbachs' co-efficient alpha is the most common way of measuring internal consistency. Cronbachs' coefficient (alpha) may range between 0 to 1, with 0 indicating an instrument full of errors and 1 indicating total absence of error. The closer Cronbach's alpha coefficient is to 1, the higher the internal consistency reliability (Oyerinde, 2011). A reliability coefficient (alpha) of 0.70 is considered acceptable, reliable and recommended for new questionnaire. Reliability was tested by use of fifteen questionnaires which were piloted with randomly selected bank managers who were not

included in the final study sample. The reliability of the questionnaire was tested using the Cronbach's alpha correlation coefficient with the aid of Statistical Package for Social Sciences (SPSS) software. After applying the Cronbach's coefficient alpha test, an overall alpha coefficient of 0.64 was reached. After improving the tool, a reliability test was redone achieving Alpha coefficient of 0.9. Based on these recommendations, all variables in the study questionnaire were concluded to have adequate internal consistency and were reliable for the study and their results could be used to generalize on population characteristics.

3.9 Data Processing and Analyzing

In this study, the primary data was collected from distributed questionnaire. Once the questionnaires are gathered, the next step is to edit, clean, encode and look for errors in the data. This was the question of data processing. Data processing is a series of actions or steps performed on data to verify, organize, transform, integrate, and extract data in an appropriate output form for subsequent use. In recognition of this fact, therefore, the data processing of collected questionnaires was rigorously done. This helped in compressing and arranging the data into small sets for easy examination and analysis.

Next, the collected and processed primary data from the questionnaire are analyzed by descriptive statistics, and multiple linear regression analysis. Descriptive statistics such as mean scores, percentages, frequency distribution and standard deviations were computed to describe the characteristics of the variables of interest in the study. Besides, inferential statistics such as multiple linear regression analysis was used to test the hypothesized relationships and to determine the relative importance of each independent variable in explaining the variation financial performance of commercial banks in Ethiopia.

3.10 Statistical Model

Regression analysis is a statistical tool for the investigation of relationships between variables. Regression analysis is also important for quantifying the impact of various simultaneous variables upon a single dependent variable. Multiple linear regression models were used to assess whether financial performance was a function of the variables indicated on the specific objectives. In order to address the objectives of research inquires; the study used the following regression equations to test the significance of the study hypotheses:

The first generic objective of the study was to examine if financial innovations influence financial performance or profitability of commercial banks in Ethiopia. The following multiple linear regression equation was used to examine the effect of financial innovations on financial performance of commercial banks in Ethiopia

$$Y= \beta_0 +\beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

Where Y represent Bank financial performance, while X_1, X_2, X_3 represent the independent variables mobile banking, internet banking, and ATM banking respectively. β_0 is the constant, while $\beta 1$, $\beta 2$ and $\beta 3$ represent corresponding coefficients or parameters for the respective independent variables to be estimated and e represent the error term that captures all relevant variables not included in the model.

The second generic objective was to establish whether bank innovations affect operational performance of commercial banks in Ethiopia. The following multiple linear regression equation was used to determine the effect of bank innovations on operational performance of commercial banks in Ethiopia

$$Y= \beta_0 +\beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

In the above model Y represent bank operational performance, while X_1, X_2, X_3 represent the independent variables mobile banking, internet banking and ATM banking respectively. β_0 is the intercept, while $\beta 1$, $\beta 2$ and $\beta 3$ represent corresponding coefficients or parameters for the respective independent variables to be estimated and e represent the error term which represents residual or disturbance factors.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter deals with organization, analysis and presentation of data collected from respondents using questionnaires. The data collected was analyzed and interpreted in line with the objective of the study which was; to determine impact of financial innovation (mobile banking, internet banking and ATM banking) on the performance of commercial banks in Ethiopia. It gives the empirical findings and results following the application of these variables using the techniques indicated in the third chapter.

4.2 Response Rate

The researcher distributed two hundred and twenty questionnaires (220). Out of these only one hundred and seventy-one questionnaires (171) were completed and returned. This represents a response rate of 77.7% and none response rate of 22.3%. According to Mugenda and Mugenda (2003), a response rate of 50% is considered good and response rate greater than 70% is considered to be very good. The 77% response rate is thus considered a very good representative of respondents to provide enough information for analysis and to derive conclusions.

Table 4.1: Response Rate

Response rate	**Sample size**	**Percentage (%)**
Returned questionnaires	171	77.7
Un-returned questionnaires	48	22.3
Total	**220**	**100**

4.3 General information of sample

This section assesses general information of respondents. Respondents were asked about their gender, age, level of education attained, work experience and their working department. This information is not necessarily important for addressing research objectives but they provided important information that helps the researcher to determine the ability of the respondent to contribute meaningfully to the investigation.

From table 4.2 show that 87.1% were males while 12.9% were females. This is suggesting that the male are taking the domination in higher management position. The age distribution was 2 respondents (1.2%) below 25 years, 80 respondents (46.8%) were age between 26 - 40 years, 78 respondents (45.6%) were age between 41-55 years and 11 respondents (6.4%) were above 55 years. Regarding the educational qualification, 73 (42.7%) having first Degree, 96 (56.1%) having second Degree and the rest 2 (1.2%) have PHD. Concerning the duration of respondent in current organization, just about half of the respondents stayed for more than 10 years, while only 2.3% of them have stayed in current organization for more than 20 years. The proportion of department was around 27% of respondents from ICT department, 20.5% from Research & Development, 18.1% from Marketing 18.1% Finance and the rest 16.4% from Operation department. Overall summary of the general information of respondent can be seen from below table.

Table 4.2 General Information of the respondent

Main factor	Factor level	Frequency	Percentage
Gender	Male	149	87.1
	Female	22	12.9
Age	Below 25	2	1.2
	26-40 years	80	46.8
	41-55 years	78	45.6
	Over 55years	11	6.4
Educational qualification	Degree	73	42.7
	MA/MSC	96	56.1
	PHD	2	1.2
Work Experience in current organization	Under 5 years	31	18.1
	5 -10 years	81	47.4
	10-14 years	38	22.2
	15-19 years	17	9.9
	20 years and above	4	2.3
Department	ICT	46	26.9
	Research & development	35	20.5
	Operation	28	16.4
	Finance	31	18.1
	Marketing	31	18.1
Total	**Total**	**171**	**100**

4.4 Descriptive analysis of study variables

Descriptive statistics were used to explain the basic features of the data that was collected from the field. They present simple summaries about the sample and the measures together with simple graphic illustrations. This section discusses the descriptive statistics of the study variables on the effect of financial innovation on performance of commercial banks in Ethiopia.

4.4.1 financial innovation and financial performance of bank

The first generic objective of the study was to determine the effect that bank innovations have on financial performance of commercial banks in Ethiopia. The objective was assessed by use of statements where the respondents indicated their degree of agreement with the statements.

4.4.1.1 Mobile banking and financial performance of bank

The first objective of the study sought to determine the influence of mobile banking on financial performance of commercial banks in Ethiopia. In order to do that the statements depicting the effect of mobile banking on financial performance were presented to respondents and the summary of the findings are presented in table 4.3. The results are presented in terms of percentages, mean scores and standard deviations. The result showed that 58.5% of the respondents agreed that mobile banking has improved the level profitability for the bank, while 29.8% remained neutral, 8.2% disagreed, and 2.9% strongly agreed. Mean response was 3.55 on a 5 point scale. Question was also asked on whether mobile banking has expanded the income generating potential of the bank. The result showed that around two-third (66.1%) of respondents agreed, while 12.3% strongly agreed, and 15.2% remained neutral. The mean score was 3.84.

Question was asked on whether income from mobile banking has high margin hence contributing positively to bank annual profit. The finding showed that 36.3% were disagreed, and 31.6% indifferent while 31% agreed. Mean response was 2.92. On whether mobile banking could recover the initial investments within three years, 40.4% of respondent agreed, and 31.6% disagreed while 25.7% neutral. The mean score for the responses was 2.87 which is an indication of less agreement that investment in mobile banking has a payback period of less than 3 years. On whether investment in mobile banking is in mostly motivated by profits to the bank, 38% of respondent disagreed, and 31 % agreed while 26.3% were neutral. The mean response was 2.98.

Table 4.3 the effect of mobile banking on financial performance

Indicators	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)	Mean	STD
	1	2	3	4	5		
Mobile banking has improved the level profitability for the bank.	0.6	8.2	29.8	58.5	2.9	3.55	0.71
MB has expanded the income generating potential of the bank.	0.6	5.8	15.2	66.1	12.3	3.84	0.73
Income from MB has high margin hence contributing positively to bank annual profit.	1.2	36.3	31.6	31	0	2.92	0.84
MB investments have payback period of less than 3 years, hence good return on assets	2.3	40.4	25.7	31.6	0	2.87	0.89
Investment in MB is in mostly motivated by profits to the bank.	1.2	38	26.3	31	3.5	2.98	0.93
Average						**3.23**	**0.82**

Reliability Cronbach's alpha 0.864

The mean score of responses regarding the effect of mobile banking on financial performance was 3.23 on a 5 point scale. The mean score was greater than 3 which would mean there was relatively moderate agreement on the nature of influence that mobile banking have on bank profitability. The average over all standard deviation of 0.82 infers that 68% of the responses were spread within one standard deviation of the overall mean.

4.4.1.2 Internet banking and financial performance of bank

The second objective of the study sought to assess the effect of internet banking on financial performance commercial banks in Ethiopia. To do this, the statements on the effect of internet banking on bank financial performance were presented and the summary of the finding are presented in table 4.4. When question were asked whether internet banking has improved the level profitability for the bank, 46.8% of the respondents were neutral and 33.9% agreed, while 17.5 disagreed. Mean response was 3.2. Respondents were also asked whether use of internet services has added to more profitable business avenues to the bank. In response to this question, 49.7% of those surveyed remained neutral and 26.3% agreed, while 22.8% disagreed. Mean

response was 3.04 which is an indication of indifferent on statement that use of internet services has added to more profitable business avenues to the bank.

On whether income from internet banking has high margin hence contributing positively to bank annual profit, 40.4% of respondents disagreed, while 32.7% agreed and 25.1% remained undecided. Mean response was 2.91 which indicated less agreement on the preposition that income from internet banking has high margin hence contributing positively to bank annual profit. On whether internet banking could recover the initial investments within three years, 42.1% of respondent disagreed, while 29.2% neutral and 27.5% agreed. The mean score was 2.83 which is an indication of less agreement on the preposition that investment in internet banking has a payback period of less than 3 years. Similarly, 45.6% of the respondents were disagreed on preposition that investment in internet banking is mostly inspired by profits the bank will make, while 28.1% of respondents agreed, another 25.1% remained neutral. Mean response was 2.8 which indicated less agreement on the statement that investment in internet banking are mostly motivated by profits. The deduction from this is that there are other most important factors rather than profit that motivated the bank to invest more in internet banking.

