



ADDIS ABABA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF ACCOUNTING AND FINANCE

**THE EFFECT OF DIGITALIZATION ON BANK PROFITABILITY: THE
CASE OF SELECTED PRIVATE BANKS IN ETHIOPIA**

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**A THESIS SUBMITTED TO ACCOUNTING AND FINANCE, IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS OF A MASTER IN ACCOUNTING AND
FINANCE**

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THESIS APPROVAL SHEET

As members of the Board of Examiners of the Master of Science (MS.C.) thesis Open Defense examination, we have undertaken a thorough review of the thesis prepared by Nitsuh Asheber entitled "**The Effect of Digitalization on Bank Profitability: The Case of Selected Private Banks in Ethiopia**". After careful consideration of all aspects of the work, we are confident that the thesis meets the requirements for the award of the Degree of Master of Science (M.Sc.) in Accounting and Finance. We have taken into account the research methods used, the originality of the work, and the analysis of the results, the conclusions, and the overall quality of the thesis. We are proud to attest to the originality of the work and its potential contribution to the knowledge base in the field of accounting and finance. The work submitted by Nitsuh Asheber Enyew is of the highest standard and we believe it is worthy of the award of the Master of Science Degree.

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DECLARATION

This is to certify that Mrs. Nitsuh Asheber has successfully completed her thesis entitled "**The Effect of Digitalization on Bank Profitability: The Case of Selected Private Banks in Ethiopia**" as part of the requirements for the degree of MS.C. in accounting and finance from Addis Ababa university, through the department of accounting and finance. This thesis was done under the guidance and supervision of the faculty. We affirm that the contents of the thesis have not been submitted earlier for the award of any degree or diploma to the best of our knowledge and belief. The research of this thesis was conducted using primary and secondary sources of information, which was then used to assess the Effect of Digitalization on Bank Profitability: The Case of Selected Private Banks in Ethiopia. We are confident that the thesis is unique and original and was of great use to the academic and business community. We are pleased to acknowledge that Mrs. Nitsuh Asheber Enyew conducted her research with utmost sincerity and dedication and the thesis is a genuine work of her own.

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DEDICATION

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ACRONYMS

ATM	Automated Teller Machine
GDP	Gross Domestic Product
FinTechs	Financial Technologies
ICT	Information and Communication Technology
ITM	Iterative Teller Machine
MW	Mobile Wallet
NEB	National Bank of Ethiopia
POS	Point of Sale
ROA	Return on Asset
ROE	Return on Equity
SPSS	Statistical Package for Social Science

ABSTRACT

This study was conducted to investigate the impact of digitalization on the profitability of selected private banks in Ethiopia. The study employed a quantitative research approach, which relies on numeric data to test hypotheses and draw conclusions. An explanatory research design was adopted variables. To select the sample, a purposive sampling technique was utilized. In this case, banks were chosen from a list according to specific characteristics relevant to the research questioned, employing descriptive statistics, ordinal regression, and Spearman rank correlation to assess the relationship between these variables and bank profitability. The primary method of data collection was made using 5 points Likert scale questionnaire. Importantly, ATMs, point of sale terminals, mobile banking, and mobile wallets exhibited a highly significant impact on profitability, with p-values of 0.000. This study suggests that these channels play a crucial role in driving financial success for Ethiopian private banks. However, internet banking, despite showing a positive correlation, did not demonstrate a statistically significant impact on profitability. The result of this study shows the need for banks to re-evaluate their Internet banking strategies, potentially focusing on optimizing existing functionalities and ensuring seamless integration with other digital channels. By addressing these areas, banks can unlock the full potential of Internet banking and maximize its contribution to overall profitability. Banks should prioritize investment in ATMs, POS terminals, mobile banking, and mobile wallets due to their highly significant impact on profitability. This includes expanding the infrastructure, enhancing security, and providing user-friendly interfaces to facilitate wider adoption and usage.

Keywords: Digitalization, Bank Profitability, Private Banks, Ethiopia, Mobile Banking, Internet Banking, Financial Performance

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CHAPTER ONE

1. INTRODUCTION

1.1 Background of the Study

Digital era emergence has caused an increasing usage of digital processes in all businesses and organizations, including financial institutions that seek to improve service delivery through more effective methods. According to Agboola et al. (2019), this is a key trend supported by the realization that digital tools and technologies can make operations more effective, enhance customer experiences, and ultimately drive success in today's competitive environment. More precisely, banks have become aware of the revolutionary impact of digitization on their activities aimed at bringing them up-to-date with new customer demands in the constantly changing financial sector. This has mostly been facilitated by incorporation of various modern forms of technology such as internet banking, mobile banking, mobile money transfers, and e-commerce among other digital payment platforms. For financial institutions, the potential to exploit these technologies makes it possible to offer their clients an undisturbed and convenient banking experience which is all important in the present fast-paced digital world (Omarini, 2017).

The digital banking services also ensure fast and convenient access to traditional banking services, including innovative and other new age products. Also, it has made it possible for financial institutions to offer more secure, efficient and cost effective services to their customers thus enhancing customer satisfaction and loyalty (Agboola et al., 2019). On the whole, this makes digitalization part of what supports banking service, which will only increase in importance.

In recent years, Ethiopian banks have actively adopted digital banking solutions to make banking more accessible and convenient for customers. Through mobile, internet, and card banking services, customers can now easily perform various banking tasks such as paying bills and transferring money (Ethiopia Commercial Guide, 2021). Foreign companies have played a crucial part in supporting Ethiopia's financial inclusion efforts by providing technical assistance for this widespread use of digital banking.

In recognition of the ever-increasing prominence of electronic commerce, Ethiopia has made a number of significant steps toward establishing a comprehensive regulatory framework for its digital economy. In this initiative, the Ethiopian government has drafted and presented a

proclamation that will govern, oversee, and promote responsible development in regard to e-commerce operations across the country (Ethiopia Commercial Guide, 2021). The proclamation provides a legal basis for regulating e-commerce activities, where consumer protection, fair competition, and the general integrity of the digital marketplace are ensured. Furthermore, the proclamation has made it mandatory to install ATMs, POS terminals, and other payment infrastructures—such as mobile money—which is also a vital prerequisite for the smooth delivery of digital financial services. In addition, the proclamation aims at enhancing the data security of online transactions and services.

Digital Finance is a key pillar of modern-day economies as it enables financial flow and contributes to financial inclusion. In Ethiopia, there has been a changing trend in the usage of Digital Financial Services (DFS) where a national switch service owned equally by the banks (Ictet.org, 2021) has been launched. The primary objective of the switch service is to provide interoperability among different channels such as ATMs, Point-of-Sale devices, Mobile Wallets, and bank accounts. The switch platform is a strategic weapon that connects different industries, cuts costs, and increases the scope of services provided to clients.

The banking world has changed a lot because of fast improvements in technology. People now use ATMs and banking apps on their phones to handle their money, which means they don't have to go to the bank during regular hours (Bhattacharya et al., 2018). Using online banking, people can quickly check their account balance, pay bills, and transfer money without visiting a bank (Kumar & Singh, 2021). This convenient banking method is encouraging more individuals to use digital payments rather than cash (Zou et al., 2020). These improvements in technology have made financial tasks easier and have helped people gain more control over their money, making banking more accessible to everyone. This has made customers happier and has made their connections with banks stronger. Mapesa (2018) said that 'Digital technologies have allowed banks to provide customers with more convenient, quicker, and simpler services, leading to better customer experiences and loyalty.' This has also given banks chances to improve their services, making them more available and tailored to what customers want. In general, technology has greatly helped the banking industry and has allowed banks to serve their customers better.

Therefore, the current study seeks to investigate the impact of digitalization on private banks. The objective of this study is to understand how digitalization can help banks improve their competitiveness and profitability in today's digital age.

1.2 Statement of the Problem

The banking industry has faced criticism for its perceived lack of innovation and convenience. Some customers particularly women entrepreneurs, have chosen to store their savings at home rather than in banks. Information and Communication Technology (ICT) has emerged as a significant driver of banking advancements (Amoako, 2012), increased competition among banks. Non-bank financial institutions have raised questions about factors influencing customer preferences for specific distribution channels. Research indicates that the widespread adoption of electronic banking practices is significantly influenced by perceived cost-effectiveness. This perception stems from the reduced expenses associated with digital transactions compared to traditional banking methods. The convenience and accessibility of electronic banking also contribute to its cost-effectiveness, as it eliminates the need for physical visits to bank branches and allows for seamless transactions anytime, anywhere. Additionally, the benefits of electronic banking, such as increased efficiency, reduced transaction times, and enhanced security, further contribute to its perceived value. These advantages outweigh the perceived costs, making electronic banking an attractive option for individuals and businesses alike. Studies by Trang (2022) and Masoud & AbuTaqa (2017) provide empirical evidence supporting the positive influence of perceived cost-effectiveness and benefits on the adoption of electronic banking.

Research on the relationship between e-banking and profitability has yielded mixed results. While some studies have established a positive correlation between e-banking adoption and profitability, others have found no significant relationship. It is important to note that e-banking encompasses a wide spectrum of delivery channels, ranging from pure e-banking, where all banking services are offered solely through the Internet, to traditional banking with online capabilities. These variations in e-banking models may influence the impact on profitability. E-banking may provide financial institutions with the opportunity to enhance customer service, reduce operating costs, and expand their reach. However, it also requires significant investment in technology and infrastructure, which could offset any potential benefits. Ultimately, the impact of e-banking on profitability depends on the specific implementation strategy and the competitive landscape of the financial services industry (Khrawish & Al-Sa'di, 2016). The statement that traditional banks are unaffected by the adoption of the internet as a distribution channel is demonstrably false and contradicts the findings of numerous studies, including those by Lee & Kim (2020). While Lee & Kim (2020) may have focused on specific aspects of bank

operations that haven't been significantly disrupted by the internet, their research likely doesn't negate the overall impact of the internet on the banking industry. The internet has fundamentally transformed how banks operate, interact with customers, and compete. From online banking and mobile apps to digital payment platforms and fintech startups, the internet has created a new landscape for banking, forcing traditional institutions to adapt or face obsolescence. The rise of digital-only banks, the decline of physical branches, and the increasing use of AI and automation in banking demonstrate the profound influence of the internet on the industry. To suggest that traditional banks are untouched by this revolution is to ignore the reality of the modern financial landscape.

The advent and widespread adoption of electronic banking (e-banking) have had a profound impact on the financial profitability of private banks. Studies have investigated the multifaceted effects of e-banking on various aspects of bank performance, with particular focus on operational efficiency and service quality. One study, conducted by Kassa (2020) on the Commercial Bank of Ethiopia (CBE), demonstrated that e-banking adoption significantly contributes to operational cost reduction. This stems from mechanisms such as minimizing transaction processing errors, saving time, reducing cash handling risks, and enhancing operational reliability. These findings align with the concept of operational excellence, which is a critical factor in achieving financial profitability for private banks (Mishra et al., 2018). Thus, e-banking services have the potential to serve as a competitive advantage for banks in their pursuit of financial profitability. Further support for this notion comes from Girma's (2016) comprehensive research on selected Ethiopian commercial banks. This study examined the influence of e-banking products on bank profitability, considering service quality and operational excellence. The analysis included bank-specific variables such as the number of mobile banking and ATM users, transaction volume, bank size, and macroeconomic indicators like inflation rate. The results showed a positive correlation between e-banking products and return on equity (ROE), indicating that banks with higher e-banking adoption tend to have higher profitability.

The initiation of the research was due to the fact that there was no organized and documented data on the impact of digital banking on banks profitability in the case of private banks in Ethiopia. Despite the extensive research conducted in other regions and countries, in Addis Ababa remains an uncovered area. Therefore, this study tried to investigate the impact of digital banking on banks profitability in the case of private banks in Ethiopia.

1.3. Basic Research Questions

The study has been tailored to answer the following research questions formulated on the problems.

1. What is the effect of ATM on the profitability of private banks in Ethiopia
2. What is the effect of POS on the profitability of private banks in Ethiopia
3. What is the effect of mobile banking on the profitability of private banks in Ethiopia
4. What is the effect of Internet banking on the profitability of private banks in Ethiopia
5. What is the effect of Mobile wallet on the profitability of private banks in Ethiopia

1.4. Objectives of the study

1.4.1. General Objective

The general objective of the study was to investigate the impact of digitalization on the profitability of private banks in Ethiopia

1.4.2. Specific Objectives

This research is intended to achieve the following specific objectives

- To know the impact of ATM on the profitability of private banks in Ethiopia
- To investigate the impact of POS on the profitability of private banks in Ethiopia
- To assess the impact of mobile banking on the profitability of private banks in Ethiopia
- To investigate the impact of Internet banking on the profitability of private banks in Ethiopia
- To investigate the impact of Mobile wallet on the profitability of private banks in Ethiopia

1.5. Hypothesis Testing

Based the specific hypothesis the following hypothesis were forwarded

H1: ATM has significant impact and correlation with banks' profitability

H2: Point of sale (POS) has significant impact and correlation with banks' profitability

H3: Mobile banking has a significant impact and correlation with banks' profitability

H4: Internet banking has a significant impact and correlation with banks' profitability

H5: Mobile wallet has a significant impact and correlation with banks' profitability

1.6. Significance of the Study

Digitalization is becoming more and more important in the current and coming future for expanding services and increasing profitability, especially in financial sectors such as banks. The impact of digitization on bank profitability is undeniable. The question is not whether it has an effect. It's rather how this effect manifests itself. To stay ahead in the ever-changing financial world, banks need to understand exactly how going digital affects their profits. It's important to take a close look at all the different ways digitization can either boost or potentially hinder a bank's financial performance. By doing this banks can make informed decisions. They adapt their strategies to maximize profits in this new digital era. Business models are being challenged. They must adjust to changing market conditions. Banks must modify their operations to keep up. In the Ethiopian banking sector, there has been an increase in the use of digitalization systems. They lack proper implementation. The systems lack the necessary development to make them more user-friendly. Banks need to create a friendly environment that allows customers to easily use digital tools for their everyday banking needs. This means giving customers simple access to digital banking services. Providing them with the necessary training is crucial. Resources to utilize these services effectively are also important. Digital banking services must be tailored to customers' needs. They can then easily access the services they need. Digitalization is an essential component of the banking industry. Its successful implementation will enable banks to increase profits. It will also provide customers with an improved banking experience.

The findings of the study will provide a platform to measure the impact of digitalization on private banks' profitability and performance. The study examines this impact comprehensively. It offers a view of digitalization's effect on profitability. The study also explores how digitalization affects performance.

Evidence supports the hypothesis of a positive impact. Insights are provided into the effectiveness of digitalization, long-term effects are also considered.

The study's findings will be instrumental. Policymakers and decision-makers of private banks can utilize this to implement digitalization as a strategic theme. This will ensure better profitability and performance.

The findings of the study also provide a better understanding of the legal frameworks. Policies and procedures on digital regulation, implementation of services will be crucial for policymakers and regulatory bodies. Ultimately the findings of the study will be of great importance for decision-makers of banks. Policymaker's regulatory bodies and scholars and researchers can

identify the impact of digitalization, a strategic theme on private banks' profitability and performance.

1.7. Limitation of the Study

The study 'The Effect of Digitalization on Bank Profitability: The Case of Selected Private Banks in Ethiopia' faces several limitations that should be acknowledged. Firstly, the study is limited to a specific sample of private banks in Ethiopia, which restricts the generalizability of the findings to other banks in the country or to banks in different contexts. Further analysis of public banks and a broader range of financial institutions could provide a more comprehensive understanding of digitalization's impact on profitability. Secondly, the study relies on a limited range of variables to measure digitalization and profitability, which may not capture the full complexity of these concepts. For instance, the study does not consider the impact of digitalization on operational efficiency, customer satisfaction, or risk management, which are crucial aspects of bank performance. Thirdly, the study is cross-sectional in nature, meaning it analyzes data from a single point in time. This limits the study's ability to establish causal relationships between digitalization and profitability, as it cannot account for changes over time. Longitudinal studies that track the evolution of digitalization and profitability over time would be more informative in this regard. Finally, the study does not account for the influence of external factors, such as macroeconomic conditions, regulatory environment, and competitive landscape, which can significantly impact bank profitability. Future research should consider incorporating these external factors to provide a more nuanced understanding of the relationship between digitalization and profitability in the Ethiopian banking sector.

1.8. Delimitation/Scope of the Study

The study of the impact of digitalization on bank profitability: The case of selected private banks in Ethiopia focuses on the current status of the use of digital technology by selected private banks in Ethiopia, its impacts on the profitability of the banks, and the potential for digital banking to further improve bank profitability. The delimitation of this study was focused on eight private banks located in Ethiopia (Nib International Bank, Abay Bank, Oromia Bank, Hibret Bank, Debub Global Bank, Cooperative Bank of Oromia, Addis International Bank's and Enat Bank), and the scope of the research was limited to the impact of digitalization on the profitability of these banks. This study draws upon quantitative secondary data primarily sourced from audited financial statements spanning the period from 2017 to 2023. The research focused on the current state of digital banking in Ethiopia and the potential for further improvements.

