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MASTER THESIS

THE IMPACT OF INFORMATION TECHNOLOGICAL INNOVATION ON FINANCIAL PERFORMANCE OF CBE (COMMERICAL BANK OF ETHIOPIA) IN Aksum, TIGRAY REGION

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Aksum, ETHIOPIA

THE IMPACT OF INFORMATION TECHNOLOGICAL INNOVATION ON FINANCIAL PERFORMANCE OF CBE (COMMERICAL BANK OF ETHIOPIA) IN Aksum, TIGRAY REGION

A Thesis in Partial Fulfillment Of The Requirement For The Degree Of Master Of Science In Information Technology

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List of Abbreviations

ATM = Automatic Teller Machine

(ROA) =return on assets

, (ROE), =return on equity

(NPM)= net profit margin

, (EFT) =electronic fund transfers

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Abstract

This thesis investigates the relationship between technological innovation and the financial performance of Commercial Bank of Ethiopia in the Aksum, Tigray Region. The study evaluates key financial metrics, including return on assets (ROA), return on equity (ROE), and net profit margin (NPM), to assess the impact of innovations like mobile banking, ATMs, and electronic fund transfers (EFT) on profitability, efficiency, and risk management. The banking sector has been significantly transformed by technological advancements, redefining how services are delivered and managed. While global studies suggest a positive impact of these innovations, this research focuses on a local context where the relationship between technology and financial outcomes has been underexplored. A quantitative research design was used, with data collected from 4 Commercial Bank of Ethiopia, employing multivariate regression analysis to determine the effects of technological innovation on financial performance. The findings indicate a positive correlation between technological innovation and financial performance, particularly in the areas of mobile banking and ATMs, which have significantly boosted ROA and profitability. However, challenges such as the cost of technology implementation and regulatory pressures limit the extent of these benefits. In conclusion, technological innovation is essential for enhancing the financial performance of Commercial Bank of Ethiopia. Recommendations include increased investment in customer-centric technologies and addressing barriers to innovation. The study provides insights for Commercial Bank of Ethiopia, regulators, and policymakers in maximizing returns from technology adoption.

Keywords: *Technological innovation, financial performance, Commercial Bank of Ethiopia*

CHAPTER ONE

INTRODUCTION

This chapter consists of the background of the study, statement of the problem, research questions, and objectives of the study, significance of the study, and delimitations of the study.

1.1 Background of the Study

In the wake of global economic challenges and increasing regulatory pressures, Commercial Bank of Ethiopia face mounting expectations to demonstrate resilience, agility, and profitability (Demirgüç-Kunt & Klapper, 2013). Technological innovation emerges as a strategic imperative for Commercial Bank of Ethiopia to navigate these challenges, differentiate themselves in the market, and sustain long-term growth and profitability.

The banking sector has undergone a profound transformation in recent years, driven by rapid advancements in technology and evolving consumer preferences (Beck, T., De Jonghe, O., & Schepens, G., 2017). Traditional banking services, once characterized by brick-and-mortar branches and paper-based transactions, have given way to digital innovations that offer convenience, accessibility, and efficiency. Commercial banks Ethiopia, in particular, have been instrumental in embracing these technological advancements to stay competitive in an increasingly digitalized landscape (Demirgüç-Kunt & Klapper, 2013).

The adoption of technological innovations in Commercial Bank of Ethiopia encompasses a wide range of initiatives, including the implementation of online banking platforms, mobile banking applications, AI-powered chat bots, block chain technology, and data analytics tools (Beck et al., 2017). These innovations not only streamline internal operations and enhance risk management but also revolutionize the way banks interact with customers, providing personalized services and seamless user experiences across multiple channels.

The significance of technological innovation in commercial banking extends beyond operational efficiency and customer engagement—it has profound implications for financial performance (Beck et al., 2017). As Commercial Bank of Ethiopia allocate substantial resources to technology investments, it becomes imperative to assess the impact of these investments on key financial metrics such as profitability, efficiency, and risk management. Understanding the relationship

between technological innovation and financial performance is essential for Commercial Bank of Ethiopia to justify their investments, optimize resource allocation, and maintain competitiveness in a dynamic market environment.

While existing literature provides insights into the general benefits of technological innovation in the banking sector, there is a gap in understanding the specific mechanisms through which innovation influences the financial performance of Commercial Bank of Ethiopia. By conducting a study on selected Commercial Bank of Ethiopia, this research aims to fill this gap and contribute to the body of knowledge on the nexus between technology and financial performance in the banking industry.

Thus, The study will aims to explore the relationship between technological innovation and the financial performance of selected Commercial Bank of Ethiopia, shedding light on the mechanisms through which technology influences key financial metrics.

1.2 Statement of the Problem

Financial Technology is the up to the minute technology and innovation that directs the traditional financial methods to deliver the financial services (Neha, 2018).

Nowadays, technological innovation is considered one of the most important tools that can affect the economic sector as well as the banking sector. DeYoung has forecasted that technological progress will destroy the models used in developing and delivering services in banks and will replace them with new and original ones (DeYoung R.,2001). Thus, banks should develop and adopt new technological innovation to perform in a highly competitive environment. Hobe and Alas stated that innovation is one of the key profitability drivers of banks and, in the 21st century, it is becoming increasingly decisive in performance and competitiveness (Beccalli E., (2007). Beccalli has revealed that the investment in information technology and innovation has a significant impact on the performance of the banking sector (Hobe & Alas R., 2017).

The adoption of innovative technologies by Commercial Bank of Ethiopia has not only changed the way banking services are delivered but also influenced their financial performance.

Despite the widespread adoption of technological innovation in the banking sector, there remains a gap in understanding the specific impact of these innovations on the financial performance of selected Commercial Bank of Ethiopia. While existing literature acknowledges the general benefits of technology adoption in enhancing operational efficiency and customer experience (Beck et al., 2017), there is limited empirical research focusing on the nuanced relationship

between technological innovation and financial performance metrics such as profitability, efficiency, and risk management in the context of Commercial Bank of Ethiopia (Demirgüç-Kunt & Klapper, 2013).

Furthermore, while commercial banks Ethiopia invest substantial resources in technological initiatives, there is a lack of clarity regarding the effectiveness of these investments in driving tangible improvements in financial performance. The complex interplay between technological innovation, regulatory environment, market dynamics, and internal capabilities makes it challenging to discern the direct impact of innovation on financial outcomes.

Moreover, as commercial banks Ethiopia operate in a highly competitive and dynamic market environment, there is a pressing need to understand how technological innovation contributes to their ability to achieve sustainable growth, maintain profitability, and adapt to changing market conditions. Without a comprehensive understanding of the relationship between technological innovation and financial performance, Commercial Bank of Ethiopia may struggle to formulate effective strategies, allocate resources efficiently, and capitalize on emerging opportunities in the digital era.

Therefore, the overarching problem addressed by this research is to investigate the impact of technological innovation on the financial performance of selected Commercial Bank of Ethiopia, with a focus on identifying the specific technologies, strategies, and contextual factors that drive financial success in the banking industry.

1.2.1 Basic Research Questions

These basic research questions guide the investigation into the impact of technological innovation on the financial performance of selected Commercial Bank of Ethiopia, facilitating a deeper understanding of the dynamics at play in the banking industry's digital transformation journey.

1. What are the technological innovations adopted by selected Commercial Bank of Ethiopia?
2. What are the key financial performance indicators (e.g., return on assets, return on equity, net profit margin) of the chosen Commercial Bank of Ethiopia over a specified period?
3. What is the relationship between the adoption of technological innovations and the financial performance of selected Commercial Bank of Ethiopia?

4. Which specific technological innovations have the most significant impact on the financial performance metrics of Commercial Bank of Ethiopia?