Table 4.4 the effect of internet banking on financial performance

Indicators	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)	Mean	STD
	1	2	3	4	5		
Internet banking has improved the level profitability for the bank.	0	17.5	46.8	33.9	1.8	3.2	0.74
Use of internet services has added to more profitable business avenues to the bank.	0.6	22.8	49.7	26.3	0.6	3.04	0.74
Income from IB has high margin hence contributing positively to bank annual profit	1.2	40.4	25.1	32.7	0.6	2.91	0.89
IB investments have payback Period of less than 3 years hence good return on asset	1.2	42.1	29.2	27.5	0	2.83	0.85
Profitability of the bank mostly motivated investment in internet banking.	1.2	45.6	25.1	28.1	0	2.8	0.86
Average						**2.96**	**0.76**

Reliability Cronbach's alpha 0.873

The mean score of responses regarding the effect of internet banking on financial performance was 2.96 on a 5 point scale. The mean score was very close to 3.00 which would mean there was indifference on the nature of influence that internet banking have on bank profitability. This may an indication of weak effect of internet banking on bank financial performance. The average standard deviation of 0.76 infers that a spread of within one standard deviation from the mean.

4.4.1.3 ATM banking and financial performance of bank

The third objective of the study was to determine the effect of ATM banking on financial performance of commercial banks in Ethiopia. The statements depicting how ATM banking affects bank financial performance were presented to respondents and the summary of the findings are presented in table 4.5. When respondents were asked whether ATM banking service has improved the level profitability for the bank, 45% of those surveyed disagreed, while 31% agreed and 21.1% remained neutral. The mean score was 2.85. On whether ATM banking has expanded the income generating potential of the bank, 32.7% of respondent are agreed, while 33.3% disagreed and 30.4% remained neutral. The mean score was 2.97 which show there was indifference on the nature of influence that ATM banking has on bank income.

On whether income from ATM has high margin hence contributing positively to bank annual profit, 36.3% of respondent are agreed, while 29.8% disagreed and 29.8% remained neutral. The mean score for the responses was 3.02. On whether ATMs could recover the initial investments within three years, 39.8% of respondent disagreed, 30.4% agreed and 25.1% indifferent. The mean score for the responses was 2.93. Moreover, 42.1% of those surveyed disagreed that investment in ATMs by banks was driven by profits, while 31% were agreed and 24% remained neutral. The mean score was 2.88. This indicates that there was less agreement that investing in ATMs is highly driven by profitability in the commercial banks.

The overall mean score of responses regarding the effect of ATM banking on financial performance was 2.93 on a 5 point scale. The mean score was close to 3.00 which would mean there was not taking sides on the nature of influence that ATM banking have on bank profitability. This is might an indication of weak influence of ATM banking on bank financial performance. The average standard deviation was 0.92 meaning that at least 68% of the responses were spread within one standard deviation of the mean.

Table 4.5 the effect of ATM banking on financial performance

Indicators	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)	Mean	STD
	1	2	3	4	5		
ATM banking service has significantly improved the level profitability for the bank.	1.8	45	21.1	31	1.2	2.85	0.93
The use of ATM has improved the level of deposits for the bank	2.3	33.3	30.4	32.7	1.2	2.97	0.89
ATM has low maintenance costs leading to high profitability over its economic lifetime	0	36.3	29.8	29.8	4.1	3.02	0.91
ATM investments have payback Period of less than 3 years hence Good return on assets	1.8	39.8	25.1	30.4	2.9	2.93	0.94
Investing in ATMs is highly driven by profitability in the commercial banks.	1.8	42.1	24	31	1.2	2.88	0.92
Average						**2.93**	**0.92**

Reliability Cronbach's alpha 0.954

4.4.1.4 Descriptive statistics on banks financial performance

The respondents were also asked to rate their opinion regarding financial performance of their bank for the last five years. The summary of their response to specific questions as revealed by the findings will be as presented in table 4.6. The finding revealed that 76% of respondents reported that the amount of their bank net income has greatly increased over the last five years. While 17.5% indicated the bank net income has increased in moderate extent. The mean score was 3.85 confirm that net income of most banks has increased over the time. Regarding the bank annual revenue, 76% indicated that their bank annual revenue has been increasing in great extent, while about 21.6% reported that their bank net income has been increased moderately. The average score was 3.8, indicating that the annual revenue of most banks has been increased over the time. When the participants were asked to rate to what extent the performance of their bank return on assets had improved, over half (57.9) of those surveyed reported that their bank return on assets has been greatly improved over time. The average response was 3.55 indicating that banks return on assets is improved in between moderate and great extent.

Of the 171 respondents who completed the questionnaire, 63.7% indicated that their bank market share has been moderately increased, whereas 34.5% indicated that the bank market share has been greatly increased. The mean response was 3.32. When participants were asked about non-interest income of bank, 52% of respondents indicated that non-interest income of bank has been moderately grown over a time, while 46.2% reported that non-interest income has been greatly growing over the last five years. The mean response was 3.46. When the participants were asked to rate to what level the efficiency ratio of the bank had improving over a time, 52% of those surveyed reported bank efficiency ratio has been improved at great extent, whereas 45.6% reported that their bank efficiency ratio has been moderately improved. The average response was 3.51 indicate that for majority of bank efficiency ratio has been moderately improved.

Table 4.6 Respondents opinion on financial performance of commercial bank

Indicators	No extent (%)	Little extent (%)	Moderate extent (%)	Great extent (%)	Very great extent (%)	Mean	STD
	1	2	3	4	5		
Amount of bank Net Income has increased over the last five years.	0	1.2	17.5	76	5.3	3.85	0.5
Bank annual revenue has increased over the last five years.	0	0.6	21.6	76	2.3	3.8	0.47
The bank return on assets has improved over the last five years.	0	1.2	40.4	57.9	0.6	3.55	0.53
The bank market share has increased over the last five years.	0.6	1.2	63.7	34.5	0	3.32	0.52
Amount of non-interest income of bank has grown over a time.	0	1.2	52	46.2	0.6	3.46	0.53
The bank efficiency ratio has improved over the last five years.	0	1.8	45.6	52	0.6	3.51	0.55
Average						**3.58**	**0.6**

Reliability Cronbach's alpha 0.871

The overall mean score for general bank staffs' opinion on bank financial performance was 3.58 on a 5 point scale. This would an indication that the financial performance for majority of the banks have greatly improved over the last five years. The average standard deviation was 0.6 meaning that at least 68% of the responses were spread within one standard deviation of the mean.

4.4.2. financial innovation and operational performance of bank

The second generic objective of the study was to determine the effect that bank innovations have on operational performance of commercial banks in Ethiopia. The objective was verified from respondents by use of likert scaled statements on a questionnaire.

4.4.2.1 Mobile banking and operational performance of bank

The fourth specific objective of the study was to determine the effect that mobile banking has on operational performance of commercial banks in Ethiopia. In order to do that statements depicting the effect of mobile banking on operational performance were presented to respondents and the summary of the findings are presented in table 4.7. When respondents were asked whether mobile banking has enables to make quick and easy transaction leading to high speed of delivery, 56.6% of respondent agreed and 25.1% strongly agreed, while 17% remained neutral and only 3% simply disagreed. Mean response was 4.04 confirming that mobile banking has enables to make quick and easy transaction. On whether mobile banking has provides consumers with a convenient method of conducting bank business, 61.4% agreed and 20.5% strongly agreed, while 16.4% remained neutral. Mean score was 4.01.

Respondents were asked whether the use of mobile banking has led to improvement of bank cost efficiency. Findings from table 4.7 showed that 68.4% agreed and 18.7% strongly agreed, while 11.7% were neutral. Mean response was 3.99. It was agreed by 67.8% and strongly agreed by 18.7% that using mobile banking has improved quality of financial services, while 11.7% were neutral and only 1.8% disagreed. Mean response was 4.04 indicating that using mobile banking has improved quality of financial services delivery. On whether mobile banking has led to the improvement of bank overall operational efficiency, 64.9% agreed and 12.3% strongly agreed on it. Only 17.5 % were undecided and 5.3% disagreed. Mean score was 3.84 indicating there was more agreement that mobile banking has led to the improvement of bank operational efficiency.

The overall mean score of responses regarding the effect of mobile banking on operational performance was 3.98 on a 5 point scale. The mean score was close to 4.00 which would mean there was more agreement on the influence that mobile banking has on bank operational performance. The average standard deviation was 0.65 meaning that at least 68% of the responses were spread within one standard deviation of the mean.

Table 4.7 Effect of mobile banking on operational performance

Indicators	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)	Mean	STD
	1	2	3	4	5		
Mobile banking enables to make quick and easy transaction leading to high speed of delivery.	0	2.3	17	56.6	25.1	4.04	0.72
MB provides consumers with convenient method of conducting bank business.	0	1.8	16.4	61.4	20.5	4.01	0.66
Mobile banking has improved quality of financial services delivery.	0	1.8	11.7	67.8	18.7	4.04	0.61
Mobile banking has led to improvement of bank cost efficiency.	0	0.6	15.2	68.4	15.8	3.99	0.58
MB has led to the improvement of bank overall operational efficiency.	0	5.3	17.5	64.9	12.3	3.84	0.7
Average						**3.98**	**0.65**

Reliability Cronbach's alpha 0.861

4.4.2.2 Internet banking and operational performance of bank

The fifth objective of the study sought to assess the effect of internet banking on operational performance of commercial banks in Ethiopia. To do this, the statements that show the influence of internet banking on operational performance of bank were presented and the summary of the finding are presented in table 4.8. On whether the use of internet banking enables to make quick and easy transaction leading to high speed of delivery, 71.3% of those surveyed agreed and 8.8% strongly agreed, while 15.2% remained neutral but only less 5% disagreed. Mean response was 3.84. It was agreed by 71.3% and strongly agreed by 15.2% of the respondents that internet banking has provides consumers with a convenient method of conducting bank business, while 11.1% were neutral and only 2.3% disagreed. Mean response was 3.99 indicating that internet banking provides consumers with a convenient method of conducting bank business.

When respondents were also asked whether internet banking has improved quality financial services delivery, 66.7% of respondents agreed and 20.5% strongly agreed on it, while only 10.5% were neutral. Mean response was 4.05 confirming that internet banking has improved quality financial services of commercial banks in Ethiopia. Question was also asked on whether

the use of internet banking has led to the improvement of bank cost efficiency. The result showed that around three-fourth (74.3%) respondents agreed and 16.4% strongly agreed on it. Only 10.5% were undecided and 2.3% disagreed. Mean response was 4.03 indicating that the use of internet banking has led to the improvement on bank cost efficiency. On whether internet banking has led to the improvement of bank operational efficiency, 71.3% of respondents agreed, and 16.4% strongly agreed but only 10.5% were undecided. Mean response was 4.02 indicating that internet banking has led to the improvement of bank overall operational efficiency.