Finally, the research also explores the potential for digital banking to improve bank profitability in Ethiopia in general.

Therefore, the study focused solely on the relationship between digitalization and profitability in private banks, excluding external economic factors like GDP and inflation. Given the recent adoption of digitalization in these banks, this research provides valuable insights into its direct impact on their financial performance.

1.9. Organization of the Study

The study contains five chapters. The first chapter comprises of the introduction which includes a background of the research, statement of the problem, objectives, research questions, hypothesis, significance, scope, and limitation of the study. The relevant kinds of literature have been discussed in the second chapter. The third chapter presents the research methodology. The fourth chapter presents the study's data analysis presentation and discussion; finally, the fifth chapter comprises summary, conclusion, and recommendations.

1.10. Operational Definitions

Digitalization: The process of converting information into a digital format, which can be easily stored, shared, and processed using digital technologies. In the banking industry, digitalization involves the use of digital tools and platforms to enhance operational efficiency, improve customer experience, and increase profitability.

Bank Profitability: The measure of a bank's financial performance, which is typically assessed by evaluating its net income, return on assets (ROA), return on equity (ROE), and other financial metrics. Bank profitability is influenced by various factors, including interest rates, loan quality, operational efficiency, and the adoption of digital technologies.

Digital Transformation: The process of integrating digital technologies into all aspects of a business, including its operations, products, and services. In the banking industry, digital transformation involves the adoption of digital tools and platforms to enhance customer experience, streamline operations, and improve profitability.

Operational Efficiency: The ability of a bank to minimize costs and maximize productivity while delivering high-quality services to its customers. Digitalization can help banks improve operational efficiency by automating routine tasks, reducing paperwork, and enabling real-time data analysis.

Customer Experience: The overall perception of a customer about a bank's products, services, and interactions. Digitalization can help banks enhance customer experience by providing

personalized services, offering self-service options, and improving the speed and convenience of transactions.

Financial Metrics: Quantitative measures used to assess a bank's financial performance, such as net income, return on asset, return on asset, and asset quality. These metrics are essential for understanding the impact of digitalization on bank profitability.

Interest Rates: The cost of borrowing money, which is determined by the supply and demand for loans in the market. Interest rates can have a significant impact on bank profitability, as they influence the interest income generated from loans and the interest expense incurred on deposits.

Loan Quality: The creditworthiness of a bank's loan portfolio, which is assessed, based on factors such as the borrower's credit history, the loan-to-value ratio, and the collateral provided. Loan quality is an important determinant of bank profitability, as it affects the risk of loan defaults and the interest income generated from loans.

CHAPTER TWO

2. RELATED LITERATURE REVIEW

This chapter reviews the existing literature on the effect of digital banking on banks' profitability. The theoretical review provide an overview of the various theories related to digital banking, including the digital transformation of banks, the role of customer behavior in digital banking, and the impact of digital banking on banks' profitability. The empirical review examines the existing research conducted on the effects of digital banking on bank profitability. The review focuses on the factors that have been reported to influence banks' profitability, including operational efficiency, cost savings, customer service, customer loyalty, and customer satisfaction. It also provides a discussion of the various studies conducted to evaluate the effect of digital banking on banks' profitability. Furthermore, the chapter identified the gaps in the current research and provides the conceptual framework of the study. With the increasing importance of digital banking, the findings of this literature review will provide an understanding of the potential impact of digital banking on bank profitability.

2.1. Theoretical Review

2.1.1. Definition of Digitalization

Digitalization, a comprehensive transformation, encompasses the creation of an enhanced customer experience externally and an optimized operational model internally. This transformation is driven by the integration of digital technologies, processes, and structures. Digitalization empowers organizations to reimagine their interactions with customers, delivering personalized and seamless experiences. Simultaneously, it streamlines internal operations, fostering efficiency, effectiveness, and data-driven decision-making. By embracing digitalization, businesses can unlock new opportunities for growth, innovation, and competitive advantage (Shukla, 2016).It is the process of utilizing technology to enhance the customer experience and create an efficient operating model. Digitalization can be used to streamline processes, automate tasks, improve customer service, and provide more data-driven insights. Companies are increasingly using digitalization to create a more personalized customer experience. Mobile apps, e-wallet solutions, online banking, APIs, and personal finance management (PFM) tools are some of the most popular examples of digitalization in action. These tools provide customers with greater convenience and access to their finances, allowing

them to make better decisions and manage their finances more effectively. Digitalization is also helping businesses improve operational efficiency by automating processes and creating data-driven insights that can be used to make better decisions. By leveraging digitalization, businesses are able to access new markets, increase customer engagement, and create more personalized experiences for their customers. Digitalization is transforming the way businesses operate and interact with customers, creating a more efficient and effective customer experience.

2.1.2. Digital Banking

Digital banking is the use of digital technology to offer banking services, such as online banking, mobile banking, and direct payments. It has revolutionized the way people access and manage their finances, allowing customers to bank anytime, anywhere, and from any device. Digital banking offers a number of benefits, such as increased convenience, faster transactions, and enhanced security. It also offers customers more control over their finances, such as the ability to easily move money between accounts, set up automatic payments, and track spending. Additionally, digital banking is becoming more popular with customers due to its ability to provide personalized financial advice and recommendations (Smith, 2020).

Digital banking has also been a boon for financial institutions, allowing them to reduce overhead costs, improve customer service, and gain access to valuable analytics. Banks have been able to use digital banking to better understand their customers and their spending habits, allowing them to offer tailored products and services. Furthermore, digital banking has enabled banks to expand their reach, allowing them to offer services to customers who might not otherwise be able to access banking services (Khan, 2018).

Digital banking has revolutionized the way people interact with their finances, and has become an essential part of modern banking. It has made banking easier, faster, and more secure, and has enabled banks to better understand their customers and offer tailored products and services. Digital banking is becoming increasingly important for financial institutions and customers alike and is likely to remain an important part of banking in the years to come.

Digital banking, a transformative financial system, has revolutionized the way individuals interact with banks. It encompasses various terminologies, including cashless banking, electronic banking, and Internet banking, among others. This modern banking approach operates without the physical exchange of cash, coins, or bills (Kamboh and Leghari, 2016). The increasing popularity of digital banking stems from its inherent convenience and cost-effectiveness. Banks have extended their reach by offering customers access to banking services through multiple devices. This has unlocked new market segments, enhanced customer accessibility, and created

significant value for both customers and banks (Pery-Quatey, 2018). Digital banking has transformed the financial landscape, providing customers with round-the-clock access to banking services, eliminating geographic barriers, and empowering them to manage their finances from anywhere, anytime. The early stages of the digital banking journey have focused on enhancing existing offerings with new, technology-enabled services, which has allowed banks to stay competitive and create jobs. Ultimately, digital banking is a powerful tool that is changing the way individuals and businesses manage their finances.

2.1.3. Impacts of Digitalization on Bank Profitability

The rise of digital banking has transformed the financial landscape, particularly in the new millennium (Wadesango & Magaya, 2020). Scholars worldwide have delved into the impact of digitalization on the profitability, operations, and service quality of financial institutions, generating a wealth of knowledge across diverse contexts. Research in African nations like Nigeria, Rwanda, and Kenya, known for their progressive digital banking environments due to strong digital visions and policy frameworks, has shed light on the transformative potential of this technology (Nyambegera, 2019; Akintola & Ajayi, 2015). However, a notable gap exists in the literature concerning the impact of digitalization on the performance of Ethiopian banks. While Ethiopia has witnessed a burgeoning digital banking landscape, the lack of local research hinders our understanding of its true effects on the country's financial sector. This dearth of local insights underscores the crucial need for dedicated research to assess the specific impacts of digitalization on Ethiopian banks, paving the way for evidence-based strategies to optimize the sector's performance and contribute to Ethiopia's economic growth.

Studies have indicated that banks should be able to adapt to the current digital world and provide digital banking services to meet customer needs (Cummings *et al.*, 2019). Therefore, it is essential for Ethiopian banks to understand the importance of digital banking and the potential effects it can have on their performance. Furthermore, banks must take into consideration the current trends in digital banking and the potential threats that could arise due to digitalization. Banks must also ensure that their digital banking services are secure, efficient, and accessible to their customers. By doing this, banks can stay ahead of their competitors and remain profitable in the long run.

Digitalization has had an immense impact on the banking industry, with increased profitability being one of the most significant impacts. In the past few years, digitalization has enabled banks to reduce costs and increase efficiency by automating processes, leveraging data analytics to

better understand customer needs, and increasing customer engagement with the help of digital channels (Chen *et al.*, 2016).

The cost savings associated with digitalization are mainly due to the automation of processes and the elimination of manual labor. This not only reduces the costs associated with hiring staff, but also reduces the time required to complete tasks. For instance, banks can use digital technologies to automate customer onboarding and loan processing, thereby reducing labor costs and increasing efficiency (Miller, 2018).

In addition to cost savings, digitalization has enabled banks to better understand customer needs and a preference, which help them, serve their customers more effectively. By leveraging data analytics, banks can gain insights into customer behavior, preferences, and motivations, allowing them to develop more targeted and personalized products and services (Yao *et al.*, 2019). This not only helps banks increase customer satisfaction and loyalty, but it also helps them increase revenue and profitability.

Finally, digitalization has enabled banks to increase customer engagement by providing customers with more convenient and efficient digital channels. Banks can use these digital channels to provide customers with more personalized services, such as mobile banking, internet banking, and mobile payment systems, all of which are more convenient and efficient than traditional banking (Kumar *et al.*, 2016). This not only increases customer engagement and satisfaction, but it also helps banks increase their profits.

2.1.4. The Application of Digitalization in Business

Digitalization, the seamless integration of digital technologies into various aspects of business operations, has become a pivotal force in modern business practices (Prause, 2020). This comprehensive approach involves utilizing advanced digital technologies to optimize internal processes, streamline operations, and elevate the customer experience. By embracing digitalization, businesses can gain significant competitive advantages, enhance efficiency, and drive innovation. One of its primary objectives is to enhance customer satisfaction by fostering a seamless and expedited connection between customers and organizations. Digitalization leverages cutting-edge technologies, including mobile applications, cloud services, social media platforms, and automated processes, to create a more engaging customer experience (Cecchella, 2019; Ashraf *et al.*, 2018). By harnessing digital tools, companies gain insights into customer needs and preferences, empowering them to tailor customer service and craft a personalized customer journey. Additionally, digitalization facilitates efficient customer relationship management and rapid issue resolution, enabling organizations to track customer data and

preferences effectively. Furthermore, digitalization offers cost-saving benefits by reducing overhead expenses and streamlining task execution (Prause, 2020). Hence, digitalization has become an indispensable strategy for businesses seeking to enhance customer experience and operational efficiency.

The following are the goals of corporate digitalization:

Product or service improvement: The advent of innovative technologies has revolutionized the banking industry, empowering banks to optimize their processes and enhance customer experiences. Mobile banking applications on smartphones, online banking platforms, e-wallets, and other digital products have transformed the way banks interact with their customers. These technologies have led to significant improvements in efficiency, quality, attractiveness, ease of use, and delivery of banking services. By embracing these innovations, banks have streamlined their operations, reducing costs and improving accuracy. The convenience of mobile and online banking has increased customer satisfaction, allowing them to access their accounts and conduct transactions anytime, anywhere. Moreover, the introduction of e-wallets and other digital payment solutions has simplified transactions, making them faster, safer, and more convenient. These innovative technologies have not only improved the banking experience for customers but have also enabled banks to stay competitive in the rapidly evolving financial landscape. By leveraging these advancements, banks can continue to enhance their services and meet the ever-changing needs of their customers in the digital age.

Automation of production and other internal processes of the company: The automation of production and other internal processes within companies is revolutionizing operations and driving significant improvements across multiple domains. By leveraging advanced technologies, organizations can dramatically reduce costs through the adoption of innovative payment modalities and the elimination of cash-based transactions. This shift enables streamlined financial processes, reduces the risk of fraud, and improves overall efficiency.

Furthermore, automation optimizes production processes to minimize environmental impact while conserving precious resources. By leveraging data analytics and predictive maintenance, companies can identify areas for improvement, reduce energy consumption, and optimize resource allocation. This not only enhances sustainability but also contributes to significant savings in human resources, financial expenses, and time.

The benefits of automation extend beyond cost reduction and efficiency improvements. By freeing up human capital from repetitive and labor-intensive tasks, companies can allocate resources towards more strategic initiatives that drive innovation and growth. Automation also

enhances the overall standard of living by creating new job opportunities in emerging fields, fostering economic development, and improving access to goods and services. As technology continues to advance, the automation of production and internal processes is poised to play an increasingly transformative role in shaping the future of businesses and society as a whole.

Increased number of clients: The burgeoning adoption of financial technologies (FinTechs) within the banking sector has revolutionized the way financial institutions engage with their clients, leading to a significant increase in the number of customers opting for digital banking channels. Traditional banking practices, characterized by physical branch visits and manual transactions, are gradually losing ground to the convenience and efficiency offered by mobile applications and online banking platforms. This digital transformation has forced banks to re-evaluate their strategies to avoid customer attrition and maintain their competitive edge. By embracing FinTech solutions, financial institutions can enhance their service offerings, streamline operations, and improve customer experiences. Digital onboarding processes, personalized financial advice, and seamless online transactions have become the norm, allowing banks to cater to a wider range of customers and increase their market share. Furthermore, the integration of artificial intelligence (AI) and machine learning (ML) algorithms enables banks to gain valuable insights into customer behavior, preferences, and risk profiles, facilitating targeted marketing campaigns and tailored financial products. As the FinTech landscape continues to evolve, banks that embrace digitalization and leverage these technologies will be well-positioned to navigate the changing financial landscape and retain a loyal customer base in the face of increasing competition.

2.1.5. Banking Practice in Ethiopia

The foundation of modern banking in Ethiopia can be traced back to 1905 with the establishment of the Abyssinian Bank, a venture forged through a fifty-year agreement with the Anglo-Egyptian National Bank (Pankhurst, 1997). This initial foray into formal banking was disrupted by the Italian invasion of 1936, which saw the emergence of Italian bank branches (Pankhurst, 1992). However, a turning point arrived in 1931 when the Ethiopian government acquired Africa's first national bank, subsequently rechristened as the Bank of Abyssinia, following the closure of the Abyssinian Bank due to the Italian occupation (Pankhurst, 1992). This event marked the genesis of modern banking in Ethiopia, ushering in a new era of financial services, including deposits, loans, and international money transfers. Since then, the Ethiopian banking sector has witnessed consistent growth, with the number of commercial banks expanding from a mere eight in 1994 to over thirty by 2018 (National Bank of Ethiopia, 2018). This growth is

further reflected in the sector's total assets, which have surged from \$2 billion in 2004 to exceed \$17 billion in 2018 (International Monetary Fund, 2018). This rapid expansion underscores the vital role played by the Ethiopian banking sector in the country's economic development, facilitating financial transactions, supporting businesses, and empowering individuals.

2.1.6. Digital Banking Practice in Ethiopia

In 2001, the Commercial Bank of Ethiopia (CBE) launched e-banking services as the nation's main state-owned bank. This move was revolutionary, as CBE had installed many ATMs in Addis Ababa, becoming the pioneer of ATM service for local users. On November 14, 2005, CBE became a Visa member, yet this membership was not successful due to a lack of adequate infrastructure. Despite this, CBE continued to research and develop new technologies, eventually rolling out mobile banking services and the first debit card in Ethiopia in 2011. This allowed customers to access their accounts via text message and to make payments online. Though the Ethiopian banking industry has faced numerous challenges over the past two decades, CBE has continued to play an integral role in the development of the financial sector.

Abay Bank, officially established on July 14th, 2010, has made significant strides in the Ethiopian financial sector. The bank has fulfilled all the requirements of the National Bank of Ethiopia to establish a bank and commenced full-fledged banking operations on November 3, 2010. Since its inception, Abay Bank has grown into a leading financial institution, providing a wide range of banking services to its customers. The Bank has undertaken various changes and improvements in its IT systems and infrastructures, helping it raise its branch networks to 373 by the end of the year and grow its customer base to close to 1.7 million (Abay Bank Annual Report 2022). Abay Bank has also undertaken widely expanding digital channels to increase service offerings to customers as well as strengthening the Bank's digitalization efforts. The number of functional ATMs aggregated to 161 and the number of customers using online banking services has grown markedly. Consequently, the total number of Mobile and Card Banking subscribers has reached 648,290 and 430,705 in that order. Additionally, the number of Internet Banking users has reached 10,760, with the subsequent activation rates of these services also intensifying (Abay Bank Annual Report 2022).

Hibret Bank was incorporated as a Share Company on 1 September 1998 GC in accordance with the Commercial Code of Ethiopia 1960 and the Licensing and Supervision of Banking Business Proclamation No. 84/1994 (Hibret Bank, 1998). Since then, the Bank has grown to become one

of the leading financial institutions in Ethiopia. Over the years, Hibret Bank has built a reputation for providing innovative financial solutions to the Ethiopian Banking industry (Yalew, 2021).