1.3. Objectives of the Study

These specific objectives guide the research process and help achieve a comprehensive understanding of the impact of technological innovation on the financial performance of selected Commercial Bank of Ethiopia.

1.3.1 General Objective

The general objective of the study was to examine the impact of technological innovation on the financial performance of selected Commercial Bank of Ethiopia.

1.3.2 Specific Objectives

While the specific objectives of the study were:

- To identify the technological innovations implemented by selected Commercial Bank of Ethiopia.
- To analyze the financial performance indicators (e.g., return on assets, return on equity, net profit margin) of the chosen Commercial Bank of Ethiopia.
- To establish the relationship between technological innovation and financial performance metrics of selected Commercial Bank of Ethiopia.
- To determine the key technological drivers that influence financial performance in Commercial Bank of Ethiopia.

1.4 Significance of the study

This study holds significant importance for various stakeholders within the banking industry and beyond:

- Commercial Bank of Ethiopia: Understanding the impact of technological innovation on financial performance will help Commercial Bank of Ethiopia make informed decisions regarding their technology investments and digital transformation strategies.
- Regulators and Policymakers: Insights from this study can inform the formulation of policies and regulations that promote innovation while ensuring financial stability and consumer protection in the banking sector.
- Investors: Investors can use the findings of this study to evaluate the long-term sustainability and competitiveness of Commercial Bank of Ethiopia based on their technological capabilities and financial performance.

- Academic Community: The research contributes to the existing body of knowledge by providing empirical evidence on the relationship between technological innovation and financial performance in the banking industry.

1.5 Scope of the Study

The studies have delimitation or scope that pertains Time, resource and methodological delimitations**.**

Geographic Scope - The study was focused on selected Commercial Bank of Ethiopia operating in Aksum town.

Conceptual scope -The research was used to examine a broad range of technological innovations adopted by Commercial Bank of Ethiopia including online banking, mobile banking, ATM but will not cover the AI-powered solutions, block chain technology, and data analytics tools which are not implemented in these banks.

Financial Performance Indicators -Financial performance will be assessed using key indicators such as return on assets (ROA), return on equity (ROE), and net profit margin (NPM).

Time Frame -The study will analyze financial data and technological innovations over a specified period of 2017 E.C.

Methodological scope - Quantitative research methods, including regression analysis and panel data techniques, will be employed to investigate the relationship between technological innovation and financial performance.

Sample Selection scope - A purposive sampling approach will be used to select a representative sample of Commercial Bank of Ethiopia based on criteria such as size, technological sophistication, and availability of financial data.

1.6 Organization of the Study

This organization provides a structured framework for the study, allowing for a systematic exploration of the impact of technological innovation on the financial performance of selected Commercial Bank of Ethiopia. Each section contributes to a comprehensive understanding of the research topic, from theoretical foundations to empirical analysis and implications for theory and practice. Chapter one Introduction and Background of the Study; chapter two focused on literature Review and Conceptual Framework; chapter three covered Methodology; while chapter four talks about Data Analysis Techniques and lastly chapter five communicated about summery, conclusion and recommendation.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter reviews literature on bank innovations. It discusses the key theories underlying bank innovations, develops a conceptual framework and expounds on the research gaps on bank innovations and financial performance.

2.1 Theoretical Literature Review

A theory is a reasoned statement or group of statements, which are supported by evidence meant to explain some phenomena. A theory is a systematic explanation of the relationship among phenomena. Theories provide a generalized explanation to an occurrence. Therefore a researcher should be conversant with those theories applicable to his area of research (Kombo and Tromp, 2009, Smyth, 2004). According to Trochim (2006) Aguilar (2009), and Tormo (2006), a theoretical framework guides research, determining what variables to measure, and what statistical relationships to look for in the context of the problems under study. Thus, the theoretical literature helps the researcher see clearly the variables of the study; provides a general framework for data analysis; and helps in the selection of applicable research design.

The theories reviewed and which inform the study are, Schumpeter theory of innovation, innovation diffusion theory, task technology fit theory and technology acceptance model. The theories reviewed inform the source of the variables of the study and the interactions between the dependent and independent variables.

2.2 Innovation Diffusion Theory

According to Dillon and Morris (1996); Rogers (1983 & 2003), the factors which influence the diffusion of an innovation include; relative advantage (the extent to which a technology offers improvements over currently available tools), compatibility (its consistency with social practices and norms among its users), complexity (its ease of use or learning), trial ability (the opportunity to try an innovation before committing to use it), and observe ability (the extent to which the technology's outputs and its gains are clear to see). These elements are not mutually exclusive thus unable to predict either the extent or the rate of innovation diffusion. Moore and Benbasat (1991) built on the work of Roger (1983), amongst others Tornatsky and Klein (1982) and

Brancheau and Wetherbe (1990) and expanded the array of innovation characteristics to seven. Three of the seven innovation characteristics are directly borrowed from Rogers: relative advantage, compatibility, and trial ability.

The fourth characteristic, ease of use, is a close relative to Rogers' complexity. It is worth noting that both relative advantage and ease of use are subjective characteristics since they can be viewed differently depending on an individual's perception.

2.3 Task Technology Fit (TTF) Theory

This theory contends that it is more likely to have a positive impact on individual performance and be used if the capabilities of Information Communication and Technology (ICT) match the tasks that the user must perform (Goodhue and Thompson, 1995). Goodhue and Thompson (1995) mention the factors that measure task-technology fit as; quality, locatability, authorization, and compatibility, eases of use/training, production timeliness, systems reliability and relationship with users. The model is useful in the analysis of various context of a diverse range of information systems including electronic commerce systems and combined with or used as an extension of other models related to information systems outcomes.

According to the theory of task-technology fit, the success of an information system should be related to the fit between task and technology, whereby success has been related to individual performance (Goodhue and Thompson, 1995) and to group performance (Zigurs and Buckland, 1998).

2.4 Technology Acceptance Model

Theories and models used in studies related to the innovations, acceptance and use of new technology are many. For instance, focusing on the technological issues (Davis 1989) advances the Technology Acceptance Model (TAM). This model relates the individuals' behavioral intentions and his/her ICT use. It is suggested that, the actual behavior of a person is determined by his behavioral intention to use, which is in turn influenced by user's attitude toward and perceived usefulness of the technology. However attitude and perceived usefulness are both determined by ease of use. Adopting the TAM model requires the understanding of end-users requirements regarding usefulness and user friendliness (Pedersen, Leif, Methlie and Thorbjornsen, 2002). From this model, usefulness and user friendliness affect users' attitudes

towards any service (ibid.). Davis (1989; 1993), thus suggest that it is important to value user requirements based on perceived usefulness and the user friendliness of the technology rather than other objective measure. Critiques of this model are directed to its inclination to the technological/technical aspects of the technology in question ignoring other factors such as social aspect of the users. In practice, constraints such as limited ability, time, environmental or organizational limits and unconscious habits will limit the freedom to act.

