THE IMPACT OF FINANCIAL INNOVATION ON THE PERFORMANCE OF COMMERCIAL BANKS IN ETHIOPIA

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THE IMPACT OF FINANCIAL INNOVATION ON THE PERFORMANCE OF COMMERCIAL BANKS IN ETHIOPIA

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Addis Ababa, Ethiopia

Statement of Declaration

I, Biniyame Kebede, hereby declare that this thesis, entitled "The Impact of Financial Innovation on the Performance of Commercial Banks in Ethiopia," is my original work. Which has not been presented for a degree in this or any other universities and that all sources of materials used for the thesis have been properly acknowledged.

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Statement of Certification

This is to certify that the thesis entitled "The Impact of Financial Innovation on the Performance of Commercial Banks in Ethiopia" has been carried out by Biniyame Kebede under my supervision. This thesis is submitted for the fulfillment of the requirements for the Master of Science in Corporate Finance (With Specialty in Investment Management) program at Addis Ababa University. I confirm that the candidate has met the necessary academic requirements and recommend the thesis for submission and defense.

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Approval Sheet

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Abstract

This study examines the impact of financial innovation on the performance of commercial banks in Ethiopia, focusing on both financial and operational outcomes. Financial innovation, including internet banking, mobile banking, automated teller machines (ATMs), ATM cards, and point of sale (POS) terminals, has revolutionized banking operations globally. Using panel data from eight commercial banks over nine years (2015–2023), this research employs a regression model to analyze the relationship between financial innovation and bank performance. Return on Assets (ROA) measures financial performance, while the number of new customer recruits serves as an indicator of operational performance, with bank size included as a control variable. The findings reveal that mobile banking, ATM cards, and POS terminals have a positive and statistically significant impact on both financial and operational performance, suggesting that these innovations enhance efficiency and customer acquisition. Conversely, internet banking and ATMs exhibit either an insignificant or negative effect, highlighting challenges related to adoption or profitability. The study underscores the importance of embracing financial innovation to strengthen bank performance, while addressing barriers to adoption. The results offer valuable insights for policymakers, banking executives, and regulators seeking to shape strategies for digital transformation and financial sector growth. Future research should consider additional financial innovation variables and assess their long-term effects on competitiveness and financial inclusion in Ethiopia.

Keywords: Financial Innovation, Bank Performance, ROA, Mobile Banking, ATM Cards, POS Terminals.

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List of Abbreviations

- NCR – New Customer Recruit
- ATM – Automatic Teller Machine
- POS – Point of Sale
- E-banking – Electronic Banking
- ROA – Return on Asset
- SPSS – Statistical Package for the Social Sciences

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Innovation involves implementing novel solutions to address both emerging and existing demands in markets. It can take the form of new or improved products, processes, services, technologies, or concepts that are accessible to businesses, governments, and society at large (BCG, 2009).

Innovation refers to the introduction of a new or significantly improved product, process, marketing approach, or organizational method within business operations. It is typically categorized into four types: product innovation, process innovation, marketing innovation, and organizational innovation (OECD, Oslo Manual, 2018). In this context, financial innovation involves the development and application of new financial products, delivery mechanisms, marketing techniques, and institutional structures.

Several economists, including Karl Marx and Joseph Schumpeter, are recognized for their early contributions to theories explaining the causes of financial innovation. Their ideas have influenced various academic perspectives, such as Kane's (1984) technology and political theory, which views financial innovation as an institutional response to the financial costs linked to technological advancements. Similarly, Miller's (1986) theory of taxes and regulation suggests that financial innovation helps modify the timing and amount of taxable income. Silber's (1972) constraint theory, on the other hand, explains product innovation as an organization's strategy to overcome imposed limitations.

Financial innovation has extended concerns in developed countries like EU and USA. Most African nations still need to take full advantage of the many benefits procured by mobile banking services (Lambert, 2018). Some countries like Kenya become ultimate sources for innovative financial services. Financial innovation has been used to refer to a wide range of changes and advances affecting financial markets in a variety of contexts. The term can be used to refer to the introduction of new financial instruments in a very narrow meaning and the changes in the structure and depth of financial markets, as well as changes in financial institutions' roles to the broader one. Because financial innovation is a continuous process, it is difficult, in practice, to grasp all of its forms; and even more

difficult to foresee its consequences, which adds an element of uncertainty to the economic setting in which central banks work. If financial innovation enhances the financial systems efficiency, it should also have a considerable impact on the functioning of the overall economy.

In Ethiopia, the banking sector has been relatively slow in adopting financial innovations compared to global trends. However, promoting growth in this area is crucial for the country's financial sector development (Gardachew, 2010). According to Rahel (2015), banks in Ethiopia acknowledge the benefits of technological advancements such as electronic banking, which can drive innovation adoption.

Several studies including those by Elbetel (2022), Feysel (2020), Girma (2016), Solomon (2016), Tilahun (2016), and Rukiya (2018) have examined the impact of financial innovation and electronic banking on the performance of Ethiopian commercial banks. However, comprehensive research evaluating the impact on both financial and operational performance remains limited.

Recently, Ethiopia’s banking sector has experienced notable progress, particularly in branch network expansion. The National Bank of Ethiopia's (NBE) annual report for 2022/23 emphasized the importance of financial inclusion strategies, which have spurred the adoption of mobile money and innovative financial services. Delivering banking solutions in an increasingly interconnected environment has become more efficient than ever, making access to digital and connected banking services essential for improving service delivery and customer experience.

Given this rapid transformation, it is crucial to assess whether financial innovations represent a positive development and how they impact the financial and operational performance of banks. Therefore, this study aims to examine the impacts of financial innovation on the performance of commercial banks in Ethiopia.

1.2. Statement of the Problem

Intense competition within an industry fosters innovation, enabling companies to distinguish themselves from their rivals. Mai et al. (2019) argued that while innovation

strategies require significant investments and therefore entail risks, the potential for higher returns can justify these risks.

Although the crucial role of financial innovation in enhancing financial inclusion and market deepening is undisputed, the extent to which it influences bank performance continues to be debated (Mabrouk and Mamoghli, 2010; Solomon, 2016). Mabrouk and Mamoghli (2010) outlined two main challenges in understanding the impact of financial innovation on banking performance: a paucity of knowledge about the factors driving financial technological innovation adoption and insufficient investigation into its effects on performance. Chimwemwe & Moses (2018) criticized the scant empirical research linking financial innovations to firm performance, arguing that findings are largely anecdotal and vary according to the operational environment and adoption levels.

Despite a vast number of descriptive studies on recent financial innovations, there is a nonexistence of consensus among scholars about their impact on bank performance, leading to mixed findings (Catherine & Herick, 2016). While some researchers have reported positive effects, others have found negative or negligible impacts, and still, others have reached mixed conclusions. Notably, various studies have underscored the significant positive contribution of financial innovation to banking performance, whereas some have highlighted its minimal, insignificant, or adverse effects. The inconsistent evidence on the impact of financial innovation on banking performance underscores the need for further research.

Elbetel (2022) sought to carry out a study. Using secondary data, the impact of technological innovation adoption on Ethiopia's commercial banks' financial performance the dependent variable was financial success as determined by Return on Asset (ROA). The number of ATMs, debit card holders, POS terminals, internet banking users, and mobile banking user all indicators of technological innovation were the independent variables. Another control variable that was employed was bank size. The study's findings showed that while debit cards and mobile banking have a negative association with ROA, internet banking, ATMs, POS terminals, and bank size had a favorable one. Additionally, it demonstrated that the impact of ATMs was negligible whereas the effects

of debit cards, POS terminals, internet and mobile banking, and bank size were all substantial.

In our country, despite numerous studies in electronic banking, there is a gap in empirical research examining the effects of financial innovation on commercial banks' performance (both financial and operational). Recent empirical evidence strengthens the argument for continued investigation. For instance, Jote (2023) reports that mobile, online, and agency banking significantly improved financial performance across 18 Ethiopian commercial banks

Meanwhile, a comprehensive systematic review (Buli & Mersha, Nov 2024) spanning 2015–2024 found ATMs, mobile and internet banking, and debit cards to consistently exert positive, significant influence on bank performance although it also identifies uneven adoption and theoretical gaps.

Other studies by Elbetel (2022), Feysel (2020), Girma (2016), Solomon (2016), Tilahun (2016), and Rukiya (2018) have variously explored the impact of technological innovation and electronic banking on commercial banks' performance in Ethiopia. However, a comprehensive investigation covering both financial and operational performance aspects in the context of financial innovations remains scant, except for Feysel (2020) who exclusively focused on both financial and operational performance. This study will seek to link this gap by assessing the broader impacts of financial innovation on Ethiopian commercial banks' performance.

1.3. Research Questions

- What is the impact of internet banking, mobile banking, automated teller machines (ATMs), ATM cards and point of sale (POS) terminals on bank performance of commercial banks in Ethiopia?
- Which type of financial innovation more significantly affects bank performance of commercial banks in Ethiopia?

1.4. Objectives of the Study

1.4.1. General objective

The main objective of the study is to examine the impact of financial innovation on the bank performance of the commercial banks in Ethiopia.

1.4.2. Specific Objectives

The specific objectives of the study include;

- ✓ To examine the impact of ATM card on the bank performance of commercial banks.
- ✓ To examine the impact of mobile banking on the bank performance of commercial banks.
- ✓ To examine the impact of automated teller machines (ATMs) on the bank performance of commercial banks.
- ✓ To examine the impact of internet banking on the bank performance of commercial banks.
- ✓ To examine the impact of point of sale (POS) terminals on the bank performance of commercial banks.

1.5. Significance of Study

This research aims to enhance understanding of financial innovation and offer solid empirical evidence on its impact on bank performance. It aims to be a substantial academic contribution, helping scholars, students, and researchers alike. Moreover, this research is intend to lay the groundwork for subsequent scholarly endeavors and research in the domain of financial innovation. The outcomes of this study are expects to clarify the relationship between financial innovation and bank performance, delivering crucial insights for the executives of Ethiopian commercial banks and other financial institutions about the importance of embracing financial innovation. Essentially, this investigation looks to lighten the pivotal role that financial innovation plays in enhancing the operational efficiency and financial health of banks, thereby contributing valuable knowledge to the ongoing discourse in financial academic circles and industry practices.

1.6. Scope of the Study

In Ethiopia, the financial service sector comprises Banks, Insurance Companies, Microfinance Institutions, Capital Goods Finance Companies, and Saving & Credit Cooperatives. This study, however, will narrow its focus to investigating how financial innovation impacts the performance of private commercial banks within the country.

Data representing the commercial banks will be sourced from the institutions' annual reports, indicating that the research relies primarily on secondary data sources. For assessing financial innovation within these banks, the study will consider the adoption and usage of ATMs, debit cards, internet banking, mobile banking, and POS terminals as key indicators. The bank performance of these banks was evaluated by using Return on Asset (ROA) and number of new customer recruit as the main metrics and bank size as a controlling variable.

1.7. Limitation of the study

One key limitation of this research is its exclusive focus on private commercial banks in Ethiopia, which means the findings may not be generalizable to the broader financial services sector, including governmental banks, microfinance institutions, insurance companies, or saving and credit cooperatives that may exhibit different innovation dynamics and performance patterns. Additionally, the study relies solely on secondary data obtained from annual reports, which may be subject to reporting biases or inconsistencies and may not fully capture the qualitative aspects of financial innovation, such as customer satisfaction or user experience. Furthermore, the selected indicators of financial innovation ATMs, debit cards, internet banking, mobile banking, and POS terminals reflect technological adoption but may not encompass emerging innovations like agency banking, digital wallets, or fintech partnerships. Lastly, while Return on Asset (ROA) and new customer recruitment serve as proxies for bank performance, they may not fully reflect other important dimensions such as operational efficiency, risk management, or customer retention.

1.8. Definition of Terms

For a thesis on the impact of financial innovation on bank performance in commercial banks in Ethiopia, creating clear and precise operational definitions of key terms is crucial for guiding the research. Here are operational definitions for the key terms based on the context provided:

- ***Financial Innovation***: Financial innovation discusses to the introduction and adoption of new financial products, services, processes, and technologies within the banking sector. In the study only five variables (Mobile banking, ATM, internet banking, POS and ATM card)
- ***Bank Performance***: Bank performance is evaluated based on the following indicators includes return on assets (ROA) and number of new customers recruit.
- ***Commercial Banks in Ethiopia***: This term refers to private financial institutions licensed by the National Bank of Ethiopia to accept deposits from the public and provide credit facilities, payment services, and other banking operations for both individuals and businesses. The study focuses on these institutions within the Ethiopian context, considering specific operational, regulatory, and market

dynamics that influence their embracing of financial innovation and, subsequently, their performance.

- ***Adoption of Financial Innovation:*** This states to the process by which commercial banks in Ethiopia implement and integrate new financial technologies, products, and services into their operations.

