African Journal of Commercial Studies (ISSN: 2958-2326)
Volume 3, Number 1, 2023 | pp 46 – 66

Financial Innovation and Its Effects on Bank Financial Performance: Evidence from Ethiopian Commercial Banks

Girma Gudde Jote
School of Management, University of Science and Technology of China
girmagudde21@gmail.com

Abstract:

The objective of this study is to evaluate financial innovations and their impact on the financial performance of commercial banks. To this end, descriptive and diagnostic research designs with a qualitative approach were used. To collect primary data, the researcher used a questionnaire. The questionnaires were prepared in Likert-scale format. The study examined the validity of the data collection instruments by testing content, convergent, and discriminant validity. Content validity was ensured by reviewing the relevant literature and conducting pilot tests with the data collection instruments. By testing the value of factor loadings, Cronbach's alpha, composite reliability, and average variance extracted (AVE), convergent validity was established. The Fornell-Larcker criterion, heterotrait-monotrait ratio (HTMT), and cross loadings were used to test discriminant validity. The study used purposive sampling techniques to select 18 commercial banks that have a high reputation and have invested heavily in financial innovation. On the other hand, convenience sampling was used to select 1,249 branches of commercial banks. Pearson correlation, analysis of variance, and multiple regression analysis were performed to determine both the nature and strength of the relationship between financial innovation and financial performance. Findings indicate that mobile banking, online banking, and agency banking have positive and statistically significant effects on the financial performance of commercial banks. This implies that financial innovations have positive and significant effects on the financial performance of commercial banks.

Keywords: Financial innovation, Fin-tech, Commercial banks, mobile banking, agency banking, online banking, ATM

DOI: 10.59413/ajocs/v3.i1.3
ARK: ark:/69431/AJoCS.v3i1.3

1. Background

Financial innovation is "the creation of a new investment vehicle" (Farlex Financial Dictionary, 2009) and "the development of new financial products and procedures for the transfer of money and the lending and borrowing by financial institutions" (Collins Dictionary of Economics, 2005). It involves more than the invention of financial products. It also extends to the development and popularization of new financial processes. In their quest for greater efficiency and profit, commercial banks are innovating. Since the 1980s and 1990s, most commercial banks in Africa have invested in digital banking infrastructure and moved from manual banking to digital banking services. This allows them to efficiently reach a large number of customers and increase profits by reducing operating costs (Nyantakyi & Mouhamadou Sy, 2015, p. 4).

Digital banking, the automation of traditional banking services, enables customers to perform banking transactions and access banking services remotely without having to avail themselves physically in the banks. It makes life easier for the customers of banks and strengthens their privacy and security. It is a convenient means of banking. Customers can access

banking services wherever (even from the comfort of their home) and whenever they want (24/7). With digital banking, it is possible to save time on travel. This is great for elderly people and working professionals with busy schedules.

The most interesting thing here is that customers can go cash-free and make automatic payments for their regular utility bills and online shopping, which are becoming common in most countries. As there is no risk or threat of burglary, digital banking is safer than transactions made in cash. People who have friends and family living abroad or who have commercial relations outside their country can make international transactions via digital banking. This is why customers prefer digital banking to traditional banking. Their share of transactions via digital channels keeps increasing from time to time. For instance, the 2022 survey result of the EIB entitled "Banking in Africa," shown in Figure 1, justifies this fact.