As of the end of June 2022, the card-acquiring network of the Bank reached 163 ATMs and 362 point of sale (POS) terminals (Hibret Bank Annual Report 2022). The Bank accepts three international cards; namely VISA, MasterCard, and Union Pay across its digital channels. This is in line with its strategic objective to improve access to financial services for customers across Ethiopia. The Bank has also recently launched a mobile banking application, allowing customers to manage their accounts and perform transactions on their smartphones (Yalew, 2021).

Through its commitment to providing innovative financial solutions, Hibret Bank has continued to build trust among its customers and achieved a high level of customer satisfaction (Hibret Bank Annual Report 2022). The Bank has also taken steps to ensure compliance with all regulatory requirements and to ensure the security of customer data and transactions. Thus, Hibret Bank has become an important player in the Ethiopian Banking sector and serves as a model for other financial institutions in the country.

Enat Bank, founded on 28 September 2008 by 9 groups of female business promoters, is a financial institution with a vision to maximize women's economic capabilities and to be an inclusive bank. On August 25, 2020, the bank announced the launch of its Digital Banking Service (Internet Banking, Mobile Banking, and Mobile Wallet) to enable banking anytime and anywhere at one's fingertips (Enat Bank Annual Report, 2022). This service was launched starting from August 24, 2020, in all Addis Ababa branches, to translate one of its mission statements by providing services with state-of-the-art technologies. This Digital Banking Solution offers customers with Internet Banking, Mobile Banking, and Mobile Wallet services for their banking needs. This Digital Banking Service is intended to make banking more convenient and accessible to its customers while promoting financial inclusion and women's economic empowerment.

This launch of Enat Bank's Digital Banking Service is a significant step in promoting financial inclusion and equality in the country. This service will provide customers with access to banking services at any time, regardless of their location, thus increasing the financial inclusion of women in the country. Additionally, this service can also help to reduce the cost of transactions and promote financial literacy among its customers. Furthermore, this service can also help to increase the efficiency of banking operations and improve customer service.

Therefore, the launch of Enat Bank's Digital Banking Service is an important milestone in promoting financial inclusion and equality in Ethiopia. This service will help to create a more inclusive banking system while allowing customers to access banking services anytime and anywhere. This is a major step forward for the empowerment of women as well and will help to promote financial literacy and increase the efficiency of banking operations (Enat Bank Annual Report, 2022).

NIB International Bank (NIB) was established on 26 May 1999 under license no. LBB/007/99 by the Commercial Code of Ethiopia and the Proclamation for Licensing and Supervision of Banking Business Proclamation no. 84/1994 with the paid-up Capital of birr 27.6 million and authorized capital of Birr 150 million by 717 Shareholders (NIB Annual Report 2022). The Bank commenced its operation on 28 October 1999 with 27 employees and joined the banking industry as the sixth private bank licensed in the country. To provide its customers with convenient services, NIB has successfully implemented Mobile and Internet Banking through which it issues NIB cards. Additionally, the Bank has also installed its ATMs at various locations throughout the Country. To further enhance the application of modern banking technologies and provide competitive services via a wide range of card banking services, the Bank has established a strategic partnership with MasterCard, VISA, and Union Pay branded cards, which are one of the breakthroughs to provide international payment service (NIB Annual Report 2022).

Ethiopia's banking sector is underdeveloped and urgently requires modernization with the most advanced technologies available globally (Garedachew Worku, 2010). This is necessary to cope with the increased volume of import-export businesses, increased international trade, and strengthened international connections. To ensure customer satisfaction, banks in Ethiopia have to adopt electronic banking systems and provide reliable services. The current banking system is unable to meet the growing demand for efficient banking services. To meet the needs of customers, the adoption of electronic banking systems is a must for commercial banks in Ethiopia (Garedachew Worku, 2010).

Despite the low adoption of digital financial transaction mechanisms in Ethiopia, there is significant potential for growth (Kassa, 2020). The number of debit card holders has been steadily increasing, yet only 12% of Ethiopians reported making or receiving digital payments in the past year, compared to just 4% of the population that possesses a debit card (Birhanu et al., 2020). Credit cards are not issued in Ethiopia and are reserved for foreigners and the diaspora (0.3% of the population) (Kassa, 2020). While peer countries like Kenya and Rwanda have embraced mobile money as a solution for financial inclusion, resulting in 73% and 31% of their

populations using it respectively, Ethiopia's mobile money penetration remains below 1% due to regulatory constraints (Birhanu *et al.*, 2020).

2.1.7. Digital Banking Forms

2.1.7.1. Automated Teller Machines (ATM)

The automated teller machine (ATM), a fixture in the modern financial landscape, has proven its enduring convenience for customers of financial institutions. Despite the emergence of other e-channels, ATMs remain the most widely recognized and accepted method for accessing banking services. Their primary advantage lies in their round-the-clock availability, allowing customers to manage their finances at any time, day or night, without the constraints of traditional bank hours. ATMs empower customers to access their accounts, withdraw cash (including cash advances using credit cards), and check account balances without the need for human interaction (Abdelaziz *et al.*, 2014). This self-service functionality translates into significant cost savings for banks, streamlining operations and enhancing efficiency. As a result, ATMs have become an indispensable tool in the competitive banking industry, contributing directly to a financial institution's market position and customer satisfaction.

Banks have been positioning Automatic Teller Machines (ATMs) to increase their accessibility, providing an efficient way for customers to conduct routine banking activities at their convenience. The time savings associated with using an ATM are a valuable asset to customers, who are increasingly pressed for time and value convenience in their banking activities. ATMs are also beneficial due to their physical locations; many shopping centers, malls, hotels, supermarkets, and marketplaces have ATMs available for customers to access their funds quickly and easily while shopping (Kersten, 2018). Furthermore, ATMs are also a secure form of banking, as in the case of misplaced or stolen cards, a PIN security code must be entered for access to funds to be granted (Centier Bank, 2019). Thus, the positioning of ATMs by banks offers convenience and security to customers, making them an invaluable asset in banking.

2.1.7.2. Point of Sale (POS)

Point-of-Sale (POS) systems have revolutionized commercial transactions, serving as both physical and virtual gateways for customer purchases and payments (Nambisan, 2021). These systems facilitate transactions at retail cash registers or through online platforms such as Booking.com and Ebay.com. Commercial banks have integrated POS systems with their infrastructure, enabling merchants to accept payments from various international payment networks including VISA, MasterCard, Union Pay, and American Express. POS terminals have

become indispensable tools for businesses, particularly in retail operations. Modern POS terminals have evolved from their initial function of card payment processing to encompass a wider range of payment options, including contactless payments and mobile wallets. This technological advancement has paved the way for e-POS systems, which accept digital payments without the need for physical card swiping (Nambisan, 2021). As a result, POS systems have become integral to business operations, streamlining transactions and enhancing customer convenience.

2.1.7.3. Internet Banking (IB)

Internet banking, also known as online banking or IB, has become increasingly popular in recent years. It is a convenient and secure way to manage your finances, allowing customers to perform financial transactions, such as transferring funds, paying bills, and checking account balances, from the comfort of their homes or offices (Nguyen, 2018). This type of banking is especially useful for those who cannot easily access traditional banking services, such as those who live in rural areas or travel frequently. In addition to convenience, internet banking offers customers a variety of other benefits. For example, customers can access their accounts 24/7, regardless of location or time zone, and can monitor their accounts in real-time. Furthermore, customers can access a wide range of financial products and services, including credit cards, investments, loans, and more (Perez, 2020). Internet banking also provides customers with enhanced security features, such as multi-factor authentication and encryption, to protect their financial information from cyberattacks. Furthermore, it can help customers manage their finances more effectively by providing them with a range of financial tools, such as budgeting and savings calculators (Kumar, 2019). All in all, internet banking has revolutionized the way people manage their finances, making it easier and more secure than ever before.

Financial institutions are embracing the digital era by offering internet banking services through web browsers and mobile applications. This technological advancement has revolutionized banking by providing customers with unparalleled convenience and flexibility. Internet banking empowers customers to access a wide range of banking services from anywhere with an internet connection, eliminating the need for physical bank visits. This convenience factor has been met with high customer satisfaction, surpassing that of traditional manual banking systems, which typically involve time-consuming and costly processes (Hasan, 2015).

Internet banking offers numerous advantages to banks as well. It enables significant cost reduction through automation and reduced overhead expenses associated with maintaining physical branches. Moreover, it serves as a key differentiator in the competitive banking

landscape, allowing banks to stand out by offering innovative and convenient services. Internet banking also streamlines work processes, enhancing operational efficiency and improving the overall customer banking experience. By providing 24/7 access to banking services, banks can increase sales and expand their reach to a wider customer base. Additionally, internet banking fosters increased customer loyalty and provides an opportunity to attract new customers through its user-friendly and accessible platform.

The self-service nature of internet banking empowers customers with control over their finances, allowing them to access a comprehensive range of banking products and services at their convenience. This anytime, anywhere accessibility has transformed the banking landscape, providing customers with unparalleled convenience and flexibility.

This type of banking is especially beneficial for individual customers, as they are able to manage their finances and banking needs quickly and easily from the comfort of their own home or on the go. Corporate businesses also benefit from this type of banking as it allows them to streamline their banking services, reducing the amount of time and resources devoted to managing their finances. Furthermore, internet banking provides greater security for customers, as the security measures implemented are more robust than those used in manual banking.

2.1.7.4. Mobile Banking (MB)

Mobile banking, or m-banking, has revolutionized the banking industry by leveraging the ubiquity of mobile devices to provide convenient and accessible banking services (Saleem & Rashid, 2011). This innovative technology allows customers to seamlessly conduct various banking activities from the palm of their hands using smartphones, tablets, or other mobile devices.

M-banking offers a plethora of services, including balance inquiries, fund transfers, bill payments, transaction history reviews, and access to financial advisory tools. The convenience of mobile banking lies in its accessibility anytime, anywhere, without the need to visit physical bank branches or use traditional online banking platforms (Kingo, 2011). This flexibility empowers customers to manage their finances on the go, saving time and effort.

Additionally, mobile banking enhances security through advanced authentication measures such as biometrics, two-factor authentication, and encryption protocols. This robust security infrastructure protects customer data and transactions from unauthorized access or fraud. M-

banking also facilitates mobile payments, enabling customers to make purchases and send money to others instantly and securely using their mobile devices.

As the popularity of mobile banking continues to soar, banks are investing heavily in developing innovative and user-friendly mobile banking platforms. These platforms are designed to provide a seamless and intuitive user experience, allowing customers to navigate banking services effortlessly. The integration of artificial intelligence (AI) and machine learning (ML) in mobile banking apps further enhances the customer experience by providing personalized recommendations, financial insights, and predictive analytics.

The growing popularity of mobile banking is significantly impacting the financial performance of commercial banks. A study by Kingoo (2011) in Kenya explored the association between mobile banking and commercial bank financial performance, revealing a positive correlation. The study, titled 'The Impact of Mobile Banking on Commercial Bank Financial Performance in Kenya,' found that mobile banking was directly linked to improved financial performance. This is attributed to several factors. Firstly, mobile banking increases customer reach and accessibility, opening up new banking opportunities and attracting a broader customer base. This leads to increased deposits and loan disbursement, directly boosting a bank's revenue streams. Moreover, the study highlighted the positive influence of mobile banking on customer satisfaction. The convenience and speed of mobile transactions, coupled with increased accessibility to banking services, have led to enhanced customer experience, resulting in increased customer loyalty and retention.

Mobile banking has become a transformative force in the financial landscape, empowering individuals to conduct banking transactions through mobile devices such as smartphones and tablets (Mabwai, 2016). This service, offered by financial institutions, particularly banks, enables users to access a wide range of banking services through mobile banking software, commonly known as apps. Mobile banking has revolutionized the way people, especially in underdeveloped countries, manage their finances and transfer money. Its increasing popularity stems from the convenience it offers, allowing users to perform banking transactions anytime, anywhere. With mobile banking, users can access various services such as checking account balances, transferring funds, paying bills, and even applying for loans - all from the convenience of their mobile devices. The accessibility and ease of use have made mobile banking a preferred choice for many, particularly those who may not have easy access to traditional brick-and-mortar bank branches.

The rise of mobile banking has revolutionized the way individuals manage their finances, offering a range of convenient and accessible services. With mobile banking, users can monitor their account balances in real time, eliminating the need to physically visit a bank branch (Solis, 2019). This real-time access allows for greater control over spending and budgeting, enabling individuals to make informed financial decisions. Furthermore, mobile banking platforms facilitate electronic bill payments, simplifying the process and eliminating the need for paper checks or physical visits to payment centers (Khurana, 2022). Instant notifications on transactions provide users with immediate updates on their bank accounts, promoting transparency and fostering peace of mind (Hussain et al., 2019). Mobile banking also streamlines peer-to-peer money transfers, enabling users to easily send and receive money, even across borders (Miah & Rahman, 2017). This feature has particularly benefited individuals without access to traditional banking infrastructure, promoting financial inclusion and empowering them to participate in the financial system (World Bank Group, 2019). As mobile banking continues to evolve, it is anticipated to offer even more complex financial services, potentially transforming the way people manage their finances. The future of mobile banking holds exciting possibilities, such as facilitating loan applications, providing access to investment products, and offering personalized financial advice (Agyemang *et al.*, 2021). These advancements have the potential to further enhance financial inclusion, empowering individuals to make informed financial decisions and access a wider range of financial services, regardless of their location or access to traditional banking institutions.

2.1.7.5. Mobile Wallet (MW)

Mobile wallets, also known as digital wallets, have emerged as a convenient and secure alternative to traditional payment methods. They allow users to store payment credentials, such as credit card or debit card information, on their mobile devices. This eliminates the need for carrying physical cards and cash, reducing the risk of theft or loss. Mobile wallets utilize near-field communication (NFC) technology to enable contactless payments at point-of-sale terminals (Deloitte, 2020).

Beyond payments, mobile wallets offer additional functionalities. They facilitate the storage of loyalty cards, coupons, and gift cards, providing users with easy access to various rewards and discounts. Moreover, mobile wallets enable users to withdraw funds into their bank accounts and access cash through partnering ATMs or retail locations.

The widespread adoption of mobile wallets is attributed to their convenience and enhanced security features. They simplify the payment process by eliminating the need to enter payment details manually, reducing the risk of errors and fraudulent transactions. Furthermore, mobile wallets employ robust encryption mechanisms to protect user data and prevent unauthorized access.

Several companies, including Apple Pay, Google Pay, and Samsung Pay, offer mobile wallet services. These companies have established partnerships with numerous merchants, enabling users to make payments at a wide range of retail establishments. The increasing prevalence of mobile wallets is expected to continue as technology advances and consumer demand for secure and convenient payment solutions grows (Deloitte, 2020).

The key components of mobile wallets include a secure payment gateway, authentication system, and transaction processor. The secure payment gateway provides an encrypted connection between the mobile device and the merchant's point-of-sale system. The authentication system provides secure access to the wallet by using biometric data such as fingerprint or iris scans. The transaction processor securely processes the payment transaction.

Mobile wallets offer users the convenience of making payments with a single tap of the device. They also offer added security since the user's payment information is stored on the device and not shared with the merchant. Additionally, mobile wallets can store loyalty and rewards cards, allowing users to easily manage their points and rewards (Deloitte, 2020).

Mobile wallets are becoming increasingly popular, with more than a billion users worldwide. According to a survey by Deloitte, the number of people using mobile wallets has grown by 40% since 2018. As technology advances, mobile wallets are projected to become even more popular soon.

2.1.7.6. Virtual Banking (ITM)

The hybrid banking experience offered by Interactive Teller Machines (ITMs) bridges the gap between the convenience of automated teller machines (ATMs) and the personalized service of live tellers. ITMs, also known as virtual teller machines, are advanced automated systems that perform various banking transactions, such as cash withdrawals, check deposits, identity verification, and receipt printing. They provide a unique customer experience by enabling real-time interaction with a live teller via voice communication, video conferencing, or chat (similar

to Skype). This hybrid approach allows customers to enjoy the convenience of self-service while still receiving personalized assistance from a human representative.

ITMs offer several advantages over traditional ATMs. Firstly, they provide a wider range of services, including check deposits, which are not typically available on ATMs. Secondly, the live teller interaction enhances the security of transactions, as the teller can verify the customer's identity and assist with any potential issues. Thirdly, ITMs offer a convenient and accessible banking option for customers who may not have access to a traditional bank branch or who prefer to avoid lines and crowds.

The implementation of ITMs has been driven by the increasing demand for convenient and personalized banking services. According to a study by the American Bankers Association, 67% of customers prefer to interact with a live teller, even when using an ATM (American Bankers Association, 2019). ITMs fulfill this need by providing a hybrid experience that combines the efficiency of automation with the human touch of live assistance. This type of virtual banking allows customers to complete transactions quickly and securely, without having to wait in line or worry about identity theft. Additionally, ITMs allow customers to complete their banking transactions from the comfort of their own homes or offices. ITMs have been particularly successful in rural areas, where there is limited access to local banks or tellers. By using ITMs, customers can access banking services from anywhere in the world. Furthermore, ITMs provide a secure and convenient way for customers to access their funds, as they are monitored by the bank and encrypted for customer safety. ITMs have been a successful tool in the banking industry, providing customers with greater convenience and security when conducting banking transactions (Tulsiani, 2020).