1.9. Organization of the study

The study will be organize in five chapters, chapter one discuss the introduction part chapter two contains conceptual and theoretical framework and empirical studies literature. Chapter Three discuss about the research methodology; chapter four discuss about the data analysis and interpretation of the outputs. The final chapter presents conclusion, recommendations and further research suggestions.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2. Review of Theoretical Literature

2.1 Theoretical Framework

Innovation

The word "innovation" has been used to describe innovative combinations of productive methods, technological advancements, and above-average rates of return that support the dynamic development of the economy as a whole (Targalski, 2006, p. 7).

The supply and demand theories of the two perspectives on innovation can be used to examine the main sources of innovation from the outset. According to the demand theory, innovations arise in response to the demands of business entities seeking a competitive edge in their business environment. These inventions known as demand-driven innovations. However, this need was impacted by the internal needs of the business entity, which were centered on improving its activity or responding appropriately to changes in its environment that called for a change in its business strategy (Błach, J., 2011).

The second approach, known as the supply side theory of innovation, asserts that ideas are first developed by innovation providers and subsequently adopted by business organizations (sometimes referred to as supply driven innovation or end users of innovations) (Błach, J., 2011).

Theories of innovation

Various academics have developed a number of theories to explain financial innovation. These include, among others, Rogers' Diffusion Innovation Theory, Task Technology Fit Theory, Schumpeter Theory of Innovation, Transaction Cost Theory, and Constraint-induced Financial Innovation Theory.

2.1.1. Schumpeter Theory of Innovation

Schumpeter (1928) asserted that entrepreneurs, who may also be self-employed innovators, possess the capacity to increase the likelihood of future financial gains through their inventions. However, Schumpeter imagined that before the economy

reached equilibrium, a fresh set of innovations, which he referred to as "Kondratiev cycles" in 1934 would appear and restart the business cycle. Therefore, according to Schumpeter (1934), innovations are always occurring in the business and that innovations are always being made in the economy. As a result, institutions must be aware of these developments, and the financial sector is not an exception. This is the reason why commercial banks use a wide range of technologies to improve their financial performance. Therefore, according to Schumpeter (1934), innovation is the process of expanding an idea's practical application rather than just coming up with new ones. Put differently, innovation is characterized as the outstanding progress made by businesses in introducing novel items or implementing fresh procedures or methods for manufacturing (Lawrence, 2010).

Porter's (1992) claim that innovation is essential to maintaining a nation's competitive edge and long-term economic growth supports Schumpeter's arguments. According to Porter (1992), a country's firms need to continuously innovate, enhance, and update their competitive advantages in order to compete successfully in international trade. Sustained investment in tangible and intangible assets is necessary to ensure ongoing innovation and upgrading. Markets and financial institutions play a major role in facilitating transactions, assessing projects, controlling risk, and mobilizing savings. According to this view, banks engage in financial innovation as a strategic move to increase competitiveness, relevance, and performance (Akinyele, 2016). As a result, banks must continuously attend to their clients' needs and adapt to the changing needs of society.

2.1.2. Constraint-induced financial innovation theory

Silber, an American economist, created the notion of constraint-induced financial innovation (1983). According to this theory, commercial banks operating in highly constrained markets have every incentive to embrace and apply financial innovations that help them improve their financial performance by lowering transaction costs. These innovations are primarily adopted to strengthen their financial position or to maximize profits (Lerner, 2006).

Sibler (1983) asserts that because the banking industry is heavily regulated, it is subject to limitations on innovation and may therefore impede it. The existence of these

restrictions has two effects: it has made it harder for banks to innovate and may have decreased their overall efficiency. Due to this, commercial banks will usually take action using financial innovation to keep people off. According to Silber (1983), financial innovation happens to reduce or eliminate the restrictions placed on businesses. Because of the significant hidden costs associated with impediments like regulations and entry restrictions, businesses confronting them are most motivated to innovate and increase revenues. More highly leveraged companies are less inventive, according to Lerner's (2006) research.

Therefore, the idea is significant because it clarifies the motivations behind banks' forays into financial innovations. Furthermore, Ethiopia's commercial banks may not be able to implement any financial innovation without the regulator's express consent because they are subject to stringent regulation by the country's national banks. According to the theory, financial innovations have been observed as an attempt to undermine the financial institutions' earnings or position.

2.1.3. Transaction cost innovation theory

Hicks and Niehans created the transaction cost innovation hypothesis in 1983. According to the idea, a firm's primary incentive for embracing financial innovation is to lower transaction costs. The hypothesis states that transaction costs are crucial to innovation, and that innovation is the reaction to technological advancements that have reduced transaction costs. In this instance, the theory explains how it relates to other aspects of company development, namely that profit maximization serves as the primary driver of financial innovation in financial organizations. Hick and Niehans (1983) contend that lower transaction costs have the potential to stimulate financial innovation and that advances pertaining to money itself lower transaction costs.

The thesis clarified, from a different angle, that the goal of the firms is to earn or increase the wealth or advantages of shareholders, which is the radical reason behind financial innovation. Transaction expenses The theory of innovation is applicable in several contexts. For instance, a company's transaction costs can be greatly reduced by using Internet-connected information technology (IT), which makes information administration, coordination, and use more efficient. Due to its ability to provide virtual

access to the company's internal database and other pertinent information sources, mobile or Internet-connected IT may further reduce transaction costs.

According to Jones (1998), efficiency in transaction cost theory is defined as Pareto efficiency, where governance modes are assessed according to their capacity to moderate transactional progress until a point is reached at which it is impossible to improve the situation of one party without making the other party worse off. According to the argument, the company often offers a structure of organization that is relatively more efficient than the market because it optimizes transaction costs or overall value. Therefore, efficiency is the focus of transaction cost theory, which sees corporate organization as primarily focused on the relative effectiveness of transaction cost optimization. This hypothesis is therefore important to the study since it would enable the investigator to clarify the connection between financial innovations and Ethiopian commercial banks' performance in terms of increasing operational efficiency through lower transaction costs.

2.1.4. Task-technology fit (TTF) theory

Dishaw and Strong (1999) introduced the concept of task-technology fit, suggesting that the adoption of new technological advancements is more likely when they enhance user performance and align with the tasks that need to be completed (Goodhue & Thompson, 1995). The task-technology fit model, originally developed by Goodhue and Thompson (1995), comprises eight key elements used to determine whether a particular technology is appropriate for specific tasks. These elements include compatibility, quality, authorization, timeliness, ease of use and training, as well as user interactions. Since its inception, this theory has been widely applied to various information systems, including electronic commerce, in diverse contexts. Additionally, it has been combined with other frameworks that examine the impact of information systems (IS), such as the technology acceptance model (Gebauer & Shaw, 2004).

The task-technology fit theory plays a crucial role in determining how effectively a person performs and the impact they have when using information systems. Dishaw and Strong (1999) proposed that for an information system to enhance performance, it must be tailored to align with the tasks it is intended to support. Research on the success of information systems, such as their influence on individual performance (Goodhue &

Thompson, 1995) and group performance (Zigurs et al., 1999), has shown a strong positive relationship between task-technology fit and user evaluations, with better fit leading to improved user perceptions.

2.1.5. Rogers Innovation Diffusion Theory

To explain the process by which new concepts or innovations are accepted, Rogers' Diffusion of Innovations Theory highlights five characteristics that influence their adoption. These are relative advantage, complexity, compatibility, observability, and trialability (Rogers, 1995).The relative advantage of an innovation refers to how much better it is believed to be compared to the idea it takes over. According to Rogers' view, innovations with a distinct benefit over the previous approach are more likely to be embraced and put into practice. Research already conducted indicates that an invention will not be embraced and put into practice if a potential user determines there is no comparative benefit to employing it (Greenhalgh et al, 2004). The level of difficulty in using and understanding an innovation is referred to as its complexity. Compatibility is the extent to which an invention meets the needs of potential users, aligns with current standards and values, and considers past experiences. Research already conducted indicates that innovations have a higher likelihood of being adopted when they are more compatible (Greenhalgh et al, 2004). Trialability is the degree to which a new idea can be tested in a restricted setting. New ideas that may be tested before being completely implemented are more likely to be embraced since they need the investment of time, energy, and resources.

2.2 Financial Innovation

Innovation's significance is rarely downplayed by academics or policymakers. It is true that innovation plays a crucial role in the competitive struggle of businesses and nations; in fact, it has been estimated that technological advancements rather than increased productivity account for more than 60% of all economic growth (Freeman and Soete, 1997). In turn, small and medium-sized businesses (SMEs) have a significant impact on

Technological advancement in general, along with innovation in specific areas, is significant. Many agree that there is no perfect size for a business designed solely to enhance innovation. However, small enterprises play a vital part, a fact backed by numerous studies and common reasoning (Storey and Sykes, 1996).

Turfano (2002) described financial innovation as creating new financial technologies, institutions, markets, and tools, followed by their widespread adoption. The shifts in the financial services sector and the organization of financial markets are propelled by this innovation. It represents the structured process of modifying the tools, institutions, and procedures that form the framework of the financial system. Tufano (1995, 2002) noted that financial innovation has existed within the economy for many centuries, not just in the last few decades.

2.3 Significance of Financial Innovation

According to Metrons (1992), not all states of nature can be bridged in an incomplete market, which prevents parties from managing risk or moving money freely across time and place. There are incentives to create markets for assets that can be used to hedge significant risks and for which there are no close substitutes.

Mwangi's study from 2007 shows that a balance occurs when companies create different types of securities. This situation arises due to constant disagreements between managers who act in their own interests and external funding resources. Additionally, there is a lack of equal information, as insiders know more than outsiders do.

Since it is difficult for outside investors to determine the worth of their assets, the institutions enlist the help of investment banks to sell these securities to its clientele. These investment banks are creative in that they generate fresh low-grade asset pools. Marketing expenses and agency concerns combine to create innovation.

Odhiambo (2008) found that a lot of improvements in payment systems technology focus on lowering transaction expenses. Financial intermediaries help consumers facing transaction costs to reach their best consumption investment plans. Notable financial innovations that seek to greatly cut transaction costs consist of smart cards, ATMs, and several other new businesses.

2.3 Theories of Financial Innovation

2.3.1. Silber's Theory of Financial Burden

Silber (1975). This theory of financial innovation is among the key concepts, seeing product innovation as a reaction to the barriers faced by organizations. The main point focuses heavily on the microeconomic basis of financial innovation. A way to sum it up is by saying, "companies encounter certain financial limitations and seek to alleviate or reduce their financial challenges."

Silber outlines the specific circumstances which he categorizes as instruments and practices that will permit the creation of a financial innovation, such as the arrival or application of an exogenous restriction. He identifies two types of constraints: one is the potential decline in the firm's utility, in which case a new tool is needed to restore it to its prior, abnormally high level (successful innovation).

Silber in 1983 brought forth four key domains of financial innovation: the structure of markets, the way institutions are organized, the impact of innovations on welfare, and ideas from microeconomics. He highlights that businesses that perform poorly in their fields often show ineffective innovation. Additionally, their falling profits may result from competition outside their control or rules set by the government.

2.3.2. Kane's Theory of Regulatory Dialectic

According to Kane (1986), institutional responses to financial costs resulting from market demands, technological advancements, and political forces particularly laws and regulations are what constitute financial innovation. Kane describes the dialectical process as the interactive regulatory process that comes after institutional avoidance and innovation.

He uses his model to describe much of the change that took place in the United States during the 1960s and 1970s, with a particular emphasis on the regulatory dialectic between exogenous market forces like changing banking environments, technological advancements, and growing uncertainty about future financial developments and federal banking regulations. He uses innovation as a tool for arbitrage, hoping to capitalize on regulatory gaps. Innovation can occasionally take the form of product substitution to get around regulations by simply moving along different financial systems and rearranging contracts. For a deeper comprehension of the dialectic between exogenous variables and the Kenyan banking system, Kane's contribution is crucial.

2.3.3. Miller's regulation and taxation a theory of financial innovation

According to Miller (1986), changes in tax rules and regulations have been the primary cause of nearly all significant advances over the past 20 years. Miller connected efforts to alter the amount and timing of taxable income with the rise of various financial claims. Miller also points out that the ambition of financial institutions to escape the effects of regulatory restraints leads to financial innovations. According to this view, investors ought to be highly aware of taxation and regulatory policies and how they affect the kinds of securities that are issued by various companies. Relatively speaking, the investor shouldn't be too concerned about any obligations that the issuing firm may currently have.

Miller (1986) emphasizes the importance of government regulation and taxation in promoting financial innovation. One example of an innovation that aligns with this notion is the Adjustable Rates Mortgage (ARMS). The 1986 Tax Reform Act removed the ability to deduct federal income tax for consumer debts, excluding mortgages, which resulted in a large rise in home equity loans. One of Modigliani's and Miller's propositions, which claim that taxes and regulations are the only things that matter to investors when it comes to security firms issuing debt, equity, or any other kind of security, lends more credence to the argument.

2.4.Bank Performance

In the context of private commercial banks in Ethiopia, this study will focus on examining how financial innovation affects the performance of these banks. The performance of the banks, reflecting both their financial and operational success, is

therefore the main variable being analyzed. As stated by Damanpour and Arvind in 2011, performance refers to a company's ability to handle all four key processes: inputs, outputs, transformations, and feedback, to reach its goals.