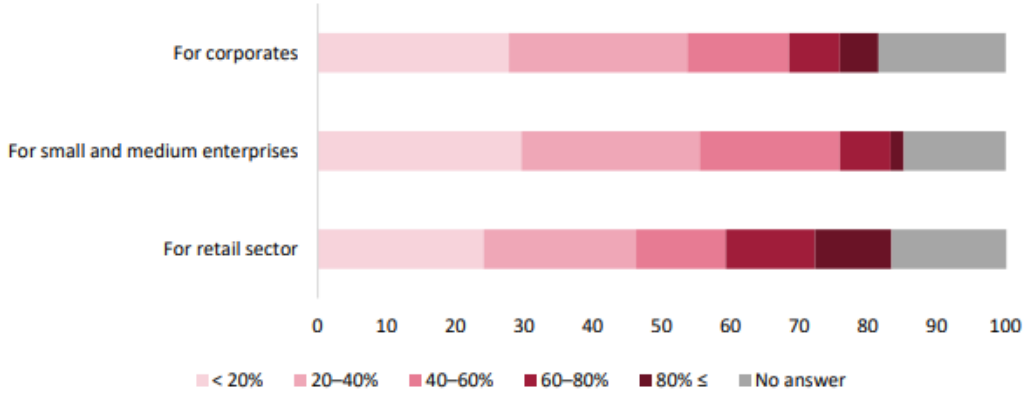

Figure 1: Customer transactions using digital channels **(**Source: European Investment Bank, 2022)

Financial innovations that make digital banking possible are not only useful for customers. They also contribute a lot of benefits to commercial banks. Commercial banks that adopt financial innovations can spend less on information technology and even human resource infrastructure, which can be the best way to save money and accumulate wealth. Automation lets commercial banks reduce operating costs, typically by hiring fewer people, digitizing information-intensive processes, lowering the cost of stationery and printing, expanding the hours of customer service, reducing mistakes, and allowing for a greater focus on more complex issues and core business objectives. Financial innovation also enables commercial banks to have a competitive advantage in the banking industry. Increasing digitization that enables all the ways customers want to bank and pay will go a long way in retaining and attracting customers, primarily the next or rising generations. As long as commercial banks work with fin-tech companies to provide customers with more digitized banking services, they can develop a competitive advantage in the banking industry. Once they satisfy their clients, expand their market share, and become competitive, they can earn the maximum profit possible. Especially during fiscal years with pandemics such as COVID-19, the use of digital banking services is preferred to remain profitable. This is why we find commercial banks dedicated to a number of training programs as a part of their investment in improving the digital skills of staff and management.

1.2 Problem Statement

Financial innovation plays a critical role in commercial bank performance. This is evident from the results of recent studies in this area. The recent study by Zhu, Y. (2023), who examined the impact of financial technology on the performance of Chinese commercial banks using the retail transformation of China Merchants Bank as an example, concluded that FinTech has a statistically significant impact on the financial performance of banks. According to his study, it is better for commercial banks to further improve their organizational structure, effectively meet multidimensional needs with more digital means, pave the way for the comprehensive upgrading of commercial banks, and strongly support the healthy, stable, and rapid development of the financial industry.

Incorporating new technologies will ensure that new products and services are readily available on the market and improve the financial performance of commercial banks. This is evident from the work of Tonui, G.C., et al. (2020), which conducted a study on the impact of product and service innovation on the financial performance of commercial banks in Kenya. The findings of this study show that most commercial banks have focused on their profits by developing new products and services that have minimized their operating costs. The study recommends that the banking sector continue to invest in innovative distribution channels to improve banks' ability to regulate expenses. This also contributes significantly to cost reduction in each service unit, which in turn improves return on investment. Therefore, commercial banks should ensure that banking innovations are well secured so that customers have confidence in using digital banking.

However, commercial banks on the African continent face constraints in increasing the digitalization of their banking services. This is evident from the results of the European

Investment Bank survey entitled Banking in Africa, which are shown in Figure 2. According to this survey, the most common barriers to greater digitization are cybersecurity risks, knowledge of customer requirements, inadequate IT infrastructure, and competition from telecommunications and FinTech companies. For this reason, digital banking adoption on the continent is low compared to other continents. For example, Omar Dayi et al. (2022) found in their study that digital adoption in African banking is between 20 and 30 percent, while it is around 50 percent in Latin America and Asia and as high as 72 percent in other global markets. The study of financial innovation is therefore a good approach to identifying the key levers that commercial banks need to consider to drive digital adoption.