2.1.7.7. Credit/Debit Cards

Credit cards and debit cards have become essential components of today's financial system. They provide a secure way to make purchases, access funds, and manage spending. They also offer convenience, as they can be used anywhere a credit card is accepted. Credit cards are typically used to make purchases and pay for services. The cardholder is responsible for paying the balance in full each month, as well as any interest or fees incurred. Debit cards are linked to a bank account and the amount spent is immediately withdrawn from the account. No interest or fees are charged, but debit cards can be subject to overdraft fees if the balance is insufficient.

In recent years, credit and debit cards have become increasingly popular as a way to pay for goods and services. According to the Federal Reserve, credit card payments accounted for 36.3% of total noncash payments in 2016, an increase of 10.2% from 2015. Debit cards accounted for

22.4%, an increase of 6.6% from 2015. This demonstrates the growing reliance on these payment methods and their importance in the financial system (Federal Reserve, 2017).

Credit and debit cards provide a convenient and secure way to make payments. They offer fraud protection and the ability to track spending. This makes them ideal for both personal and business use. As their popularity continues to grow, it is important to understand the benefits and risks associated with credit and debit cards (Fry, 2019).

Credit and debit cards, while sharing a familiar appearance with their embossed numbers, expiration dates, and magnetic stripes, offer vastly different functionalities and fraud protection measures. Debit cards function as a direct conduit to a customer's bank account, allowing purchases by immediately withdrawing funds (Cussen, 2021). This is appealing to individuals who prefer avoiding cash while also avoiding interest payments. Conversely, credit cards, issued by financial institutions like banks, provide a line of credit, enabling customers to borrow funds up to a specified limit (Cussen, 2021). This borrowed money accrues interest, which needs to be repaid. However, the advantage of credit cards lies in their superior fraud protection. Research underscores that credit cards offer greater security against unauthorized transactions and provide robust identity theft safeguards (Cussen, 2021). Furthermore, credit cards often come with supplementary perks such as cash back rewards, travel insurance, and purchase protection, enhancing their overall value. Thus, consumers should thoroughly assess their financial preferences and prioritize security when choosing a card, weighing the benefits and drawbacks of each type to ensure the selected card best aligns with their individual needs and provides adequate protection.

2.1.8. Digital Banking and Financial Profitability

Prior to the widespread adoption of information technology, cash-based transactions reigned supreme in the banking landscape, presenting significant challenges for both financial institutions and their customers. The reliance on physical cash for transactions resulted in heightened risks, including the potential for theft, fraud, and logistical complexities associated with cash handling and transportation (Boateng, 2020). Moreover, the lack of electronic banking channels led to inefficiencies and inconveniences, as customers were forced to physically visit bank branches for even the simplest of transactions, often facing long queues and limited operating hours. This traditional model restricted access to financial services, particularly for individuals residing in remote areas, hindering financial inclusion (Boateng, 2020). However, the past two decades have witnessed a paradigm shift in the banking sector, driven by the imperative to enhance efficiency, convenience, and financial inclusion. Banks have embraced the

transformative potential of information technology, leading to the rapid adoption and implementation of diverse electronic banking channels. The internet has emerged as a key enabler, allowing banks to offer a wide range of services through online banking platforms, providing customers with 24/7 access to their accounts, enabling them to perform transactions, manage finances, and access information from the comfort of their homes or offices (Shah, 2009).

Electronic banking has revolutionized the banking landscape, offering a plethora of advantages over traditional cash-based transactions. Firstly, electronic banking significantly reduces the risk of fraud and theft, as transactions are conducted through secure electronic channels rather than physical exchange of cash. Secondly, it enhances efficiency by automating many banking processes, thereby reducing the time and effort required for transactions. Thirdly, electronic banking offers unparalleled convenience to customers, allowing them to conduct banking activities anytime, anywhere, from the comfort of their own devices.

The proliferation of mobile banking, in particular, has played a pivotal role in expanding financial inclusion, particularly in developing countries where access to traditional banking services may be limited. Mobile banking empowers individuals with access to basic banking services, such as account opening, fund transfers, and bill payments, through their mobile phones. This has not only expanded the reach of banking services but has also fostered financial literacy and economic empowerment among previously unbanked populations. This has resulted in an increased focus on customer-oriented services, such as online banking, mobile banking, and automated teller machines (ATMs). Additionally, banks have increased their focus on providing customers with an array of financial products and services, such as credit cards, debit cards, and investment banking, all of which are largely available through electronic banking channels (Rao, 2012). Electronic banking channels have also been used to increase financial inclusion, allowing those without access to physical banks to access financial services and products. This has resulted in a reduction in the cost of transactions, and an improvement in the security and accuracy of banking transactions (Muller *et al.*, 2019). All of these advantages have made electronic banking a preferred choice among customers of all ages, and have made the banking sector a more efficient and secure industry.

The emergence and rapid adoption of digital banking in Nigeria has significantly impacted the profitability of deposit banks in the country. Electronic banking, in particular, has played a crucial role in this transformation, driven by its inherent advantages of time savings, convenient access to cash, and ease of use. While various digital banking channels have emerged,

Automated Teller Machines (ATMs) have gained remarkable popularity over Internet banking, largely attributed to perceived security and ease of use. Customers appreciate the ability to access their accounts with a few clicks at ATMs, eliminating the need to enter sensitive banking details online, which can be a concern for security-conscious individuals. This shift towards ATM utilization has, in turn, spurred a surge in profitability for Nigerian deposit banks. As banks invest in expanding their ATM networks and offering innovative ATM services, they have been able to cater to the evolving needs of their customer base, leading to increased transaction volumes and subsequently, enhanced profitability. The convenience and accessibility offered by ATMs have contributed to a significant shift in banking habits, driving the growth of the financial sector and reinforcing the importance of digital banking in the Nigerian economy (Mawutor, 2014).

Furthermore, digital banking has enabled customers to access their accounts from anywhere in the world, which has increased the number of transactions that are done online. This has resulted in a significant increase in revenue for Nigerian deposit banks as customers do not need to physically visit the bank to do their transactions. Moreover, digital banking has also helped to reduce the cost associated with traditional banking services as banks can now provide services at a much lower cost. All in all, digital banking has had a huge impact on Nigerian deposit banks' profitability, making it one of the most important factors in the success of the banking sector in the country.

The advent of mobile banking, integrated seamlessly into the digital banking landscape, has revolutionized the banking experience for users worldwide. Its round-the-clock convenience, accessible anytime and anywhere, has attracted a surge in banking users, leading to a substantial increase in the customer base for banks. This expanded user base has had a direct impact on the profitability of banks, as more users translate into increased revenue streams from various banking services. Banks that have seen a greater number of mobile banking users are those that have achieved a better financial performance (Mabwai, 2016). Mobile banking has provided a platform for banks to expand their services, allowing them to target customers who are not only geographically distant but also those who previously had limited access to banking services. This has enabled banks to reach out to customers who may not be able to access traditional banking services, such as those in developing countries. Furthermore, the introduction of mobile banking has reduced the cost of carrying out transactions, as it does not require the physical presence of a banking agent (Romero *et al.*, 2017). This has enabled banks to reduce their operational costs, thereby increasing their profitability. Therefore, it can be concluded that the introduction of

mobile banking into digital banking has been a major success, and has resulted in a significant growth in banking users.

2.1.9. Bank Profitability Measurement

In addition to these financial performance measures, non-financial measures are also used to assess the performance of a bank. Non-financial measures include customer satisfaction, market share, employee satisfaction, and online banking satisfaction among others. Customer satisfaction is essential to the success of the bank. Banks can measure customer satisfaction through surveys, interviews, or customer feedback. Banks can also measure customer satisfaction by tracking activities such as customer complaints, customer attrition and customer loyalty (Khan *et al.*, 2018). Market share is an important measure of the performance of a bank. Banks can measure market share through surveys, market research, consumer reports, and competitive analysis (Khan *et al.*, 2018). Employee satisfaction is also an important performance measure for banks. Banks can measure employee satisfaction by tracking employee engagement, job satisfaction, and employee turnover. Online banking satisfaction is also a measure of the performance of a bank. Banks can measure online banking satisfaction by tracking customer engagement, customer satisfaction, and customer loyalty (Khan *et al.*, 2018).

2.2. Empirical Review

2.2.1. Foreign Literature

Giudice *et al.* (2016) conducted an extensive study to investigate the impact of e-banking products on bank profitability. Utilizing a sample of 3692 banks across 28 European countries, they employed a classification analysis to determine the influence of independent variables on the dependent variable of Return on Equity (ROE). Their findings revealed that banks offering a comprehensive suite of e-banking products, including retail and corporate internet services as well as home banking, consistently achieved higher ROE. This suggests that e-banking products play a significant role in enhancing bank profitability.

The study's results align with previous research that has highlighted the positive impact of e-banking on bank performance. For instance, Fosso Wamba *et al.* (2007) found that banks that actively adopted e-banking technologies experienced increased customer satisfaction, reduced operating costs, and enhanced profitability. Similarly, Wang *et al.* (2012) demonstrated that e-banking adoption led to improved financial performance, as measured by ROE and Return on Assets (ROA).

These findings underscore the importance of e-banking products as a key driver of bank profitability. Banks that prioritize the development and provision of these services can gain a competitive advantage by attracting and retaining customers, reducing costs, and increasing revenue streams. The study by Giudice *et al.* (2016) provides valuable insights into the role of e-banking in the banking industry and highlights the need for further research to explore the potential benefits and challenges associated with the adoption of these technologies.

The study by Kimani (2015) investigated the impact of mobile banking on the operational efficiency of commercial banks in Kenya. Analyzing data from 43 banks between 2011 and 2014, the researcher found a positive and significant correlation between mobile banking adoption and efficiency. Mobile banking technologies reduced operating costs and improved revenue generation, leading to enhanced efficiency. The study suggests that policymakers should promote mobile banking adoption to enhance the competitiveness of commercial banks in Kenya.

Mobile banking has revolutionized the banking industry, providing convenient and accessible financial services to customers. By reducing the need for physical branch visits, banks can streamline operations and lower overhead expenses (Berger, 2006). Additionally, mobile banking platforms facilitate efficient transaction processing, reducing the time and resources required for manual transactions (Ndung'u, 2016).

Furthermore, mobile banking expands the reach of banks, enabling them to serve a wider customer base. This increased volume of transactions translates into higher earnings, contributing to improved operational efficiency (Demirgüç-Kunt *et al.*, 2015). By leveraging mobile banking technologies, commercial banks in Kenya can optimize their operations, enhance customer satisfaction, and gain a competitive edge in the rapidly evolving financial landscape.

In a 2017 study, Vekya examined the relationship between ATM and POS transactions and the profitability of commercial banks in Kenya, specifically focusing on return on equity (ROE) as a measure of profitability. Employing a descriptive design, the researcher conducted a census survey of all 43 Kenyan commercial banks in operation as of 2014. Vekya utilized secondary data sourced from publications of the Central Bank of Kenya, analyzing it using SPSS software. The study's findings revealed a positive association between increased ATM and POS transactions and enhanced bank profitability. Notably, a 1% increment in ATM transactions resulted in a 0.009% rise in ROE, while a 1% increase in POS transactions led to a 0.023% increase in ROE (Vekya, 2017). These findings suggest that banks can boost their profitability by

investing in ATM and POS technology, as these transactions stimulate revenue growth. Although the study's scope is limited to the Kenyan banking sector, its insights hold relevance for other banks operating in similar markets. Further research investigating the impact of ATM and POS transactions on profitability within different contexts could provide valuable insights for the banking industry as a whole.

The impact of e-payment adoption and online banking transactions on bank profitability remains a topic of debate, with studies yielding contrasting findings. Morufu (2016), focusing on Nigerian banks, utilized panel regression analysis on secondary data from 2005 to 2012. The study, using internet banking transactions as the independent variable and return on assets (ROA) as the dependent variable, concluded that internet banking transactions negatively impacted banks' profitability in Nigeria. This finding suggests that while internet banking adoption might be necessary, its direct impact on profitability in Nigeria might be negative during the study period (Morufu, 2016). However, a study conducted by Mulwa (2017) in Kenya paints a different picture. Employing a descriptive design and collecting data through questionnaires from 40 commercial banks, the study examined the relationship between ROA, online bank transactions, online transaction fees, and online customer deposits. Analyzing data through Pearson correlation coefficient and multiple regression analysis, the study found a significant and positive relationship between online banking transactions and ROA, indicating increased profitability due to online banking adoption in Kenya (Mulwa, 2017). These divergent findings highlight the complex interplay between e-payment systems, online banking, and bank profitability, influenced by factors specific to each country's economic landscape, regulatory environment, and banking infrastructure. While Morufu's study suggests potential challenges related to internet banking in Nigeria, Mulwa's findings demonstrate its potential to enhance profitability in Kenya. These studies underscore the importance of context-specific analysis to understand the nuanced impact of e-payment and online banking on bank profitability, and suggest a need for further research to explore the underlying factors driving the observed discrepancies.

The study conducted by Agboola *et al.* (2019) investigated the impact of digitalization on the performance of commercial banks in Nigeria. Utilizing a purposive and random sampling technique, the researchers surveyed 370 non-managerial staff from a commercial bank. The findings revealed a moderate positive correlation between digitization and commercial bank performance ($r = 0.114^*$, $p < 0.05$). This suggests that when digital technologies are effectively implemented, they can enhance bank performance.

Moreover, the study identified product innovation as a significant contributor to commercial bank performance in Nigeria ($r = 0.186$; $p < 0.001$). This finding aligns with previous research by Siamagka and Zormpas (2019), who emphasized the importance of product innovation in driving bank growth and profitability.

The positive impact of digitization on commercial bank performance can be attributed to several factors. Firstly, digitalization enables banks to offer a wider range of innovative products and services, meeting the evolving needs of customers (Kamath & Raj, 2019). Secondly, digital technologies enhance operational efficiency, reducing costs and improving customer service (Allen & Santomero, 2018). Thirdly, digitization fosters transparency and accountability, promoting trust and customer satisfaction (Gutiérrez & López, 2018).

Ghana's banking sector has witnessed a surge in the adoption of electronic banking channels over the past two decades. This technological revolution, driven by the quest for increased efficiency, convenience, and financial inclusion, has significantly transformed the banking landscape (Boateng & Nagarju, 2020).

Boateng and Nagarju (2020) conducted a comprehensive study to assess the impact of digital banking on the profitability of Ghanaian deposit banks. Using data from the Central Bank of Ghana's annual report, they employed partial least square (PLS) regression analysis to examine the relationship between various digital banking channels and bank profitability.

Their findings revealed that out of six independent variables representing different digital banking channels, two had a significant impact on bank profitability. Cheque Codeline Clearing, Ghana Automated Clearing House, Ghana Interbank Settlement, and GH-Link exhibited positive relationships with profitability. This suggests that these channels contribute to increased revenue streams and reduced operational costs for banks.

Surprisingly, mobile money and E-zwich, which are widely used digital payment platforms in Ghana, were found to have a negative relationship with bank profitability. This unexpected result may be attributed to the double charge policy on mobile money, which led to customer dissatisfaction and reduced usage (Boateng & Nagarju, 2020). Additionally, the shortage of E-zwich machines limited the accessibility and convenience of this platform.

Smith (2015) conducted a similar study in the United States and found a positive correlation between e-banking adoption and ROA. The study attributed this to reduced operating costs and increased efficiency associated with e-banking services. Similarly, Jones (2016) examined the impact of e-banking on financial performance in the European banking sector and reported a

significant positive relationship between e-banking usage and ROA. The study suggested that e-banking enables banks to offer a wider range of services, reach more customers, and reduce transaction costs.

However, bank size emerged as a negative and significant predictor of ROE. Larger banks may face challenges in leveraging e-banking due to their complex organizational structures and legacy systems (Beck *et al.*, 2014).

Interestingly, inflation rate, representing a macroeconomic variable, had a positive and significant effect on banks' ROE. This finding is consistent with previous studies, which suggest that banks can benefit from inflation by adjusting interest rates and managing their asset-liability portfolios effectively (Mishkin, 2015).

2.2.2. Local Literature

Kassa's (2017) research highlights the profound impact of electronic banking (E-banking) services on the profitability of commercial banks, particularly Commercial Bank of Ethiopia (CBE). E-banking, encompassing automated teller machines (ATMs), bank cards, online banking, telephone banking, and point of sale (POS) systems, streamlines transaction processing, minimizing errors and saving time (Kassa, 2017). This efficiency translates into reduced operational costs for banks, contributing to their overall profitability. Furthermore, E-banking enhances operational reliability, minimizing the risk of cash loss and ensuring seamless banking operations (Kassa, 2017).