Table 4.8 the effect of internet banking on operational performance

Indicators	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)	Mean	STD
	1	2	3	4	5		
IB enables to make quick and easy transaction leading to high speed of delivery	0	4.7	15.2	71.3	8.8	3.84	0.64
IB provides consumers with a convenient method of conducting bank business.	0	2.3	11.1	71.3	15.2	3.99	0.59
Using IB has improved quality financial services delivery	0	2.3	10.5	66.7	20.5	4.05	0.64
The use of IB has positive effect on bank cost efficiency	0	0.6	10.5	74.3	14.6	4.03	0.53
IB has led to the improvement of bank overall operational efficiency.	0	2..3	9.9	71.3	16.4	4.02	0.56
Average						**3.99**	**0.59**

Reliability Cronbach's alpha 0.854

The overall mean score of responses regarding the effect of internet banking on operational performance was 3.99 on a 5 point scale. The mean score was close to 4.00 which would mean there was more agreement on the influence that internet banking has on bank operational performance. The average over all standard deviation of 0.56 infers that 68% of the responses were spread within one standard deviation of the overall mean.

4.4.2. ATM banking and operational performance of bank

The six objective of the study was to determine the effect of ATM banking on operational performance of commercial banks in Ethiopia. The statements depicting the influence of ATM banking on bank operation were presented to respondents and the summary of the findings are

presented in table 4.9. On whether ATM enables to make quick and easy transaction leading to high speed of delivery, 67.8% agreed, and 17% strongly agreed, while 14% remained neutral. The mean response was 4.01 which indicate that ATM has improved speed of financial service delivery. More so, it was agreed by 56.7% and strongly agreed by 31% of the respondents that ATM provides consumers with a convenient method of conducting bank business, while 11.1% were neutral but only 1.2% disagreed. The mean response was 4.18 which indicate that ATM provides consumers with a convenient method of conducting bank transaction.

Table 4.9 the effect of ATM banking on operational performance

Indicators	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)	Mean	STD
	1	2	3	4	5		
ATM enables to make quick and easy transaction leading to high speed of delivery	0	1.2	14	67.8	17	4.01	0.56
ATM provides consumers with a convenient method of conducting bank business.	0	1.2	11.1	56.7	31	4.18	0.66
Using ATM banking has improved quality financial services delivery	0	1.2	20.5	44.4	33.9	4.11	0.76
ATM installation has positive effect on bank cost efficiency	0	1.2	11.1	53.8	33.3	4.19	0.69
ATM banking has led to improvement of bank operational efficiency	0	1.2	12.9	56.1	29.8	4.15	0.67
Average						**4.13**	**0.67**

Reliability Cronbach's alpha 0.908

In addition, question was also asked about the effect of ATMs on bank financial service quality and cost efficiency. It was agreed by 44.4% and strongly agreed by 33.9% of the respondents that using ATM banking has improved quality financial services delivery, while 20.2% were neutral. The mean response was 4.11 which mean there was more agreement on the nature of influence that ATM banking have on quality of financial services delivery. There were 53.5% of respondents who agreed and 33.3% respondents who strongly agree that ATM installation has led to the improvement of bank cost efficiency while 11.1% remained neutral. The mean response was 4.19 which indicate there was more agreement that ATM machines were capable

of influencing the reduction of the operational costs of bank. On whether ATM banking has led to the improvement of bank overall operational efficiency, 56.1% of the respondents agreed and 29.8% strongly agreed, while 12.9% remained neutral. The mean score was 4.15 implying that ATM banking has led to the improvement of bank overall operational efficiency.

The overall mean score of responses regarding the effect of ATM banking on operational performance was 4.13 on a 5 point scale. It would mean there was more agreement that ATM machines are capable of influencing bank operational performance. The average over all standard deviation of 0.67 infers that a spread of within one standard deviation from the mean.

4.4.2.4 Descriptive statistics on banks operational performance

The respondents were also asked to rate their opinion concerning operational performance of their bank for the last five years. The summary of their responses to specific questions, as revealed by the results, will be presented in table 4.10. The finding revealed that 66.7.1% of the participants reported that the numbers of customers have been greatly increasing over the years, whereas 28.7% indicated their customers are increased only to the moderate extent. Regarding the reputation and brand image of the bank, 53.8% of the participants indicated the reputation and brand image of their bank has been improving in great extent over the last five years. While 39.8% reported that the reputation and brand image of their bank has moderately improved. The average score was 3.61 on a 5 point scale. Regarding bank product and service quality, 60.8% of those surveyed reported that their bank product and service quality has greatly improved. Whereas 32.7% reported that their bank product and service quality has only moderately improved over the year. The average response was 3.7 on a 5 point scale.

Of the 171 respondents who completed the questionnaire, 53.2% indicated that the satisfactions of customers have improved in great extent over the years, whereas 35.1% reported that the satisfactions of customers have improved in moderate extent. The mean response was 3.6 on a 5 point scale. Regarding question on flexibility of products and service provision, 66.1% of respondents indicated that products and service provision has improved in great extent, while 19.3% reported that their bank products and service provision has improved in moderate extent. The mean response was 4.03. Besides, 59.1% of those surveyed reported the ranges of financial products and services have increased at great extent. Whereas 26.9% reported that the ranges of

financial products and services have increased at very great extent. The average response was 4.12 indicating that ranges of financial products and services have greatly diversified over a time.

Table 4.10 Respondents opinion on operational performance of commercial bank

Indicators	No extent (%)	Little extent (%)	Moderate extent (%)	Great extent (%)	Very great extent	Mean	STD
	1	2	3	4	5		
The numbers of customers have been increasing over the years.	0	1.8	28.7	66.7	2.9	3.71	0.55
The reputation and brand image of our bank has improved.	0.6	1.2	39.8	53.8	4.7	3.61	0.63
The bank product and service quality has improved over the year.	0	1.2	32.7	60.8	5.3	3.7	0.58
The satisfactions of customers have improved over the years.	1.2	4.1	35.1	53.2	6.4	3.6	0.72
Flexibility of products and service provision has improved over a time.	0.6	0.6	13.5	66.1	19.3	4.03	0.64
There has been increase in range of financial products and services.	0	1.2	12.9	59.1	26.9	4.12	0.66
Average						**3.8**	**0.63**

Reliability Cronbach's alpha 0.857

The overall mean score of responses regarding general bank staffs' opinion for their bank operational performance for the last five years was 3.8 on a 5 point scale. This would an indication that the operational performance for most of the banks have greatly improved over the last five years. The average standard deviation was 0.63 meaning that at least 68% of the responses were spread within one standard deviation of the mean.

4.4.3 Summary of respondents mean scores

The table 4.11 demonstrates the summary of mean scores for each type of financial innovation. The results indicated that mobile banking had the highest positive influence on bank financial performance with mean score of 3.23 followed by internet banking and ATM banking with mean scores of 2.96 and 2.93 respectively. The result also demonstrated that ATM banking had the highest positive influence on bank operational performance with mean score of 4.13 followed by internet banking and mobile banking with mean score of 3.99 and 3.98, respectively.

Table 4.11 also demonstrates the summary of overall mean scores of financial innovation. The results indicated that financial innovations had relatively higher positive influence on bank operational performance. The overall mean score of responses regarding the effect of financial innovation on operational performance was 4.03 on a 5 point scale. It would mean there was more agreement on the nature of influence that financial innovations have on bank operational performance. On the other hand, the overall mean score of responses regarding the effect of financial innovation on financial performance was 3.04 on a 5 point scale. The mean score was close to 3.00 which would mean there was indifference on the nature of influence that financial innovation have on bank profitability. This is might an indication of relatively weak influence of financial innovation on bank financial performance.

Table 4.11: Summary of Respondents Mean Scores

Type of Innovation	Financial Performance	Operational performance
Mobile Banking	3.23	3.98
Internet banking	2. 96	3.99
ATM banking	2.93	4.13
overall Mean score	**3.04**	**4.03**

4.5 Assumptions/diagnostic test for multiple linear regressions

Multiple linear regressions are based on the assumptions of Ordinary Least Square (OLS). When one decides to analyze data by means of multiple regressions, part of the process involves checking to make sure that the data need to analyze can in fact be analyzed using multiple regression. One could do this for the reason that it is only appropriate to use multiple regressions if the data "passes" those assumptions that are required for multiple regressions to give a valid result. So in the following section necessary diagnostic tests were carried out on the variables.

4.5.1 Assumption one: Assumption on Sample size

The first assumption of multiple linear regressions is about the sample size which assumes that for each predicative/independent variable at least twenty cases is needed. In this study there are three predicative variables and for these variables at least sixty cases are needed. Regarding the

sample size, this study is 171 cases which are far above the minimum threshold sixty cases, hence fulfilled the assumption of sample size.

4.5.2. Assumption two: Outlier, leverage and influential points

The second assumption of multiple regressions is that in order to make valid inference on multiple linear regressions, there should be no significant outliers, high leverage points or highly influential points. According to Rousseeuw, et al, (1990), outliers, leverage and influential points are observations in data set that are in some way unusual and can change the output that statistical software produces and reduce the predictive accuracy of results as well as the statistical significance (Wilcox, 2001). Accordingly, before using a multiple regression analysis, it is essential to detect possible outliers, high leverage points and highly influential points.

According to Wilcox (2001), an outlier is a data point whose response y does not follow the general trend of the rest of the data. Standardized residual (sometimes referred to as studentized residual) is the value that quantifies the size of the residuals in the standard deviation units and so they can be easily used to identify outliers. It is in principle more correct to use the term "outlier" for an observation with a Standardized residual (studentized residual) value of greater than 3 in absolute value (Rousseeuw, et. al, 1990). The standardized residual values for all cases of the dependent variable financial performance range from -2.624 to 2.359 and, for operational performance ranged from -2.478 to 2.826 indicating that the dataset is free of outliers.

According to Wilcox (2001), a data point has high leverage if it has "extreme predictor x values." The great thing about leverages is that they can help to identify x values that are extreme and therefore potentially influential on regression analysis (Rousseeuw, et. al, 1990). As stated by Wilcox (2001), common rule of thumb is to flag any observation whose leverage value, h_{ii}, is more than 3 times larger than the mean leverage value (3(k+1)/n). Based on this formula, in this study, any observation with a leverage value of greater than 0.0702 is considered a high leverage point. The finding from table 4.12 shows that a leverage value for financial performance ranges from 0.01 to 0.054 and for operational performance ranges from 0.000 to 0.068, which are less than cut-off point 0.0702. Thereby all cases were therefore subject to further analysis.