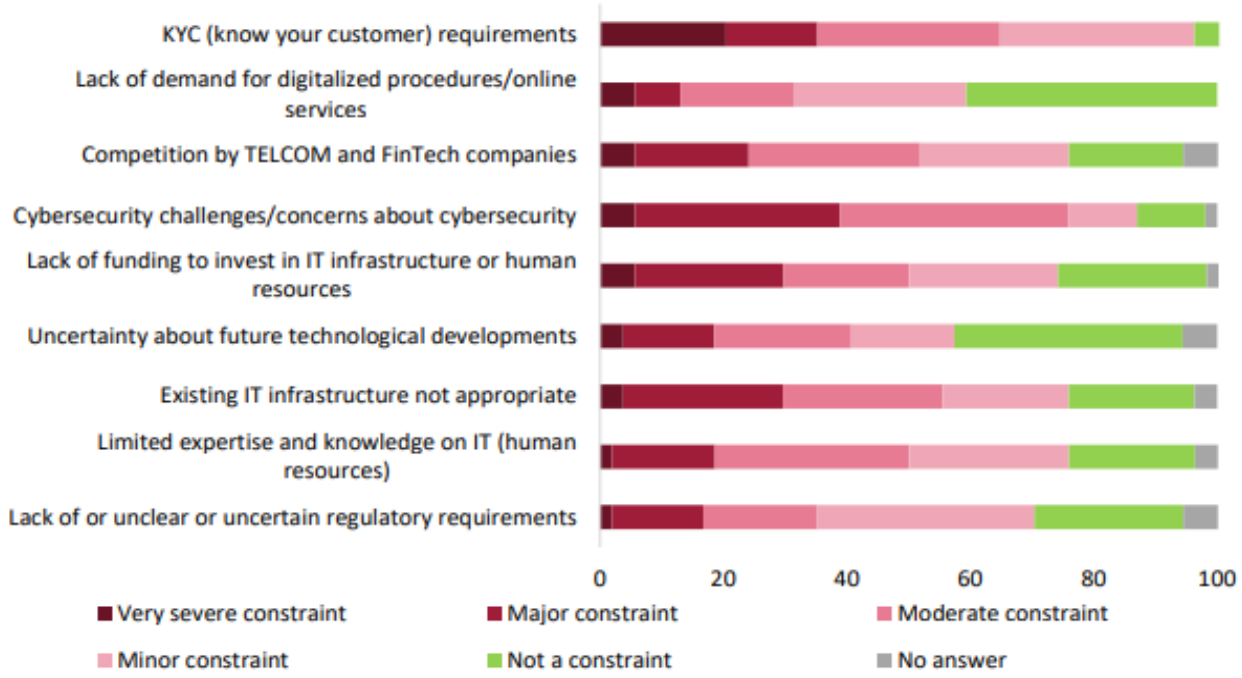

Figure 2: Factors hinder the adoption of further development of digitization in Africa
(Source: European Investment Bank, 2022)

According to Omar Dayi et al. (2022), profitability in the five largest African banking markets (Egypt, Kenya, Morocco, Nigeria, and South Africa) has declined steadily since 2016, by an average of two percentage points. Figure 3 illustrates this fact. This downward trend in profitability is attributed to a decline in net interest income in an environment of falling interest rates and decreasing fee spreads due to increasing competition and digitalization. This finding is consistent with survey results from the European Investment Bank in the same year (2022), which found that commercial banks across the continent face obstacles in advancing the digitization of banking services. For this reason, the profitability of even the continent's largest banking markets is declining. As long as digitization is a factor in this profit decline, it is important to investigate further.