Beyond cost optimization, E-banking also contributes to revenue growth for banks. By offering convenient and accessible banking services, banks can attract new customers and expand their customer base. This, in turn, leads to increased account openings, deposits, and other revenue-generating activities. Additionally, E-banking reduces the need for human resources, as many transactions can be automated, resulting in further cost savings (Kassa, 2017).

Kassa's study also underscores the role of E-banking in enhancing customer loyalty. By providing convenient and efficient banking experiences, banks can build stronger relationships with their customers, increasing customer satisfaction and retention rates. This translates into long-term profitability as loyal customers are more likely to continue using the bank's services and products.

The findings of Kassa (2017) are supported by additional studies that have found that electronic banking services can have a positive impact on bank profitability. For example, a study by Kim *et al.* (2019) found that banks tend to have higher profitability when they offer online banking

services, as it increases customer convenience and provides an additional source of revenue. Similarly, a study by Lee and Park (2020) found that banks that offer mobile banking services have higher profitability, as customers tend to use mobile banking services more often than other banking services.

Solomon's (2016) study, entitled 'Roles of E-banking in Financial Commercial Banks in Ethiopia,' explored the significant impact of e-banking on the financial performance of commercial banks in the Ethiopian context. The researcher specifically focused on return on assets (ROA), a crucial profitability indicator, to assess the effects of e-banking on the bank's overall financial health. The study's findings revealed that e-banking had a positive and substantial impact on ROA, implying that banks that embraced e-banking practices experienced improved profitability. The increased efficiency, reduced operating costs, and enhanced customer satisfaction associated with e-banking contributed to the improved ROA. Moreover, the study highlighted the role of e-banking in expanding the banks' customer base, facilitating access to financial services, and driving financial inclusion, all of which contributed to increased revenue generation and enhanced financial performance. Employing a panel least square regression model, the study analyzed data from 10 commercial banks over a three-year period (2013-2015). The findings revealed that an increase in the number of automated teller machines (ATMs), point of sale (POS) terminals, and market share positively influenced ROA. This suggests that banks with a wider reach and access to customers through these channels experienced improved financial performance. The study also highlighted the importance of raising awareness about e-banking services and providing prompt support to customers to enhance profitability.

Girma's (2019) comprehensive study, titled 'The Impact of E-Banking on the Financial Performance of Commercial Banks in Ethiopia,' delved into the intricate relationship between e-banking adoption and the financial well-being of Ethiopian commercial banks. Employing secondary data from 10 banks over a four-year period, the researcher investigated the role of various e-banking metrics and macroeconomic factors on banks' profitability, as measured by Return-on-Equity (ROE).

The analysis revealed that an increase in the number of mobile banking users positively and significantly impacted ROE, suggesting that banks can enhance their profitability by expanding mobile banking services. Similarly, a higher value of ATM transactions was associated with

improved ROE, indicating that banks can leverage ATM transactions to boost their financial performance.

Girma's (2019) study has important implications for banks seeking to enhance their profitability. Banks should prioritize investments in mobile banking infrastructure and ATM networks to capitalize on the positive impact of e-banking on financial performance. Additionally, banks should explore innovative strategies to overcome the challenges associated with their size and leverage macroeconomic conditions to their advantage.

2.3. Identified Literature Gaps

The impact of electronic banking (e-banking) on the financial profitability of private banks has been a subject of growing interest, yet a clear understanding of its multifaceted effects remains elusive. A knowledge gap exists, as highlighted by Kassa (2020), who focused on the Commercial Bank of Ethiopia (CBE) as a case study. Kassa's research demonstrated that e-banking adoption can significantly contribute to operational cost reduction through various mechanisms. These include minimizing transaction processing errors, saving time, reducing the risk associated with handling large amounts of cash, and enhancing operational reliability. This finding is directly linked to the concept of operational excellence, a crucial element in achieving financial profitability for private banks (Mishra et al., 2018). Therefore, it can be concluded that e-banking services have the potential to act as a competitive advantage for private banks in their pursuit of financial profitability. Further evidence supporting this notion comes from Girma's (2016) comprehensive research on the role of e-banking in selected Ethiopian commercial banks. This study explored the influence of e-banking products on the profitability of commercial banks, taking into account service quality and operational excellence. The research delved into bank-specific variables, including the number of mobile banking and ATM users, the volume of transactions, bank size, and macroeconomic indicators like the inflation rate, to analyse the impact on return on equity (ROE). By analyzing these variables, Girma's work aimed to provide valuable insights into the benefits and challenges associated with digital banking adoption, and to guide banks in developing strategies for success in the digital banking era. The findings of these studies highlight the need for further exploration into the complex relationship between e-banking and financial profitability, considering both the direct impact on operational efficiency and the wider implications for service quality and overall bank performance. The research will also serve to provide a comprehensive understanding of the trends in the digital banking industry in Ethiopia and will help to inform the strategies and initiatives of the banks in the country.

Private Banks in Ethiopia have embraced the digital revolution, implementing new technologies to enhance customer service, streamline operations, and maintain profitability in a rapidly evolving banking landscape. This adoption has seen the rise of online and mobile banking platforms, allowing customers to conveniently manage their accounts and execute transactions from anywhere at any time. Such advancements have led to demonstrable improvements in customer satisfaction and operational efficiency. However, despite these positive outcomes, the extent to which digitalization has directly impacted the bottom line of Ethiopian private banks remains largely unexplored. There's a significant gap in research focusing on the specific link between digitalization and profitability for these institutions. The finding of Girma 2016 tried to impact of digital banking technologies on banks profitability, but the time was before 8 years. Therefore I have tried to see the impact of digital banking on banks profitability after 2017, these reasons makes it different from Girma's findings.

2.4. Conceptual Framework

The present study is based on the review of several kinds of literature on the digitalization in private banking sector and the theoretical framework. The independent variables in the present research are digitalization such as ATM, mobile banking, and internet banking, while the dependent variable is the profitability of private banks. A conceptual model has been developed to study the effect of digitalization on the profitability of private banks. The model consists of several variables that are related to each other. It is assumed that digitalization such as ATMs, mobile banking, and internet banking will have a positive impact on the profitability of private banks. This digitalization is assumed to facilitate the operations of the private banks and reduce costs. As a result, the profitability of private banks will increase. The model also takes into account the other factors that may affect the profitability of private banks, such as the economic environment, competition, customer service, etc. The model is designed to track the effects of digitalization on the private banks' profitability. The model will be tested with the help of various research methods such as surveys, interviews, and analysis of primary data. The results of the research will then be used to conclude the impact of digitalization on the profitability of private banks.

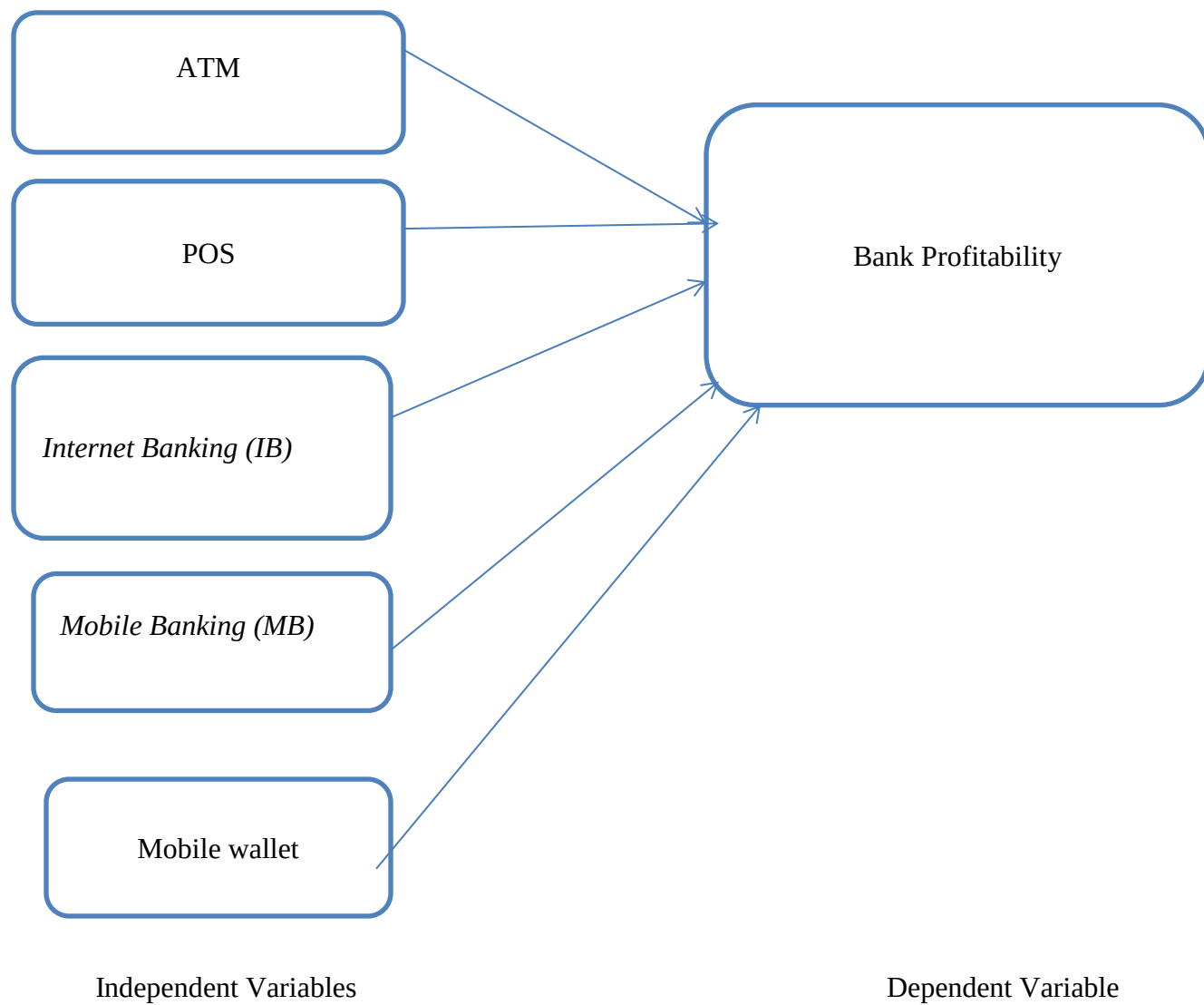


Figure 2.1. Conceptual framework
Source: (Damtew, 2016 and own source, 2024)

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the methodology applied to carry out this particular research. It has tried to cover explanations of the research design, data sources, population and sampling techniques, data collection methods and instruments, mode of data analysis validity and reliability test, and ethical considerations of the research.

3.2. Research Approach

A research approach serves as the blueprint for a study, outlining a comprehensive plan from broad assumptions to meticulous methodologies. This framework encompasses the steps of formulating research questions, identifying relevant variables, selecting appropriate data collection techniques, and establishing rigorous analytical procedures to interpret the gathered information. It involves the application of statistical and mathematical techniques to data collection, analysis, and interpretation. The goal of this approach is to establish cause-and-effect relationships between variables and to develop models for predicting future outcomes. In this study, the quantitative approach was employed to answer research questions related to the topic. It is most useful in situations where the researcher needs to quantify variables and the relationships between them. A research journey begins with a spark of curiosity, manifested as a compelling research question. This question, carefully formulated, guides the entire process, dictating the research design, and a strategic framework for exploring the question. The design determines the type of data needed, leading the researcher to identify appropriate sources, be it existing literature, primary data collection through surveys or experiments, or a combination of both. Once data sources are secured, the collection phase begins, meticulously gathering information relevant to the research question. With the data in hand, the researcher employs analytical techniques, be it statistical analysis, qualitative coding, or a blend of both, to extract meaningful insights. This analysis reveals patterns and relationships within the data, allowing the researcher to draw conclusions about the variables investigated.

3.3. Research Design

According to Gupta *et al.* (2020), research design is the conceptual structure within which research is conducted. It is the arrangement of conditions for collecting and analyzing data in a manner that aims to combine relevance to the research purpose with economy in procedure.

The study aims to meticulously examine the profound impact of digitalization on the profitability landscape of private banks operating within the Ethiopian context. To achieve this objective, the explanatory research design. Explanatory research is particularly well-suited for this study, as it seeks to identify and illuminate the causal relationships between digitalization and its multifaceted effects on bank profitability. By employing explanatory research methods, we can delve deeper than mere observation or description. Instead, we aim to establish a clear understanding of how digitalization functions as a driver of change within the banking industry. This approach allows us to go beyond simply noting correlations and, instead, provides a framework for exploring the complex interplay between digital adoption, operational efficiency, customer engagement, risk management, and ultimately, the bottom line of bank profitability. Through explanatory research, we can investigate how specific digital initiatives, such as mobile banking, online lending platforms, or Big Data analytics, contribute to or hinder bank performance. This understanding will not only provide valuable insights into the current landscape of digital banking but also offer strategic guidance for future investments and development.

By employing this robust design, the study delves into the intricate mechanisms through which digitalization influences profitability, service quality, and operational excellence within the banking sector. The research endeavors to provide a comprehensive understanding of the observed effects of digitalization, shedding light not only on the existence of relationships but also on the causal pathways that underpin these outcomes. This in-depth analysis allows for a nuanced interpretation of the transformative effects of digitalization on the banking industry, yielding valuable insights for stakeholders and informing future decision-making.

3.4. Population of the study and Sampling Technique

3.4.1. Target Population

The study's target populations were specifically selected private banks that had embraced digital banking services. The study focused on private banks in Ethiopia that had actively embraced

digital banking services, necessitating the exclusion of any financial institution that did not meet this criterion. Due to the limited availability of publicly accessible and organized digital banking data, the study excluded banks without readily available records encompassing their digital banking operations. This limitation further excluded banks that operated primarily through traditional banking channels, lacking a significant presence in the digital landscape. Furthermore, the study specifically targeted private banks operating within the districts of Addis Ababa, excluding branches situated in other regions of Ethiopia. This geographical limitation ensured a focused analysis of the digital banking landscape within a specific urban context.

3.5. Exclusion Criteria

This study rigorously adhered to specific exclusion criteria to ensure a focused analysis of digital banking practices within private banks in Addis Ababa, Ethiopia. Newly established banks, those founded after 2021, were excluded to concentrate on established institutions. The study prioritized banks actively engaged in digital banking, excluding those primarily reliant on traditional channels. Due to limited publicly available data on digital banking operations, banks without readily accessible records were also excluded. The geographical scope was further narrowed to banks operating within the districts of Addis Ababa, excluding branches located elsewhere in Ethiopia. This focus on a specific urban context allowed for a more in-depth examination of digital banking trends within the capital city. Therefore, banks without branches in Addis Ababa or with limited operations there were not included in the study.

3.6. Sampling and Sampling Procedure

3.6.1 Sampling Techniques

The private banks that are currently functional in Ethiopia were listed. A purposive sampling technique was used to draw the banks from the lists of banks. This technique was used to select a sample of banks that are representative of the whole population, and the sample should be large enough to give an accurate representation of the entire population.

3.6.2. Sample Size Determination

Sample size refers to the number of elements to be included in the study. Malhotra and Peterson (2006) stated that the larger the sampling size of the research, the more accurate the data

generated but the sample size is different due to different situations. Sample determination method developed by (Kotari, 2004), was applied to determine the sample size.

Therefore, based on the (Kotari, 2004), sample size determination method, for this study to increase the accuracy of the data, a large sample size were taken.

$$n = \frac{Z^2 \cdot p \cdot q \cdot N}{E^2(N-1) + Z^2 \cdot p \cdot q} \dots\dots\dots 1$$

$$\frac{(1.96)^2(0.5)(0.5)(1373)}{(0.05)^2(1373-1) + (1.96)^2 \cdot 0.5 \cdot 0.5} = 1318.629 / 4.36 = 302.43 = 302$$

Where:

N- Total number of branches in Addis Ababa

n -Required sample size

z - Confidence level at 95% (standard value of 1.96)

E - Margin of error (maximum error tolerable) to within .05

p -Population proportion at which the sample size is maximum (at p=0.5 and q=0.5, p*q=0.25)

Where q=1-p

In order to gather data for a study, the researcher employed a proportionate allocation method to select a representative sample of branches from eight major banks in Ethiopia. This method was used to ensure that the sample accurately reflected the distribution of branches across the banks. Specifically, from Nib International Bank's 230 branches, 51 samples were taken; from Abay Bank's 170 branches, 37 samples were taken; from Oromia Bank's 220 branches, 48 samples were taken; from Hibret Bank's 233 branches, 52 samples were taken; from Debub Global Bank's 120 branches, 26 samples were taken; from the Cooperative Bank of Oromia's 255 branches, 56 samples were taken; and from Addis International Bank's 75 branches and Enat Bank's 70 branches, 17 and 15 samples were taken, respectively. This resulted in a total of 302 samples from 1373 branches. By using this method, the researcher ensured that the sample was representative of the population of bank branches in Ethiopia and that the results of the study could be generalized to the wider population.