According to Wilcox (2001), data point is influential if it "unduly influences any part of a regression analysis, such as the predicted responses, the estimated slope coefficients, or the hypothesis test results." Cook's distance is a measure of how much the residual of all records would change if a particular record were excluded from the calculation of the model coefficients (Rousseeuw, et. al, 1990). As stated by Wilcox (2001), a common rule of thumb is that a cook's distance greater than one should be given scrutiny and perhaps removed. The finding from table 4.12 revealed that a cook's distance for a variable financial performance range from 0 to 0.094 and for operational performance ranges from 0 to 0.079 and, which is less than cut-off point 1. This suggests that no data point unduly influences the estimated regression function. Summaries of residual statistics are presented in table 4.12.

Table 12: Summary of residual statistics

Indicators	Financial performance		Operational performance		N
	Minimum	Maximum	Minimum	Maximum	
Std. Residual	-2.624	2.359	-2.478	2.826	171
Stud. Residual	-2.635	2.433	-2.486	2.879	171
Cook's Distance	.000	.094	.000	.079	171
Centered Leverage Value	.001	.054	.000	.068	171

4.5.3 Assumption three: Multicollinearity

Multicollinearity occurs when there are two or more independent variables that are highly correlated with each other. This leads to complications with understanding which independent variable contributes to the variance explained in the dependent variable, as well as technical issues in calculating a multiple regression model (Simon, 2004). Variance Inflation Factor (VIF) is a method used to test for multicollinearity among study variables. Variance Inflation Factor was checked for indication of multicollinearity where their numerical values were all well below the cut-off value of 10 suggested by Neter, Kutner, Wasserman and Nachtsheim (1996). Based on this rule of the thumb, there was no collinearity among the independent variables.

Table 4.13: Multicollinearity test for the Study Variables

Variables	Financial performance			Operational performance		
	No. of Items	Tolerance	VIF	No. of Items	Tolerance	VIF
Mobile Banking	5	0.956	1.046	5	0.713	1.403
Internet Banking	5	0.976	1.024	5	0.767	1.303
ATM Banking	5	0.961	1.040	5	0.741	1.350

4.5.4 Assumption four: Homoscedasticity

Homoscedasticity in a study usually happens when the variance of residuals (error term) would be same for all predicated (Tabachnic & Fidell, 2007). On the other hand, heteroscedasticity in a study usually happens when the variance of the errors vary across observation (Long & Ervin, 2000). There are different ways for checking whether the variances of error term are the same across observation. The most commonly used methods is Breusch-Pagan test which was used to test the null hypothesis that the error variances are all equal versus the alternative that the error variances are a multiplicative function of one or more variables. Breusch-Pagan tests the null hypothesis that heteroscedasticity is not present. If sig-value is less than 0.05, reject the null hypothesis. A large chi-square value greater than 9.22 is an indication of the existence of heteroscedasticity (Sazali, et al., 2010). In this study, the sig-value for fitted values of financial performance was 0.7716 and for operational performance was 0.5426 and sig-values of in both cases indicating that heteroscedasticity was not a concern.

Table 4.14: Breusch-Pagan for Heteroscedasticity

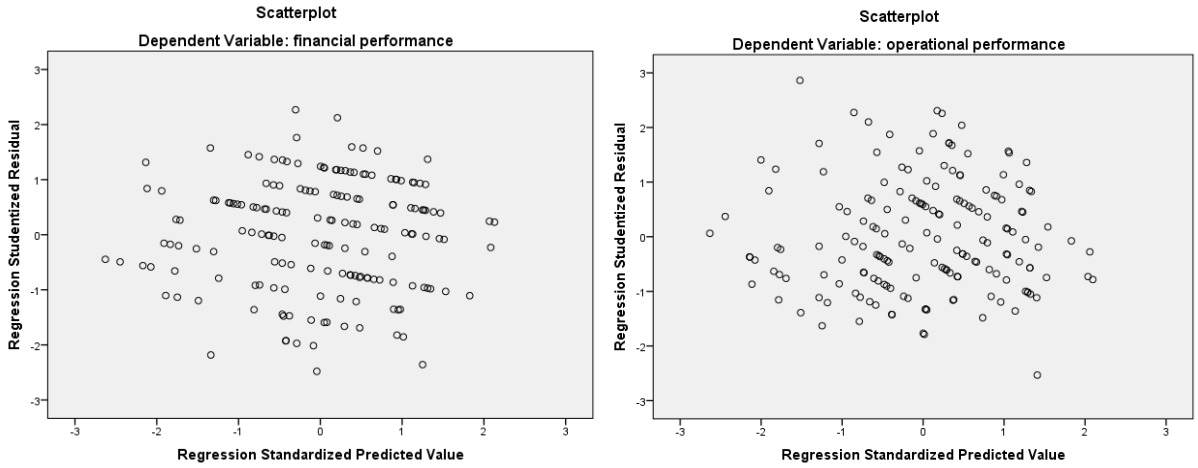
H0	Variables	Chi 2(1)	Prob > Chi2
Constant variance	Fitted values of financial performance	0.08	0.7716
Constant variance	Fitted values of operational performance	0.37	0.5426

4.5.5 Assumption five: Linearity

The linearity assumption of multiple regression analysis assumes that there must be a linear relationship between the dependent variable and each of independent variables, as well as the dependent variable and the independent variables collectively (Asghar & Saleh, 2012). The most commonly used way of checking linearity is creating scatter plots and then visually inspecting these scatter plots to check for linearity. If the figure not has an obvious pattern and the point is evenly distributed above and below zero on the X-axis, and to the left and right of zero on the Y-

axis, it is an indication of linearity. The figures below show scatter-plot of studentized residual against linearly predictive value. The figures have a horizontal band of points indicating the linear relationship.

Figure 4.2: a Studentized residual scatter plot dependent variables



4.5.6 Assumption six: Autocorrelation

The assumption of autocorrelation (serial correlation) is a key assumption in multiple regressions which assume that the error terms are independent of each other. This is however especially relevant with time series data where the data are sequenced by time. The most commonly used methods to determine whether there is autocorrelation, that is where there is a linear correlation between the error terms for one observation, is Durbin-Watson test. According to Cochrane, (1997), if a value of d is within the range 1.5 and 2.5 means there is no autocorrelation. Therefore the result proved that there is no auto correlation as shown in table 4.15 below.

Table 4.15: Durbin-Watson Test for Autocorrelation

Test	Dependent variable	Value
Durbin-Watson	Financial performance	1.831
Durbin-Watson	Operational performance	1.764

4.5.7 Assumption six: Normality

The other assumption of multiple regressions is normality which assumes that residuals (errors) are approximately normally distributed. In order to make valid inferences from regression

analysis, the residuals of the regression should follow normal distribution. A simple way to check this assumption is to test for one sample Shapiro-Wilk test, then plot normal P-P or Q.Q for the dependent variable to confirm the obtained result (Asghar & Saleh, 2012).

4.5.7.1 Shapiro-Wilk Test

Shapiro-Wilk test is the most commonly used method of test for normality. It has been found to be the most powerful test in most situations (Richardson & Smith, 1993). It is mostly used for evaluating the assumption of univariate normality by taking the observed cumulative distribution of scores and comparing them to the theoretical cumulative distribution for a normally distributed variable. The null and alternative hypotheses were stated as follows:

Ho: The data is not normally distributed
H1: The data is normally distributed

The rule of thumb is that if the p -value is less than 0.05, H0 is rejected and H1 is not reject, and if the p-value is greater than 0.05, Ho is not rejected and H1 is reject. As shown from table below, the tests results for financial performance has a p-value of 0.12307 and operational performance has the p-value = 0.19054, which are greater than the cut point 0.05, confirming that the standardized residuals was significantly normally distributed (Asghar & Saleh, 2012).

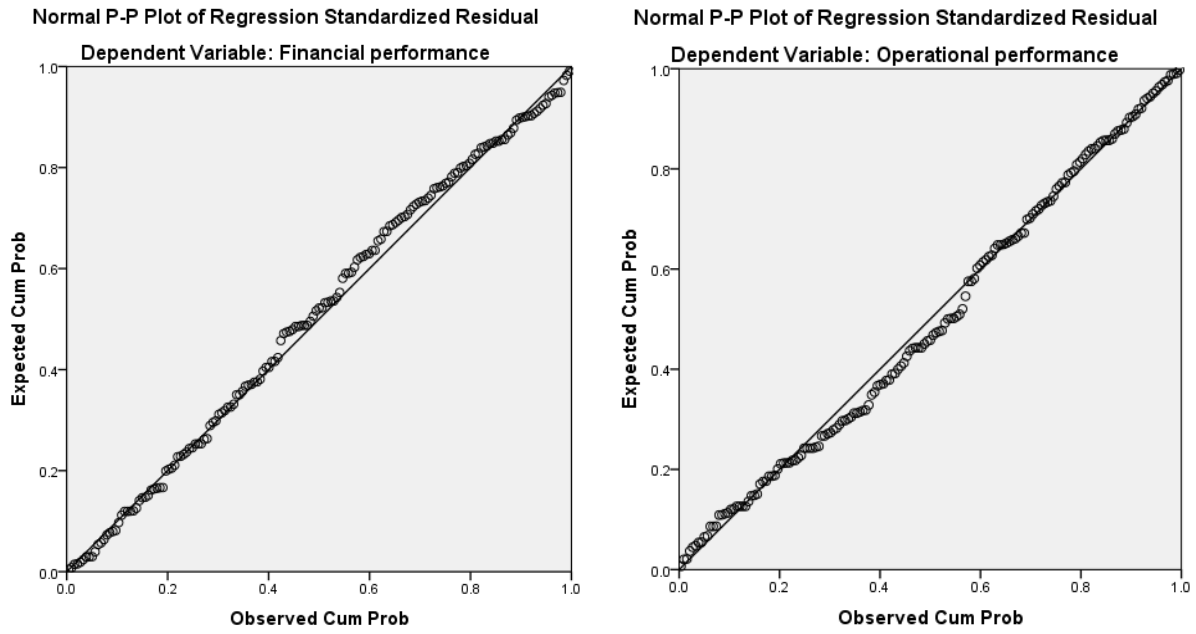
Table 4.16: Shapiro-Wilk W test for normal data

Variable	Observation	W	V	Z	Prob>z
Financial performance	171	0.98724	1.662	1.160	0.12307
Operational performance	171	0.98873	1.468	0.876	0.19054

4.5.7.2 Normal P-P Plots

This is a graphical procedure that plots the cumulative probabilities (values range from 0 to 1) on the X-axis and the expected probabilities given the normal curve on the Y-axis. If the sample were exactly normally distributed, the points would lie on a straight diagonal line. The diagram below shows Normal P-P Plots for the dependent variables (operational & financial performance) in which the points would lie on a straight line confirming the data was normally distributed.

Figure 4.3: Normal P-P Plot of residual for dependent variables



4.6 Inferential Statistical Analysis

This section describes the inferential statistical analysis that was derived from the collected data and models. The study sought to test the relationship between financial innovations and the bank performance. This was done through correlation and regression analysis. It starts with results of the correlation and then proceeds to results of the multiple linear regression models.