External parties typically use a company's performance to gauge its capabilities. This suggests the reason why a firm's performance acts as a mirror. Performance, as defined by Richard et al. (2009), is an organization's actual output or results compared to its expected outputs (or goals and objectives). It might be understood as the company's productivity and efficiency within the parameters of the market in which it competes. It depends on how well a company uses the resources it has from its primary function of conducting business to the income it subsequently generates (Omondi & Muturi, 2013). Performance is defined as the results attained in achieving a company's internal and external goals (Liao et al., 2010).

Organizational goals act as the basis for various performance evaluation methods employed by different firms. These can include both financial and operational (nonfinancial) criteria to assess this performance measure (BerginSeers & Jago, 2007). Nevertheless, most companies tend to evaluate their success using financial indicators (Beccalli, 2007). As explained by Omondi & Muturi (2013), financial performance refers to using financial metrics to determine how well goals are met and how much the bank supports investment prospects. It measures how effectively a company utilizes resources from its core business to generate revenue (Heremans, 2007). Some financial measures identified by Simpson & Kohers (2012) include sales growth, profit margins, income, net interest earnings, stock values, return on equity, return on assets, operating income/expenses, liquidity ratios, and capital sufficiency.

Generally, performance indicators that offer motivation for improving results and evaluations to track progress toward this goal can greatly contribute to encouraging and adopting financial innovations (Omondi & Muturi, 2013). Yet, aside from financial metrics, there are additional measures that can evaluate a company's success. To respond to shifts in both internal and external environments, these should be linked with operational assessments. Many previous studies relied only on financial metrics to judge a company's success, but this approach is lacking; therefore, a comprehensive method is necessary to incorporate nonfinancial (operational) information (Hansen & Wernerfelt,

1989). According to BerginSeers and Jago (2007), it is recommended to use a mix of financial and nonfinancial (operational) measures. After reviewing existing research, the study will utilize an operational definition that summarizes both financial (profitability) and nonfinancial (operational performance) measures to assess an organization's achievements.

2.4.1. Financial performance

Financial metrics, as described by Heremans in 2007, serve as signs of an organization's success regarding investment returns and overall profitability. Simpson and Kohers, in 2012, point out that a firm's financial success is assessed by its effectiveness in production, which includes factors like investment return, asset return, yearly earnings, overall revenue, payback time, and added value. One of the most commonly employed techniques to evaluate a company's financial health is the return on assets, known as ROA. This metric, ROA, measures the relationship between earnings and total assets, showing how efficiently a bank manages its assets to generate income.

2.4.2. Operational Performance

Operational performance evaluates how well a business runs its main lines of operation. Despite the fact that a comprehensive assessment of operational performance requires examining, factors like account activity and cost ratios, this study focuses on the number of new customer recruits as an initial indicator. Growth in new customers suggests a bank's ability to attract potential clients, potentially reflecting the effectiveness of marketing campaigns, product offerings, and overall customer appeal. However, we acknowledge this metric doesn't capture customer retention or internal efficiency, and future research may incorporate additional measures for a more holistic view.

2.5. Empirical Review

Many studies have looked at how new financial technology affects the performance of banks, but the research shows different results and does not reach clear conclusions. Most of the studies indicate positive effects, but a few found negative impacts, and some reported varied results. In this section, we will summarize earlier research that examines the effects of financial innovations on commercial bank performance.

Research by Hernando and Nieto in 2007 examined how using internet banking channels affects the performance of banks in Spain. Their findings indicated that it takes time for financial innovations, like online banking, to impact bank performance positively. Specifically, they noted that after three years of implementing these digital banking services, there was a significant enhancement in the performance of the sampled banks, measured by ROA and ROE. In another study, Rauf and Qiang in 2014 analyzed the performance of commercial banks in Pakistan regarding electronic banking. They found that early adopters experienced a minor rise in ROA but saw a significant boost in interest margin and ROE. For those who embraced electronic banking first, there was a strong positive effect on interest margin, ROA, and ROE.

In 2014, Karimzadeh and colleagues examined the impact of electronic banking growth on the profitability of a commercial bank in Iran. Their study revealed a strong positive relationship between the expansion of electronic banking and bank profitability, measured by return on assets (ROA). Similarly, Roberts and Amit (2003) found that financial innovation played a significant role in driving the financial success of banks. Their research focused on how innovation contributes to creating competitive advantages in the retail banking sector of Australia. De Young et al. (2007) also observed that the profitability of community banks increased with the adoption of internet banking, particularly due to a rise in fees from deposit services. In Bangladesh, Rahman (2007) explored the influence of modern technology on banking profitability, finding that as banks embraced innovative technologies, their performance improved. Additionally, financial innovations such as venture capital, mutual funds, exchange-traded funds, equity funds, and securitization have been shown to contribute to financial development and growth, according to Lerner and Tufano (2011).

While many studies have shown a positive impact of financial innovation on bank performance, some research has highlighted its negative effects. For instance, AlSmadi and Al Wabel (2011) investigated the influence of electronic banking channels on bank performance in Jordan, analyzing data from 15 banks between 2000 and 2010. Their findings indicated that electronic banking had a negative effect on the financial performance of the banks. In contrast, other studies have presented opposing results.

Oyerinde (2011) examined the performance of Nigerian banks with respect to electronic banking and found that it significantly improved bank performance, as measured by indicators like Return on Assets (ROA) and Net Interest Margin (NIM), although no effect was observed on Return on Equity (ROE). Likewise, Onay and Ozsoz (2013) studied the impact of electronic banking on the performance of eighteen retail banks in Turkey from 1990 to 2008. Their research revealed a positive relationship between the use of internet banking and increased profits, deposits, and loans at the branch level. However, after two years of adopting online banking, bank profitability declined, which the authors attributed to reduced interest income and increased competition.

In Kenya, Kimingi (2010) explored the impact of technological advancements on the financial success of commercial banks. His research found that when banks adopted these technologies, it led to higher profits, increased sales, and improved returns on equity. Similarly, Okiro and Ndungu (2013) discovered that financial innovation had a positive and significant effect on the profitability of commercial banks in Kenya. In Nigeria, Gbalam et al. (2017) investigated the impact of electronic banking on the profitability of commercial banks. Their study focused on four e-banking services: automated teller machines, online banking, mobile banking, and point-of-sale transactions. Analyzing data from 2006 to 2014, they examined the relationship between these services and the pre-tax profits of Nigerian commercial banks. The findings indicated that, despite varying effects from each service, electronic banking overall had a significant positive influence on the profitability of these banks.

Paul et al. (2015) used yearly financial data covering the five-year period of 2009–2013 to conduct study in the Ghanaian setting to investigate the effects of financial innovations on the profitability of Fidelity Bank in Ghana. They came to the conclusion that a bank in Ghana will eventually become more profitable as financial innovations are used more widely.

While numerous studies have been conducted on electronic banking in Ethiopia, fewer have focused on how financial innovations impact the performance of banks. Recent empirical studies have continued to explore the relationship between financial innovation and bank performance, with a focus on emerging markets like Ethiopia. Jote (2023) conducted a study across 18 commercial banks in Ethiopia and found that mobile banking, online banking, and agency banking had a statistically significant and positive impact on financial performance indicators such as Return on Assets (ROA) and Return on Equity (ROE). Similarly, Buli and Mersha (2024), through a systematic review of studies conducted between 2015 and 2024, concluded that technological innovations including ATMs, mobile banking, internet banking, and debit cards consistently contribute to the improved financial performance of commercial banks in Ethiopia. However, the review also highlighted persistent gaps in the depth and integration of these innovations across institutions, emphasizing the need for more comprehensive research that also incorporates operational performance metrics. These recent findings underscore the relevance and timeliness of further empirical inquiry into how financial innovation affects both the financial and operational performance of Ethiopian commercial banks. In 2016, Girma analyzed secondary data from 2010 to 2014 to examine the effect of information and communication technology (ICT) on the performance of Ethiopia's banking sector. The study considered five factors to represent electronic banking, including investments in ICT, automated teller machines (ATMs), and point-of-sale (POS) systems. The number of branches and GDP were included as control variables, while profit before taxes and return on assets (ROA) were used to assess profitability. The study concluded that there was no significant statistical relationship between ICT investments, ATMs, POS systems, and the return on assets (ROA) of Ethiopian commercial banks. Instead, it found that the number of branches, ICT investments, and POS systems negatively affected the ROA. In another study, Solomon (2016) used panel data from nine commercial banks between 2013 and 2015 to investigate the impact of electronic banking on financial performance. The dependent variable was ROA, while independent variables included market share, the financial value of ATM operations, POS transactions, debit card usage, and the total number of ATMs. The results indicated that increases in POS availability, ATM numbers, and market share positively impacted

financial performance, while a higher volume of debit card transactions had a negative effect on bank profitability.

Tilahun's (2016) study aimed to assess the impact of electronic banking on the financial performance of commercial banks in Ethiopia. The research gathered data from ten Ethiopian commercial banks, focusing on financial performance between 2013 and 2015. Electronic banking was represented by three factors: the total number of ATMs, the number of POS terminals, and the number of debit card users. Profitability was evaluated using profit before taxes and return on assets (ROA) as dependent variables. The study concluded that electronic banking had a significant positive impact on both the profitability and return on assets (ROA) of commercial banks in Ethiopia.

Rukiya (2018) explored the impact of financial innovation on the performance of commercial banks in Ethiopia by analyzing secondary data from nine banks between 2015 and 2017. Return on Assets (ROA) was used to measure financial performance. Independent variables included the number of debit card users, automated teller machines (ATMs), new savings accounts, mobile banking customers, and point-of-sale (POS) systems, with managerial efficiency serving as a control variable. The findings revealed that increases in mobile banking users and new savings accounts had a positive effect on financial performance by lowering transaction costs and boosting deposits. On the other hand, the number of ATMs negatively affected financial performance due to high initial costs compared to the income generated. The number of debit card holders and the presence of POS terminals did not have a significant impact on profitability. Additionally, a negative relationship was found between managerial efficiency and cost-effectiveness in Ethiopian commercial banks. This contrasts with Solomon’s (2016) finding that increased ATM and POS installations benefited the profits of commercial banks.

Elbetel (2022) examined the effect of adopting technological innovations on the financial performance of Ethiopian commercial banks using secondary data. Return on Assets (ROA) was used as the measure of financial performance (dependent variable). The study considered several technological innovation indicators as independent variables, including the number of ATMs, debit cardholders, POS terminals, internet banking users,

and mobile banking users. Bank size was included as a control variable. The results revealed that internet banking, ATMs, POS terminals, and bank size had a positive association with ROA, while debit cards and mobile banking showed a negative association. Interestingly, the impact of ATMs was found to be insignificant, while the effects of debit cards, POS terminals, internet banking, mobile banking, and bank size were statistically significant.

2.6. Types of Financial Innovations in the Banking Sector

Frame and White (2002) recognized three types of financial innovations: institutional, procedural, and product. Product innovation is about introducing a new good or service that is either original or greatly improved regarding its characteristics or intended uses (Ignazio, 2007). Process innovations are new business practices that increase productivity, lower production costs per unit, and produce innovative or noticeably better products (Frame & White, 2002). Online banking and securities trading are two examples. Within institutions where the manufacturing process is conducted, institutional innovation includes the establishment of new institutions or organizational structures as well as the use of novel business practices and techniques (Ignazio, 2007). One main example of this kind of innovation is banking that is done exclusively online. The most extensively used and approved financial innovations in Ethiopia are mobile, internet, ATM, and point-of-sale (POS) banking. Thus, the study makes advantage of the following financial innovations: debit cards, POS terminals, internet banking, mobile banking, and automated teller machines (ATMs).

2.6.1. Automated Teller Machines

Automated teller machines, or ATMs, were the first popular devices that allowed people to access banking services electronically. The introduction of ATMs has allowed banks to service clients outside of the banking hall. An automated teller machine (ATM) is a device that connects retail banking consumers to banks and other financial institutions for a variety of standard banking transactions (Dossantos and Peffers, 1993). These consist of payments, cash transfers, cash withdrawals, deposits, and queries. All of this is accomplished by using a customer's PIN and a plastic card with a magnetic chip embedded in it to identify them (Mwatsika, 2014).

Data that has been released indicates that using ATMs for banking has become more

popular than visiting bank branches for accessing financial products and services (Charles, 2016). In 2001, Ethiopia's principal state bank, the Commercial Bank of Ethiopia (CBE), began operating ATMs. This marked a significant change for ebanking in the country. CBE was responsible for the introduction of the first eight ATMs in Ethiopia. Following this, Dashen Bank S. C. also joined in (Ashenafi, 2019). Among the banks currently providing this service in Ethiopia, ATMs have emerged as the leading method for innovation in banking (Mattewos, 2016). Bank customers can utilize ATMs for banking services at any hour of the day, and these machines are designed to be easy to use and convenient (Charles, 2016).

H1a: Automated teller machines (ATMs) have a positive and significant impact on the financial performance of commercial banks in Ethiopia.

H1b: Automated teller machines (ATMs) have a positive and significant impact on the operational performance of commercial banks in Ethiopia.