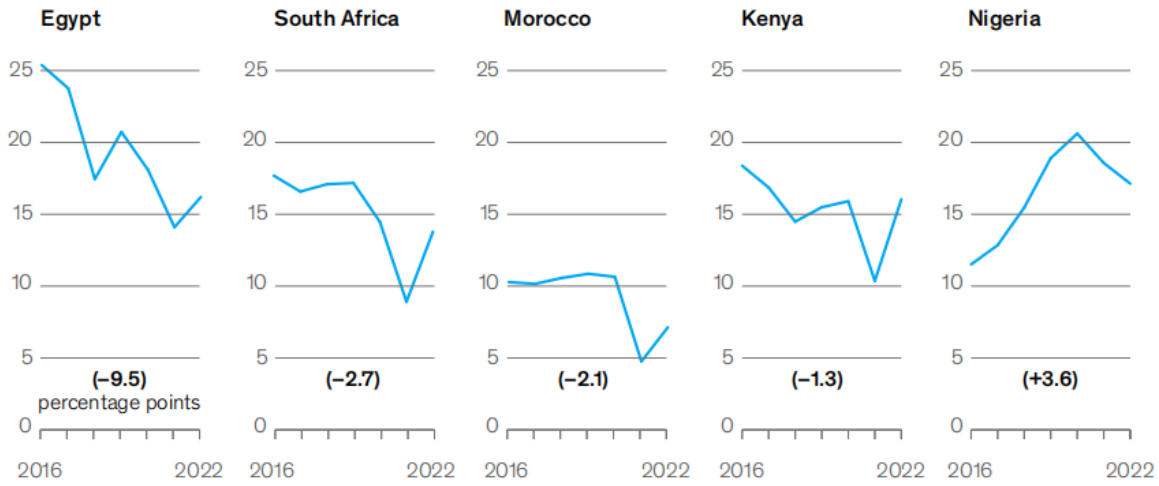

Figure 3: Banking return on average equity of the top five African markets (% change)
(Source: Omar Dayi, et.al. 2022. p. 2)

The researcher's review of the financial statements of commercial banks operating in Ethiopia revealed that many factors have affected their financial performance. The first factor is the prevalence of the new COVID-19 version of the pandemic and its severe impact on operations. This pandemic caused banks to incur enormous costs related to its prevention and reduced the number of customers who visited the banks in person. Second, the instability in some parts of the country and the outbreak of war in the Tigray region (Eric Pichon, 2022) severely affected the national economy in general and banking in particular. They have affected the smooth operation of business and led to the closure of branches in war-affected areas, seriously affecting the banks' operations. In addition, internally, from time to time, several new conventional and interest-free banks officially start operations. For example, 10 new banks were established in fiscal years 2021 and 2022 (NBE, 2022). This opened up fierce competition between existing and new banks. To have a competitive advantage, they need to innovate and invest a lot of capital in technology. From the outside, they will soon be threatened by foreign banks. The government is making efforts to open the banking sector to foreign banks. This is evident from the strategy paper approved by the Council of Ministers on September 3, 2022 (First Consult, 2022). As long as they are international banks, it is assumed that foreign banks have the best and latest technologies. Thus, the entry of foreign banks is a curse for domestic banks, especially newly established ones. To remain competitive in the banking sector, domestic banks need to invest more in digital banking, innovative financial products, and other technologies.

The current higher inflation in the country is also another challenge that affects the financial performance of Ethiopian banks. It increases their operating costs on the one hand and reduces their interest income from lending on the other. In order to manage operating costs, banks are increasing their lending rates. However, borrowers are not happy about the high interest rates and are reluctant to borrow from the banks. This affects the banking business, i.e., lending and earning interest income. How much interest income will they lose if the inflation rate is high and keeps rising? According to the World Economic Outlook (April 2023), inflation has been rising at an increasing rate since 2015, ranging from 6.6 percent to 33.9 percent. The details of the annual percentage change in the inflation rate in Ethiopia are shown in Figure 4. Even though inflation is beyond the control of commercial banks, they can reduce their operating costs and expand their lending business in a cost-effective manner if they use the latest and most effective digital banking services, innovative financial products, and other technologies.