2.5 Financial Performance of Commercial Banks

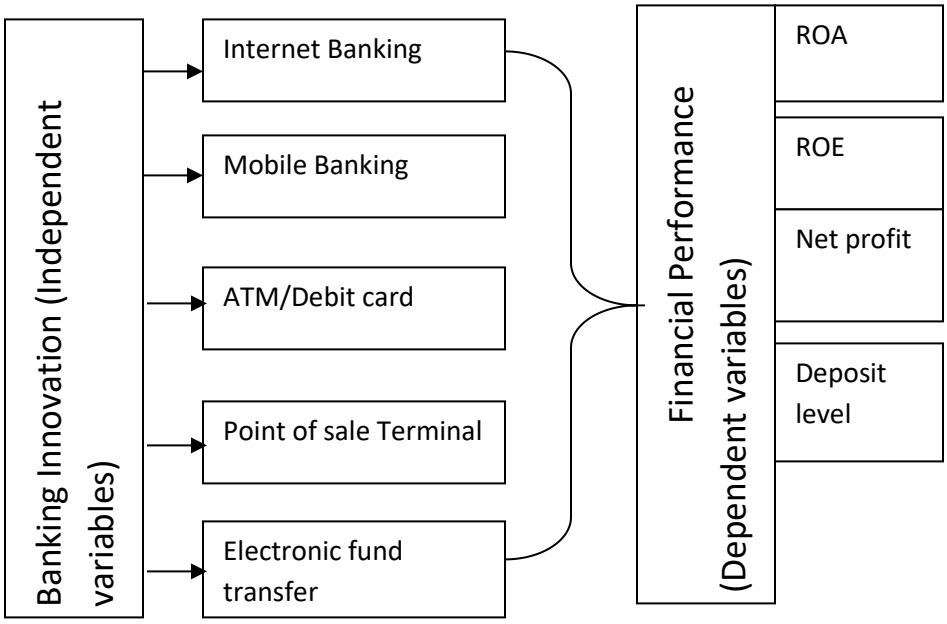
Performance measurement and reporting is now widespread across the commercial sector as well as public sector of many industrialized and industrializing countries (Williams, 2003). The common tool that is used for this process, key performance indicators (KPIs), has been argued to provide intelligence in the form of useful information about a public and commercial agency's performance (Williams, 2003). Scholars like Modell (2004), Moynihan (2005), Vakkuri and Meklin (2006) have maintained that the implementation of performance measurement systems possess important symbolic value.

Profitability offers clues about the ability of the bank to undertake risks and to expand its activity. The main indicators used in the appreciation of the bank profitability are: Return on equity, ROE (Net income / Average Equity), Return on Asset, ROA (Net income /Total assets) and the indicator of financial leverage or (Equity / Total Assets) Dardac and Barbu, 2005). The indicators are submitted to observation along a period of time in order to detect the tendencies of profitability. The analysis of the modification of the various indicators in time shows the changes of the policies and strategies of banks and/or of its business environment (Greuning and Bratanovic, 2004) A commonly used measure of bank performance is the level of bank profits (Ceylan, Emre and Asl, 2008). Bank profitability can be measured by the return on a bank's assets (ROA), a ratio of a bank's profits to its total assets. The income statements of commercial banks report profits before and after taxes. Another good measure on bank performance is the ratio of pre-tax profits to equity (ROE) rather than total assets since banks with higher equity ratio should also have a higher return on assets (Ceylan, Emre and Asl, 2008).

2.6 Conceptual Framework

A concept is an abstract or general idea inferred or derived from specific instances (Kombo and Tromp, 2009, Miles and Huberman, 1994 and Reichel and Ramey, 1987). Unlike a theory, a concept does not need to be discussed to be understood (Smyth, 2004). A conceptual framework is a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation (Kombo and Tromp, 2009). A conceptual framework is a research tool intended to assist a researcher to develop awareness and understanding of the situation under scrutiny and to communicate it. When clearly articulated, a conceptual framework has potential usefulness as a tool to assist a researcher to make meaning of subsequent findings. It forms part of the agenda for negotiation to be scrutinized, tested, reviewed and reformed as a result of investigation and it explains the possible connections between the variables (Smyth, 2004). A conceptual framework for the present study shows the relationship of bank innovations on financial performance of Commercial Bank of Ethiopia in Aksum, Tigray and has been depicted in Figure 2.2 below. Figure 2.2 conceptualizes that bank innovations (Automatic Teller Machines, Debit and Credit cards, Point of Sale (POS) terminals, mobile banking, internet banking and electronic funds transfer) influence on financial performance of banks ascertained through the total income, profitability, return on assets and customer deposits.

Figure 2.2: Conceptual Framework



Source: Own formulation (2025)

2.7 Empirical Literature Review

Empirical literature review is a directed search of published works, including periodicals and books, that discusses theory and presents empirical results that are relevant to the topic at hand (Zikmund et al., 2010). Literature review is a comprehensive survey of previous inquiries related to a research question. Although it can often be wide in scope, covering decades, perhaps even centuries of material, it should also be narrowly tailored, addressing only the scholarship that is directly related to the research question (Kaifeng and Miller, 2008). Through the use of a systematic approach to previous scholarship, literature review allows a researcher to place his or her research into an intellectual and historical context. In other words, literature review helps the author declare why their research matters (Kaifeng and Miller, 2008).

Financial services, the lifeblood of a bank is determined by how well it can gather funds from the customers at the lowest cost; buy money, do something with the money, and then sell it to their profit (Dew, 2007). Financial innovations enable firms from all sectors to raise money in larger amounts and at a cheaper cost than they could elsewhere (Lerner, 2006).

The relationship between IT expenditures and bank's financial performance or market share is conditional upon the extent of network effect. If the network effect is too low, IT expenditures are likely to (1) reduce payroll expenses, (2) increase market share, and (3) increase revenue and profit (Nadia, Anthony and Scholnick, 2003). ATMs as studied by Massoud and Bernhardt (2002a, 2002b) and McAndrews (2002) consider the possibility that ATM surcharges can impact banks profitability, both directly as well as indirectly through a so-called customer relationship effect. This indirect effect results from a customer at a small bank with relatively few ATMs switching his/her deposit account to a larger bank with a larger number of ATMs in order to avoid paying ATM surcharges. If switching occurs then higher ATM surcharges should result in an increase in the market share of bank products (e.g. deposits) and profitability of larger banks and a decrease in the market share of deposits and profitability of smaller banks (McAndrews, 2002).

Hernando and Nieto (2006) while studying whether internet delivery channels change bank's performance, found out that adoption of internet as a delivery channel involved gradual reduction in overhead expenses (particularly, staff, marketing and IT) which translates to an improvement

in banks´ profitability. The study also indicates that internet is used as a complement to, rather than a substitute for, physical branches. The profitability gains associated with the adoption of a transactional web site are mainly explained by a significant reduction in overhead expenses. This effect is gradual, becoming significant eighteen months after adoption and reaching a maximum generally two and a half years after adoption. Their study showed that multichannel banks present statistically significant evidence of efficiency gains, that is, reduction in general expenses per unit of output. Banks would further profit from cost reductions to the extent that the Internet delivery channel functions as a substitute for traditional distribution channels. Their analysis shows that this effect varies over time and explains, in terms of cost and income structure, the main drivers of better performance.

The internet offers a potential competitive advantage for banks and this advantage lies in the areas of cost reduction and more satisfaction of customer needs (Bradley and Stewart, 2003 and Jaruwachirathanakul and Fink, 2005). Encouraging customers to use the Internet for banking transactions can result in considerable operating costs savings (Sathye, 1999). The internet is the cheapest distribution channel for standardized bank operations, such as account management and funds transfer (Polasik and Wisniewski, 2009). Customer dissatisfaction with branch banking because of long queuing and poor customer service is an important reason for the rapid movement to electronic delivery (Karjaluoto, Mattila and Pento, 2002). The commitment of senior management is a driving force in the adoption and exploitation of technology (Shiels, McIvor and O'Reilly, 2003).

CHAPTER THREE

RESEARCH METHODOLOGY

3.3.1 Study Area Description

The study was concentrated on Commercial Bank of Ethiopia operating within the Aksum region of Tigray, Ethiopia. Aksum is selected as the study area due to its significant presence of Commercial Bank of Ethiopia and its representative nature of urban banking environments within Tigray.

3.3.2 Study Population

The study population comprises all Commercial Bank of Ethiopia operating within the Aksum region of Tigray. There are four Commercial Bank of Ethiopia currently operating in Aksum. These banks were served as the primary units of analysis for assessing the impact of technological innovation on financial performance.