2.6.2. Mobile Banking

With the rapid growth of internet technologies and the extensive popularity of mobile phones, mobile banking has increasingly emerged as a convenient option for accessing financial services. Thanks to recent advancements in telecommunications, mobile banking, which allows users to interact with their banks through a mobile device to access financial services, has been introduced (Barnes & Corbitt 2003). According to Tiwari, Buse, and Herstatt (2006), mobile banking encompasses any transactions that are started and/or finished through mobile access to computer networks using an electronic device, including the transfer of ownership or usage rights for goods and services. The term "mobile banking" signifies performing financial transactions through a mobile device, like a phone (Anyasi & Otubu, 2009). It focuses on delivering financial services connected to banks via mobile technology.

H2a: Mobile banking has a positive and significant impact on the financial performance of commercial banks in Ethiopia.

H2b: Mobile banking has a positive and significant impact on the operational performance of commercial banks in Ethiopia.

2.6.3. Internet Banking

As stated by Sathye (2009), internet banking serves as a tool allowing bank customers to reach their accounts through the bank's website without needing any human help or the hassle of sending letters, faxing documents, using original signatures, or making phone calls for verification. This method offers bank customers a wide range of beneficial products and services through online and telecommunications systems. Clients who register can log into internet banking to perform transactions related to their accounts on the bank's website. Internet banking is another term used for this service.

H3a: Internet banking has a positive and significant impact on the financial performance of commercial banks in Ethiopia.

H3b: Internet banking has a positive and significant impact on the operational performance of commercial banks in Ethiopia.

2.6.4. POS Terminals

Retail establishments utilize hardware called point of sale (POS) terminals to handle credit and debit card payments. In order to determine whether there are enough money available to send to the merchant, the point of sale terminal scans the magnetic strips on debit and credit cards. The transfer is then made (Halton, 2021).

H4a: Point of sale (POS) terminals has a positive and significant impact on the financial performance of commercial banks in Ethiopia.

H4b: Point of sale (POS) terminals has a positive and significant impact on the operational performance of commercial banks in Ethiopia.

2.6.5. ATM Cards

Debit cards are much like ATM cards. They are plastic cards linked to the user's bank account. When a person uses the card, the available balance in their bank account is checked. Banks created a system that allows customers to use their cards at ATMs that belong to any bank within the system, making it easier for users. Over time, these ATM cards came to be known as debit cards (Parker et al, 2011).

H5a: ATM cards have a positive and significant impact on the financial performance of commercial banks in Ethiopia.

H5b: ATM cards have a positive and significant impact on the operational performance of commercial banks in Ethiopia.

2.6.6. Bank size

The term bank size indicates how large a bank is in terms of its activities. This is usually assessed by looking at various factors such as total assets, total equity, total deposits, total loans, or its market value (Olalekan & Adeyinka, 2013).It plays a crucial role in determining financial performance, risk-taking behavior, and competitiveness (Berger & Mester, 1997). The Economies of Scale Theory suggests that larger banks benefit from cost advantages, while the Market Power Hypothesis argues that they can dominate the market and set competitive rates (Hughes et al., 2001; Demirgüç-Kunt & Huizinga, 1999). Nevertheless, the Too Big to Fail (TBTF) Theory points out that big banks might engage in highrisk behavior, believing that the government will rescue them in tough times (Mishkin, 2006). Research examining how the size of banks affects their financial outcomes presents varied conclusions. Some studies identify a beneficial link because of improved risk spreading and reduced expenses, whereas others contend that significant growth causes inefficiencies and complications in management (Athanasoglou et al. , 2008; Berger & Humphrey, 1994). In financial research, bank size is often used as a control variable since larger banks may have different risk exposures, operational efficiencies, and regulatory requirements than smaller banks, influencing their financial outcomes (Sufian & Habibullah, 2010). Overall, while larger banks may enjoy economies of scale and market power, they must balance growth with efficiency to sustain profitability.

H6a: Bank size has a positive and significant impact on the financial performance of commercial banks in Ethiopia.

H6b: Bank size has a positive and significant impact on the operational performance of commercial banks in Ethiopia.

2.7. Literature gap and Summary

The earlier discussed empirical literature indicates that the evidence surrounding financial innovation's impact on bank performance is unclear and inconsistent. It is important to remember that studies focusing on financial innovation and its effects on bank performance are still at a preliminary stage and do not have enough systematic evidence or reliable data with broadly accepted results. Consequently, this creates an opportunity for scholars, researchers, bankers, regulators, and supervisors to explore the real effects of financial innovation on financial and operational performance.

Research has been conducted on how technological progress and electronic banking influence the performance of commercial banks in Ethiopia (Elbetel, 2022; Feysel, 2020; Girma, 2016; Solomon, 2016; Tilahun, 2016; Rukiya, 2018). However, there is a lack of thorough studies that look at the overall effects of financial innovation on both operational and financial performance. An exception to this is Feysel (2020), who discusses both areas. This study seeks to fill this gap by exploring the wider effects of financial innovation on the performance of Ethiopian commercial banks, looking at both financial and operational aspects.

2.8. Conceptual Framework

Below is a conceptual framework that illustrates the link between the independent and dependent variables.

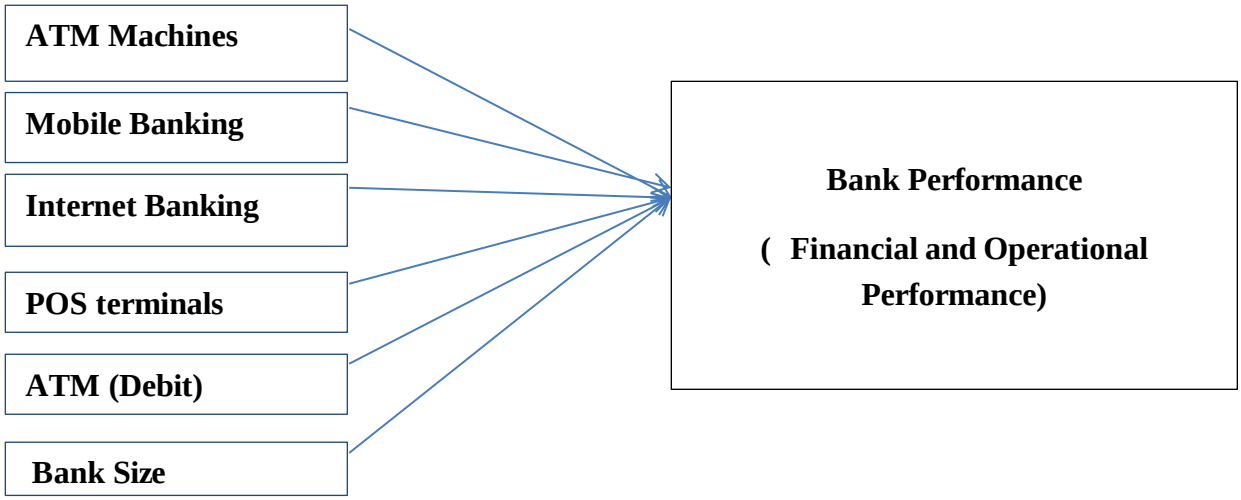


Figure2.1: Conceptual Framework

Source: Developed by the researcher

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The term research methodology refers to a strategy for providing relevant light on scientific processes. According to Akinyele (2016), the general standard specifies how and what analysis should be done to the data that has been obtained, as well as how the research study's methodologies were carried out. These are demonstrated by the study's research methodology, data gathering procedures, and fieldwork methodology.

3.2 Research design

The goals that the researchers hope to accomplish will determine whatever research strategy they use. This study's main goal is to investigate how financial innovation affects Ethiopian commercial banks' performance. An explanatory research design is used to accomplish this goal. The study's ultimate objective is to determine whether a relationship exists and how financial innovation may affect Ethiopian commercial banks' performance. Therefore, the researcher can investigate how financial innovation affects Ethiopian commercial banks' performance using an explanatory research design.

3.3 Research Approach

This study uses a quantitative research approach to examine how financial innovation affects the performance of private commercial banks in Ethiopia. It is based on secondary data collected from the annual reports of selected banks over a nine year period. The research focuses on measuring the use of financial innovation tools such as ATMs, debit cards, internet banking, mobile banking, and POS terminals. The performance of the banks is evaluated using Return on Asset (ROA) and the number of new customers, with bank size included as a control variable. To analyze the data, the study applies panel data regression, which helps identify the relationship between financial innovation and bank performance in a clear and measurable way.

3.4 Target Population

The target population refers to the group to which a researcher intends to apply the findings of a study (Smyth, 2004). In this study, the population consists of all elements

sharing similar characteristics, representing the entire universe of interest. Specifically, the target group comprises the 31 private commercial banks currently operating in Ethiopia. Siket Bank was excluded from the study as it commenced operations on July 12, 2023. As of now, a total of 32 private commercial banks are operating in Ethiopia.

3.5 Sample Technique and Sample Size

The researcher employs purposive sampling, a non-probability sampling method, to select banks based on the availability of sufficient data. Consequently, the selected banks are Awash Bank, Bank of Abyssinia, Dashen Bank, Wegagen Bank, Hibret Bank, Nib International Bank, Zemen Bank, and the Cooperative Bank of Oromia.

3.6 Data Type and Source

Using secondary data obtained from a subset of commercial banks and published yearly reports from commercial banks via their official websites; the study employs a quantitative research methodology. The panel data used in this study was span of nine years, from 2015 to 2023. Pooling observations from multiple units over multiple time periods is what makes up panel data (Brooks, 2008).

3.7 Method of Data Analysis

Regression analysis and descriptive statistics are used to determine how financial innovation impact Ethiopian commercial banks' performance. The researcher examined the relationship between the dependent, independent and control variables using linear regression models. The dependent variable is bank performance, as determined by ROA and number of new customer recruits. The independent variables in financial innovation measurement are ATMs machines, ATM cards, POS terminals, mobile banking, and internet banking. We use bank size as controlling variable. The Panel regression model used in the study to assess each variable's statistical significance.

3.8 Model Specification and Operational Definition of Variables

3.8.1 Model Specification

The research aims to examine the statistical importance of different independent factors, such as internet banking, mobile banking, ATM machines, ATM cards, and POS terminals, along with the dependent factors. This analysis will use panel data regression model along with frequency counts and descriptive analysis.

ROA = β0 + Number of Internet Banking Users + Number of Mobile Banking Users + Number of ATMs + Number of Debit(ATM) Card Holders + Number of POS terminals +bank size+ ε

ROA= β0+β1 NMBi,t+β2NIBi,t+β3 NATM i,t+ β4NPOSi,t+ β5NATCHi,t +BSIZEi,t + ε

Where:

ROA - Return on Assets for bank i at time t

NMB i,t - Number of Mobile Banking users for bank i at time t

NIB i,t - Number of Internet banking users for bank i at time t

NATM i,t- Number of ATMs for bank i at time t

NPOS i,t - Number of POS terminals for bank i at time t

NATCH i,t- Number of ATM Card Holders for bank i at time t

BSIZEi,t-Bank size for bank i at time t

ε _____ error term

βo= Constant term

β1, 2, 3…6 are parameters to be estimated

Return on assets is measured by dividing net income of the banks by their total assets and then multiplied by 100% to get a percentage return on assets.

New customer recruit (NCR) = β0 + Number of Internet Banking Users + Number of Mobile Banking Users + Number of ATMs + Number of Debit(ATM) Card Holders + Number of POS terminals + bank size+ ε

NCR= β0+β1 NMB i,t+β2NIBi,t+β3 NATM i,t+ β4NPOSi,t+ β5NATCHi,t + BSIZEi,t + ε

Where: NCR – New customer recruit for bank i at time t

NMB i,t - Number of Mobile Banking users for bank i at time t

NIB i,t - Number of Internet banking users for bank i at time t

NATM i,t- Number of ATMs for bank i at time t

NPOS i,t - Number of POS terminals for bank i at time t

NATCH i,t- Number of ATM Card Holders for bank i at time t

BSIZEi,t-Bank size for bank i at time t

ε - error term

βo- Constant term

β1, 2, 3…6 are parameters to be estimated

New customers recruit (NCR) measures operational performance.

3.8.2 Operational Definition of Variables

In the paragraphs that follow, dependent, independent and control variables are define.

Dependent Variables

The dependent variable is assessed using the count of new customer acquisitions and return on assets. Return on Assets (ROA) gauges financial performance through the relationship between net income and total assets. To understand how financial innovation affects the performance of commercial banks, operational performance is indicated by the number of new customers brought in.

Independent Variables

ATM machines: According to published data, ATM banking has surpassed branch banking as the most common method for obtaining banking goods and services (Charles, 2016). Among the banks that presently offer the service in Ethiopia, ATMs are the most popular innovation channel (Mattewos, 2016). Customers of banks can access banking services around-the-clock via ATMs, which are also user-friendly and convenient (Charles, 2016). ATMs are grouped in this section according to the overall number of ATMs.

Internet Banking: It is the process of providing bank customers with a vast array of value-added goods and services via the internet and telecommunications networks. Registered clients can access the bank's website and conduct account-related transactions by logging on to internet banking. Another name for it is internet banking. Internet banking is proxied by the total number of users in this segment.