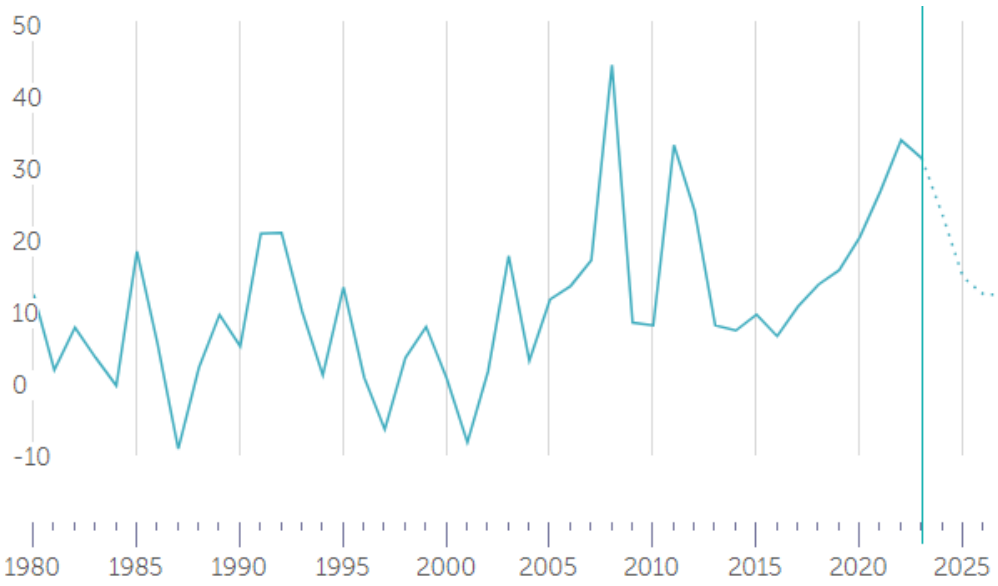

Figure 4: Ethiopia's inflation in annual percent change since 1980
(Source: World Economic outlook, April 2023)

Due to all these factors, namely the pandemic, war, introduction of new banks and potential foreign banks, inflation, and conflicting evidence in the existing literature, this study was initiated to examine financial innovation and its effect on the financial performance of commercial banks.

1.3 Objectives of the Study

1.3.1 General Objective

The objective of the study is to assess financial innovation and its effects on the financial performance of commercial banks.

1.3.2 Specific Objectives

The specific objectives of this study are: -

a) To examine the effect of mobile banking on the financial performance of commercial banks.
b) To study the effect of ATMs on the financial performance of commercial banks.
c) To review the effect of online banking on the financial performance of commercial banks.
d) To explore the effects of agency banking on the financial performance of commercial banks.

1.4 Hypothesis

The study was done based on the following research hypothesis which are derived from empirical evidence and tested throughout the analysis.

Hypothesis 1: Mobile Banking has a positive and significant effect on the profitability of commercial banks.
Hypothesis 2: ATM has a positive and significant effect on the profitability of commercial banks.
Hypothesis 3: Online banking has a positive and significant effect on the profitability of commercial banks.
Hypothesis 4: Agency banking has a positive and significant effect on the profitability of commercial banks.

Figure 5 indicates the overall framework (the theoretical image of the object of study) via the research model. This model reveals the hypothesized relationships between the independent variables and the dependent variable. Specifically, it depicts that mobile banking, Automated Teller Machines, online banking, and agency banking affect the financial performance of commercial banks.