3.3.3 Research Design

This study employed a quantitative research design to analyze the relationship between technological innovation and financial performance. Specifically, a cross-sectional design was utilized to collect data at a single point in time, allowing for an examination of the current state of technological innovation and financial performance among selected Commercial Bank of Ethiopia.

3.3.4 Sample Size and Techniques

The sample size was determined based on the total number of Commercial Bank of Ethiopia operating within the Aksum region of Tigray. The study will took General Manager, Deputy Manager, operational and business manager from each bank. Therefore, from management body, there will be 4*4=16 sample will be taken. Similarly, 20 employees from each bank who have been working in the bank for more than two years will be selected randomly. This will leads to 20*4=80 sample size.

In addition experts from information technology departments of each bank will be also included purposively in the study around 74 from each four commercial banks in Aksum. Totally the study will have 16+80+74=170

A purposive sampling technique was used to select a representative sample of Commercial Bank of Ethiopia for inclusion in the study. The selection criteria will include factors such as bank size, market share, and technological sophistication.

3.3.5 Data Source and Collection

Data for this study was collected from both primary and secondary sources:

Primary Data - Primary data were collected through structured questionnaires administered to bank managers or designated personnel responsible for technology adoption and financial performance monitoring. The questionnaire was rather information on the types of technological innovations implemented by the banks, as well as financial performance indicators such as return on assets (ROA), return on equity (ROE), and net profit margin (NPM).

Secondary Data - Secondary data were collected from annual reports, financial statements, and other publicly available sources. These sources provide additional information on the financial performance of selected Commercial Bank of Ethiopia, allowing for a comprehensive analysis of key performance metrics.

3.3.6 Data Analysis Methods

The collected data were analyzed using both descriptive and inferential statistical techniques:

Descriptive Analysis

Descriptive statistics such as mean, median, standard deviation, and frequency distributions will be used to summarize the characteristics of technological innovation and financial performance indicators among selected Commercial Bank of Ethiopia.

Inferential Analysis

Inferential statistics, including correlation analysis and regression analysis, will be employed to examine the relationship between technological innovation and financial performance.

Since you have more than one dependent variable (Income, RON, and Profit), **Multivariate Regression** is the most appropriate technique. This type of regression helps to model and examine the relationships between multiple dependent variables and multiple independent variables simultaneously.

$$\{Y1,Y2,Y3\} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Where:

- $Y1 = Y\_1 = Y1$ = Income

- Y2=Y_2 =Y2 = ROA
- Y3=Y_3 =Y3 = Profit
- X1=X_1 =X1 = ATM
- X2=X_2 =X2 = Electronic Fund Transfer (EFT)
- X3=X_3 =X3 = Mobile Banking
- X4=X_4 =X4 = Internet Banking

β0 ,β1 ,…,β4 are the regression coefficients for the independent variables

- ϵ\epsilon is the error term

The **coefficients** (β\beta) tell you the direction and strength of the relationship between each independent variable and each dependent variable.

R-squared values provide an indication of how well the independent variables explain the variance in the dependent variables.

P-values help you determine the statistical significance of each relationship.

3.2 Ethical Considerations

Ethical considerations will be carefully addressed throughout the research process. Prior consent will be obtained from participating Commercial Bank of Ethiopia, and confidentiality of the collected data will be ensured. The study will adhere to ethical guidelines and principles of research conduct to protect the rights and privacy of all stakeholders involved.

3.3 Validity and Reliability Test

To increase the validity level of findings Triangulation techniques will be used. Use multiple data sources (surveys, interviews, document analysis) to increase the validity of findings. In addition, pilot testing will also use to check the reliability of questions or items before the actual data collection. Conduct a pilot study to test the survey instruments and refine the interview questions

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.1 Response Rate

Primary data was collected between June and August 2025 G.C using a questionnaire. One hundred Seventy (170) questionnaires were issued to randomly selected bank senior managers, employees from 4 commercial banks. One hundred sixty four (164) questionnaires were returned representing a 94.47% response rate.

$$\text{ResponseRate}=(\text{Numberof response}/\text{Totalquesstionre distributed})\times 100$$

$$\text{ResponseRate}=(164/170)\times 100=96.47\%$$

A response rate of 96.47% is excellent, indicating a high level of engagement from the participants. This strengthens the credibility of the findings, as it suggests that the data collected is highly representative of the surveyed population.

Since the response rate is very high, the results are likely to be valid, and non-response bias (where those who didn't respond might have different views) is minimized.

4.2 Demographic profile of Respondents

Table 4.1: Gender of Respondents

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	113	68.9	68.9	68.9
	Female	51	31.1	31.1	100.0
	Total	164	100.0	100.0	

Source: Researcher own computation, 2017 E.C

The table presents the distribution of respondents based on gender, showing both the frequency and percentage of male and female respondents.

There were 164 respondents in total, of which 113 were male respondents making up 68.9 % of the total. While 51 did female respondents comprise 31.1% of the total sample?

The majority of respondents are male (68.9%), while females make up a smaller portion (31.1%). The table confirms that all 164 respondents are accounted for with 100% valid data.

Table 4.2: Age category of Respondents

Age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-30	12	7.3	7.3	7.3
	31-41	114	69.5	69.5	76.8
	41-51	38	23.2	23.2	100.0
	Total	164	100.0	100.0	

Source: Researcher own computation, 2017E.C

In the analysis of Table 4.2 which presents the age category of respondents.

The table shows the distribution of respondents by age categories in terms of frequency, percentage, valid percentage, and cumulative percentage. The key variables here are age categories and their corresponding frequencies and percentages.

20-30 years: This age group represents the youngest category with 12 respondents, constituting 7.3% of the total sample.

31-41 years: This group has the highest representation with 114 respondents, making up 69.5% of the sample, indicating a predominant middle-aged population in the study.

41-51 years: The older age group includes 38 respondents, accounting for 23.2% of the total sample.

The cumulative percent allows us to observe that 76.8% of the respondents are 41 years or younger, with only the remaining 23.2% being over 41 years old. This shows a relatively younger sample skewed towards the 31-41 age groups.

The majority of the respondents (about 70%) are in the 31-41 age range, which suggests that most of the participants in the survey are working-age individuals, likely in their prime career years. This could imply a workforce actively engaged in the core operations of the industry or topic being studied.

Workforce Dynamics: The large percentage of respondents in the 31-41 category may reflect the typical age of employees in certain sectors, such as commercial banking, where experienced professionals are most active.

In conclusion, the age distribution in this dataset indicates that the sample is predominantly composed of respondents in the 31-41 age groups. This age concentration may influence the study outcomes depending on the research's focus and whether age is a significant factor in the analysis of technological innovations or financial performance in the banking sector. The analysis could benefit from acknowledging this bias and considering how it might affect the interpretation of results or necessitate further research involving a broader age range for balance.

Table 4.3: Educational rank of Respondents

		Frequency	Percent
Valid	1st Degree	126	76.8
	Masters & above Degree	38	23.2
	Total	164	100.0

Source: Researcher own computation, 2017 E.C

The data provided in Table 4.3 reflects the educational qualifications of the respondents.

Distribution of Educational Levels: 126 respondents (76.8%) hold a 1st degree while, 38 respondents (23.2%) have a master's degree or higher.

The majority of respondents in your sample have a 1st degree, with a significant share (more than three-quarters) at this level of education.

A smaller, but still relevant portion of respondents (23.2%) have pursued higher education, such as a master's degree or above.

The educational rank of respondents indicates the general skill level in the population. Most have at least a bachelor's degree, which may suggest a relatively educated sample.