Mobile Banking: Tiwari, Buse, and Herstatt (2006) state that mobile banking involves any transaction started or completed using a mobile device to connect to computer networks. This includes transferring ownership or access rights to goods and services. This section estimates mobile banking by looking at the overall number of mobile banking users.

ATM cards: ATM cards represent the initial type of debit cards. These are plastic cards linked to the user's bank account. When a user utilizes the card, the funds in their bank account are assessed (Parker et al, 2011).

POS: Hardware devices known as point of sale (POS) terminals are utilized in retail settings to handle credit and debit card payments (Halton, 2021). In return for the goods, customers pay the vendor (Habibzadeh and Mirmajidi 2011). The total number of POS terminals is used to approximate POS in this section.

Control Variables

To prevent the exclusion of crucial variables, the size of the bank is utilized as a control variable. Relying on just one measure for bank size is not advisable. Typically, it is important to consider a wider perspective. However, if a single indicator must be chosen, it should be the most thorough, comparable, and strong option available: revenues. Following revenues, total equity could be considered the secondbest choice, while total assets and market capitalization can serve as the third options. As a result, the researcher assessed bank size using the natural logarithm of the total equity value of a bank (Jan S, 2017).

3.9 Unit of Analysis

One of the most important ideas in an explanatory research is the unit of analysis. The unit of analysis is the major entity that what the researcher try to analysing in the study. In this study the unit of analysis will be each private commercial banks operating in Ethiopia.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4.1. Introduction

This chapter focuses on the organization, analysis, and presentation of data obtained from secondary sources. The collected data is examined and interpreted in alignment with the research objective assessing the impact of financial innovation on the performance of Ethiopian banks. It presents the findings and results derived from the specified variables using the methodologies outlined in Chapter Three.

4.2. Descriptive Statistics

Descriptive statistics provide a summary of data by illustrating the relationships between different variables within a sample or population. This step is crucial in research and serves as a foundation before conducting comparisons through inferential statistics. It encompasses various types of variables and includes measures of frequency, central tendency, variability, and position (Yellapu, 2018).

This section presents the summary statistics for the dependent, independent, and control variables in the study. The dependent variables include Return on Assets (ROA), representing financial performance, and the number of newly acquired customers, reflecting operational success. The independent variables are internet banking, mobile banking, ATMs, ATM cards, and POS terminals, while bank size serves as the control variable.

Below are the results of the descriptive statistics, which include the mean, median, maximum, minimum, and standard deviation, along with their explanations.

Table 4.1: Summary of Descriptive Statistics

	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic
Number of ATM card users	72	4.1761	6.5926	5.431106	.5550617
Number of mobile banking user	72	3.4060	6.6095	5.310199	.8286667
Number of POS terminal	72	1.5911	3.3930	2.450416	.4351828
Number of ATM machines	72	1.1761	3.1062	2.207628	.3925522
Number of internet banking users	72	2.2430	5.3327	4.042137	.6275417
Return on asset	72	.0031	.0673	.023119	.0093706
Number of new customer recruit	72	3.2271	6.4472	5.387207	.6791491
Bank Size in millions	72	8.8836	10.4467	9.666121	.3362489

Source: SPSS25 output

The descriptive statistics offer a comprehensive overview of the variables used in this study, capturing both financial innovation indicators and performance measures from 72 observations covering eight commercial banks over nine years. The number of ATM card users (log-transformed) shows a minimum of 4.18 and a maximum of 6.59, with a mean of 5.43 and a standard deviation of 0.56, reflecting moderate variation in card usage. Mobile banking users have the widest spread, ranging from 3.41 to 6.61, with a mean of 5.31 and the highest standard deviation among all financial innovation variables 0.83. This suggests that mobile banking adoption significantly differs across banks likely due to factors such as technological infrastructure, customer digital literacy, and the level of marketing or outreach strategies. The number of POS terminals, with a mean of 2.45 and standard deviation of 0.44, also reflects variation in banks' investment in card based payment technology, indicating that some banks may prioritize face to face retail transaction solutions more than others.

ATM machine deployment appears more consistent across the sector, with a mean of 2.21 and a relatively low standard deviation of 0.39, pointing to standardization in physical banking infrastructure. Internet banking users show a moderate spread, with a

mean of 4.04 and standard deviation of 0.63, suggesting a growing but uneven trend in internet based service usage. When we turn to performance variables, the return on asset (ROA) ranges from 0.0031 to 0.067 with an average of .0231 and a low standard deviation of .0093, indicating relatively stable profitability across the sampled banks. The number of new customer recruits, used here as an operational performance proxy, ranges from 3.23 to 6.45 (log transformed), with a mean of 5.39 and a standard deviation of 0.68 reflecting a noticeable difference in customer acquisition efforts or success across banks. Lastly, bank size, measured as the natural logarithm of total assets, has a mean of 9.67 with a narrow spread standard deviation of 0.34, suggesting that while banks vary in scale, they are generally comparable in size. These findings highlight that while digital financial innovation indicators vary considerably among Ethiopian banks, core banking characteristics like profitability and size remain relatively stable providing a strong basis for exploring how these innovations influence both financial and operational outcomes.

4.3. Diagnostic test for multiple linear regressions

To ensure the accuracy and reliability of the regression results in this study, it is crucial to assess the fundamental assumptions of the classical linear regression model. This evaluation helps identify and correct any errors in the model, enhancing the overall quality of the research, as emphasized by Brooks (2008). If the data meets the necessary conditions for multiple regression to yield reliable results, diagnostic tests on the variables were conducted in the following section.

4.3.2 Test for average value of the error term is zero (E (ui) =0) assumption

As stated by Brooks (2014), the assumption will always hold true if a constant term is part of the regression equation. Therefore, because this study's regression model has a constant term, it does not violate this assumption.

$$E(ui)=0$$

Where ui represents the error term for the i-th observation, and E(ui) is the expected value of the error term. If this assumption holds, it implies that the model does not systematically over- or under-predict the dependent variable. To test for this assumption, residuals from the OLS regression can be examined. If the residuals are randomly distributed around zero without any systematic patterns, this supports the validity of the assumption.

4.3.3 Multicollinearity

Multicollinearity occurs when two or more independent variables exhibit a strong correlation with each other. This situation complicates the identification of which independent variable affects the variance in the dependent variable and poses challenges in estimating a multiple regression model (Simon, 2004). The Variance Inflation Factor (VIF) is a tool used to detect multicollinearity among variables in a study. In this analysis, the VIF values were examined to assess multicollinearity, and all values were well below the recommended threshold of 10, as suggested by Neter, Kutner, Wasserman, and Nachtsheim (1996). Based on this guideline, it can be concluded that there is no multicollinearity among the independent variables.

Table 4.2.Multicollinearity Test

		Return on asset		Number of new customer recruit	
		Collinearity Statistics		Collinearity Statistics	
Model		Tolerance	VIF	Tolerance	VIF
1	(Constant)				
	NumberofAtmcardusers	.109	9.172	.109	9.172
	Numberofmobilebankinguser	.244	4.093	.244	4.093
	NumberofPOSterminal	.197	5.069	.197	5.069
	NumberofATMmachines	.126	7.936	.126	7.936
	Numberofinternetbankinguser s	.411	2.433	.411	2.433
	BankSizeinmillions	.113	8.817	.113	8.817

Source: SPSS25 output

4.3.4 Assumption for Heteroscedasticity

One of the fundamental assumptions of regression analysis is that the error terms have a constant variance across all observations. When this condition is met, the errors are referred to as homoscedastic. However, if the variance of the errors changes across observations, a condition known as heteroscedasticity arises. This issue is a significant concern in regression analysis, including analysis of variance, because it can distort statistical tests of significance. These tests typically assume that the model's errors are

normally distributed, uncorrelated, and exhibit constant variance across the factors being analyzed (Gujarati, 2004).

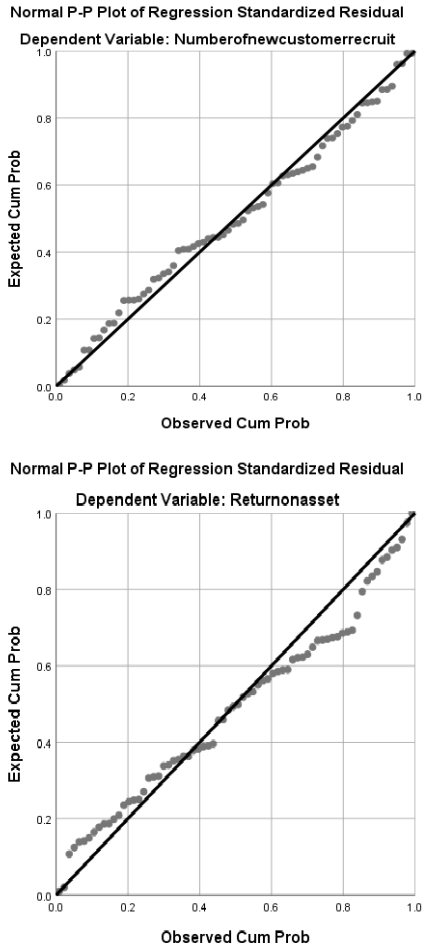
A key assumption of panel regression model is that the residuals have a constant variance. In a well-fitted model, plotting the residuals against the fitted values should not reveal any distinct pattern. However, if the variance of the residuals is inconsistent across observations, this condition is referred to as "heteroscedasticity."

A common method for assessing the assumption of homoscedasticity in regression analysis is to plot the predicted values against the residuals. If the spread of residuals increases or decreases systematically from left to right, it indicates the presence of heteroscedasticity. Conversely, if most points are clustered around zero in the scatter plot, it suggests that the assumption of homoscedasticity is not violated (see Appendix 1).

4.3.5 Assumption for Linearity

The assumption of linearity can be tested by examining the Normal Probability-Probability (P-P) Plot of the Regression Standardized Residual and the scatter plot. Therefore, the linearity of the relationship between the dependent and independent variables was checked using normal p-p plots of the regression residuals for the model through SPSS software. The p-p plot of residuals indicates that the points dwell in a rationally straight line from bottom to top. Therefore, we can conclude that the assumption of linearity was not violated.

Figure 4.1: Normal pp plot Source: SPSS25 output



4.3.6 Assumption for Autocorrelation

The assumption of autocorrelation, also known as serial correlation, is crucial in multiple regression analyses. It assumes that the error terms are independent of one another. This assumption is particularly important in panel data analysis, where observations are organized chronologically. One of the most commonly used methods for detecting autocorrelation defined as the linear correlation between error terms of consecutive observations is the Durbin-Watson test. According to Cochrane (1997), a Durbin-Watson value between 1.5 and 2.5 indicates the absence of autocorrelation. As shown in Table 4.3 below, the findings confirm that there is no autocorrelation present.

Table 4.3.Autocorrelation Test

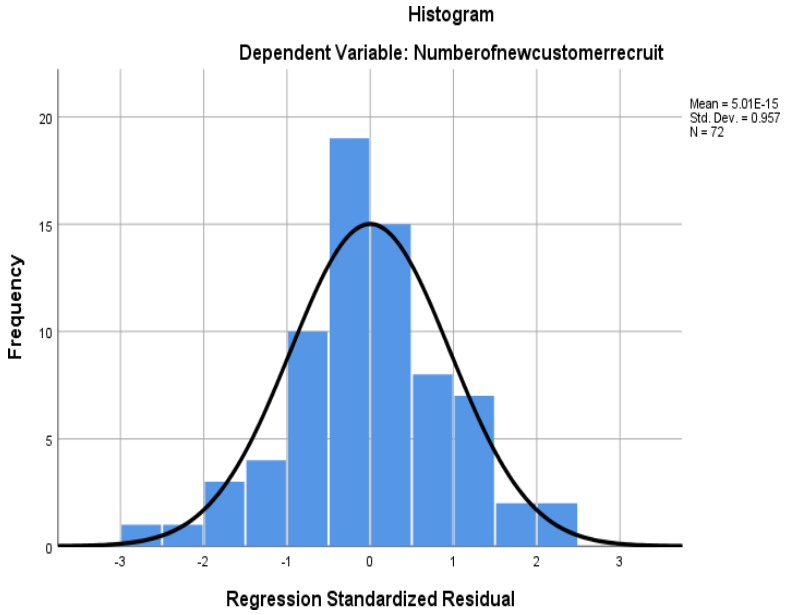
Test	Dependent Variable	Durbin-Watson
Durbin-Watson	Return on Asset	1.615
Durbin-Watson	Number of new customer recruit	1.877

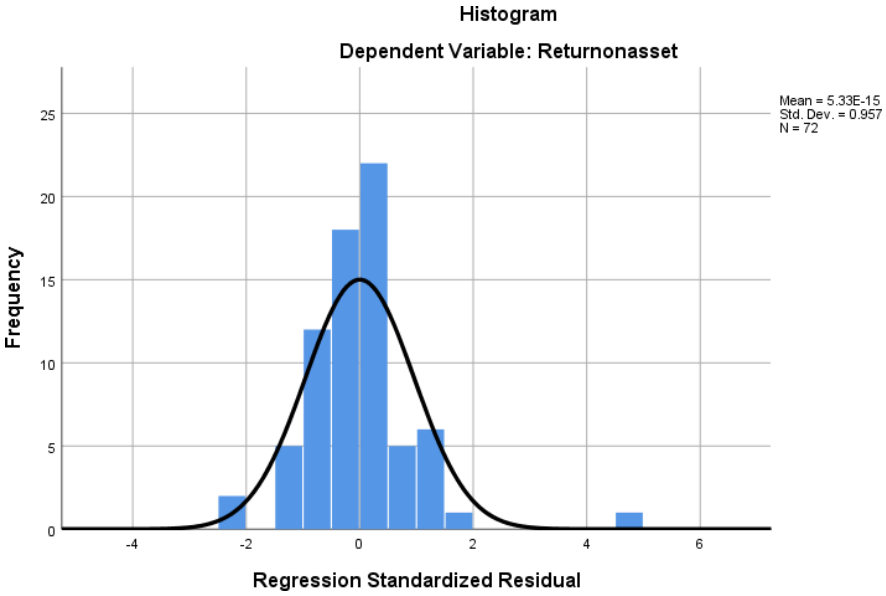
Source: SPSS25 output

4.3.7 Assumption for Normality test

A test for normality was conducted to check if the error term has a normal distribution. The standardized residuals were compared to a normal distribution (see Appendix 1). While some deviations from the curve were observed, most residuals were relatively close to it. Furthermore, the histograms displayed a bell-shaped pattern, suggesting that the residuals (disturbances or errors) are approximately normally distributed. Therefore, it can be concluded that the assumption of normality for the error term is not violated.