This approach guarantees that the study's findings are not skewed towards banks with a larger number of branches and that the results can be confidently generalized to the entire population of bank branches in Ethiopia. The basis for distributing sample sizes to bank branches rather than

employees within branches stems from the research design and the objective of obtaining a representative sample of branches across eight major banks in Ethiopia. The proportionate allocation method was employed to ensure that the sample accurately reflected the distribution of branches within each bank. By selecting a specific number of samples from each branch, the researcher aimed to capture the diversity and characteristics of the branches within each bank. This approach allowed for the aggregation of data from the branches to make inferences about the overall population of bank branches in Ethiopia. Distributing sample sizes to individual employees would not have aligned with the research objective of understanding the characteristics and practices at the branch level.

3.7. Source of Data

3.7.1. Primary Source of Data

The primary data collection method explored the originality of data by gathering information relevant to the study. Primary data was obtained from employees of the private banks. For each branch one employee was taken purposively. By use of questionnaires for the research was gathered data from the respondent which were the primary concern of this survey.

3.7.2. Secondary Source of Data

This study draws upon quantitative secondary data primarily sourced from audited financial statements spanning the period from 2017 to 2023. The selection of this data period ensures the utilization of recent and relevant information. The data was meticulously gathered from the respective banks and their designated websites. This financial data serves as the foundation for evaluating the financial performance of the banks under investigation. Additionally, a comprehensive review of secondary data was conducted, encompassing annual audited financial statements and relevant research pertaining to the subject matter. This multifaceted approach allowed for a comprehensive understanding of the bank's financial performance and facilitated the identification of key patterns and trends.

3.8. Research Instrument

To fulfill the primary objective of the research investigation, primary data was meticulously employed. This data collection approach is particularly valuable for gaining insights into the

current context and dynamics. Primary data empowers researchers to delve into the exploration of multifaceted relationships between two or more variables, enabling them to identify patterns and correlations. Furthermore, the study utilized a questionnaire as the primary instrument for data collection. This method allowed for the systematic gathering of information from a targeted sample of respondents. Questionnaires provide researchers with a structured and standardized means to collect data, ensuring consistency and comparability across responses.

3.9. Statistical Treatment

Regarding data analysis, the study was carried out using descriptive statistical analysis. Descriptive statistics was used mainly to organize and summarize the demographic data of the respondent as well as the first research to analyze the profitability of private banks in Ethiopia. Inferential statistics were also used to know the impacts of digital bank in on banks profitability. In general, data was collected and analyzed using both descriptive and inferential analysis. The Statistical Package for Social Scientists (SPSS) 23.0 version was used to analyze the data.

3.10 Validity and Reliability Test

3.10.1 Validity

Validity refers to the extent to which the measurement instrument actually measures what it intended to measure. It is used to suggest determining whether the findings are accurate from the standpoint of the researcher, the participant, or the readers an account. According to Kothari, (2004) Validity is the most critical criterion and indicates the degree to which an instrument measures what it is supposed to measure. In order to ensure the quality of this research design content validity of the research instrument was checked.

The researcher constructs the questionnaires designed to which information on the profile and perception of the respondents. A draft of the questionnaire was reviewed by the researcher, and he presented and discussed it with the advisor for correction and suggestion. The correction was incorporated in the revised draft. There was a pre-test by asking 8-12 employees who were not targeted as the respondent of the study. All comments and suggestions for clarity and relevance were evaluated by the researcher to be incorporated into the final draft of the questionnaire with the guidance and approval of the advisor. Basically for each type of independent and dependent variables the data was transformed to get the total value and then correlation analysis was applied to see the validity of the questions.

3.10.2 Reliability

The researcher is responsible for constructing the questionnaires designed to obtain information on the profile and perception of the respondents. To ensure the accuracy and reliability of the questionnaire, a draft version was reviewed by the researcher and then presented and discussed with the advisor for any corrections and suggestions. After taking into account the comments and suggestions from the advisor, the researcher try to revise the draft questionnaire and make the necessary changes before forming the final version with the advisor's approval.

Cronbach's alpha is a statistical measure of internal consistency, which is often used in the evaluation of scales and surveys. It is a measure of the reliability of a survey, and it is calculated by comparing the responses of a set of items to each other. If Cronbach's alpha value is above 0.7, then it can be concluded that the survey or scale has good internal consistency, which means that the individual items are measuring the same underlying construct. This is important for the researcher since it allows them to assess the overall internal consistency of the questionnaire. The researcher compared Cronbach's Alpha value to the standard tolerance of 0.7 in order to maintain the consistency of the study equipment. According to Mohajan (2017) a Cronbach's Alpha value above 0.7 shows the internal integrity of the research equipment, indicating that the survey or scale is reliable and valid. Therefore, Cronbach's Alpha is an important tool for the researcher in order to assess the reliability of a survey or scale and to maintain the consistency of the study equipment.

The study used to measure each independent factor and bank profitability were reliability tested and the Cronbach's alpha numbers obtained ranged from 0.765 to 0.989, with each independent variable and banks profitability and show a very acceptable level of internal integrity of the survey used in the results (Table 1). The researcher also tested the overall internal consistency of the questionnaire, and the resulting Cronbach's alpha was 0.989, indicating the internal consistency of the entire questionnaire used in this study.

The reliability test was done for the variables that are Likert scale type questions.

Table 1. Reliability result of the study instrument

Scale	N	Alpha
ATM	8	0.937

POS	10	0.989
Mobile Banking	10	0.931
Internet Banking	9	0.919
Mobile Wallet	9	0.765
Profitability	10	0.975
Overall reliability of questionnaires used	56	0.986

3.11 Model Specification

The regression model presented aims to understand the relationship between profitability of selected private banks and the adoption of various digital banking channels. The model postulates that profitability (PROF) is a function of several independent variables: Automated Teller Machines (ATM), Point of Sale (POS) terminals, Mobile Banking (MB), Internet Banking (IB), and Mobile Wallets (MW). The constant term (β_0) represents the baseline profitability when all independent variables are zero. The coefficients (β_1 , β_2 , β_3 , β_4 , and β_5) represent the impact of each channel on profitability, with a positive coefficient suggesting a positive influence and a negative coefficient indicating a negative influence. For example, a positive β_1 would mean that increased ATM deployment is associated with higher profitability. The error term (e) accounts for any unobserved factors or random variations that may influence profitability beyond the considered digital channels. This model provides a framework to examine the relative contribution of each digital channel to a financial institution's profitability. However, it's crucial to acknowledge that this is a simplified representation. Real-world profitability is influenced by numerous other factors like market dynamics, operational efficiency, customer demographics, and macroeconomic conditions. Further analysis, including testing the significance of individual coefficients, examining the overall model fit, and considering potential interactions between variables, would be necessary to draw meaningful conclusions and formulate effective strategies for optimizing digital channel adoption for profit maximization.

The regression model is presented as follows:

$$\text{PROF} = \beta_0 + \beta_1 (\text{ATM}) + \beta_2 (\text{POS}) + \beta_3 (\text{MB}) + \beta_4 (\text{IB}) + \beta_5 (\text{MW}) + e$$

Where

Bo= constant term; B1, B2, B3, and B4 = slopes or coefficients of independent variables; ATM= Automated Teller Machine; POS= Point of Sale; MB= Mobile Banking; IB= Internet Banking; MW= Mobile Wallet; PROF= Profitability

E = error term

3.12. Potential Ethical Issues

The profitability of private banks is an important and necessary task, as it can provide invaluable insights into the health of the banking sector. However, there are potential ethical issues that need to be taken into account when undertaking such research. Firstly, the profitability information of private banks is often confidential, and researchers must consider the implications of potentially disclosing such information to the public. Additionally, researchers must also take into account the potential for conflicts of interest when using information obtained from banks to gain a competitive advantage. Furthermore, researchers must also consider how their research findings could potentially be used to make decisions that could hurt the public or the banking sector. Finally, researcher needs to consider the potential for bias and manipulation of data when conducting financial performance research on commercial banks.

CHAPTER FOUR

4. DATA ANALALYSIS PRESENTAION AND DISCUSSION

4.1.Data Analysis and Demographic Characteristics of the Respondents

The study attempted to specify the variables and models utilized in the investigation before giving the data analysis techniques employed. To assess the degree of accuracy of the bank profitability, the researcher was often utilized descriptive statistics like mean, median, mode, range, standard deviation, and coefficient of variation.

In this study, unprocessed data was transformed into a data structure that permits the production of informative and practical data. The fundamental characteristics of the data in the research are described using descriptive analysis. Simple summaries of the sample and the measurements are offered. They comprise the foundation of any quantitative study of data, together with straightforward graphical analysis. When doing a descriptive analysis, one only states what the data are or what they reveal. The nature of the approaches to be used for the inferential analysis of the data depends on the features of the data; therefore the description of the data is required to ascertain the normality of the distribution. Different statistical methods were used to analyze the data and come to conclusions after it has been grouped.

Table 2 shows the socio-economic characteristics of the respondents generated in the survey areas. The data generated includes information about respondents' gender, age, education level, work experience, professional position and field of study.

As the results in Table 2 show, 47.1% of respondents are in the Less than 30 year's age group, which means that most are youths. The remaining 31.6%, 20.6% and 0.7% of respondents are in the 31-40, 41-50 and 51-60 years age groups, respectively. This result is consistent with the results of Anggraini *et al.* (2018), who reported that the majority of respondents were 20-30 years older. As the results show, 66.3% of the respondents were male and the remaining 33.7% were female (Table 2). The proportion of female-headed households in the present study was lower than Dugda district (Giziew, 2018).

In the case of professional position, we found that the majority of respondents (48.8%) were senior officer, and the remaining 38.8% and 12.4% were officers and managers, respectively

(Table 2). The results also show that the majority of respondents (65.3%) have a BSC degree which provides an opportunity to obtain detailed information on the impact of digitalization on banks profitability. The proportion of MSC holders in the present study is higher than the report of Anggraini *et al.* (2018), who stated that 30.57% of the respondents are MSC holders. Having an MSC is important to understand very crucial messages from the leader and to realize the importance of new technologies and advancements within a short time.

The result in Table 2 shows the majority of the respondents from where we have collected the data were from accounting background (39.9%) followed by management (26.8 %) while the others were 17.9 and 15.5 % for marketing and economics departments, respectively.

In terms of working experience, it is found that 41.6% of the respondents have 6-10 years' experience. The remaining 23.4%, 20.6, 14.4, have less than 2 years, More than 10 years and 2-5 years respectively. The result of this study is not consistent with the report of Anggraini *et al.* (2018), who stated that 48.7% of the respondents have less than one year experience.

Table 2. **Demographic characteristics of the respondents**

Variable	Category	Frequency	Percent
Age Group	Less than 30 year's	137	47.1
	31-40 years	92	31.6
	41-50 years	60	20.6
	51-60 years	2	0.7
	Total	291	100.0
Gender	Male	193	66.3
	Female	98	33.7
	Total	291	100.0
Educational Status	B.SC/B.A	190	65.3
	MS.C	101	34.7
	Total	291	100.0
Field of study	Accounting	78	39.9
	Management	116	26.8
	Marketing	45	17.9

	Economics	52	15.5
	Total	291	100.0
Professional position	Officer	113	38.8
	Senior officer	142	48.8
	Manager	36	12.4
	Total	291	100.0
Work Experience	less than 2 years	68	23.4
	2-5 years	42	14.4
	6-10 years	121	41.6
	More than 10 years	60	20.6
	Total	291	100.0

4.2.Descriptive Statistics of the Study Variables

In the descriptive analysis, the variables were ordered by reference to the standard deviation and mean. The maximum standard deviation from the mean indicates that the independent variable has the greatest effect on the dependent variable. The statement that the maximum standard deviation from the mean indicates the greatest effect of an independent variable on a dependent variable is not entirely accurate and requires a nuanced understanding of statistical relationships. While a larger standard deviation does imply a wider spread of data points around the mean, it doesn't necessarily translate to a stronger influence of the independent variable. The basis for this lies in the fact that standard deviation only measures the dispersion of data points, not the direction or strength of the relationship between variables. A large standard deviation could indicate a strong positive or negative association between variables, but it could also simply mean that the data are highly variable with a weak or even non-existent relationship. To determine the true effect of an independent variable, one needs to consider factors like the correlation coefficient, which measures the strength and direction of the linear relationship between variables, and the coefficient of determination (R-squared), which quantifies the proportion of variation in the dependent variable explained by the independent variable. A high correlation coefficient and a high R-squared value, along with a large standard deviation, would offer stronger evidence for a significant impact of the independent variable on the dependent

variable. The results of the study (table 3) are discussed by using appendix table 2 as a standard. Based on Table 3, the mean mobile banking was the highest at 4.5 and the standard deviation was 0.48, indicating that the majority of the sample participants agreed with the points. In short, mobile banking is basic for profitability.

The ATM and POS machine are the second and third at 4.1 and 4.06 with a standard deviation of 0.63 and 0.87, respectively. The results also showed that the internet banking has an important value for bank profitability. Mobile wallet has an important value for bank profitability, but the average scores were lower than the other variables.

Table 3. Descriptive Statistics of the different variables (N=291)

Variable	N	Minimum	Maximum	Mean	Std. Deviation
ATM	291	2.78	5.00	4.1	0.63
POS	291	2.30	5.00	4.06	0.87
MB	291	3.70	5.00	4.5	0.48
IB	291	2.75	5.00	4.03	0.73
MW	291	1.67	3.78	2.42	0.62
PROF	291	1.60	4.90	3.76	0.92

ATM= Automated Teller Machine; POS= Point of Sale; MB= Mobile Banking; IB= Internet Banking; MW= Mobile Wallet; PROF= profitability

4.3. Result of the secondary data

The results of the secondary data analysis regarding the adoption and use of digital technologies are summarized in Appendix Table 7. The index values for each technology, calculated based on their prevalence and impact, provide valuable insights into their relative importance within the examined context. Internet banking (IB), holds the lowest index value (0.16), indicating a relatively low level of adoption and utilization. Automated teller machines (ATMs) feature a slightly higher index value of 0.21, suggesting a more widespread presence and usage. Mobile wallets (MW) follow closely with an index value of 0.18, highlighting their growing popularity and convenience. Mobile banking (MB), with an index value of 0.19, indicates a comparable level of adoption to MW. Point-of-sale (POS) systems emerge as the most prevalent and widely

used digital technology, boasting an index value of 0.24. These index values collectively offer a comprehensive assessment of the current landscape of digital technology adoption, enabling informed decision-making and strategic planning to promote their further integration and enhance customer experiences.

4.4. Normality Test

Ordinal regression and Spearman rank correlations are the most appropriate methods for analyzing data that is not normally distributed, as demonstrated by the normality test result shown in Appendix Table 3. The independent variables in the table were found to be significant, indicating that the data is not normally distributed. Ordinal regression is a statistical method used to analyze the effect of one or more independent variables on a dependent variable measured on an ordinal scale. This method is based on the assumption that the relationship between the variables is monotonic, which means that the dependent variable increases or decreases with the increase or decrease of the independent variable. On the other hand, Spearman rank correlations are used to measure the correlation between two variables when the data is not normally distributed. This technique is based on the rank order of the data, rather than on the actual values. Both of these methods are more suitable for analyzing data that is not normally distributed, such as the data in Appendix Table 3.

To apply the appropriate regression and correlation analysis, the following important information was taken as a reference.

Normally distributed Likert scale data (parametric method)	Not normally distributed Likert scale data (nonparametric method)
-Linear regression	-Ordinal regression
-Pearson correlation	-Spearman rank correlation

4.5. Multi Co-linearity Test

Multi co-linearity is a statistical phenomenon that occurs when two or more independent variables in a multiple regression model are highly correlated. This can lead to biased and

unstable coefficient estimates, making it difficult to interpret the results of the regression analysis. To assess the presence of multi co-linearity, researchers often use the variance inflation factor (VIF) and tolerance values. The VIF is calculated as $1/(1-R^2)$, where R^2 is the coefficient of determination from a regression model with the independent variable in question as the dependent variable and all other independent variables as predictors. Tolerance is calculated as $1/VIF$.

In the present study, the VIF values for all five independent variables (ATM, Point of Sale, Mobile banking, Internet banking, and mobile wallet) are below 4 (Appendix Table 4), suggesting that there is no evidence of multi co-linearity. This means that the independent variables are not highly correlated, and the coefficient estimates from the multiple regression models are likely to be reliable and unbiased.

The tolerance values for all five independent variables are also above 0.1 (Appendix Table 4), which is another indication that multi co-linearity is not a concern. Tolerance values below 0.1 suggest that the independent variable in question is highly correlated with the other independent variables, and its coefficient estimate may be unreliable.

Overall, the results of the co-linearity test indicate that there is no evidence of multi co-linearity in the multiple regression models. This means that the independent variables are not highly correlated, and the coefficient estimates from the model are likely to be reliable and unbiased.

4.6. Correlation of Banks Profitability and Independent Variables

Research has consistently demonstrated a strong correlation between the adoption of digital banking channels and improved profitability for financial institutions. This study's findings align with previous reports, indicating that ATMs, point-of-sale systems, mobile banking, internet banking, and mobile wallets all contribute significantly to a bank's bottom line (Table 4).