Having a diverse representation of educational qualifications (both undergraduate and postgraduate) can contribute to varied perspectives in the research findings. Higher education levels might correlate with deeper insights into complex issues, while those with a 1st degree might bring more practical experience or operational insights. Understanding technological innovations and financial performance in commercial banks, could help tailor analysis by recognizing how education levels influence decision-making and adoption of technologies in the financial sector.

This table shows a well-educated group of respondents with a balanced representation of higher education, which adds value to your study by providing insights from individuals with varying levels of academic attainment.

Table 4.4: Department of Respondents			
		Frequency	Percent
Valid	General manager	4	2.4
	Business Manager	4	2.4
	Operational manager	4	2.4
	ICT	34	20.7
	Audit	44	26.8
	HR	28	17.0
	Customer officer	46	28.0
	Total	164	100.0

Source: Researcher own computation, 2017 E.C

To analyze the data from Table 4.4, which presents the distribution of respondents by department as follows?

The data in Table 4.4 indicates the number of respondents from various departments. A total of 164 respondents participated, and the distribution is provided in both frequency and percentage.

General Managers make up 2.4% of the total sample. Business Managers with 4 respondents, they represent the largest group, constituting 28% of the sample. Operational Managers Comprising 4 respondents, they account for 2.4 % of the total.

There are 34 respondents from the ICT department, making up 20.7% of the sample. Similarly, the Audit department is represented by 44 respondents (26.8%). Twenty eight respondents from the HR department account for 17 %, which is the 2.4% percentage as General Managers. A total of 4 respondents, or 2.4 %, are Customer Officers.

Business Managers (2.4%) As the group, business managers likely play a crucial role in offering insights and driving innovation within the bank.

Customer Officers (28%) and Operational Managers (26.8%) represent important respondent segments. Customer officers focus on client interaction, while operational managers are pivotal to the bank's internal processes, both contributing significantly to overall operations and performance.

Departments such as ICT (20.7%), Audit (26.8%), and HR (17 %) are fairly well represented, suggesting that their input is valuable, though perhaps not as central as those from business and operational areas.

Significance for Technological Innovations: Business Managers and ICT staff together account for a notable 20.7 % of respondents. This is crucial as both departments are typically involved in spearheading technological innovations in banks, with business managers leading strategic initiatives and ICT ensuring their technological implementation.

Operational Managers (2.4 %) and Audit (26.8%) are essential for providing insight into how innovations are applied, monitored, and optimized for efficiency and compliance.

Table 4.5: Service Year of Respondents

		Frequency	Percent
Valid	6-10 Years	25	15.2
	10-15 Years	64	39.0
	Over 15 Years	75	45.7
	Total	164	100.0

Source: Researcher own computation, 2017 E.C

The table provides information on the years of service of the respondents, divided into three categories. The data is analyzed based on the frequency and percentage of each category.

This indicates that 15.2% of the respondents have worked in their respective fields for 6-10 years, representing a smaller portion of the sample.

The majority of respondents, 39%, have been in their roles for 10-15 years. This group represents the largest segment, suggesting that a significant portion of the sample is mid-career professionals. The second-largest group consists of those with over 15 years of experience, making up 45.7% of the total. This shows that a substantial number of respondents are highly experienced.

The majority of respondents (84.7%) have been working for more than 10 years, with almost half (45.7%) having over 15 years of experience. This implies that the sample consists largely of

seasoned professionals, which could indicate that the results reflect the views of experienced employees.

The distribution suggests a skew toward more experienced employees, with only a small proportion (15.2%) having worked between 6-10 years. This could influence how respondents perceive changes or innovations within their industry, as longer-serving employees may have more insight into historical trends and the impact of technological advancements.

This composition of experience is important in understanding how technological innovations might be perceived differently across various levels of experience.

4.3 Study Variables Data Analysis

This section presents the findings and discussion in the order of the five specific objectives of the study. Frequencies and descriptive statistics are presented first followed by inferential statistics. The questionnaire responses were based on a likert scale which was coded with numerical values for ease of data analysis. The values assigned to the likert were 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree.

4.3.1 Technological Innovations Adopted By Commercial Banks

Table 4.6: Descriptive Statistics

	N	Mini	Maxi	Mean	Std. Deviation
The bank has significantly invested in ATM service (ATM)	164	3	5	4.79	.426
The bank has integrated mobile banking technology in its operations (e.g., for transactions, record-keeping) (MOB)	164	4	5	4.98	.155
The bank has significantly invested in Internet banking technology (IBT)	164	2	5	3.78	.776

The bank has significantly invested in Point of Sale (POS) Terminals banking service (POS)	164	1	4	2.98	.910
The bank has significantly invested in Electronic fund transfer banking service (EFT)	164	2	4	2.61	.803
Valid N (listwise)	164				

Source: Researcher own computation, 2017 E.C

The table provides descriptive statistics on the level of investment by commercial banks in various technological innovations. The statistics include the number of observations (N), minimum (Mini), maximum (Maxi), mean, and standard deviation (Std. Deviation) for each technological innovation.

1. ATM Services (ATM)

Mean = 4.79, Std. Deviation = 0.426. This indicates that the majority of banks have made significant investments in ATM services. The mean score is very close to the maximum value of 5, showing a high degree of adoption. Most commercial banks have strongly embraced ATM technology as part of their operations.

2. Mobile Banking Technology (MOB)

Mean= 4.98, Std. Deviation = 0.155.The near-maximum mean suggests that virtually all banks have integrated mobile banking technology into their operations. The low standard deviation indicates consistency across banks. Mobile banking is nearly universally adopted, reflecting its importance in modern banking.

3. Internet Banking Technology (IBT)

Mean = 3.78, Std. Deviation = 0.77. While the mean score is high, it is not as close to the maximum as ATMs or mobile banking, indicating a somewhat lower level of investment in internet banking technology.

There is significant adoption, but some banks may lag in fully adopting internet banking services.

4. Point of Sale (POS) Terminals

Mean= 2.98, Std. Deviation= 0.910. The mean score is closer to 3, indicating that the investment in POS terminals is moderate. The higher standard deviation reflects more variability in how different banks have adopted this technology.

The adoption of POS terminals is uneven, with some banks investing more than others.

5. Electronic Fund Transfer (EFT)

Mean=2.61, Std. Deviation= 0.803. The mean is relatively low, suggesting that investment in EFT services is not as widespread as the other technologies. The variability is also high, indicating that banks differ in their level of investment.

EFT technology is less prioritized, with only moderate adoption across banks.

Overall Summary

Mobile banking and ATM services are the most widely adopted technological innovations, with almost universal investment.

Internet banking is also well adopted, though less consistently across banks.

POS terminals and EFT services show lower and more variable levels of investment, suggesting these technologies are not as high on the priority list for commercial banks as mobile and ATM technologies.

4.3.2 Key Financial Performance Indicators

Table 4.7: Descriptive Statistics

	N	Mini	Maxim	Mean	Std. Deviation
The bank has consistently achieved a high return on assets (ROA) over the past 2017 E.C years. (KFPROA)	164	5	5	5.00	.000
The bank's return on equity (ROE) has shown positive growth in 2017 E.C (KFPROE)	164	5	5	5.00	.000
The bank has maintained a strong net profit margin in 2017 E.C years. (KFPProfitM	164	5	5	5.00	.000

The bank has experienced steady growth in total assets 2017 e.c years. (KFPTAG)	164	2	5	2.91	.842
The bank's cost-to-income ratio has improved as a result of operational efficiencies. (KFP CIR)	164	2	5	3.51	1.030
Valid N (list wise)	164				

Source: Researcher own computation, 2017E.C

The data presented in Table 4.7 provides descriptive statistics on key financial performance indicators for a bank over the years 2017/17 (Ethiopian Calendar). Here's an analysis and interpretation of the table:

1. Return on Assets (ROA)

The ROA, which measures how effectively the bank is utilizing its assets to generate profits, shows a consistent performance across all observations. A mean of 5 with no variation (standard deviation = 0) implies that all data points recorded the highest possible value (5), suggesting excellent and stable returns on assets for the bank during 2017..