Figure 4.2: Normality Test *Source: SPSS25 output*





4.4. Model Selection-Fixed Effects vs. Random Effects

This research employed a panel data regression approach to evaluate how financial innovation affects the performance of commercial banks in Ethiopia. The analysis can be conducted with a fixed effects model or a random effects model. To identify the suitable method, guidance was taken from the works of Brooks (2008) and Gujarati (2004).

Gujarati (2004) suggests that when the time dimension (T) of the dataset is significantly larger than the number of cross-sectional units (N), the results obtained from both fixed and random effects models tend to be similar. In such cases, FEM is often preferred due to its computational simplicity.

In this study, the dataset spans 9 years while covering only 8 commercial banks, indicating that the time dimension is larger than the cross-sectional units. As a result, FEM is deemed more suitable. Additionally, Brooks (2008), Verbeek (2004), and Wooldridge (2006) argue that the REM is more appropriate when the entities in the sample are randomly drawn from a larger population. Since this study's sample was not randomly selected but represents a defined population, FEM is a more reasonable choice. Based on these considerations, the fixed effects model (FEM) used as the optimal approach for analysis.

4.5. Regression analysis

Regression analysis is used to determine whether there is a significant relationship between independent variables and a dependent variable. It also measures the strength of the effects that different independent variables have on the dependent variable and enables predictions (Mooi, 2014). In this study, regression analysis examines two dependent variables Return on Assets (ROA) and new customer recruitment against five independent variables: internet banking, mobile banking, ATM machines, ATM cards, and POS terminals. Additionally, bank size serves as a control variable to assess its influence on the dependent variables.

The connection between the independent and dependent variables is analyzed using SPSS 25. The panel dataset includes 72 entries for five independent variables and one control variable related to 8 commercial banks. To ensure proportionality, these variables were

transformed into natural logarithms, while the dependent variable (ROA) is displayed as a percentage. The operational model that was applied is as shown below:

$$ROA_{it} = \alpha_i + \beta_1 * logNIB_{it} + \beta_2 * logNMB_{it} + \beta_3 * logNATM_{it} + \beta_4 * logNAtmC_{it} + \beta_5 * logNPOS_{it} + \beta_6 * logSIZE_{it} + £_{it}$$

$$NCR_{it} = \alpha_i + \beta_1 * logNIB_{it} + \beta_2 * logNMB_{it} + \beta_3 * logNATM_{it} + \beta_4 * logNAtmC_{it} + \beta_5 * logNPOS_{it} + \beta_6 * logSIZE_{it} + £_{it}$$

Below is the presentation of the outcomes from the regression analysis, which assesses how the control and independent variables affect the dependent variables, along with their interpretations.

Table 4.4: Model Summary for financial innovation and bank financial performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.663[a]	.440	.388	.0073291

a. Predictors: (Constant), BankSizeinmillions, Numberofinternetbankingusers, Numberofmobilebankinguser, NumberofPOSterminal, NumberofATMmachines, NumberofAtmcardusers

b. Dependent Variable: Returnonasset

Source: SPSS 25 output

The coefficient of determination reflects the percentage of variation in the financial performance of commercial banks explained by the five independent variables. The findings reveal that these variables account for only 38.8% of the financial performance, as indicated by the adjusted R^2 value. This suggests that the combination of financial innovation variables and the control variable explains just 38.8% of the changes in banks' financial performance. The remaining 61.2% of the variation in financial performance is attributed to factors not included in the model.

4.5.1. Regression Coefficients

The results displayed in table 4.5 illustrate the regression coefficients. The results indicate that only the count of ATM card users, mobile banking users, the quantity of POS terminals, and the size of the bank significantly affect the banks' financial

performance. ATM card users have positive and significant effect on bank financial performance with a beta value of 0.011 which is significant at 5%. Mobile banking users have a beta value of 0.010 which is significant at 1% , number of POS terminal have 0.015 beta value at significant level of 1% and bank size have 0.028 beta value at significant level of 1% .But Internet banking users and number of ATM machines have negative and insignificant effect on financial performance.

Table 4.5: Coefficients for financial innovation and bank financial performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.162	.057		2.833	.006
	NumberofAtmcardusers	.011	.005	.673	2.393	.020
	Numberofmobilebankinguser	.010	.002	.907	4.829	.000
	NumberofPOSterminal	.015	.005	.719	3.442	.001
	NumberofATMmachines	-.010	.006	-.434	-1.661	.101
	Numberofinternetbankingusers	-.003	.002	-.195	-1.345	.183
	BankSizeinmillions	.028	.008	1.020	3.700	.000

a. Dependent Variable: Return on asset

Source: SPSS 25 output

According to the information provided earlier, the way dependent, independent, and control variables interact within the model is shown in the following manner:

$ROA_{it} = 0.162 + 0.011*NAtmCit + 0.010*NMB_{it} + 0.015*NPOS_{it} - 0.010*NATM_{it} -0.003*NIB_{it} + 0.028*BSIZE + £_{it}$

This means that holding other factors constant one unit increase in number of ATM card users result in 0.011 unit increases in the bank financial performance, one unit increase in mobile banking users result in 0.010 unit increase in the bank financial performance, one

unit increase in number of POS terminal result in 0.015 unit increase in the bank financial performance.

Table 4.6: Model Summary for financial innovation and bank operational performance (which is measured by number of new customer recruited by banks)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.812[a]	.660	.629	.4138324

a. Predictors: (Constant), BankSizeinmillions, Numberofinternetbankingusers, Numberofmobilebankinguser, NumberofPOSterminal, NumberofATMmachines, NumberofAtmcardusers

b. Dependent Variable: Number of new customer recruit

Source: SPSS 25 output

The adjusted R value mentioned above indicates how much the changes in the dependent variable can be accounted for by alterations in the independent and control variables. It also shows the percentage of variation in the operational performance variable that relates to all five independent variables, along with the control variable. The summary of the model can be found in table 4. 6 presented above.

The findings indicate that the adjusted R^2 value reveals the five independent variables, along with the control variables, account for 62.9% of the operational performance. The other 37.1% of the variations are due to different variables that are not part of this model.

Table 4.7: Regression Coefficients of operational performance

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.803	3.234		.557	.579
	Number of Atm card users	.629	.268	.514	2.346	.022
	Number of mobile banking user	.516	.120	.629	4.300	.000
	Number of POS terminal	.757	.254	.485	2.981	.004
	Number of ATM machines	.128	.352	.074	.364	.717

	Number of internet banking users	-.185	.122	-.171	-1.514	.135
	Bank Size in millions	.347	.434	.172	.801	.426

a. Dependent Variable: Number of new customer recruit

Source: SPSS 25 Output

The results presented in table 4. 7 display the regression coefficients. From these results, it can be seen that the only significant factors in forecasting the banks' operational performance are the count of ATM card users, mobile banking users, and the number of POS terminals. ATM card users have positive and significant effect on bank operational performance with a beta value of 0.629 which is significant at 5%. Mobile banking users have a beta value of 0.516 which is significant at 1% and number of POS terminal have 0.757 beta value at significant level of 1%.But Internet banking users have negative and insignificant effect on operational performance while number of ATM machines and bank size have positive but insignificant effect on operational performance.

According to the information provided earlier, the connections among the dependent, independent, and control variables in the model are shown in the following way:

$$NCR_{it} = 1.803 + 0.629*NAtmCit + 0.516*NMB_{it} + 0.757*NPOS_{it} + 0.128*NATM_{it} -0.185*NIB_{it} + 0.347*BSIZE + £_{it}$$

This indicates that if all other factors remain the same, an increase of one unit in the count of ATM card users leads to a rise of 0.629 units in the operational performance of the bank. Similarly, a one unit growth in mobile banking users results in a 0.516 unit improvement in the bank's operational performance. Furthermore, an increase of one unit in the number of POS terminals brings about a 0.757 unit rise in the bank's operational performance.

4.7 Hypothesis Test

The results of this study show that although a few outcomes matched our expectations, others did not. Below, we will talk about the hypotheses that differed from the actual results.

H1a: Automated teller machines (ATMs) have a positive and significant impact on the financial performance of commercial banks in Ethiopia.

The regression results show that the number of ATMs has a negative and insignificant impact on the financial performance of commercial banks in Ethiopia. This finding

contradicts the hypothesis that ATMs would enhance bank profitability so we reject the hypothesis. Similar findings have been reported by Rukiya Temam (2018), who argued that the high costs associated with installing and maintaining ATMs, particularly in developing markets, outweigh the financial benefits in Ethiopian banks. ATMs are costly to operate, and their maintenance demands a substantial investment, especially when network infrastructure is unreliable and cash replenishment issues arise. However, studies by Tilahun (2016) and Solomon (2016) found a positive relationship between ATMs and bank profitability, suggesting that ATMs can enhance customer convenience and reduce transaction times. The discrepancy in the findings of this study could be explained by limited transaction volumes at ATMs in Ethiopia. Many customers still prefer in-person banking or mobile banking services for transactions, which limits the potential impact of ATMs on profitability. Moreover, security concerns surrounding ATM usage and a relatively low banking penetration rate may discourage widespread adoption, contributing to the negative and insignificant effect on financial performance in the Ethiopian context.

H1b: Automated teller machines (ATMs) have a positive and significant impact on the operational performance of commercial banks in Ethiopia.

Regarding operational performance, the study finds that the number of ATMs has a positive effect on operational performance, but the effect is statistically insignificant so we reject the hypothesis. While ATMs are expected to improve the efficiency of banking operations by automating cash withdrawals and reducing congestion at bank branches, the lack of significance suggests that their impact may be limited in the Ethiopian context. Similar to findings in other markets (Jegede, 2014), ATMs can potentially streamline operations and reduce the need for manual labor. However, challenges such as network failures, inconsistent service availability, and the low usage of ATMs by the majority of the population could explain why the impact is not significant in Ethiopia. Additionally, operational inefficiencies such as poor cash management systems and lack of support infrastructure may hinder the full operational potential of ATMs.

H2a: Mobile banking has a positive and significant impact on the financial performance of commercial banks in Ethiopia.

The study confirms that mobile banking has a positive and significant impact on the financial performance of commercial banks, with a beta value of 0.010, which is

significant at the 1% level due to this we accept the hypothesis. This finding is consistent with previous studies by Haabazoka (2018), Gakure & Ngumi (2013) and Rahel (2015), who found that mobile banking positively impacts profitability by increasing customer accessibility and reducing reliance on physical branches. The success of mobile banking in Ethiopia can be attributed to the high penetration of mobile phones and the low cost of mobile banking relative to other forms of banking. USSD-based mobile banking platforms, mobile wallets, and digital transaction services have become highly popular, driving financial performance by enhancing customer reach and reducing operating costs. The adoption of mobile banking in Ethiopia has matured in recent years, with a growing number of customers using mobile platforms for daily banking transactions such as bill payments, money transfers, and mobile loans.

H2b: Mobile banking has a positive and significant impact on the operational performance of commercial banks in Ethiopia.

Mobile banking also demonstrates a positive and significant impact on operational performance ($\beta = 0.516$, $p < 0.01$) so we accept the hypothesis on 1% significant level. This suggests that mobile banking enhances the operational efficiency of banks by reducing branch workload, cutting down on administrative costs, and streamlining customer service. Banks are able to handle more customers digitally, reducing the burden on physical branches. With more customers opting for mobile banking, branches can focus on offering higher-value services rather than routine transactions. Security improvements and the increased speed of mobile transactions likely contribute to this significant effect. Mobile banking has also become a critical tool for enhancing customer engagement, driving efficiency, and reducing the need for in-person visits, which ultimately improves bank operations.