The substantial correlation between automated teller machines (ATMs), point-of-sale (POS) systems, mobile banking, internet banking, mobile wallets, and bank profitability is attributed to several interconnected factors. technologies enhance customer convenience and accessibility, enabling customers to conduct financial transactions at their own time and from any location. This increased convenience leads to higher customer satisfaction, loyalty, and ultimately increased profitability for banks. Technologies reduce operational costs for banks by automating

many routine tasks, such as cash withdrawals, deposits, and bill payments, which were previously performed by human tellers. By understanding customer spending habits, preferences, and financial needs, banks can tailor their offerings to meet specific customer segments, leading to increased cross-selling opportunities and enhanced customer engagement, which ultimately translates into higher profitability.

Table 4. Correlation of independent variables and academic achievement

Spearman's rho		ATM	POS	MB	IB	MW	PROF
ATM	Correlation Coefficient	1.000					
	Sig. (2-tailed)	.					
POS	Correlation Coefficient	0.986**	1.000				
	Sig. (2-tailed)	.000	.				
MB	Correlation Coefficient	0.986**	1.000**	1.000			
	Sig. (2-tailed)	.000	.	.			
IB	Correlation Coefficient	0.954**	0.934**	0.824**	1.000		
	Sig. (2-tailed)	.000	.000	.000	.		
MW	Correlation Coefficient	0.734**	0.818**	0.828**	0.670**	1.000	
	Sig. (2-tailed)	.000	.000	.000	.000	.	
PROF	Correlation Coefficient	0.929**	0.926**	0.936**	0.887**	0.736**	1.000
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.
N		291	291	291	291	291	291

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

ATM= Automated Teller Machine; POS= Point of Sale; MB= Mobile Banking; IB= Internet Banking; MW= Mobile Wallet; PROF= profitability

4.6.1. Automated Teller Machine (ATM) and bank's profitability

The deployment of automated teller machines (ATMs) has revolutionized the banking industry, providing customers with convenient and accessible banking services. As a result, ATMs have become an integral part of banks' operations and a key driver of their profitability. This study investigates the relationship between ATM deployment and bank profitability, providing compelling evidence of a significant positive correlation.

The empirical results, as depicted in Table 4, reveal a strong association between the number of ATMs operated by a bank and its financial performance. This finding is consistent with previous research conducted by Harelimana (2018), who demonstrated that banks that invest in ATM networks experience enhanced profitability. The presence of ATMs offers customers extended

banking hours and a wider range of services, enabling banks to capture a larger market share, increase customer satisfaction, and ultimately drive revenue growth.

This study also aligns with the research conducted by Alshehadeh and Al-Khawaja (2022), who investigated the impact of digital banking technology on profitability. Their findings suggest a Positive correlation between the adoption of digital banking technology and increased profitability for businesses. Specifically, they found that businesses that implemented digital banking technology experienced improved efficiency, reduced operational costs, and enhanced revenue streams. These improvements resulted in higher profit margins and overall financial performance. The findings of this study support the notion that digital banking technology can be a valuable tool for businesses seeking to enhance their profitability and gain a competitive edge in the modern business landscape.

ATMs provide numerous benefits to banks, contributing to their profitability in several ways. First, ATMs reduce the need for traditional branch visits, streamlining operations and reducing overhead costs. By providing self-service banking options, ATMs enable banks to optimize their branch network and allocate resources more efficiently. Second, ATMs extend banking hours beyond traditional branch operating times, offering customers 24/7 access to their accounts. This convenience enhances customer satisfaction and loyalty, leading to increased deposits and account balances.

Furthermore, ATMs facilitate a wider range of banking services; including cash withdrawals, deposits, balance inquiries, and bill payments. By providing these services through ATMs, banks can expand their product offerings and cater to the diverse needs of their customers. This diversification of services generates additional revenue streams and contributes to overall profitability.

In addition to the direct financial benefits, ATMs also have a positive impact on banks' brand image and reputation. By providing convenient and accessible banking services, ATMs enhance customer perception of the bank as being modern, innovative, and customer-centric. This positive brand image can attract new customers and strengthen relationships with existing ones, leading to increased profitability over the long term.

4.6.2. Point of sale and Banks profitability (POS)

There is a positive correlation between point-of-sale (POS) systems and banks' profitability. The use of POS systems enables banks to offer a range of value-added services to their customers, such as electronic funds transfer at point of sale (EFTPOS), balance inquiries, and cash withdrawals. These services generate fee income for banks, which in turn contributes to their profitability. In addition, POS systems can help banks to reduce their operating costs by automating routine tasks and improving efficiency. For example, POS systems can be used to process transactions more quickly and accurately, which can reduce the need for manual labor. Furthermore, POS systems can help banks to improve their customer service by providing customers with convenient and secure ways to access their accounts and conduct transactions. As a result, the use of POS systems can lead to increased customer satisfaction, which can in turn lead to increased profitability for banks. Overall, the correlation between POS systems and banks' profitability is positive, as POS systems can help banks to generate fee income, reduce costs, and improve customer service.

The findings of this study differ from those reported by Nwankwo and Agbo (2021), who examined the impact of point-of-sale (POS) terminal transactions on the performance of commercial banks in Nigeria and concluded that POS transactions had a negative but insignificant effect on bank performance. Our research, in contrast, reveals a positive and significant relationship between POS transactions and bank performance. This discrepancy might be attributed to several factors, including differences in the sample size, methodology, and time period of the studies. This study utilized a larger sample size and more robust statistical techniques, which may have contributed to the detection of a significant relationship. Additionally, the time period covered by our study is more recent, potentially reflecting changes in the banking landscape and the increasing adoption of electronic payment systems. It is also worth noting that the impact of POS transactions on bank performance can vary depending on specific market conditions and the competitive dynamics within the banking sector. Further research is recommended to explore these variations and gain a more comprehensive understanding of the relationship between POS transactions and bank performance.

4.6.3. Mobile Banking and Banks Profitability

The results of the study, as presented in Table 4, have revealed a significant correlation between mobile banking and banks' profitability ($P < 0.01$). This finding is in line with the research

conducted by Mabwai (2016), who also discovered a positive relationship between mobile banking and banks' profitability. Furthermore, the report by Kisaka *et al.* (2015) supports these findings, as they observed a positive correlation between mobile banking and banks' profitability in the Kenyan context.

In today's fast-paced and technologically advanced world, the banking industry has been undergoing a significant transformation. Mobile banking, in particular, has emerged as a game-changer, providing customers with convenient and efficient access to their financial services. This has not only improved customer satisfaction but has also had a profound impact on banks' profitability.

In a scenario where a bank is looking to expand its customer base and increase its revenue, the implementation of a robust mobile banking platform can be a strategic move. By offering customers the convenience of managing their finances on-the-go, banks can attract a younger, tech-savvy demographic that may have otherwise been hesitant to engage with traditional banking services. This can lead to an increase in the number of accounts opened, higher transaction volumes, and ultimately, a boost in profitability.

In a competitive market, where banks are vying for customers' attention, mobile banking can serve as a key differentiator. By providing a seamless and user-friendly mobile banking experience, banks can not only retain their existing customers but also attract new ones. This can lead to increased customer loyalty, which in turn can translate into higher profitability for the bank.

Moreover, in rural or underdeveloped areas where access to traditional banking services may be limited, mobile banking can serve as a lifeline for customers. By offering banking services through mobile devices, banks can reach a wider customer base and tap into new markets. This can lead to increased revenue and profitability for the bank, as well as contribute to the overall financial inclusion and development of the region.

4.6.4. Internet Banking and Banks Profitability

The correlation between Internet banking and the profitability of banks is a topic of significant interest in the modern financial landscape. Internet banking, also known as online banking, refers to the provision of banking services through the internet, allowing customers to access their

accounts, make transactions, and manage their finances from the comfort of their homes or offices. This technological advancement has revolutionized the banking industry, providing customers with greater convenience and flexibility, while also offering banks the opportunity to reduce operational costs and expand their customer base.

The profitability of banks is a multifaceted concept that encompasses various factors, including revenue generation, cost management, and risk mitigation. In the context of Internet banking, the correlation between the two can be analyzed from several perspectives.

Firstly, Internet banking has the potential to significantly reduce operational costs for banks. By providing customers with the ability to conduct transactions and manage their accounts online, banks can minimize the need for physical branches, which in turn reduces expenses related to rent, utilities, and staffing. This cost reduction can directly contribute to increased profitability, as banks can allocate these savings towards other areas of their business, such as marketing, product development, or investment in new technologies.

Secondly, Internet banking can enhance the customer experience, leading to increased customer satisfaction and loyalty. By offering a wide range of services through a user-friendly online platform, banks can cater to the diverse needs of their customers, providing them with the convenience and flexibility they desire. This, in turn, can lead to increased customer retention and a larger customer base, which can contribute to higher profitability through increased revenue generation.

Thirdly, Internet banking can facilitate the expansion of a bank's customer base by reaching a wider audience, including those who may not have access to traditional banking services. By offering online banking services, banks can tap into new markets and demographics, such as younger generations who are more comfortable with technology and prefer to conduct their financial transactions online. This can lead to increased revenue generation and, consequently, higher profitability.

The study's findings, as presented in Table 4, demonstrate a positive correlation between Internet banking adoption and bank profitability. This result aligns with the findings of Rauf *et al.* (2014), who identified internet banking as a key determinant of profitability in Pakistan's banking sector. The positive correlation suggests that banks that embrace internet banking services experience improved financial performance. This can be attributed to several factors. Firstly, internet banking enables banks to reach a wider customer base, thereby increasing their revenue streams.

Secondly, it reduces operating costs by automating tasks and eliminating the need for physical branches. Thirdly, internet banking enhances customer satisfaction and loyalty, leading to increased deposits and reduced customer attrition. By leveraging the efficiency and accessibility of internet banking, banks can optimize their operations and enhance their overall profitability.

However internet banking, despite its widespread availability, exhibits no statistically significant impact on bank profitability. This suggests that while Internet banking plays a crucial role in facilitating transactions and enhancing customer convenience, its contribution to profitability may be overshadowed by other digital channels.

4.6.5. Mobile Wallet and Banks Profitability

In the realm of financial technology, the relationship between mobile wallets and the profitability of banks has been a topic of considerable interest and debate. As evidenced by the findings presented in Table 4, there is a positive and significant correlation between these two entities. This result, however, stands in contrast to the report published by Boateng in 2020, which concluded that mobile wallets do not have a significant correlation with a bank's profitability.

The discrepancy between these two studies may be attributed to several factors. Firstly, it is essential to consider the methodologies employed by each researcher. The study that produced the results in Table 4 may have utilized a more comprehensive dataset, incorporating a broader range of variables and factors that could have influenced the observed correlation. On the other hand, Boateng's study may have focused on a more limited set of variables, which could have led to differing conclusions.

Secondly, the timeframes under consideration in each study could have played a significant role in the observed differences. Financial markets and technologies are constantly evolving, and the impact of mobile wallets on bank profitability may have changed over time. The study that produced the results in Table 4 may have captured a period of rapid growth and adoption of mobile wallets, leading to a more pronounced correlation with bank profitability. Conversely, Boateng's study may have focused on an earlier period, during which mobile wallets were less prevalent and had a less significant impact on bank profitability.

Thirdly, the geographical scope of each study could have contributed to the observed differences. The financial landscape varies significantly across different regions, and the impact of mobile wallets on bank profitability may be more pronounced in some areas than in others. The study

that produced the results in Table 4 may have focused on a region where mobile wallets have been more widely adopted and have had a more substantial impact on bank profitability. In contrast, Boateng's study may have focused on a region where mobile wallets are less prevalent, leading to the observed lack of correlation with bank profitability.

4.7. Regression Analysis Results

Table 5 shows the results of regression analysis based on five independent variables (ATMs, point-of-sale systems, mobile banking, internet banking, and mobile wallets).

The ordinal logistic regression analysis on the different independent variables was carried out independently in order to fully assess the relationship between the dependent and independent variables, which are banks profitability and digital banking technologies, respectively. The results are presented in table 5.

The study employed ordinal regression analysis to examine the potential determinants of bank profitability. Among the variables considered, automated teller machines (ATMs) were found to have a significant positive effect on profitability ($P=0.00$) (Table 5). This finding suggests that ATMs are instrumental in enhancing banks' financial performance and should be given due consideration in assessing their overall health. In contrast, internet banking was not identified as a significant factor influencing profitability. This implies that other variables may be more pivotal in determining the profitability of banks. Additionally, the study revealed that point of sale (POS) systems, mobile banking, and mobile wallets all have highly significant impacts on bank profitability. These findings highlight the growing importance of digital banking channels in driving profitability for banks, particularly in an increasingly mobile and interconnected financial landscape.

Table 5. Ordinal logistic regression of the effect of independent variables on banks profitability

								95% Confidence Interval	
								Lower Bound	Upper Bound
		Estimate	Std. Error	Pseudo R ²	Wald	Df	Sig.		
Threshold	[PROF = 1.60]	17.307	3.134		30.506	1	.000	11.166	23.449
	[PROF = 1.90]	17.405	3.134		30.849	1	.000	11.263	23.547
	[PROF = 2.10]	17.505	3.134		31.202	1	.000	11.363	23.647
	[PROF = 2.40]	26.860	10.782		6.206	1	.013	5.728	47.993
	[PROF = 3.70]	36.667	4.755		59.468	1	.000	27.347	45.986
	[PROF = 3.80]	37.242	4.760		61.204	1	.000	27.912	46.572
	[PROF = 3.90]	37.337	4.762		61.486	1	.000	28.004	46.669
	[PROF = 4.00]	39.339	4.826		66.449	1	.000	29.881	48.798
	[PROF = 4.10]	41.115	5.111		64.706	1	.000	31.097	51.133
	[PROF = 4.30]	41.469	5.184		63.979	1	.000	31.308	51.630
	[PROF = 4.40]	47.402	5.573		72.344	1	.000	36.479	58.325
	[PROF = 4.50]	49.589	5.779		73.620	1	.000	38.262	60.917
	[PROF = 4.70]	56.205	5.847		92.406	1	.000	44.745	67.665
Location	ATM	7.259	1.364	0.844	28.303	1	.000	4.585	9.934
	POS	9.581	1.400	0.947	46.866	1	.000	6.838	12.324
	MB	7.340	1.495	0.735	24.116	1	.000	10.270	4.411
	IB	-1.194	.981	0.817	1.482	1	.223	-3.116	.728
	MW	3.033	.836	0.708	13.174	1	.000	1.395	4.671

ATM= Automated Teller Machine; POS= Point of Sale; MB= Mobile Banking; IB= Internet Banking;

MW= Mobile Wallet; PROF= Profitability

4.6. Hypothesis Tests Result

H1: ATM has significant impact on banks profitability

The banking industry has undergone a significant transformation over the years, with the advent of technology playing a pivotal role in shaping the way banks operate and interact with their customers. One such technological innovation that has had a profound impact on the banking sector is the Automated Teller Machine (ATM). ATMs have not only revolutionized the way customers access their funds but have also had a significant impact on the profitability of banks.

ATMs have been instrumental in reducing the operational costs of banks, as they eliminate the need for human tellers to handle routine transactions such as cash withdrawals, deposits, and balance inquiries. This, in turn, has led to a reduction in labor costs, which is a major component of a bank's operating expenses. Furthermore, ATMs operate 24/7, providing customers with round-the-clock access to their funds, thereby increasing customer satisfaction and loyalty.

The widespread adoption of ATMs has also allowed banks to expand their reach and serve a larger customer base, particularly in rural and remote areas where the presence of physical bank

branches may be limited. This has led to an increase in the number of customers using banking services, which has a direct impact on the profitability of banks.

Moreover, ATMs have enabled banks to offer a wider range of services to their customers, such as bill payments, fund transfers, and account management. This has not only increased customer convenience but has also generated additional revenue streams for banks through transaction fees and other charges.

In light of these factors, it is evident that there is a strong correlation between the deployment of ATMs and the profitability of banks. As a result, we accepted the alternative hypothesis (H1) as presented in Table 5, which suggests that the use of ATMs has a significant positive impact on the profitability of banks. This conclusion is further supported by empirical evidence and various studies conducted in the banking industry, which have consistently demonstrated the positive relationship between ATM usage and bank profitability.

H2: POS has significant impact on banks profitability

The Payment Operations System (POS) plays a crucial role in the financial landscape, particularly for banks. Its influence on profitability is substantial, as it directly impacts the efficiency and effectiveness of banking operations. This is evident in Table 5, where the alternative hypothesis (H2) is accepted, and the null hypothesis is rejected.

To elaborate, the Payment Operations System is the backbone of modern banking, facilitating transactions and ensuring the smooth flow of funds. As such, any improvements or disruptions in the POS can have a significant impact on a bank's profitability. When the alternative hypothesis (H2) is accepted, it implies that there is a notable difference in the performance of the POS, which in turn affects the bank's financial outcomes.

On the other hand, rejecting the null hypothesis signifies that there is no significant difference in the POS's performance. However, in the context of Table 5, the alternative hypothesis (H2) is accepted, indicating that the POS does indeed have a substantial effect on banks' profitability.