4.6.1 Correlation Results

The study conducted correlation analysis to test the strength of relationship or association between the research variables from the primary data. Correlation is the measure of the relationship or association between two continuous numeric variables (Kothari, 2004). Correlation analysis results present a correlation coefficient which measures the linear relationship or association between two variables (Crossman et al., 2013). A Pearson correlation was run to establish how the variables were related to each other. The value of correlation coefficient ranges between -1 and +1. A correlation coefficient of +1 indicates that two variables are perfectly related in a positive linear. A correlation of -1 indicates that two variables are negatively linearly related and a correlation coefficient of 0 indicates that there is no linear relationship between two variables.

4.6.1.1 Correlations –Bank Innovations and financial performance

The findings of the study are presented in table 4.17. The results show that mobile banking was positively correlated to financial performance with a Pearson's Correlation Coefficient of r = 0.251 and at level of significance of 0.001, was statistically significant as the p-value is less than 0.01. This relationship was weak. The results also revealed that there is a positive relationship between internet banking and financial performance with a Pearson's Correlation Coefficient of r = 0.167. The test is significant at 0.029 that was statistically significant as the p-value is less than 0.05. This is also a relatively weak relationship. The result of the study also show that there was a positive correlation between ATM banking and financial performance with a Pearson's Correlation Coefficient of r = 0.124 and at level of significance of 0.106, was not statistically significant even at the p-value is 0.10. This was a relatively very weak correlation.

Table 4.17: Pearson Correlation Bank Innovations and financial performance

		Mobile banking	Internet banking	ATM Banking	Financial Performance
Mobile banking	Pearson Correlation	1	.129	.178*	.251**
	Sig. (2-tailed)		.093	.020	.001
Internet banking	Pearson Correlation	.129	1	.106	.167*
	Sig. (2-tailed)	.093		.166	.029
ATM banking	Pearson Correlation	.178*	.106	1	.124
	Sig. (2-tailed)	.020	.166		.106
Financial	Pearson Correlation	.251**	.167*	.124	1
Performance	Sig. (2-tailed)	.001	.029	.106	

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

4.6.1.2 Correlations –Bank Innovations and financial performance

The findings of the study as presented in table 4.18, ATM and operational performance are positively related with a Pearson's Correlation Coefficient of r = 0.541 and at level of significance of 0.000. This relationship was quite strong. The results also show that mobile banking was positively correlated to operational performance with a Pearson's Correlation Coefficient of r = 0.474 and at level of significance of 0.000. This relationship was also moderately strong. The findings of the study further show that there was a positive relationship between internet banking and operational performance with a Pearson's Correlation Coefficient

of r = 0.412 and at level of significance of 0.000. This indicates any of the financial innovation had positive correlation with banks operational performance and the relationship is quite strong.

Table 4.18: Pearson Correlation Bank Innovations and operational performance

		Mobile banking	Internet banking	ATM banking	Operational performance
Mobile banking	Pearson Correlation	1	.431**	.462**	.474**
	Sig. (2-tailed)		.000	.000	.000
Internet banking	Pearson Correlation	.431**	1	.392**	.412**
	Sig. (2-tailed)	.000		.000	.000
ATM banking	Pearson Correlation	.462**	.392**	1	.541**
	Sig. (2-tailed)	.000	.000		.000
Operational performance	Pearson Correlation	.474**	.412**	.541**	1
	Sig. (2-tailed)	.000	.000	.000	

**. Correlation is significant at the 0.01 level (2-tailed).

4.6.2 Analysis of Regression Results

The study sought to test the relationship between financial innovations and the bank performance. This was done through regression analysis. The independent variable financial innovation is operationalized through: mobile banking, internet banking and ATM banking, while the dependent variable bank performance is operationalized through; financial and operational performance. The study adopted operational definition for measuring bank performance as the sum of financial (profitability) and non-financial measures (operational performance) measures. Thus study sought to determine the effect of financial innovation (mobile banking internet banking, and ATM banking) on each of the dependent variable (financial and operational performance) separately. Thus, a separate regression analysis were undertaken to determine the effect of financial innovation on operational performance on one hand and its effect on financial performance on other hand.

4.6.2.1 Regression analysis - financial innovation & financial performance

The first generic objective of study was to determining the effect of financial innovation on bank financial performance. To do this multiple linear regression is used to estimate the effect of mobile, internet, and ATM banking on financial performance commercial banks in Ethiopia.

I. The Multiple Coefficient of Determination R^2

Coefficient of determination explains the percentage of variation in the dependent variable (financial performance of commercial banks) that is explained by all the three independent variables (mobile, internet and ATM banking). The table 4.19 below preset the model summary.

Table 4.19: Model Summary for financial innovation and bank financial performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.293[a]	.086	.070	2.11658

a. Predictors: (Constant), mobile banking, internet banking, ATM banking,

The result shows that the three independent variables (mobile, internet and ATM banking) that were studied, explain only 7% of the financial performance as represented by the R^2 value. This means the adoption of mobile, internet and ATM banking together explains only 7% of the variation or change of bank financial performance. The remaining 93% of the variability in the bank financial performance is explained by other variables which are not included in the model

II. ANOVA Interpretation

The result in ANOVA table shows that the sum of squares of the regression is 70.426 at 3 degrees of freedom and a mean square of 23.475. The residual sum of squares is 748.147 with 167 degrees of freedom and mean square value of 4.480. The Total sum of squares is 818.573 with 170 degrees of freedom. The test for the joint significant which is given by the F statistic is 5.240 and it is statistically significant at 5 percent. This imply that the independent variables, that is, mobile, internet and ATM banking, considered were relevant in explaining the financial performance among commercial banks in Ethiopia.

Table 4.20: ANOVA[a] for financial innovation and bank financial performance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	70.426	3	23.475	5.240	.002[b]
	Residual	748.147	167	4.480		
	Total	818.573	170			

a. Dependent Variable: financial performance

b. Predictors: (Constant), mobile banking, Internet banking, ATM banking,

III. Regression Coefficients

The findings in table 4.21 show the coefficients of the regression. According to the findings, only mobile banking is significant in predicting the financial performance of the banks. Mobile banking has positive and significant effect on bank financial performance with a beta value of 0.145 and t value of 2.925 which is significant at 5%. Internet banking has also positive but insignificant effect on bank financial performance with a beta value of 0.086 and t value of 1.745 which is only significant at 10%. ATM banking has also positive but insignificant effect on financial performance with a beta value of 0.037) and t value of 0.938 which is also insignificant.

Table 4.21: Coefficients[a] for financial innovation and bank financial performance

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	17.373	1.084		16.024	.000
	Mobile banking	.145	.050	.221	2.925	.004
	Internet banking	.086	.049	.131	1.745	.083
	ATM banking	.037	.039	.071	.938	.349

a. Dependent Variable: financial performance

When these beta coefficients are substituted in the equation, the model becomes

Y = 17.373 + 0.145MB + 0.086IB + 0.037ATM

Where: Y is the financial performance of the commercial banks in Ethiopia, MB is the adoption of Mobile banking, IB is the adoption of Internet banking and ATM is the adoption of ATM banking. This means that holding other factors constant one unit increase in mobile banking result in 0.145 unit increases in the bank financial performance, one unit increase in internet banking result in 0.086 unit increase in the bank financial performance and one unit increase in ATM banking result in 0.037 unit increase in the bank financial performance.

4.6.2.2 Regression analysis - financial innovation & operational performance

The second generic objective of study was to determining the effect of financial innovation on bank operational performance. To estimate the effect of each predicator variable, that is, mobile, internet and ATM banking on operational performance commercial banks in Ethiopia, Ordinary Least Square method was used and the results are presented in the following section.

I. The Multiple Coefficient of Determination (R^2)

Coefficient of determination (R^2) explain the degree to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable (operational performance) that is explained by all the three independent variables (mobile, internet and ATM banking). The table 4.22 below preset the model summary.

Table 4.22: Model Summary for financial innovation and operational performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.615[a]	. 378	.367	2.24856

a. Predictors: (Constant), ATM, Internet, mobile

The result shows that the three independent variables (mobile, internet and ATM banking) explain 36.7% of the operational performance as represented by the R^2 value. This therefore means the adoption of mobile, internet and ATM banking together explains about 36.7% of the variation of bank operational performance. The remaining 63.3% of the changes was explained by other variables which are not included in the model.

II. ANOVA Interpretation

The result in ANOVA table 4.23 shows that the sum of squares of the regression is 512.816 at 3 degrees of freedom and a mean square of 170.939. The residual sum of squares is 884.354 with 167 degrees of freedom and mean square value of 5.056. The results also indicates that the overall models was a good fit since the value of F-statistic was found to be 33.809 and the p-values was found to be 0.000 which is less than the critical value of 0.01. This imply that the independent variable variables, that is, mobile, internet and ATM banking, considered were relevant in explaining the operational performance among commercial banks in Ethiopia.

Table 4.23: ANOVA[a] for financial innovation and bank operational performance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	512.816	3	170.939	33.809	.000[b]
	Residual	844.354	167	5.056		
	Total	1357.170	170			

a. Dependent Variable: operational performance

b. Predictors: (Constant), ATM banking, Internet banking, mobile banking

III. Regression Coefficients

According to the findings, all predicator variables are significant in predicting the operational performance of the banks. Mobile banking has positive and significant effect on bank operational performance with a beta value (beta =.248) and a t value of 3.787 which is significant at 0.000. Internet banking has also positive and significant effect on bank operational performance with a beta value (beta =.200) and a t value of 2.426 which is significant at 0.002. Similarly, ATM banking has also positive and significant effect on bank operational performance with a beta value (beta =.357) and a t value of 5.183 which is also significant at 0.000.

Table 4.24: Coefficients[a] for financial innovation and bank operational performance

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.463	1.707		3.787	.000
	Mobile banking	.248	.078	.231	3.196	.002
	Internet banking	.200	.083	.169	2.426	.016
	ATM banking	.357	.069	.368	5.183	.000

a. Dependent Variable: Bank operational performance

When these beta coefficients are substituted in the equation, the model becomes

Y = 6.463 + 0.248MB + 0.2IB + 0.357ATM

Where: Y is the operational performance of the commercial banks in Ethiopia, MB is the adoption of Mobile banking, IB is the adoption of Internet banking and ATM is the adoption of ATM banking. This means that holding other factor constant one unit increase in mobile banking result in 0.248 unit increases in the bank operational performance, one unit increase in internet banking result in 0.2 unit increase in the bank operational performance and one unit increase in ATM banking result in 0.357 unit increase in the bank operational performance.

4.7 Hypothesis test

The study used multiple linear regression analysis to determine the statistical relationship between the independent and dependent variables. All the six null hypotheses as stated in chapter one of this study were tested using multiple linear regression models.