2. Return on Equity (ROE): Similar to ROA, the ROE, which indicates how effectively the bank is using shareholders' equity to generate profit, also consistently scored the maximum value (5) with no variability. This suggests that the bank achieved optimal and steady growth in shareholder returns during 2017.

3. Net Profit Margin: The bank's net profit margin, which represents how much of the bank's revenue is converted into profit, also consistently achieved the maximum value. This indicates that the bank maintained a strong and stable profit margin throughout 2015/16, with no variation in performance.

4. Total Asset Growth: Unlike the ROA, ROE, and net profit margin, the bank's total asset growth shows variability, with values ranging from 2 to 5. A mean of 2.91 suggests moderate growth in total assets over the years, but the relatively high standard deviation (0.842) indicates significant differences in asset growth performance across observations. Some periods or branches may have experienced lower asset growth, while others achieved stronger results.

5. Cost-to-Income Ratio: The cost-to-income ratio reflects the bank's efficiency, with lower values indicating better performance. The mean score of 3.51 suggests a relatively efficient operation, though there is considerable variability (standard deviation = 1.030). This implies that

some aspects of the bank's operations were more efficient than others, leading to differing levels of operational costs relative to income.

To sum up, the bank's financial performance in 2017 appears to be strong and consistent across several key metrics, including ROA, ROE, and net profit margin, all of which demonstrate top-tier performance with no variability.

However, there are some areas of variability, particularly in total asset growth and the cost-to-income ratio. This suggests that while profitability measures were stable, the bank may have faced challenges in managing growth and operational efficiency consistently across all branches or periods.

4.2.3 Effect of information Innovations bank on the Income of Banks

4.2.3.1 Multivariate regression

Table 4.8 Multivariate Test

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.000	.[b]	.000	.000	.
	Wilks' Lambda	1.000	.[b]	.000	160.000	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.
	Roy's Largest Root	.000	.000[b]	1.000	159.000	1.000
ATM	Pillai's Trace	.000	.[b]	.000	.000	.
	Wilks' Lambda	1.000	.[b]	.000	160.000	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.
	Roy's Largest Root	.000	.000[b]	1.000	159.000	1.000
POS	Pillai's Trace	.855	939.953[b]	1.000	160.000	.000
	Wilks' Lambda	.145	939.953[b]	1.000	160.000	.000

	Hotelling's Trace	5.875	939.953[b]	1.000	160.000	.000
	Roy's Largest Root	5.875	939.953[b]	1.000	160.000	.000
MOB	Pillai's Trace	.907	1563.494[b]	1.000	160.000	.000
	Wilks' Lambda	.093	1563.494[b]	1.000	160.000	.000
	Hotelling's Trace	9.772	1563.494[b]	1.000	160.000	.000
	Roy's Largest Root	9.772	1563.494[b]	1.000	160.000	.000
Internet Banking	Pillai's Trace	.344	83.781[b]	1.000	160.000	.000
	Wilks' Lambda	.656	83.781[b]	1.000	160.000	.000
	Hotelling's Trace	.524	83.781[b]	1.000	160.000	.000
	Roy's Largest Root	.524	83.781[b]	1.000	160.000	.000
EFT	Pillai's Trace	.000	.[b]	.000	.000	.
	Wilks' Lambda	1.000	.[b]	.000	160.000	.
	Hotelling's Trace	.000	.[b]	.000	2.000	.
	Roy's Largest Root	.000	.000[b]	1.000	159.000	1.000
a. Design: Intercept + ATM + POS + MOB + Internet Banking + EFT						
b. Exact statistic						

The results presented are from a Multivariate Analysis of Variance (MANOVA) using SPSS. Here's how to interpret the key components:

For the intercept, the values of Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root are not informative since the hypothesis degrees of freedom are 0, resulting in

undefined results (.b and .000 values). This suggests that the intercept itself doesn't contribute significantly to the variance in the dependent variables.

2. ATM

Similarly, for the independent variable "ATM," all the test statistics (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, Roy's Largest Root) are either 0 or non-calculable, meaning that "ATM" does not have a statistically significant effect on the dependent variables.

3. POS (Point of Sale)

Pillai's Trace = 0.855, Wilks' Lambda = 0.145, Hotelling's Trace = 5.875, Roy's Largest Root = 5.875, all with F = 939.953 and $p < 0.001$. These values indicate that "POS" has a very significant impact on the dependent variables, as the p-value is well below the typical 0.05 threshold.

The Wilks' Lambda value of 0.145 suggests that only about 14.5% of the variance is unexplained by the "POS" variable, meaning "POS" explains a significant amount of variance.

4. MOB (Mobile Banking)

Pillai's Trace = 0.907, Wilks' Lambda = 0.093, Hotelling's Trace = 9.772, Roy's Largest Root = 9.772, with F = 1563.494and $p < 0.001$. This again indicates a highly significant effect of "MOB" on the dependent variables.

Wilks' Lambda = 0.093 means that only 9.3% of the variance remains unexplained, further emphasizing the importance of mobile banking.

5. Internet Banking (Internet Banking)

Pillai's Trace = 0.344, Wilks' Lambda = 0.656, Hotelling's Trace = 0.524, Roy's Largest Root = 0.524, with F = 83.781 and $p < 0.001$. These values show that "Internet Banking Average" also has a significant effect on the dependent variables, though its effect is smaller compared to "POS" and "MOB."

Wilks' Lambda = 0.656 suggests that about 65.6% of the variance is unexplained, meaning that the effect of Internet banking is moderate compared to other factors.

6. EFT (Electronic Funds Transfer)

For "EFT," similar to the intercept and "ATM," the values of Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root are all 0 or undefined, indicating that it does not significantly affect the dependent variables.

In summary:

POS and MOB (mobile banking) have very strong and significant effects on the dependent variables.

Internet banking also shows a significant, though smaller, effect.

ATM and EFT do not have significant impacts according to the test results.

This analysis suggests that among the technological innovations considered, point-of-sale systems (POS) and mobile banking play the largest role in affecting the dependent variables, possibly related to financial performance in commercial banks.

Table 4.9 : Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Net Profit	.000[a]	3	.000	.	.
	Income	2.360[b]	3	.787	768.307	.000
	Asset	.000[a]	3	.000	.	.
Intercept	Net Profit	.000	0	.	.	.
	Income	.000	0	.	.	.
	Asset	.000	0	.	.	.
ATM	Net Profit	.000	0	.	.	.
	Income	.000	0	.	.	.
	Asset	.000	0	.	.	.
POS	Net Profit	.000	1	.000	.	.
	Income	.963	1	.963	939.953	.000
	Asset	.000	1	.000	.	.
MOB	Net Profit	.000	1	.000	.	.
	Income	1.601	1	1.601	1563.494	.000
	Asset	.000	1	.000	.	.
Internet Banking	Net Profit	.000	1	.000	.	.
	Income	.086	1	.086	83.781	.000

	Asset	.000	1	.000	.	.
EFT	Net Profit	.000	0	.	.	.
	Income	.000	0	.	.	.
	Asset	.000	0	.	.	.
Error	Net Profit	.000	160	.000		
	Income	.164	160	.001		
	Asset	.000	160	.000		
Total	Net Profit	2734.472	164			
	Income	2561.685	164			
	Asset	1174.010	164			
Corrected Total	Net Profit	.000	163			
	Income	2.524	163			
	Asset	.000	163			
a. R Squared = . (Adjusted R Squared = .)						
b. R Squared = .935 (Adjusted R Squared = .934)						

The results from the Tests of Between-Subjects Effects are typically used to determine if there is a significant effect of independent variables on dependent variables.