H3a: Internet banking has a positive and significant impact on the financial performance of commercial banks in Ethiopia.

The research indicates that internet banking does not have a significant or positive effect on financial performance, leading us to dismiss the hypothesis. This result corresponds with earlier studies by Haabazoka (2018), Francesca & Claeys (2010), and Malhotra & Singh (2010), but it contrasts with the findings from Chaarani & Abiad (2018), who researched a similar topic in Lebanon. Additionally, Kalluri (n. d.) discovered different

results for commercial banks in India, noting that internet banking showed no immediate influence on profitability, especially during the initial phases of its use. The reason for the insignificance could be attributed to low internet penetration and security concerns surrounding online banking in Ethiopia. Unlike mobile banking, which is accessible through USSD codes (requiring no internet connection), internet banking relies on stable internet connectivity and customers' trust in online transactions, both of which are underdeveloped in Ethiopia. The relatively high levels of banking literacy required for internet banking and lack of trust in the security of online platforms also contribute to its slow adoption rate. Given that mobile banking is far more accessible, internet banking continues to struggle in terms of its adoption and use, resulting in insignificant financial returns for banks at this stage.

H3b: Internet banking has a positive and significant impact on the operational performance of commercial banks in Ethiopia.

Similarly, internet banking has a negative and insignificant effect on operational performance so we reject the hypothesis. While internet banking can streamline banking operations by automating many tasks, its adoption rate is still limited in Ethiopia. The low rate of internet connectivity and slow technological adaptation among customers has prevented internet banking from playing a major role in improving operational efficiency. In contrast to mobile banking, which offers customers access through low-cost and highly accessible USSD platforms, internet banking requires better infrastructure and higher digital literacy, both of which are still in their early stages in Ethiopia.

H4a: Point of sale (POS) terminals has a positive and significant impact on the financial performance of commercial banks in Ethiopia.

The analysis of regression indicates that POS terminals positively and significantly influence financial performance ($\beta = 0.015$, $p < 0.01$), leading us to accept the hypothesis. This result aligns with earlier studies conducted by Akhisar et al. (2015) and mirrors findings from Elbetel (2022) and Temam (2018).

Additionally, Kalluri (2015) identified a positive link between POS terminals and financial performance. On the other hand, research by Damtew (2016) found a negative connection between POS terminals and financial results, which suggested that using POS enhanced bank profitability through increased transaction volumes, promotion of cashless

payments, and decreased cash handling expenses.

The efforts by the Ethiopian government to encourage digital payment solutions, including etax and cashless transactions, have probably helped more merchants accept POS systems. With an increasing number of consumers and businesses turning to cashless payments, the number of transactions through POS systems is growing. This growth enhances bank profits by raising the income earned from each transaction and lowering operating expenses.

H4b: Point of sale (POS) terminals has a positive and significant impact on the operational performance of commercial banks in Ethiopia.

POS terminals also show a positive and significant effect on operational performance ($\beta = 0.757$, $p < 0.01$) due to this we accept the hypothesis, which strongly suggests that the adoption of POS systems helps banks increase operational efficiency. POS systems reduce the need for manual cash handling, improve transaction speed, and increase accuracy in financial reporting. Banks and merchants benefit from faster payment processing and improved customer satisfaction as POS systems facilitate seamless transactions, contributing to better overall operational performance.

H5a: ATM cards have a positive and significant impact on the financial performance of commercial banks in Ethiopia.

The study finds that ATM card usage has a positive and significant impact on financial performance ($\beta = 0.011$, $p < 0.05$) so we accept the hypothesis. this result is differ from Temam (2018) and Elbetel (2022) however the result supports findings by Jegede (2014) and Akhisar et al. (2015) and Damtew (2016) who found that ATM card usage enhances profitability by increasing transaction volumes and reducing the reliance on cash-based transactions. ATM cards are linked to various banking products, including online payments, international transactions, and utility bill payments, all of which enhance bank profitability. E-commerce adoption and the ability to perform transactions remotely via ATM cards have also contributed to the increased use of cards and higher transaction fees, which benefit banks financially.

H5b: ATM cards have a positive and significant impact on the operational performance of commercial banks in Ethiopia.

ATM card usage also shows a positive and significant effect on operational performance

($\beta = 0.629$, $p < 0.05$) so we accept the hypothesis. This is because ATM cards facilitate faster transactions, reduce physical branch congestion, and improve overall banking efficiency. Banks are able to serve more customers with fewer resources, resulting in improved operational efficiency. However, challenges such as fraud risks, security concerns, and the lack of widespread merchant acceptance of ATM card payments continue to pose obstacles to the full potential of ATM cards in the long run.

H6a: Bank size has a positive and significant impact on the financial performance of commercial banks in Ethiopia.

H6b: Bank size has a positive and significant impact on the operational performance of commercial banks in Ethiopia.

The size of a bank positively affects its financial performance ($\beta = 0.\ 028$, $p < 0.\ 01$). This aligns with the findings from Abebe (2019) and Elbetel (2022). Both researchers examined how bank size influences commercial banks' profitability and the role of technological innovation in bank performance, respectively, and identified a strong positive association. On the other hand, Alfadhli & Alali (2021) observed an inverse relationship between bank size and return on assets (ROA). This supports the theory that larger banks gain advantages through economies of scale, wider customer bases, and varied revenue sources, which enables them to achieve higher profits. Nonetheless, bank size does not significantly affect operational performance. This indicates that even though large banks may have financial benefits, operational efficiency is mainly shaped by other elements like the adoption of technology and the quality of services.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter presents the summary, conclusion, and recommendations of the study, which examined the impact of financial innovation on the performance of commercial banks in Ethiopia. The research focused on evaluating financial performance using return on assets (ROA) and assessing operational performance through the number of new customers. Financial innovation was represented by five independent variables: internet banking, mobile banking, automated teller machines (ATMs), ATM cards, and POS terminals, with bank size included as a control variable. The chapter summarizes the key findings, draws conclusions based on the results, and provides recommendations to enhance the financial performance of commercial banks through effective financial innovation strategies.

5.2 Summary of Major Findings

This research looked into how financial innovation affects how well commercial banks perform in Ethiopia. It used return on assets (ROA) to evaluate financial performance and counted the number of new customers to assess operational performance. Five independent variables represented financial innovation: internet banking, mobile banking, automated teller machines (ATMs), ATM cards, and POS terminals. The size of the bank was also considered a control variable.

The results of the research show that different financial innovations affect the financial success of commercial banks in Ethiopia in different ways. The analysis revealed that internet banking has a negative and statistically insignificant effect on the return on assets (ROA), thereby failing to support the corresponding hypothesis. This insignificance may be attributed to the relatively low internet penetration and prevailing security concerns associated with online banking in Ethiopia. In contrast to mobile banking, which is widely accessible through USSD codes and does not require internet connectivity, internet banking depends on stable internet infrastructure and a high level of customer trust both of which remain underdeveloped in the Ethiopian context. On the other hand, mobile banking has demonstrated a statistically significant and positive impact on both

the financial and operational performance of banks in Ethiopia. This success is largely attributable to the widespread penetration of mobile phones and the relatively low cost of mobile banking compared to traditional banking channels. The growing popularity of USSD-based mobile banking platforms, mobile wallets, and digital transaction services has expanded customer access and contributed to cost efficiencies. In recent years, mobile banking adoption has matured considerably, with an increasing number of customers utilizing mobile platforms for routine financial activities such as bill payments, fund transfers, and accessing mobile credit services.

The deployment of ATM machines exhibited a negative and statistically insignificant effect on Return on Assets (ROA). This outcome may be attributed to the high operational and maintenance costs associated with ATMs, particularly in environments with unreliable network infrastructure and frequent cash replenishment challenges. Additionally, the growing preference for mobile banking among customers has further limited the utilization and profitability of ATMs. Meanwhile, POS terminals showed a positive and significant impact on ROA, implying that an increase in POS transactions contributes to improved financial performance. This can be attributed to the growing adoption of cashless transactions, which enhances efficiency and revenue generation for banks. Similarly, ATM cards were found to have a positive and statistically significant impact on the financial performance of commercial banks. This can be attributed to their multifaceted role in modern banking, as ATM cards are not only used for cash withdrawals but are also integrated with a variety of financial services such as online purchases, utility payments, and international transactions. These functionalities increase customer convenience and transaction volumes, thereby contributing to fee-based income and improving overall bank profitability.

In terms of operational performance measured by the number of new customer recruitment financial innovations have proven to be pivotal in enhancing customer engagement and outreach. Specifically, mobile banking, ATM cards, and POS terminals have significantly contributed to attracting new clients by increasing convenience and accessibility to financial services. These technologies align well with evolving consumer expectations for flexible, real-time banking interactions.

Conversely, internet banking and ATM machines exhibited an insignificant impact on customer acquisition. This outcome may be attributed to inconsistent user experiences, interface usability challenges, and varying levels of customer familiarity and trust, which can lead to lower adoption rates. In the case of ATM machines, their limited role may also reflect the emergence of more convenient alternatives such as mobile banking and digital wallets, which reduce reliance on physical infrastructure.

These findings underscore the importance for banks to strategically enhance the usability, reliability, and awareness of underperforming technologies particularly internet banking and ATM services. Doing so could help unlock their full potential, improve operational efficiency, and expand customer bases in a competitive financial landscape.

5.3 Conclusion

This study investigated the impact of financial innovation on the performance of commercial banks in Ethiopia, using return on assets (ROA) as a measure of financial performance and the number of new customer recruits as an indicator of operational performance. The findings reveal that not all financial innovations exert the same level of influence. Mobile banking, ATM cards, and POS terminals were found to significantly enhance both financial and operational performance, underlining their critical role in driving profitability and expanding customer outreach. These innovations, particularly mobile banking, have benefited from widespread mobile phone penetration and customer familiarity, enabling banks to reduce costs, enhance accessibility, and provide flexible, user-friendly services that align with consumer expectations.

Conversely, the study found that internet banking and ATM machines had a statistically insignificant impact on both financial and operational performance. These results may reflect limitations in infrastructure, inconsistent user experiences, and consumer skepticism around digital security. Despite their potential, these technologies have yet to gain widespread traction in the Ethiopian banking context. As such, the findings suggest that for commercial banks to remain competitive and improve performance outcomes, greater emphasis must be placed on enhancing the functionality, accessibility, and public awareness of underutilized innovations. Investments in customer education, digital literacy, and infrastructure development particularly for internet banking will be vital in

unlocking their full potential and ensuring inclusive financial innovation across the sector.

5.4 Recommendations

In light of the study's findings, it is recommended that commercial banks in Ethiopia prioritize the continued expansion and enhancement of mobile banking, ATM card services, and POS terminals. These technologies have shown a strong and positive impact on both financial and operational performance. Banks should invest in improving the user interface, service reliability, and integration of these platforms with other financial products such as mobile wallets, microloans, and digital payment systems. In addition, strategic partnerships with fintech providers and merchants can help extend the reach of POS terminals and further encourage the use of digital payments, thereby improving efficiency and profitability.

Furthermore, banks should reassess their strategies surrounding internet banking and ATM machine deployment. Given the insignificant impact of these channels on performance, banks are advised to enhance customer awareness, simplify user experiences, and improve the reliability and security of internet banking platforms. Investments in digital infrastructure, customer education, and robust cybersecurity measures are essential to increase adoption and trust. Similarly, with declining demand for ATM services, banks should consider optimizing ATM network locations and minimizing maintenance costs, while gradually transitioning toward more cost-effective and digital alternatives. Collectively, these strategic interventions can help commercial banks in Ethiopia better leverage financial innovations to improve customer engagement and overall performance in a competitive and evolving financial landscape.

5.5 Proposed for Future Research

While this study provided valuable insights into the impact of financial innovations on the performance of commercial banks in Ethiopia, it was limited to five specific innovation variables and used ROA and customer recruitment as proxies for financial and operational performance. Future research could expand the scope by incorporating additional financial innovation variables such as agency banking and mobile wallets. Including these emerging technologies may provide a more comprehensive understanding

of how digital transformation influences bank performance in developing economies.

Moreover, future studies may benefit from using broader performance metrics, including customer satisfaction, cost-to-income ratios, or return on equity (ROE), to capture a more nuanced picture of bank efficiency and stability. Qualitative approaches, such as interviews or case studies, could also provide deeper insight into customer perceptions, barriers to technology adoption, and institutional readiness. Additionally, researchers may consider examining regional variations within Ethiopia or conducting comparative studies between Ethiopian banks and those in other Sub-Saharan African countries to evaluate the contextual effectiveness of financial innovations across diverse environments.