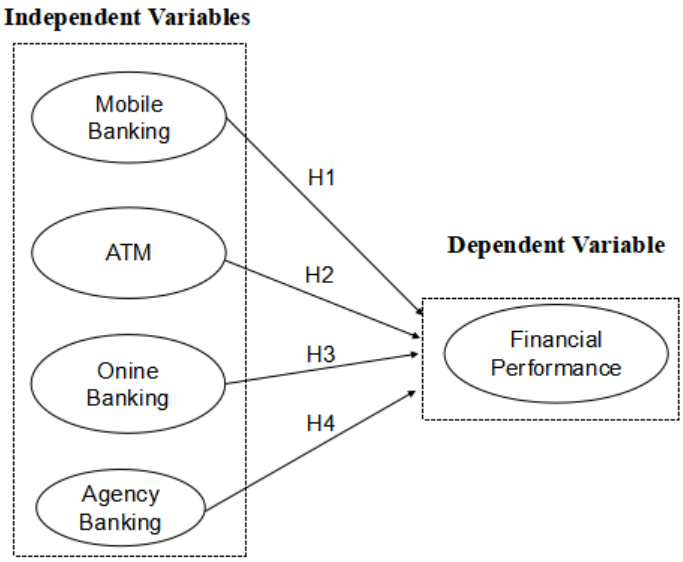

Figure 5: Research Model

2. Literature Review

2.1 Theoretical Review

Ethiopia's modern banking history is 117 years long. The first bank, known as the Bank of Abyssinia, was founded in 1906. Emperor Minilik II and Mr. Ma Gillivray, a representative of the National Bank of Egypt, a British-owned institution, came to an arrangement that led to the establishment of this bank in 1905. The Egyptian National Bank handled all aspects of management. The Bank was granted complete authority to create legal currency in the form of banknotes and coins, with all associated earnings going to the Bank and being freely convertible into gold and silver under its protection. The Bank was also given the authority to create silver coins. Government and public funds were deposited with the bank, and all payments were made by check (National Bank of Ethiopia, 2012).

The Bank of Abyssinia established branches around the nation within the first fifteen years of its existence. A branch was established in Harar in 1906, followed by branches in Dire Dawa and Gore in 1912, and Dessie and Djibouti in 1920. The Bank of Abyssinia had only engaged in a small amount of business over the course of its 25-year existence, such as maintaining government accounts, providing some export finance, and performing different duties for the government. Additionally, the Bank came under intense pressure for being ineffective and driven only by profit, and as a result, it decided to stop operating and be liquidated in order to free banking from foreign influence and hold the institution accountable for Ethiopia's credit needs. Thus, by 1931, the Bank of Abyssinia had been liquidated and legally replaced by the Bank of Ethiopia (National Bank of Ethiopia, 2012).

The Bank of Ethiopia, a wholly Ethiopian organization, was the first native bank in Africa and was founded on August 29, 1931, with a capital of £750,000, by official decree. Its Minister of Finance examined each of its transactions. The Bank of Ethiopia has the power to print money. Up until the Italian invasion in 1935, the Bank, which had offices in Dire Dawa, Gore, Dessie, Debre Tabor, Harar, an agency in Gambella, and a transit office in Djibouti, operated successfully. During the invasion, the Italians established branches of their main banks[1] and started operations in the main towns of Ethiopia. With the exception of two banks[2], which remained in Asmara, they all stopped operating quickly after the country was liberated. With the arrival of the British forces in Ethiopia in 1941, Barclays Bank established banking services in Addis Ababa until its departure in 1943. The State Bank of Ethiopia then began full operation on April 15, 1943. As the representative of the Ministry of Finance, it served as the country's central bank and had the authority to print coins and banknotes. In 1945 and 1949, the Bank was given exclusive authority to issue money and transact in foreign currencies. The Bank carried out all commercial banking activities and served as the main commercial bank for the entire nation (National Bank of Ethiopia, 2012).