Hypothesis 1: Mobile Banking has positive and significant effect on profitability/financial performance of commercial banks in Ethiopia.

Conclusion: Failed to reject the formulated hypothesis since as show on table 4.21 above the regression coefficient for of mobile banking is 0.145 and its P value is 0.04 which is significant at 5%. It indicate that where other explanatory variables remain constant the adoption of mobile banking by bank have a positive influence on bank financial performance and implies that when a bank adoption of mobile banking increase by 1 unit, the bank financial performance will increase by 0.145 unit and statistically significant at 5%.

This result is consistence with many studies which have conducted in different countries context. In Kenyan context the studies undertake by Misati et al (2010), found that mobile banking had expanded the range and variety of services that a bank could offer to its customers and hence expanded incomes sources for banks. In the same token, Kamau and Oluoch (2016) also point out that mobile banking positively influenced the financial performance of commercial banks in Kenya. Similarly, Porteus (2006) affirms that in Uganda mobile banking has increased access to banking services and consequently income and profits for the banks. In Ethiopian context, Rukia (2018) also found that mobile banking had positively and significantly influence on Return on Asset (ROA). On the other hand, the study conducted in Lebanon by Sujud and Hashim (2017) found that mobile banking do not have any significant impact on the return on assets (ROA) of Lebanese commercial banks which is contradict to this finding.

The positive and significant effect of mobile banking on financial performance of commercial banks in Ethiopia could be attributed to different reasons. Firstly, currently in Ethiopia the penetration mobile banking is steadily increasing as it provides an alternative service delivery channel for banks which is both accessible and affordable to many customers. The easiness and speed with which customers can transact on mobile phones has made mobile banking very fashionable to both the banks and the customers. Secondly, transaction made by mobile banking in Ethiopia are mostly related with the transfer of balance from one account to another account, make payment to beneficiary and look in to activity summary transaction, that may not significant impact on customer deposit. Thirdly, mobile banking has moderately increased in range and diversification of financial products and services that banks offer to their customers

which in turn expanded income sources of bank. Banks have arranged to make collaborations with different institution which have increased the kind and number of transactions that banks and customers can perform on the mobile phone and as a result creating more opportunities for income generation for banks.

Hypothesis 2: Internet Banking has positive and significant effect on profitability/financial performance of commercial banks in Ethiopia.

Conclusion: reject the formulated hypothesis since as show on table 4.21 above even if the regression coefficient for of internet banking is positive (0.086), its P value is 0.083 is not significant at 5%. However, it indicate that where other explanatory variables remain constant the adoption of internet banking by bank have a positive influence on bank financial performance and implies that when a bank adoption of internet banking increase by 1 unit, the bank financial performance will increase by 0.0.086 unit and statistically significant at 10%.

This result is consistence with many studies which have undertaken with different countries. In the studies which undertake in India by Malhotra and Singh (2010), it is revealed that experience in offering of internet banking and the profitability does not have any significant association. Similar findings were shown in a study conducted on EU 60 largest banking groups over the period 1995-2005 by Francesca and Claeys (2010) and it is found that internet banks fall short of forming synergies with other banking activities and so financial innovations in the form of internet banking does not improve banks financial performance. Likewise, according to Arisa and Muturi (2015), internet banking has a very small impact on financial performance of commercial banks in Kenya. However, in the study by De Young et al. (2007) concluded that adoption of internet banking improved community bank profitability, for the most part through increased revenues from deposit service charges.

The insignificant association between internet banking and financial performance of commercial banks in Ethiopia could be attributed to the fact that the modern internet banking is a new technology to the Ethiopian commercial banking sector. All banks in Ethiopia are too late to move with technological advancement and customers are not awareness about the use and benefits of internet banking technology. More so, currently in Ethiopia internet banking function is a complement not a substitute for traditional distribution channels such as bank's branch. The

findings also show that Ethiopian commercial banks do not invest in internet banking with a sole objective of getting higher incomes and profitability from the service. Many banks in Ethiopia also do not charge or offered at a minimum charge the access fees on a customer account through the internet and thus making it available as a platform for banks to offer their services. Charging bank customers for accessing their accounts through the internet will amount to a double charge by both the bank and the internet service providers. Rather internet banking in Ethiopia is primarily used as a compliment of other service delivery channels so as to create convenience and a value-add to the customers.

Hypothesis 3: ATM Banking has positive and significant effect on profitability/financial performance of commercial banks in Ethiopia.

Conclusion: Reject the formulated hypothesis since as show on table 4.21 above though the regression coefficient for ATM banking is positive (0.037), it is not statistically significant. It indicate that where other explanatory variables remain constant the use of ATM machine by bank have a positive influence on bank financial performance and implies that when a bank installation ATM machine increase by 1 unit, the bank operational performance will increase by 0.055 unit and it is statistically insignificant.

The findings of this research agree with the study conducted in Jordanian banks by Al-Asmadi and Al-Wabel (2011) and on their study they concluded that ATM has positive but insignificant relationship with bank performances. Similar finding was also found in Pakistan context where Asif (2011) conducted a study during the period 2007 – 2012. Based on the results of their study they concluded that ATM may not have any meaningful impact on profitability. In the same token, in Nigerian context, Jegede (2014) aimed to assess the impact of ATM on the performance of five Nigerian banks and the result of the study showed that the adoption of ATM terminals have not significantly improved the financial performance of Nigerian banks. Likewise, the study conducted in South Sudan by Makur (2014) found that the number of daily transactions using ATM showed positive but very weak relationship with the financial performance of the commercial banks. On the contrary to this finding, the study made by Rukiya (2018) in Ethiopian context found that there was a negative and significant relationship between ATM and financial performance of commercial banks in Ethiopia.

The insignificant association between ATM and financial performance of commercial banks in Ethiopia could be linked to the reality that, ATMs are not capable of generating enough profit for commercial banks because of its high initial cost of installation and high maintenance and service cost throughout its life time. More so, currently customers in Ethiopia used ATM only for withdrawing the money which in turn may negatively affect the customer deposit amount. Nevertheless, currently almost all commercial banks in Ethiopian are installing more ATM terminals across the country and use core banking to their ATM terminals in order to increase access to financial service and improve their convenience to their customers. ATM machines are now located at non-traditional locations like at supermarkets, universities and colleges, indicative of the importance that banks attach to ATM machines in reaching and maintaining customers.

Hypothesis 4: Mobile Banking has positive and significant effect on operational performance of commercial banks in Ethiopia.

Conclusion: Failed to reject the formulated hypothesis since as show on table 4.24 above the regression coefficient for of mobile banking is 0.248 and its P value is 0.002. It indicate that where other explanatory variables remain constant the adoption of mobile banking by bank have a positive influence on bank operational performance and implies that when a bank adoption of mobile banking increase by 1 unit, the bank operational performance will increase by 0.248 unit and statistically significant at 1%.

This result is consistence with many studies which have undertaken with different countries. In the study which undertake in Kenya by Misati et al (2010), it is revealed that mobile banking had reduction of operational cost that a bank incurred and hence improved operational efficiency for banks. Similarly, Ndung'u (2011) concurs that in Kenya mobile banking has revolutionalised the money transfer business and has created further innovations that have lowered the transaction costs for both the banks and customers.

The positive and significant effect of mobile banking on operational performance of commercial banks in Ethiopia could be attributed to different reasons. The major reasons for these could be: first, currently in Ethiopia the penetration mobile banking is increasing as it provides an alternative service delivery channel for banks which is both accessible and affordable to many customers. Secondly, mobile banking proved to be quick, reliable and convenient services and

provide the benefits of added customer service, which makes it a marketing tool that helps banks in attracting and retaining customers. Thirdly, by using mobile banking the customers can easily access their account at any time without going to the bank physically; this in turn reduce transaction cost including time and money incurred by both the commercial bank and customer.

Hypothesis 5: Internet Banking has positive and significant effect on operational performance of commercial banks in Ethiopia.

Conclusion: Failed to reject the formulated hypothesis since as show on table 4.24 above, the regression coefficient for internet banking is 0.2 and its P value is 0.016. It indicate that where other explanatory variables remain constant the adoption of internet banking by bank have a positive influence on bank operational performance and implies that when a bank adoption of internet banking increase by 1 unit, the bank operational performance will increase by 0.2 unit and statistically significant at 5%.

These findings are supported by findings on internet banking and bank profitability by Chang and Dutta (2012)), in their a study conducted in Pakistan assert that internet based banking led to cost reduction, saved time, improved accuracy, improved reliability and quality of services and hence likely to improved bank's operation efficiency. In the same token, in Nigeria Ibrahim et al (2019) found that internet banking has statistical significant impact on operational efficiency of bank in Nigeria. Malhotra et al (2009) in the study on the impact of internet banking on bank performance and risk found out that on average internet banks are more operationally efficient. Simpson (2002) point out that internet banking is motivated mainly by the prospects of operating costs minimization. Haq (2005) also concluded that use of internet banking has improved the ability to achieve economies of scale in minimizing asymmetry of information between savers and borrowers and that the unit costs of internet banking fall more rapidly than those of traditional banks as output increases as a result of balance sheet growth.

In Ethiopia, internet banking is primarily used as an alternative of other service delivery channels in order to create convenience to the customers. This has led to reduction and control of banks' operational costs and hence better operation leading to improved operational performance. Internet has been used generally by commercial banks to promote their services and product through their corporate websites. It is also used as a conveyance channel for delivering internet

banking services. This demonstrates that the internet has presented as avenue for banks to promote their product and services and to attract new customers thereby more business leading to higher performance.

Hypothesis 6: ATM Banking has positive and significant effect on operational performance of commercial banks in Ethiopia.

Conclusion: Failed to reject the formulated hypothesis since as show on table 4.24 above the regression coefficient for of internet banking is 0.357 and its P value is 0.000. It indicate that where other explanatory variables remain constant the use of ATM machine by bank have a positive influence on bank operational performance and implies that when a bank adoption of ATM banking increase by 1 unit, the bank operational performance will increase by 0.357 unit and statistically significant at 1%.

This result is consistence with many studies which have undertaken with different countries. In the study which undertakes in Kenya by Obuba (2013) it is revealed that ATM usage has a positive and significant relationship with operational performance. Similar result was found in Nigeria by Agboola (2006) and it was found that the increase in the adoption of ATMs had a positive impact on a bank's image. In the same token the study by Hasan et.al. (2009), which was conducted across the European Union, showed that ATMs increased bank cost efficiency. Other similar result were found by Frei, Harker and Hunter (1997) who point out that banks were using ATMs to change customer behavior by migrating them away from high cost delivery systems. In same token, Akram and Allam (2010) undertaken a study in Jordan and found that use of information technology which is embodied in ATMs improved the matrix of operational performance.