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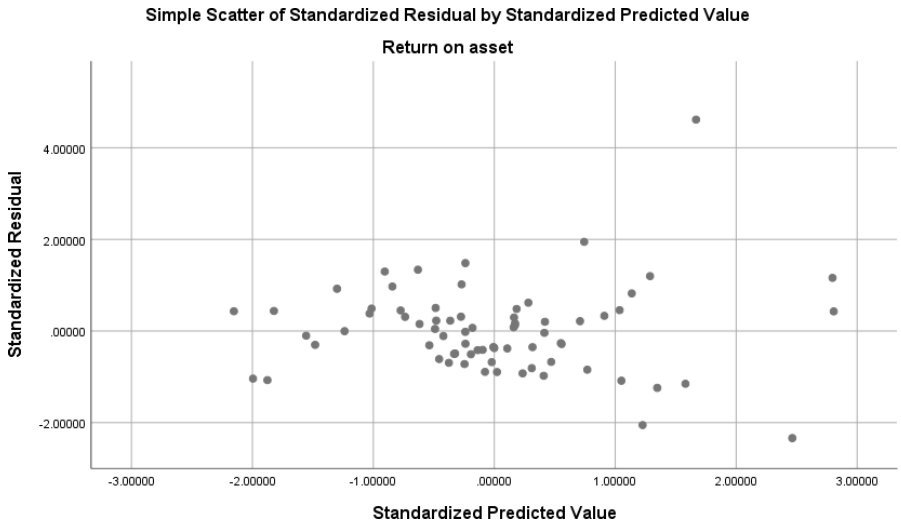
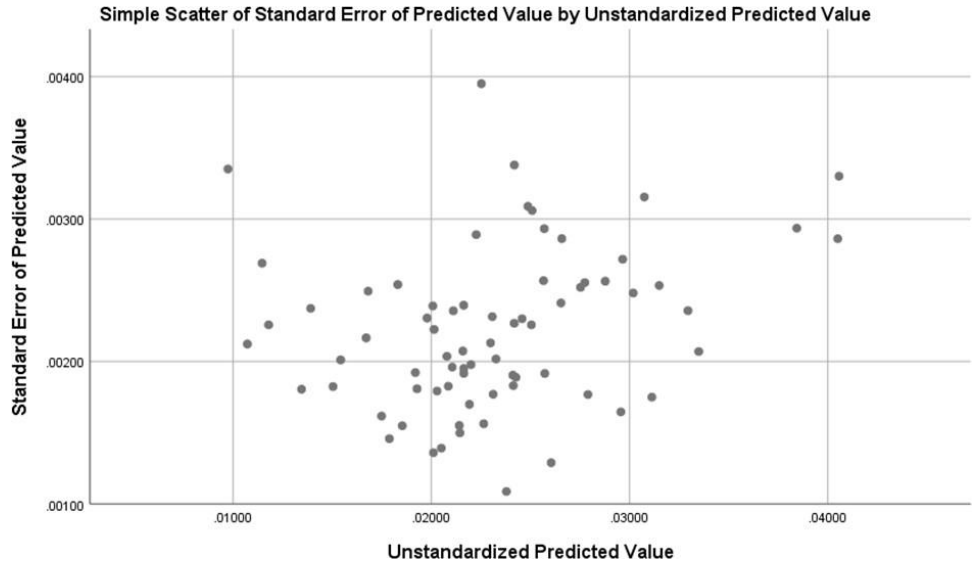
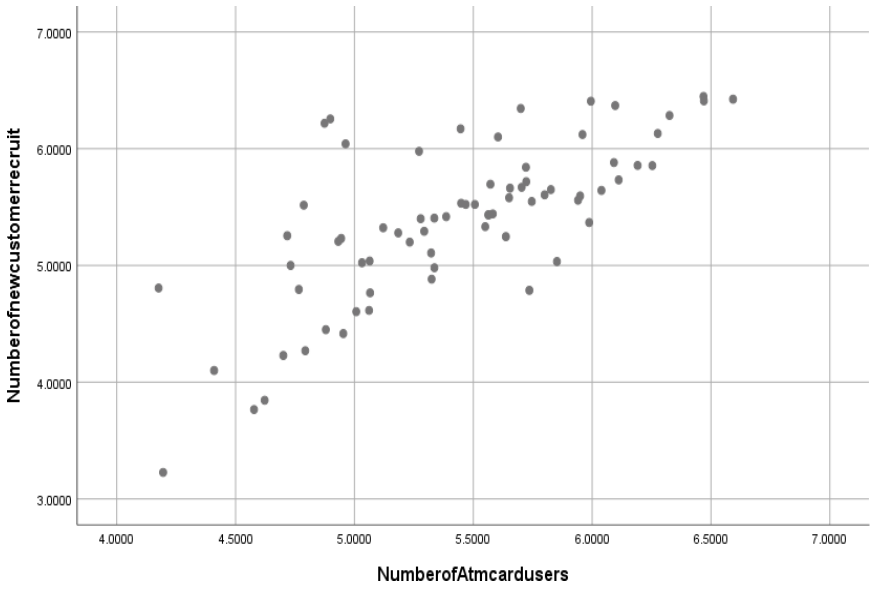
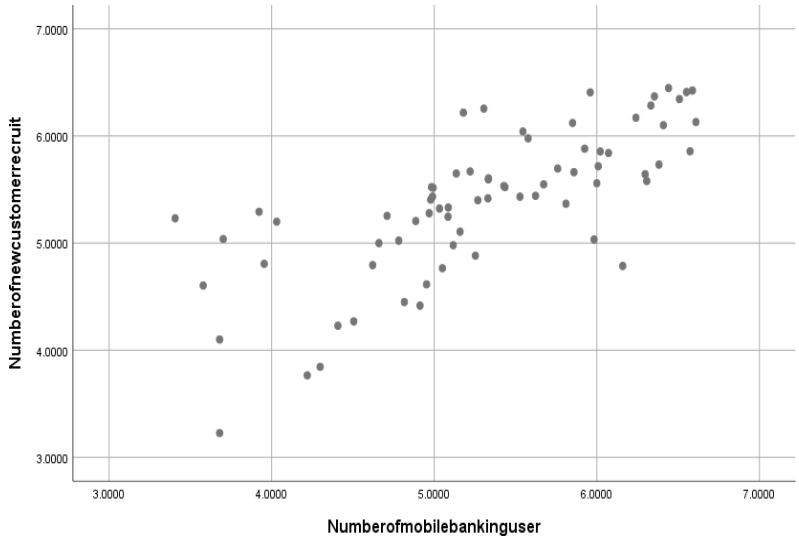
Appendix 1 Heteroscedasticity






Numberofnewcustomerrecruit
7.0000
6.0000
5.0000
4.0000
3.0000
4.0000
4.5000
5.0000
5.5000
6.0000
6.5000
7.0000
NumberofAtmcardusers


Numberofnewcustomerrecruit
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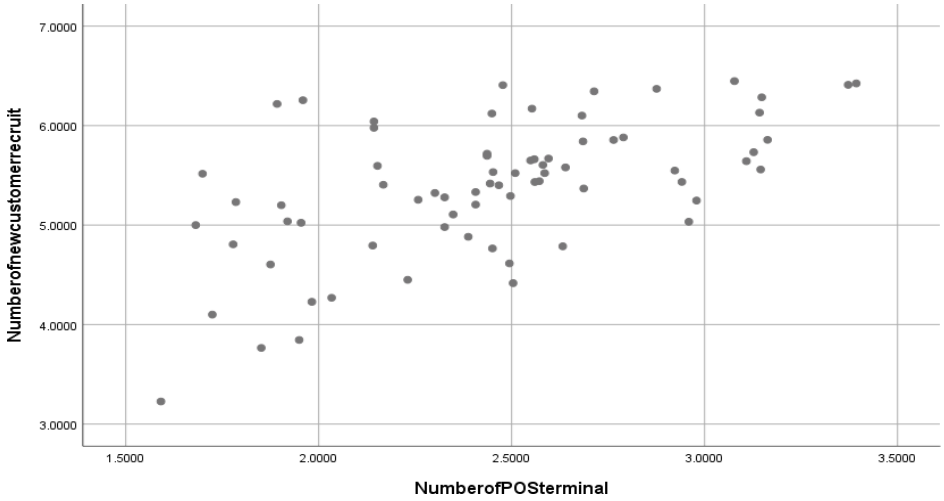
Numberofmobilebankinguser


7.0000
6.0000
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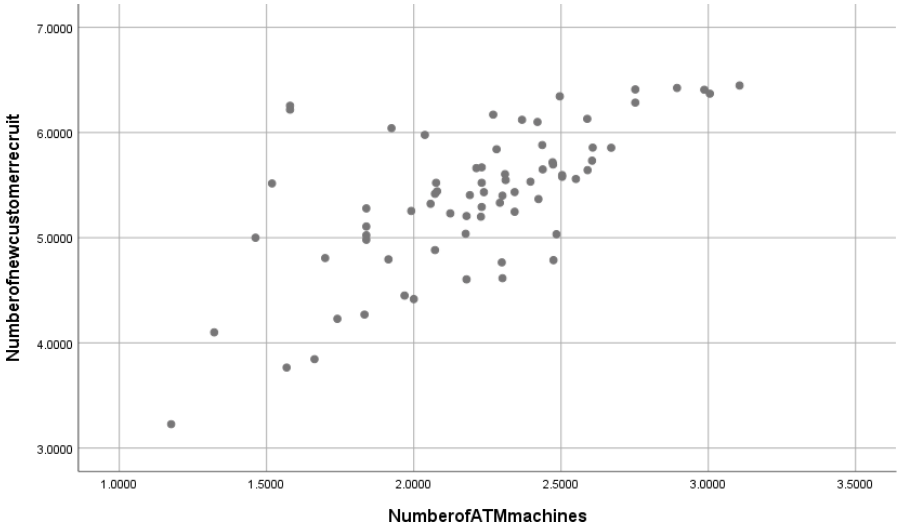
Numberofnewcustomerrecruit
1.5000
2.0000
2.5000
3.0000
3.5000
NumberofPOSterminal


7.0000
6.0000
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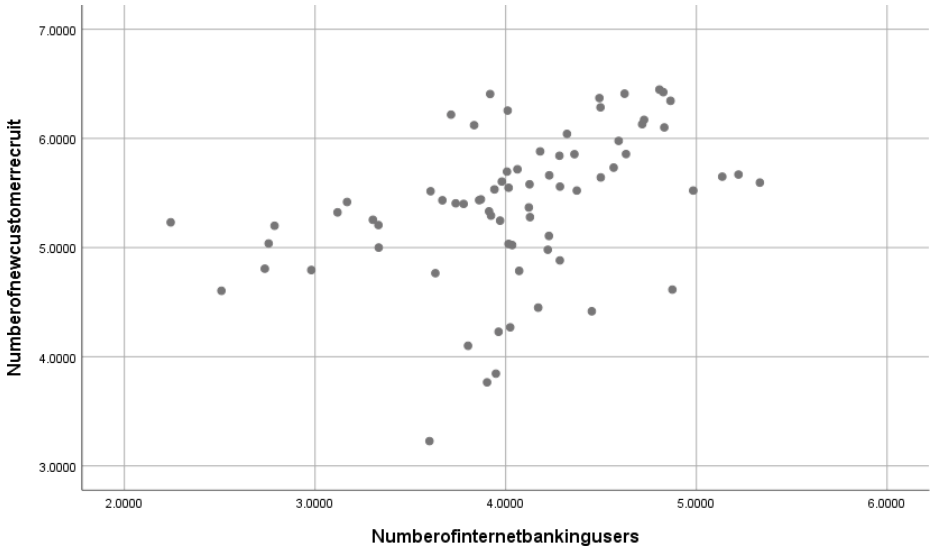
2.0000
2.5000
3.0000
3.5000
NumberofATMmachines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Numberofnewcustomerrecruit
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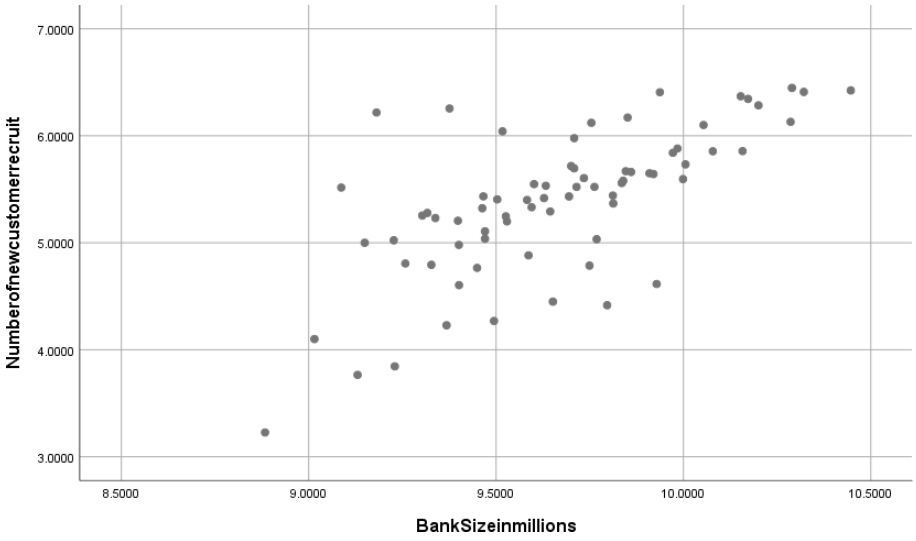
Numberofinternetbankingusers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6.0000
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Numberofnewcustomerrecruit
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9.0000
9.5000
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BankSizeinmillions