1. Corrected Model

Net Profit: The sum of squares (SS), mean square, F-value, and significance are missing, indicated by dots (.). This means there is no significant model fit for predicting net profit from the independent variables in the model.

Income: Type III SS = 2.360, df = 3, Mean Square = 0.787, F = 768.307, $p < 0.001$.

This means the model explains a large proportion of variance in income, and the F-statistic is very high, indicating a highly significant relationship between the independent variables (ATM, POS, MOB, Internet Banking, etc.) and income.

Asset: Similar to net profit, the sum of squares, mean square, and F-value are missing for the asset, which suggests no significant relationship between the independent variables and assets.

2. Intercept

For Net Profit, Income, and Asset, the intercept values are missing, showing that the intercept is not contributing significantly to explaining any variance in the dependent variables.

3. ATM

For Net Profit and Asset, the results are missing, which suggests that ATM does not have a significant effect on these dependent variables.

Income: Similarly, ATM does not have a significant effect on income as the F-value and p-value are missing.

4. POS

Net Profit: The results for POS Average's effect on net profit are missing, suggesting it doesn't significantly affect net profit.

Income: Type III SS = 0.963, df = 1, F = 939.953, $p < 0.001$.

POS has a highly significant effect on income. The large F-value indicates a strong relationship, with POS systems playing a significant role in influencing the bank's income.

Asset: Missing data, implying POS doesn't significantly affect assets.

5. MOB (Mobile Banking)

Net Profit: Missing values again suggest no significant effect on net profit.

Income: Type III SS = 1.601, F = 1563.494, $p < 0.001$.

Mobile banking has a very strong and significant effect on income, with an even larger F-value than POS, indicating that mobile banking is an even stronger predictor of income.

Chapter Five

5. Finding, Conclusion and Recommendation

5.1 Major Finding of the Study

The response rate for the survey was 94.47%, with 164 out of 170 questionnaires returned. This high response rate indicates strong participant engagement and suggests that the collected data is highly representative of the surveyed population. The high response rate also reduces the likelihood of non-response bias, which helps in maintaining the validity of the study results.

The majority of respondents (69.5%) are in the 31-41 age range, indicating a predominantly mid-career workforce. This age concentration may influence perceptions of technological innovations and financial performance, reflecting the views of individuals who are actively engaged in their careers.

A majority of the respondents hold a 1st degree (76.8%), with a significant portion having a master's degree or higher (23.2%). This educational background provides a varied perspective on the study's topics, with the higher education level likely correlating with deeper insights into technological innovations and financial performance.

The largest group of respondents is from the Business Managers department (23.8%), followed by Operational Managers and Customer Officers. This distribution indicates diverse input from various functional areas, with Business Managers and ICT staff being crucial for insights into technological innovations.

A majority (84.7%) of respondents have over 10 years of experience, suggesting a sample of experienced professionals. This could impact how technological innovations are perceived, as longer-serving employees might have more historical context and insights into their effects.

Mobile Banking and ATM Services are the most widely adopted technologies, reflecting strong investment and integration into bank operations.

Internet Banking has significant adoption but is less consistent.

POS Terminals and EFT Services show moderate to low investment, indicating these technologies are less prioritized compared to mobile banking and ATMs.

ROA, ROE, and Net Profit Margin are consistently high, indicating strong financial performance.

Total Asset Growth and Cost-to-Income Ratio show more variability, suggesting some challenges in asset growth and operational efficiency across different periods or branches.

POS (Point of Sale) has Very significant effect on income with a large F-value (939.953, $p < 0.001$).

Mobile Banking has highly significant effect on income with an even larger F-value (1563.494, $p < 0.001$).

Internet Banking have Significant but moderate effect on income ($F = 83.781$, $p < 0.001$).

ATM and EFT do not significant effect on dependent variables.

5.2 Summary of Research Finding

- POS and Mobile Banking are crucial drivers of income, with mobile banking having a stronger effect.
- Internet Banking has a significant but smaller impact compared to POS and Mobile Banking.
- ATM and EFT do not significantly affect income or other performance metrics according to the regression analysis.

5.3 Conclusion

The analysis indicates that technological innovations like mobile banking and POS systems have a significant impact on financial performance, particularly on income. The study also shows a well-represented sample in terms of age, education, and experience, with a high response rate that enhances the credibility of the findings. The focus on experienced professionals and a diverse range of departmental inputs provides a comprehensive view of how technological innovations influence performance in commercial banks**.**

5.4. Recommendations

Based on the research results, here are some recommendations for further action or analysis:

1. Leverage Key Technologies:
   - Mobile Banking and POS Systems:** Given their significant positive impact on income, banks should continue to invest in and promote these technologies. Consider expanding features or enhancing user experience to maximize their potential benefits.

- Internet Banking: While its effect is significant, it is less impactful compared to mobile banking and POS systems. Explore ways to enhance the functionality and user engagement of Internet banking to increase its contribution to income.

2. Re-evaluate Investment in ATM and EFT:

Since ATM and EFT technologies do not show significant effects on income, it may be worth re-evaluating their strategic importance. Consider whether investments in these areas can be redirected to more impactful technologies.

3. Address Variability in Asset Growth and Operational Efficiency:

The variability in Total Asset Growth and Cost-to-Income Ratio suggests some branches or periods face challenges. Conduct a deeper analysis to identify the underlying causes and implement targeted strategies to address these issues.

4. Focus on Mid-Career Professionals:

The concentration of respondents in the 31-41 age range and their substantial experience levels offer valuable insights. Ensure that strategies and technological advancements consider the perspectives and needs of this demographic, as they are key drivers in the bank's operations.

5. Tailor Strategies to Functional Areas:

The diversity in departmental input indicates that different functional areas have varied perspectives on technological innovations. Tailor strategies to address the specific needs and contributions of Business Managers, Operational Managers, and Customer Officers to enhance overall performance.

6. Enhance Data Collection and Analysis:

While the response rate and data representatively are strong, consider periodic follow-up surveys or interviews to track changes over time and ensure that the insights remain relevant.

7. Communicate Findings:

Share the research findings with stakeholders to ensure that the insights inform strategic decisions. Highlight the importance of mobile banking and POS systems and the need for a strategic review of ATM and EFT investments.

5.5 Future Research Directions

- Investigate how emerging technologies (e.g., AI, block chain) are expected to influence financial performance in the future.
- Conduct a comparative study with other banks or financial institutions to validate the findings and understand if these trends are consistent across the industry.
- Explore how customer perceptions of technological innovations impact their usage and, consequently, the bank's financial performance.
- Implement longitudinal studies to assess how technological innovations and their impacts evolve over time.

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Appendix

Mekelle University

Department information technology (Msc)

Dear Participant,

You are invited to participate in a research study titled **"**. THE IMPACT OF INFORMATIONTECHNOLOGICAL INNOVATION ON FINANCIAL PERFORMANCE OF CBE (COMMERICAL BANK OF ETHIOPIA) IN Aksum, TIGRAY REGION" The purpose of this study is to explore the relationship between the adoption of technological innovations and the financial performance of selected commercial banks. Your responses will contribute valuable insights into how technological advancements influence key financial metrics in the banking sector.

Your participation is completely voluntary, and all responses will be kept confidential. The data collected will be used solely for academic research purposes. The questionnaire should take approximately 10-15 minutes to complete.

Thank you for your time and contribution to this important research.