In Ethiopia ATMs are capable of improving operational performance for commercial banks due to the convenience they offer to bank customers. Banks in Ethiopia have been marketing themselves by showcasing their ATM network across the country with an objective to attract more customers and eventually contribute to bank profits. On many circumstance banks demonstrate the extent of ATM network as a means of attracting mostly the retail customers. It is also common to see banks advertising in their annual reports on the number of ATMs and even the capabilities of the ATMs in order to produce customer appeal.

4.8 Chapter Summary

This chapter has presented descriptive data analysis using frequency tables, percentages, mean, graphs, correlation analysis and multiple linear regressions. Different statistical tests were also analyzed to test assumptions in the chapter. The profiles of respondent were presented at the beginning of the chapter followed by responses from each variable section of the questionnaire. The descriptive and reliability analysis of primary data showed that a high reliability was attained by questionnaire instrument with a reliability coefficients ranging from 0.799 to 0.91 as shown previously. These figures fall within the acceptable levels of data reliability and consistency. Descriptive statics of the dependent and independent variables from primary data collection was analyzed. Multiple linear regression were used to test the hypotheses, tests of significance using t- tests has indicated varying level of significance amongst the independent variables as well as when combined, against the dependent variable.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the summary of findings, conclusions and recommendations of the study were discussed. The purpose of the study was to in examine the effect of bank innovations on performance of commercial banks in Ethiopia. The bank innovations studied were; Automated Teller Machines (ATMs), mobile banking and internet banking. Bank performance indicators studied were; operational and financial performance. The presentation in the section followed was prepared around specific objectives and research hypotheses.

5.2 Summary of Findings

The study was conducted with an aim of examining the effects of financial innovations on performance of commercial banks. Before the actual final data collection, a pilot study was conducted where the content validity and reliability of the questionnaires were tested. The reliability analysis of primary data showed that a high reliability was attained by questionnaire instrument with acceptable range of reliability coefficients. The study sample had 220 questionnaires distributed and 171 were duly completed and returned for analysis. This represented a response rate of 77.7% which according to Oloyo (2001) is very good response rate. To maintain the data validity and robustness of the regressed result of the research, the most critical regression diagnostic tests consisting of outliers, leverage and influential points, Normality, linearity, Multicollinearity, Heteroscedasticity and Autocorrelation were tested. Then, multiple linear regression were used to test the hypotheses, and tests of significance using t- tests has indicated varying level of significance amongst the independent variables as well as when combined, against the dependent variable.

Evidence from previous studies on whether bank innovations influence bank performance showed that there were mixed results based on the operating environment and the level of adoption. In Ethiopia slow adoption of financial innovation in banking practice is moderately changing for the better. The findings of the study revealed that the combined effect of bank innovations influenced bank performance positively. These findings were both supported by the frequencies of the responses from the respondents which were presented in the form of

percentages, mean score and regression result. The study found that bank innovations had relatively higher positive influence on bank operational performance. The overall mean score of responses regarding the effect of financial innovation on operational performance was 4.03 on a 5 point scale. It would mean there was more agreement on the nature of influence that financial innovations have on bank operational performance. On the other hand, the overall mean score of responses regarding the effect of financial innovation on financial performance was 3.04 on a 5 point scale. This would mean there was indifference on the nature of influence that financial innovation have on bank profitability. The findings of the study also revealed that each type of bank innovation influenced bank performance positively. The results indicated that ATM banking had the highest positive influence on bank operational performance with mean score of 4.13 followed by internet banking and mobile banking with mean score of 3.99 and 3.98 respectively The result also demonstrated that mobile banking had the highest positive influence on bank financial performance with mean score of 3.23 followed by internet banking and ATM banking with mean scores of 2.96 and 2.93 respectively.

5.2.1 Effect of mobile banking on financial performance of commercial banks

The first objective of the study sought to investigate the effect of mobile banking on financial performance of commercial banks in Ethiopia and the result showed that variations in financial performance can be explained by mobile banking. This finding is supported by regression results which showed mobile banking has positive and significant influence on financial performance of commercial banks in Ethiopia and therefore the alternate hypothesis was accepted.

5.2. 2 Effect of internet banking on financial performance of commercial banks

The second objective of the study sought to establish the effect of internet banking on financial performance of commercial banks in Ethiopia. Results revealed that internet banking had positive but insignificant effect on the financial performance of commercial banks in Ethiopia. This is supported by the test for significance which shows that the effect was statistically not significant and hence rejects the formulated hypothesis.

5.2. 3 Effect of ATM banking on financial performance of commercial banks

The third objective of the study sought to assess the effect of ATM banking on financial performance of commercial banks in Ethiopia. The findings revealed that ATM banking had

positive but insignificant effect on the financial performance of commercial banks in Ethiopia. This is supported by the test for significance which shows that the effect was statistically not significant and hence rejects the formulated hypothesis.

5.2. 4 Effect of mobile banking on operational performance of banks

The fourth objective of the study sought to examine the effect of mobile banking on operational performance of commercial banks in Ethiopia. The findings revealed that mobile banking have a positive and significant effect on the operational performance of commercial banks in Ethiopia. This finding is supported by the coefficient of determination which shows that the variations in banks operational performance are explained by mobile banking. The influence of mobile banking on operational performance of bank is also statistically significant and hence the alternate hypothesis was accepted.

5.2.5 Effect of internet banking on operational performance of banks

The fifth objective of the study sought to establish the effect of internet banking on operational performance of commercial banks in Ethiopia. Results revealed that internet banking had positive effect on the operational performance of commercial banks in Ethiopia. This is supported by the coefficient of determination which shows that internet banking describe the variations operational performance of commercial banks in Ethiopia. The test for significance showed that the effect was statistically significant and hence alternate hypothesis was accepted.

5.2.6 Effect of ATM banking on operational performance of commercial banks

The six objective of the study was to establish the effect of ATM banking on operational performance of commercial banks in Ethiopia. The results showed that ATM banking has a positive and significant influence on operational performance of commercial banks in Ethiopia. The analysis produced a coefficient of determination which showed the variations in operational performance which is explained by ATM banking. The significance test showed that effect of ATM banking on bank operational performance was statistically significant and hence the alternative hypothesis was accepted.

5.3 Conclusion

Based on the findings of the study, it can be concluded that bank innovations influence performance of commercial banks in Ethiopia positively. The adoption of innovations by commercial banks has a higher potential of improving operational performance than financial performance. Financial innovation has positive, strong and significant effect on operational performance. But financial innovation has positive, but relatively weak effect on financial performance. Some of positive but insignificant impact of variables (internet and ATM banking) on financial performance is may be due to an early stage and low level of adoption of financial innovation in Ethiopia commercial banking industry.

5.4 Recommendation

The commercial banks are a key and essential sector in the economy, because of the big roles they play in the financial system. A country is only as strong as its financial system. Their dynamism and versatility therefore becomes a must in a developing economy like Ethiopia such that they are capable of boost up the local commerce and be essential and competitive in global financial order. Accordingly, adoption and implementation of financial innovation turn out to be a fundamental issue; its acceptance, development, process, and support must be constantly monitored and upgraded. This study therefore makes several recommendations to stakeholders in the financial sector like the government, policy makers as well as the commercial banks.

From these research findings: on mobile banking, the study found positive and significant effect on both operational and financial performance of bank. Thus, commercial banks in Ethiopia should invest more in mobile banking and employ modern mobile banking technologies in order to boost their performance and to compete in ever changing financial system. The study also found that mobile money account penetration in Ethiopia is also very low. Thus commercial bank managers should properly adopt strategy that will encourage businessmen and general public in using innovative mobile banking delivery channels which will improve effectiveness and efficiency of the banking sector. Banks should develop effective strategies for customers to shift from traditional to mobile banking as they are able to control their costs much better as compared to investment physical branches. More so, the use of mobile banking should be widened in intensity of use. This means customers should have more freedom and frequency in

accessing the services provided by commercial banks through mobile banking. Banks should has done a lot regarding the number of accounts being opened using mobile devices, widening the segments of the clients that have access to financial services and the percentage of customers using mobile banking vis-à-vis traditional banking. The study also recommends commercial banks to work more on mobile banking to use it as an instrument of income diversification tools. Banks should diversification and increased in range of financial products and services that they offer to their customers which in turn expanded income sources of bank. The commercial banks are advised to ensure product range extension, product improvement, product repositioning and new product introduction to enable the banks to be more productive, grow faster, invest more and earn more profit. Banks should arranged to make collaborations with different institution which have increased the kind and number of transactions that banks and customers can perform on the mobile phone and as a result creating more opportunities for income generation for banks.

On Internet banking, though the study found positive and significant effect on operational performance, their impact is insignificant on financial performance. The insignificant association between internet banking and financial performance of commercial banks in Ethiopia could be attributed to the fact that the modern internet banking is a new technology to the Ethiopian commercial banking sector. All banks in Ethiopia are too late to move with technological advancement and customers are not awareness about the use and benefits of internet banking technology. Thus banks should create awareness and promotion of the new technology of internet banking to the customers and increase its facilities of banking to the customers. Banks should make internet banking services more useful and usable. This means they should focus on the full functionality of their systems to response efficiently to the different banking needs of users. They could achieve this by increasing the customers' awareness of the usefulness of using Internet banking services s through advertising. Banks should concentrate on their corporate websites to make it more user-friendly since customers should perceive it as easy to use. They can also educate how to use internet banking services to customers. Banks must be careful about their charges of internet banking and the way they transfer costs to customers. Banks should look at and reduce chances of double charging their customers under various disguise. Commercial banks should also take necessary action to decrease the fraudulent risk associated with internet baking that ultimately increases customer trust in using these modes of payments. Possibility of

collaboration with government and private security agents could be considered on ICT fraud prevention and detection but more importantly internal control system must be strengthened. Government should also improve ICT infrastructure because Internet banking services cannot be used unless there is good and reliable internet connection.

On ATM banking, the insignificant impacts of variable on financial performance may due to its high initial cost of installation and high maintenance and service cost throughout its life. Commercial banks should take necessary action to bring down the service and maintenance costs and possibly looks into areas of operation and collaboration within themselves in the interest of stepping up commonly use ATM machines. More so, banks can consider venturing into provision of maintenances service providers, a move to reduce service and maintenance costs, and fast track service delivery. Management should also conduct frequent education on all the services the ATM can offer to customers

The study further recommends that the government should ensure existence of stable conducive business environment and provide constant availability of developmental infrastructures like telecommunication facilities. More so, the government should provide incentives for research and development and offer a support to researcher and scientists who would continue to invest their time and skills in discovering more bank innovations. It is recommended that the government also follow a strategy to offer incentives for technology transfer from more developed economies so as to encourage the adoption of world class innovations. More so, government should enhance diffusion and adoption of innovation through consumer education programs and promote increased use of innovations in the banking sector. The bank also should take the initiative to develop an effective research and development center to get innovative ideas to capture the competitive market.