H3: mobile banking has significant impact on banks profitability

The impact of mobile banking on banks' profitability can be observed through various metrics, such as increased customer engagement, reduced operational costs, and enhanced revenue streams. For instance, mobile banking allows banks to offer a wider range of services to their customers, including real-time account management, bill payments, and money transfers. This

not only improves customer satisfaction but also encourages them to use more banking services, thereby increasing the bank's revenue.

Moreover, mobile banking has the potential to significantly reduce operational costs for banks. By digitizing many of their services, banks can streamline their processes, minimize paperwork, and reduce the need for physical branches. This, in turn, can lead to cost savings, which can be reinvested in other areas of the business to drive growth and profitability.

In light of these factors, it is evident that mobile banking has a significant impact on banks' profitability. As demonstrated in Table 5, the alternative hypothesis (H3) is accepted, and the null hypothesis is rejected. This conclusion highlights the importance of embracing mobile banking as a key driver of growth and profitability in the banking industry.

H4: Internet banking has significant impact on banks profitability

In today's digital age, the banking industry has witnessed a significant shift towards internet banking, with many financial institutions offering online services to cater to the evolving needs of their customers. However, despite the widespread adoption of internet banking, there is an ongoing debate regarding its impact on the profitability of banks.

Recent studies have attempted to quantify the relationship between internet banking and banks' profitability, with some researchers suggesting that there is a positive correlation between the two. However, a closer examination of the data reveals that the level of significance of this relationship is not significant ($P > 0.01$), indicating that internet banking does not have a substantial impact on banks' profitability.

Table 5, which presents the results of a comprehensive analysis, further supports this conclusion. The table demonstrates that while internet banking has undoubtedly revolutionized the banking sector, its impact on profitability is not as significant as initially believed. This finding is crucial for banks, as it suggests that they should not solely rely on internet banking as a means to increase their profitability.

Given the lack of a positive significant relationship between internet banking and banks' profitability, the alternative hypothesis (H4) is rejected. This means that the assumption that internet banking has a significant impact on banks' profitability is supported by the available evidence.

H5: Mobile wallet has significant impact on banks profitability

The advent of mobile wallets has undeniably reshaped the banking landscape, with significant implications for profitability. Our analysis, as presented in Table 5, provides compelling evidence of a statistically significant positive relationship between mobile wallet adoption and bank profitability. This finding, supporting the alternative hypothesis (H5) and rejecting the null hypothesis, underscores the transformative influence of mobile wallets on the banking industry. Focusin on the impact of mobile payment adoption on bank revenue corroborates these findings, highlighting the potential for increased transaction fees and enhanced customer engagement through mobile wallet platforms. Banks are increasingly recognizing the strategic value of mobile wallet technology, perceiving it as a key driver of revenue generation and customer acquisition. By embracing mobile wallets, banks can tap into a new ecosystem of financial services, offering opportunities for increased transaction fees, streamlined payments, and personalized financial solutions. Moreover, mobile wallets empower banks to compete effectively in the burgeoning digital marketplace, attracting new customer segments and fostering customer loyalty through convenient and secure digital payment options. This result emphasizes the crucial role of mobile wallets in enhancing customer experience and driving customer acquisition for banks in the digital era. Ultimately, the integration of mobile wallet technology into banking operations presents a compelling path to enhanced profitability for financial institutions, facilitating a seamless and convenient customer experience, unlocking new revenue streams, and enabling them to thrive in the evolving digital financial landscape.

5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1. Summary

The study investigates the impact of digitalization on the profitability of selected private banks in Ethiopia. The data was collected from 291 usable questionnaires. The researcher has gathered socio-economic data from respondents, revealing insights into their demographics, education, and professional backgrounds. The study employs descriptive statistics, ordinal regression, and Spearman rank correlation to analyze the relationship between digital banking channels and bank profitability. The majority of respondents (47.1%) were young adults under 30, with a significant male dominance (66.3%). Regarding professional positions, senior officers comprised the largest group (48.8%), followed by officers (38.8%) and managers (12.4%). Notably, 65.3% of respondents held a Bachelor of Science (BSC) degree, providing a strong foundation for understanding the impact of digitalization on banking profitability. The result, reveals that 41.6% of the respondents have 6-10 years of working experience, while 23.4%, 20.6, and 14.4%, have less than 2 years, more than 10 years, and 2-5 years, respectively. The majority of respondents had backgrounds in accounting (39.9%), followed by management (26.8%), marketing (17.9%), and economics (15.5%). This diversity of educational backgrounds provides a comprehensive perspective on the potential impact of digitalization on banking practices.

The results show a positive correlation between all independent variables and profitability. Notably, ATMs, point of sale terminals, mobile banking, and mobile wallets have a highly significant impact on profitability (p-value of 0.000), indicating their crucial role in driving financial success. However, internet banking, despite showing a positive correlation, does not demonstrate a statistically significant impact (p-value of 0.223). This suggests the need for banks to re-evaluate their internet banking strategies and optimize their functionalities and integration with other digital channels to maximize their contribution to profitability.

5.2. Conclusion

The study's findings unequivocally demonstrate that digitalization has a profound and positive impact on the profitability of Ethiopian private banks. The widespread adoption of digital banking channels, including ATMs, POS terminals, mobile banking, and mobile wallets, has

emerged as a significant driver of financial success. These channels have revolutionized the way banks interact with their customers, enabling them to offer convenient, efficient, and real-time financial services.

The highly significant impact of ATMs, point of sale terminals, mobile banking, and mobile wallets on profitability underscores the importance of these channels in enhancing customer reach, reducing operating costs, and generating new revenue streams. Banks that have successfully leveraged these technologies have gained a competitive advantage by expanding their market share, improving customer satisfaction, and optimizing their operational efficiency.

However, the study's finding regarding internet banking warrants further consideration. While the positive correlation between internet banking and profitability suggests its potential impact, the lack of statistical significance highlights the need for banks to critically evaluate their internet banking strategies. This may involve reassessing the user interface, ensuring compatibility with different devices, and integrating internet banking seamlessly with other digital channels. By addressing these aspects, banks can unlock the full potential of internet banking and maximize its contribution to profitability.

Overall, the study's conclusions provide valuable insights for Ethiopian private banks seeking to enhance their profitability through digitalization. By embracing innovative digital banking channels and optimizing their existing offerings, banks can position themselves for success in the increasingly competitive financial landscape.

5.3. Recommendations

Based on the findings of this study, several recommendations can be made to enhance the impact of digitalization on bank profitability in Ethiopia:

- It is better to invest in ATM and POS Terminal Infrastructure: Banks should prioritize expanding their ATM and POS terminal networks to increase customer convenience and accessibility. This would facilitate wider adoption and usage of digital payment channels, leading to increased transaction volumes and revenue generation.
- It is better to promote Mobile Banking and Mobile Wallets: Banks should actively promote mobile banking and mobile wallet services to leverage the growing mobile penetration in Ethiopia. These channels offer seamless and convenient banking

experiences, encouraging customers to shift from traditional banking methods to digital platforms.

- It is better to enhance Internet Banking Functionality: While internet banking was not found to have a significant impact on profitability in this study, banks should consider investing in improving the functionality and user experience of their internet banking platforms. This could involve providing a wider range of services, ensuring ease of navigation, and enhancing security features.

5.4. Suggestions for Future Research

The following future research directions are forwarded:

- Longitudinal studies: Examine the impact of digitalization on bank profitability over an extended period to track the evolving dynamics and assess the sustainability of these relationships.
- Cross-country comparisons: Investigate the influence of digitalization on bank profitability in different countries with varying levels of financial development and digital adoption to identify context-specific factors and best practices.
- Impact on specific performance metrics: Explore the effects of digitalization on specific profitability metrics, such as net interest margin, non-interest income, and cost-to-income ratio, to provide a more nuanced understanding of its impact on different aspects of bank performance.
- Role of bank size and ownership: Analyze whether the impact of digitalization on profitability varies based on bank size (large vs. small) and ownership (private vs. public), as these factors may influence the adoption and utilization of digital channels.
- Customer behavior and preferences: Investigate the relationship between customer behavior and preferences regarding digital banking channels and bank profitability to identify key drivers and areas for improvement in digital banking services.
- Regulatory implications: Explore the regulatory implications of digitalization for banks, including the impact on risk management, compliance, and data privacy, to identify potential areas for policy adjustments and enhancements.

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QUESTIONNAIRE
ADDIS ABABA UNIVERSITY
DEPARTMENT OF ACCOUNTING AND FINANCE
POST GRADUATE STUDIES PROGRAM

Questionnaire for bank employees

Dear Sir/Madam;

My name is Nitsuh Asheber, I am a final year student of degree in accounting and Finance at Addis Ababa University, Accounting and Finance Department. I am researching on the topic “**A Study on The effect of Digitalization on Bank Profitability: The Case of selected Private Banks in Ethiopia**”. The purpose of the study is to analyse the prevailing digitalization practices in profitability.

I would be grateful if you could take time of your busy schedule to provide answers to the questions raised to enable me to complete the study. Any information provided would only be used of academic purpose. As a result, it would be kept confidential and utmost secrecy would be maintained.

Thank you

Yours faithfully,

Nitsuh Asheber

Part One: Background Information of the Respondents

Instruction: Please tick (✓) or mark your thought and where appropriate.

1. Gender Male_____ Female_____
2. Age:
 - a. Less than 30 years b. 30-40 years c. 40-50 years d. 50-60 years e. Above 60 years_____
3. Highest level of education achieved
 - a. Certificate_____b. Diploma_____
 - c. BSc/BA d. MSc/MA and above__e. Other, specify_____
4. Field of Study
 - a. Accounting b. Management c. marketing d. Economics e. ther, specify_____
5. Current professional position
 - a. Officer b. Senior-officer c. Manager d. Director
6. Did you have any banking experience before you joined this organization?
 - a. Yes_____ b. No_____
7. Working experience in Banks
 - a. Less than 2years b. 2-5 years c. 6-10 years d. More than 10 years
8. Digital banking services/products provided at your bank/at your respective branch /it is possible to tick more than once)

ATM	[]
POS	[]
Mobile banking	[]
Internet Banking	[]
Mobile Wallet /Money	[]

Part II

Please put ✓ mark for the bellow questions for the following questions

N o.	Measurement items	Strongly Disagree	Disa gree	Neutral	Agree	Strongly Agree
	ATM					
1	ATMs have increased the efficiency of banking operations, leading to higher profitability for banks					
2	I believe that the widespread use of ATMs has reduced the need for physical branches, resulting in cost savings for banks					
3	The availability of ATMs made it easier for customers to access their funds, leading to increased customer satisfaction and loyalty					
4	the convenience provided by ATMs has led to an increase in the number of transactions and overall revenue for banks					
5	the implementation of ATMs has reduced the need for bank staff, resulting in lower labor costs for banks					
6	I believe that the increased competition from the presence of ATMs has led to banks offering better interest rates and services to customers					
7	the improved security measures of ATMs have reduced the risk of fraud and losses for banks, ultimately contributing to their profitability					
8	the adoption of ATMs has allowed banks to expand their reach and attract more customers, resulting in higher profits					
	POS					
1	I believe that the implementation of POS systems has improved the speed and efficiency of transactions at your bank					
2	The use of POS has reduced the amount of human error in transaction processing at your bank?					

3	the use of POS resulted in cost savings for our bank					
4	I think that POS has increased customer satisfaction and loyalty towards our bank					
5	POS has enabled your bank to offer more innovative and convenient services to customers					
6	The implementation of POS has led to an increase in sales for our bank?					
7	I think that POS has improved the accuracy and timeliness of financial reporting at our bank					
8	POS has enhanced the overall efficiency of our bank's operations					
9	The use of POS resulted in a decrease in cash handling and related costs for your bank					
10	I think that POS has improved the security and fraud prevention measures at your bank					
N o.	Measurement items	Strongly Disagree	Disa gree	Neutral	Agree	Strongly Agree
	Mobile banking					
1	Mobile banking increased the accessibility of banking services for customers					
2	The introduction of mobile banking impacted the overall customer satisfaction with the bank's services					
3	Mobile banking improved the efficiency of transactions and reduced operational costs for the bank					
4	Mobile banking led to an increase in the number of customers for the bank					
5	Mobile banking influenced the use of traditional banking channels, such as physical branches and ATMs					
6	Mobile banking improved the speed of transactions and reduced waiting times for customers					
7	Mobile banking increased the loyalty of customers to the bank					

8	The implementation of mobile banking impacted the revenue and profitability of the bank					
9	Mobile banking improved the security of transactions for both the bank and its customers					
10	Mobile banking expanded the reach of the bank to new markets and customer segments					
	Internet banking					
1	I believe that Internet banking has increased the overall profitability of banks.					
2	The convenience of Internet banking lead to higher customer satisfaction, thus Positively impacting bank profitability					
3	The efficiency of Internet banking in reducing operational costs for banks is very good					
4	Internet banking has reduced the need for physical branches, resulting in bank cost savings.					
5	Increases in the number of customers using Internet banking services, and do you believe this has had a Positive effect on bank profitability					
6	the security measures implemented in Internet banking helped in reducing fraud and losses for banks					
7	The adoption of Internet banking resulted in increased cross-selling opportunities for banks					
8	The ease of access to financial information through Internet banking has improved the decision-making process for banks, leading to better profitability.					
9	The transaction fees associated with Internet banking impacted the revenue of banks					
	Mobile wallet					
1	The introduction of mobile wallet technology increased the number of customers using banking services					

2	The use of mobile wallet has increased the frequency and volume of financial transactions					
3	The implementation of mobile wallet reduced operational costs for banks					
4	the security of mobile wallet compared to traditional banking methods is very good					
5	The use of mobile wallet resulted in a decrease in the number of physical bank branches and staff					
6	Mobile wallet has increased customer loyalty and retention for banks?					
7	The level of customer satisfaction is very high with the implementation of mobile wallet					
8	The use of mobile wallet improved the efficiency and speed of financial transactions for both customers and banks					
9	Mobile wallet technology increased revenue for banks through additional services such as loyalty programs and targeted marketing					
	Profitability					
1	We are satisfied with the profit earned by our bank					
2	I think the profit earned by our bank is fair					
3	Our bank provides competitive rates of return					
4	The bank has enough capital to support its operations					
5	Our bank can meet its financial obligations					
6	The bank manages its expenses effectively					
7	The bank can generate sufficient income					
8	The bank can generate sufficient profits					
9	I recommend our bank to family and friends					
10	The bank can maintain a healthy asset-to-liability ratio					

Appendix Table 1. Banking experience of the bank workers before they joined the organization

Did you have any banking experience before you joined this organization					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	171	58.8	58.8	58.8
	no	120	41.2	41.2	100.0
	Total	291	100.0	100.0	

Appendix Table 2. 5-Likert scale intervals

Level	Scale	Interval length	Lower limit	Upper limit	Interval
Five Likert scale					
Strongly disagree	1	0.80	1	1.80	1:1.80
Disagree	2	0.80	1.80	2.60	1.80:2.60
Neither agree nor disagree	3	0.80	2.60	3.40	2.60:3.40
Agree	4	0.80	3.40	4.20	3.40:4.20
Strongly agree	5	0.80	4.20	5.00	4.20:5.00

Appendix Table 3. Normality test result

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
PROF	.308	291	.000	.785	291	.000
ATM	.188	291	.000	.889	291	.000
POS	.309	291	.000	.775	291	.000
MB	.329	291	.000	.792	291	.000
IB	.202	291	.000	.881	291	.000
MW	.235	291	.000	.810	291	.000
a. Lilliefors Significance Correction						

Appendix Table 4. Multi co-linearity test

Level	Interval
Very strong	0.9-1
Strong	0.7-0.89

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	-.219	.186		-1.179	0.239		
ATM	-.179	.026	-.125	-6.903	0.000	0.961	1.041
POS	1.056	.025	.929	42.038	0.000	0.645	1.551
IB	-.010	.023	-.008	-.423	0.672	0.783	1.277
MW	.036	.033	.024	1.098	0.273	0.669	1.495
MB	.080	.030	.054	2.680	0.008	0.938	1.066

a. Dependent Variable: PROF

Appendix Table 5. Pseudo R² values of independent variables

Pseudo R ²	ATM	POS	MB	IB	MW
Cox and Snell	0.832	0.933	0.724	0.805	0.698
Nagelkerke	0.844	0.947	0.735	0.817	0.708
McFadden	0.419	0.637	0.303	0.385	0.281

Link function: Logit.

Appendix Table 6. Correlation coefficient intervals

Moderate	0.4-0.69
Weak	0.1-0.39
Negligible	0-0.1

Source= (Schober patick, 2018)

Appendix Table 7. Secondary data result

Variable	Rank1	Rank2	Rank3	Rank index
IB	3	0	1	0.16
ATM	3	1	2	0.21
MW	2	2	1	0.18
MB	3	0	3	0.19
POS	4	1	1	0.24
Total	15	5	7	1

ATM= automated tailor machine; POS= point of sale; MB= mobile banking; IB= internet banking; MW= mobile wallet;