Section 1: General Information

1. Name of the bank: _____
2. Gender: 0 male 1 Female
3. Age categories: **0:** 20-30 **1:** 31-41 **2**: 41-51 **3**: above 51
4. Educational rank: **0:** Diploma **1:** Degree **2:** Masters and above

Department

s.n	Department	Circle one as appropriate
	General manager	0
	Business manager	1
	Operational	2
	ICT	3
	Audit	4
	Credit	5
	HR	6
	Customer service officer	7
	Other	8

6. How long have you worked in the Banking Sector (tick as appropriate)

S.N	**Period**	Circle one as appropriate
	Less than 1 yr	**0**
	Btw 1-5 yrs	**1**
	Btw 5-10 yrs	**2**
	Over 10 yrs	**3**

Instructions

1**.** Please read each statement carefully and select the option that best represents your opinion or experience.

2. Indicate your level of agreement with each statement by selecting one of the following options, where:

5 = Strongly Agree, 4= Agree , 3 = Neutral , 2= Disagree , 1= Strongly Disagree

Section 1: Technological Innovations Adopted By Selected commercial Banks

S.N	Items	Response Rate				
1	The bank has significantly invested in ATM service	1	2	3	4	5
2	The bank has integrated mobile banking technology in its operations (e.g., for transactions, record-keeping)					
3	The bank has significantly invested in Internet banking technology					
4	The bank has significantly invested in Point of Sale (POS) Terminals banking service					
5	The bank has significantly invested in Electronic fund transfer banking service					
List other						

Section 2: Key Financial Performance Indicators

S.N	Items	Response Rate				
1	The bank has consistently achieved a high return on assets (ROA) over the past 2015/16 e.c years. (KFPROA)	1	2	3	4	5
2	The bank's return on equity (ROE) has shown positive growth in 2015/16 e.c (KFPROE)					
3	The bank has maintained a strong net profit margin in 2015/16 e.c years. (KFPProfitM)					
4	The bank has experienced steady growth in total assets 2015/16 e.c years. (KFPTAG)					
5	The bank's cost-to-income ratio has improved as a result of operational efficiencies. (KFP CIR)					

Section 3: Effect of Bank Innovations on Total Income

This section has statements regarding the effect of bank innovations on incomes of the bank. Kindly respond with the response that matches you opinion. Please tick as appropriate in the boxes using a tick (√) or cross mark (x)

S.N	Automatic Teller Machine (ATM)	Response Rate				
1	ATMs have had a positive effect of increasing commission fee based income (BIEATM1)	**1**	**2**	**3**	**4**	**5**
2	ATMs have influenced positively the increase of interest based income (BIEATM2)					
3	ATMs have expanded the income generating potential of the bank (BIEATM3)					
	Point of Sale (POS) Terminals					
5	POS terminals have had a positive effect of increasing commission fee based income (BIEPOS1)					
6	POS terminals have influenced positively the increase of interest based income (BIEPOS2)					
7	POS terminals have expanded the income generating potential of the bank (BIEPOS3)					
	Mobile Banking					
8	Mobile banking has had a positive effect of increasing commission fee based income. (BIEMB1)					
9	Mobile banking has influenced positively the increase of interest based income (BIEMB2)					
10	Mobile banking has expanded the income generating potential of the bank (BIEMB3)					
	Internet Banking					
11	Internet banking has had a positive effect of increasing commission fee based income. (BIEIB1)					
12	Internet banking has influenced positively the increase of interest based income(BIEIB2)					
`13	Internet banking has expanded the income generating					

	potential of the bank (BIEIB3)					
	Electronic Funds Transfer					
14	Electronic funds transfer has had a positive effect of increasing commission fee based income (EFTBI1)					
15	Electronic funds transfer has influenced positively the increase of interest based income (EFTBI2)					
16	Electronic funds transfer has expanded the income generating potential of the bank (EFTBI3)					

Section 4: Effect of Bank Innovations on Return on Assets

This section has statements regarding the effect of bank innovations on return on assets of the bank. Kindly respond with the response that matches you opinion. Please tick as appropriate in the boxes using a tick (√) or cross mark (x)

S.N	**Automatic Teller Machine (ATM)**	**Response Rate**				
1	ATMs influence reduction of operational costs and hence better return on assets for the bank (EATMROA1)	**1**	**2**	**3**	**4**	**5**
2	ATMs investments have payback period of less than 3 years and hence good return on assets. (EATMROA2)					
3	Incomes from ATMs have had positive impact on bank income margins (EATMROA3)					
	Point of Sale (POS) Terminals					
4	POS terminals influence reduction of operational costs and hence better return on assets for the bank (EPOSROA1)					
5	POS terminals investments have payback period of less than 3 years and hence good return on assets (EPOSROA2)					
6	Incomes from POS terminals have had positive impact on bank income margins. (EROSROA3)					

	Mobile Banking					
7	Mobile banking influence reduction of operational costs and hence better return on assets for the bank (EMBROA1)					
8	Mobile banking investments have payback period of less than 3 years and hence good return on assets (EMBROA2)					
9	Incomes from mobile banking have had positive impact on bank income margins (EMBROA3)					
	Internet Banking					
11	Internet banking influence reduction of operational costs and hence better return on assets for the bank (EIBROA1)					
12	Internet banking investments have payback period of less than 3 years and hence good return on asset (EIBROA2)					
13	Incomes from internet banking have had positive impact on bank (EIBROA3)					
	Electronic Funds Transfer					
14	Electronic funds transfer influence reduction of operational costs and hence better return on assets for the bank (EEFTROA1)					
15	Electronic funds transfer investments have payback period of less than 3 years and hence good return on assets (EEFTROA2)					
16	Incomes from electronic funds transfer have had positive impact on bank income margins (EETFROA3)					

Section 5: Effect of Bank Innovations on Bank Profitability

This section has statements regarding the effect of bank innovations on profitability of the bank. Kindly respond with the response that matches you opinion. Please tick as appropriate in the boxes using a tick (√) or cross mark (x)

S.N	Automatic Teller Machine (ATM)	Response Rate				
1	Income from ATMs has high margin hence contributing positively to bank annual profitability	**1**	**2**	**3**	**4**	**5**
2	ATMs have low maintenance costs leading to high levels of profitability over their economic lifetime					
3	Investment in ATMs in mostly motivated by profits to the bank					
	Point of Sale (POS) Terminals					
4	Income from POS terminals has high margin hence contributing positively to bank annual profitability					
5	POS terminals have low maintenance costs leading to high levels of profitability over their economic lifetime					
6	Investment in POS terminals is mostly motivated by profits to the bank					
	Mobile Banking					
7	Income from mobile banking has high margin hence contributing positively to bank annual profitability					
8	Mobile banking has low maintenance costs leading to high levels of profitability over their economic lifetime					
9	Investment in mobile banking is mostly motivated by profits to the bank					
	Internet Banking					
10	Income from internet banking has high margin hence contributing positively to bank annual profitability					
11	Internet banking has low maintenance costs leading to high levels of profitability over their economic lifetime					
12	Investment in internet banking is mostly motivated by					

	profits to the bank					
	Electronic Funds Transfer					
13	Income from electronic funds transfer has high margin hence contributing positively to bank annual profitability					
14	Electronic funds transfer have low maintenance costs leading to high levels of profitability over their economic lifetime					
15	Investment in electronic funds transfer is mostly motivated by profits to the bank					

Open-Ended Questions

1. In your opinion, which technological innovation has had the most significant impact on the financial performance of your bank, and why?

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2. Can you describe any challenges or obstacles your bank has faced in adopting new technologies? How have these challenges impacted financial performance?

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3. What specific financial performance improvements (e.g., cost reductions, increased revenue) have you observed as a result of implementing technological innovations? Please provide examples.

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4. Are there any technological innovations you believe your bank should adopt to stay competitive in the industry? Please explain your reasoning.

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Thank You