5.5 Area Further Research

The study focused on the effect of financial innovation on bank performance empirical evidence of commercial banks of Ethiopia. Thus, it serves as a useful reference for future research especially relating to the banking sector. The study was confined to the banking sector and the results aren't able to generalization to other sectors. Hence, it is recommended that similar studies should be done in other financial services sectors of the economy in order to have a

comprehensive view of impact of financial innovation and examinations of firm performance. The study also suggests that further studies should include a qualitative analysis of the relationship between financial innovation and performance of banks. Such a study would involve interview of key informants in the banking sector and would provide hidden insights into the intricate relationship between financial innovation and performance of banks.

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APPENDIX I

RESEARCH QUESTIONNAIRE

Please your assistance in completing the questionnaire attached on the impact of financial innovation on performance of commercial banks in Ethiopia will be highly appreciated. This questionnaire is required to assist in determining the objectives of the study. Any information provided will be used for academic purpose only and will be treated in strict confidence. Just put a tick (√) or cross mark (x) in the appropriate box as you deem fit. Thank you for agreeing to participate in this academic study.

SECTION A: GENERAL INFORMATION

INSTRUCTION: Please put a tick (√) or cross mark (x) against any response that applies to you.

1. Name of the Bank (Optional) .....
2. Gender: Male [ ] Female [ ]
3. Age: 15-25years [ ] 26-40 years [ ] 41-55 years [ ] Over 55years [ ]
4. Educational Qualification: Diploma [ ] Degree [ ] MA/MC [ ] PHD [ ]
5. How long have been working or dealing with this organization?
   Under 5 years [ ] 5 -10 years [ ], 10-14 years [ ],
   15-19 years [ ], 20 years and above [ ],
6. Department (tick as appropriate)
   ICT [ ], Operation [ ] Finance [ ]
   Marketing [ ] Research and Development [ ],

Section B: Effect of financial innovations on financial performance of bank

Section B1: This section has statements regarding the effect of **Mobile Banking (MB)** on **financial performance** of the bank. Tick (✔) any option that represents your answer.

NO.	Statements	Strongly disagree	Disagree	Neutral	agree	Strongly disagree
		1	2	3	4	5
7.	Mobile banking has improved the level profitability for the bank.					
8.	Mobile banking has expanded the income generating potential of the bank.					
9.	Income from MB has high margin hence contributing positively to bank annual profit.					
10.	MB investments have payback period of less than 3 years, hence good return on assets.					
11.	Investment in MB is in mostly motivated by profits to the bank.					

12. In your own word, how do you express the impact of mobile baking on the financial performance of commercial banks in Ethiopia?

Section B II: This section has statements regarding the effect of **Internet Banking (IB)** on **financial performance** of the bank. Tick (✔) any option that represents your answer.

NO.	Statements	Strongly disagree	Disagree	Neutral	agree	Strongly agree
		1	2	3	4	5
13.	Internet banking has improved the level profitability for the bank.					
14	Use of internet services has added to more profitable business avenues to the bank.					
15..	Income from IB has high margin hence contributing positively to bank annual profit					
14.	IB investments have payback Period of less than 3 years hence good return on asset					
15.	Profitability of the bank mostly motivated investment in IB.					

16. In your own word, how do you express the impact of internet baking on the financial performance of commercial banks in Ethiopia?

Section B3 I: This section has statements regarding the effect of **ATM banking** on **financial performance** of the bank. Tick (✔) any option that represents your answer.

NO.	Statements	Strongly disagree	Disagree	Neutral	agree	Strongly disagree
		1	2	3	4	5
17.	ATM banking has improved the level profitability for the bank.					
18.	ATM banking has expanded the income generating potential of the bank.					
19.	Income from ATM has high margin hence contributing positively to bank annual profit.					
20.	ATM investments have payback Period of less than 3 years hence Good return on assets					
21.	Investing in ATMs is highly driven by profitability in the commercial banks.					

22. In your own word, how do you express the impact of ATM baking on the financial performance of commercial banks in Ethiopia?

Section C: Effect of financial innovations on operational performance of bank

Section C1: This section has statements regarding the effect of **Mobile Banking (MB)** on **operational performance** of the bank. Tick (✔) any option that represents your answer.

NO.	Statements	Strongly disagree	Disagree	Neutral	agree	Strongly disagree
		1	2	3	4	5
23.	MB enables to make quick and easy transaction leading to high speed of delivery.					
24.	MB provides consumers with a convenient method of conducting bank business.					
25..	Using mobile banking has improved quality financial services delivery					
26.	The use of mobile banking has positive effect on bank cost efficiency					
27.	MB has led to the improvement of bank overall operational efficiency.					

28. In your own word, how do you express the impact of mobile baking on the operational performance of commercial banks in Ethiopia?

Section C II: This section has statements regarding the impact of **Internet Banking (IB)** on **operational performance** of the bank. Tick (✔) any option that represents your answer.

NO.	Statements	Strongly disagree	Disagree	Neutral	agree	Strongly disagree
		1	2	3	4	5
28.	IB enables to make quick and easy transaction leading to high speed of delivery					
29.	IB provides consumers with a convenient method of conducting bank business.					
30.	Using internet banking has improved quality financial services delivery					
31.	The use of Internet banking has positive effect on bank cost efficiency					
32.	IB has led to the improvement of bank overall operational efficiency.					

33. In your own word, how do you express the impact of internet baking on the operational performance of commercial banks in Ethiopia?

Section C3 III: This section has statements regarding the impact of **ATM banking** on **operational performance** of the bank. Tick (✔) any option that represents your answer.

NO.	Statements	Strongly disagree	Disagree	Neutral	agree	Strongly disagree
		1	2	3	4	5
34.	ATM enables to make quick and easy transaction leading to high speed of delivery					
35.	ATM provides consumers with a convenient method of conducting bank business.					
36.	Using ATM banking has improved quality financial services delivery					
37.	ATM installation has positive effect on bank cost efficiency					
38.	ATM banking has led to the improvement of bank overall operational efficiency					

39. In your own word, how do you express the impact of ATM baking on the operational performance of commercial banks in Ethiopia?

SECTION C: PERFORMANCE MEASURE

SECTION C I: - PROFITABILITY/FINANCIAL PERFORMANCE MEASURE

Please tick (✔) or cross mark (x) the level of measurements related to **financial perspective** of performance of your bank for last five year.

NO.	Statements	No extent	little extent	Moderate extent	great extent	Very great extent
		1	2	3	4	5
40.	Amount of bank Net Income has been increasing over the last five years.					
41.	Bank annual revenue has been increasing over the years.					
42.	Your bank return on assets has improved over time.					
43.	The bank market share has increased over time.					
44.	Amount of non-interest income of bank is growing over a time.					
45.	The bank efficiency ratio has improved over a time.					

SECTION C II: - NON-FINANCIAL /OPERATIONAL PERFORMANCE MEASURE

Please tick (✔) or cross mark (x) on the level of success related to **operational/non-financial** perspective of performance of your bank for last five year.

NO.	Statements	No extent	little extent	Moderate extent	great extent	Very great extent
		1	2	3	4	5
46.	The customers have been increasing over the years.					
47.	The reputation and brand image of our bank has improved.					
48.	The bank product and service quality has improved over the year.					
49.	The satisfaction of customers have improved over the years					
50.	Flexibility of products and service provision has improved over a time.					
51.	There has been increase in range of financial products and services.					

APENDIX II

Sample size - Departmental Management staff per Bank

NO	Bank Name	Market Share	ICT	R & D	finance	Operation	marketing	Total
1.	Commercial Bank of Ethiopia S.C.	7 (A)	5	5	5	5	5	**25**
2.	Awash International Bank	5 (B)	5	4	3	3	3	**18**
3.	Dashen Bank S.C.	5 (B)	5	4	3	3	3	**18**
4.	Abyssinia Bank S.C.	5 (B)	5	4	3	3	2	**17**
5.	Wegagen Bank S.C.	5 (B)	5	4	2	2	2	**15**
6.	Nib International Bank S.C.	5 (B)	4	4	2	2	2	**14**
7.	United Bank S.C.	5 (B)	4	4	2	2	2	**14**
8.	Oromia International Bank S.C.	3 (C)	4	3	2	2	2	**13**
9.	Cooperative Bank of Oromia S.C.	3 (C)	4	3	2	2	2	**13**
10.	Berhan International Bank S.C.	3 (C)	4	3	2	2	2	**13**
11.	Buna International Bank S.C.	3 (C)	3	3	1	1	2	**10**
12.	Abay Bank S.C.	3 (C)	3	3	1	1	1	**10**
13.	Zemen Bank S.C.	3 (C)	3	3	1	1	1	**10**
14.	Lion International Bank S.C.	3 (D)	3	2	1	1	1	**8**
15.	Enat Bank S.C.	2 (D)	3	2	1	1	1	**8**
16.	Addis International Bank S.C.	2 (D)	3	2	1	1	1	**8**
17.	Debub Global Bank S.C.	2 (D)	3	2	1	1	1	**8**
	Total sample population		**66**	**55**	**33**	**33**	**33**	**220**

APENDIX III

LIST OF COMMERIAL BANKS IN ETHIOPIA

NO	Bank Name	Year of establishment
1.	Abay Bank S.C.	2010
2.	Addis International Bank S.C.	2011
3.	Awash International Bank	1994
4.	Bank Abyssinia Bank S.C.	1996
5.	Berhan International Bank S.C.	2010
6.	Buna International Bank S.C.	2009
7.	Commercial Bank of Ethiopia S.C.	1963
8.	Cooperative Bank of Oromia S.C.	2005
9.	Dashen Bank S.C.	2003
10.	Debub Global Bank S.C.	2012
11.	Enat Bank S.C.	2013
12.	Lion International Bank S.C.	2006
13.	Nib International Bank S.C.	1999
14.	Oromia International Bank S.C.	2008
15.	United Bank S.C.	1998
16.	Wegagen Bank S.C.	1997
17.	Zemen Bank S.C.	2009

APPENDIX IV: TIME FRAME

No.	Activities	March 2019	April 2019	May 2019	June 2019	July 2019	Aug. 2019	Sept. 2019	Oct. 2019	Nov. 2019	Dec. 2019	Jan. 2020
1.	Proposal Writing											
2.	Proposal Correction and finalization											
3.	Developing questionnaires & make pilot test											
4.	Field data collection											
5.	Data processing, analysis & Report writing											
6.	Report finalization, presentation and submissions of final report.											

APPENDIX VI: BUDGET DESCRIPTION

No.	Cost categories	Budget in Birr
1.	Stationary (Photocopying and binding)	3,000
2.	Transportation	4,800
3.	Fee for Piloting and Field Data collector	16,000
5.	Other expenses (miscellaneous	3,000
	Total	**25,000**