The State Bank of Ethiopia established 21 branches, including a branch in Khartoum and a transit office in Djibouti, in December 1963 with a bank declaration. The Ethiopian Monetary and Banking Act, which entered into force in 1963,

[1] Banca d'Italia, Banco di Roma, Banco di Napoli, and Banca Nazionale del Lavoro

[2] Banco di Roma and Banco di Napoli

separated the functions of the commercial bank from those of the central bank and created the National Bank of Ethiopia and the Commercial Bank of Ethiopia. In addition, foreign banks were allowed to operate in Ethiopia, with a maximum ownership limit of 49 percent and the remaining balances owned by Ethiopians. In January 1964, the National Bank of Ethiopia opened with more power and duties. Following its incorporation as a share company on December 16, 1963, according to Proclamation No. 207/1955 of October 1963, the Commercial Bank of Ethiopia took over the commercial banking operations of the former State Bank of Ethiopia. It started operations on January 1, 1964 (National Bank of Ethiopia, 2012).

The first private bank, Addis Ababa Bank Share Company, was founded at the initiative of Ethiopians and began its operations in 1964 with a capital of 2 million in association with the National and Grindlay Bank, London, which accounted for 40% of the total share. In 1968, the bank's initial capital increased to $5 million, and it had 300 employees in 26 branches until it stopped operating. In addition, there was a bank called the Agricultural Bank that provided loans to agricultural and other related projects created in 1945. However, in 1951, the Investment Bank of Ethiopia replaced it. In 1965, the bank's name was renamed the Ethiopian Investment Corporation Share Company. However, by proclamation No. 55 of 1970, the Agricultural and Industrial Development Bank Share Company was established to take over the assets and liabilities of the former Development Bank and Investment Corporation of Ethiopia (National Bank of Ethiopia, 2012).

After the declaration of socialism in 1974, the government extended control of the entire economy and nationalized all large companies. Organizational arrangements were made to create stronger institutions by merging those that perform similar functions. Thus, the three privately owned banks[3] merged in 1976 and became the second largest bank in Ethiopia, Addis Bank. Prior to the merger, the foreign participation of these banks was first nationalized in early 1975. Subsequently, Addis Bank and the Commercial Bank of Ethiopia S.C. merged in Proclamation No. 184 of August 2, 1980, and became the country's only commercial bank until 1994, when private commercial banks were established. Savings and Mortgage Corporation S.C. and Imperial Saving and Home Ownership Public Association were also merged to form the Housing and Saving Bank, and all rights, privileges, assets, and liabilities were transferred to the new bank by Proclamation No. 60 of 1975. Proclamation No. 99 of 1976 established the Agricultural and Industrial Bank, founded in 1970 with 100% state ownership, under the patronage of the National Bank of Ethiopia. It was then re-established as a public finance agency with judicial personality under Proclamation 158 of 1979 and was designated the Agricultural and Industrial Development Bank (AIDB). It is responsible for funding the economic development of agricultural, industrial, and other sectors of the national economy, granting medium- and long-term loans as well as short-term loans for agricultural production (National Bank of Ethiopia, 2012).

After the collapse of the Dergue regime in 1991, the EPRDF[4] declared a liberal economic system. In accordance with this, the 1994 Monetary and Banking Proclamation established the National Bank of Ethiopia as a judicial entity separated from the government and outlined its main functions. The Monetary and Banking Proclamation No. 83/1994 and the Banking Business Licensing and Supervision No. 84/1994 established the legal basis for investment in the banking sector. Shortly after the proclamation, the first private bank, Awash International Bank, was founded in 1994. From 1995 to 2008, nine private commercial banks were founded[5]. Since then, several commercial banks have been established. At the end of 2022, two state-owned commercial banks[6] and 23 private commercial banks[7] had been operating in Ethiopia (National Bank of Ethiopia, 2022).

2.2 Empirical Review

EL Yamani Rachida (2023) did a study entitled "Does Financial innovation improve Financial Inclusion in African countries?". The study measured financial innovation by the number of ATMs and the ratio of bank credit provided to the private sector, and it measured financial inclusion by the number of depositors with commercial banks per 1,000 adults. This study used cross-sectional data for six African countries from 2006 to 2020, which totaled 90 observations. The researcher applied the Seemingly Unrelated Regression approach. The econometric results of the study show that there is a statistically significant relationship between financial inclusion, the number of ATMs, and the ratio of bank credit provided to the private sector in six African countries. On the other hand, the study found that per capita remittances received exert a negative effect on the process of financial inclusion. The estimation results indicate that the process of financial innovation improves with more bank credit provided to the private sector.

Research done in Kenya on the impact of agency banking financial innovation on the market capitalization of commercial banks listed on the NSE by Muthoka, N. I., et al. (2018) found that agency banking innovation had a statistically significant effect on the market capitalization of the listed commercial banks of the nation. And the researchers suggested that listed banks should

[3] Addis Ababa Bank, Banco di Roma, and Banco di Napoli

[4] Ethiopian People's Revolutionary Democratic Front

[5] Dashen Bank (1995), Bank of Abyssinia (1996), Wegagen Bank (1997), Hibret Bank (1998), Nib International Bank (1999), Cooperative Bank of Oromia (2004), Lion International Bank (2006), Zemen Bank (2008), and Oromia International Bank (2008).

[6] Commercial Bank of Ethiopia and Development Bank of Ethiopia

[7] Awash Bank, Dashen Bank, Bank of Abyssinia, Wegagen Bank, Hibret Bank, Nib International Bank, Cooperative Bank of Oromia, Lion International Bank, Oromia International Bank, Zemen Bank, Bunna International Bank, Berhan Bank, Abay Bank, Addis International Bank, Debub Global Bank, Enat Bank, Hijira Bank, Zamzam Bank, Goh Betoch Bank, Siinqee Bank, Tseday Bank, Shebele Bank, and Amhara Bank.

embrace agency banking by increasing the number of agents, expanding its scope to all regions of the country, and encouraging customers to be regular users of the agents so that the number of transactions and then the market share would increase. According to the findings of the study done by Korir, M. (2014), there is a strong relationship between financial innovations and financial performance. The value of the checks cleared, the value of the EFT cleared, and the value of the RTGS transfer explain 92.8% of the variability in the financial performance of the commercial banks in the country.

Mugane, C., and Ondigo, H.O. (2016) investigated the effect of financial innovations on the financial performance of commercial banks in Kenya. They adopted an explanatory research design. As their study population, they included all the 43 commercial banks operating in the country during the study period. The study used primary data, and an ordinary linear regression model was conducted using a statistical package for social sciences, version 20. At the end of their research process, they found that there is a negative and significant relationship between product innovation and ROA. While the relationship between service innovation and ROA, as well as organizational innovation and ROA, was found to be positive and significant,

Adopting financial innovations boosts the financial performance of Commercial Banks. This is true according to the study of Lagat, C., and Kising, D.T. (2018), who found that financial innovations have a statistically significant effect on the financial performance of commercial banks in Mombasa. Specifically, internet banking, agency banking, ATM banking, and mobile banking innovations have statistically significant effects on the financial performance of commercial banks. The findings of Rukiya, T. (2018), also imply the same thing. She found that the numbers of mobile banking users, the number of new saving accounts, and the number of ATM terminals have significant effects on the financial performance of commercial banks measured by return on assets. Hence, it's better if commercial banks exert their best efforts on creating awareness about financial innovation services and keep up with introducing and implementing updated financial innovations.

Gambo, N. (2020), examined the effect of banking innovations on the financial performance of listed commercial banks in Nigeria. The researcher adopted a correlational research design and used secondary data that was collected from all listed Commercial Banks in Nigeria between 2008 and 2019. The study found that ATMs, internet banking, and mobile banking have significant impacts on financial performance. Accordingly, properly adopting a strategy that will encourage businessmen and the public to use financial innovations is essential to improving the effectiveness and efficiency of banking services. As per Mbizi, R., et al. (2022), the use of automated teller machines and internet banking have a strong positive relationship with financial performance. To enhance banking operations, it is profitable for banks to intensify the adoption of financial innovation.

The introduction of more features in financial product innovations attracts more customers and improves financial performance. This is apparent from the study done by Ntirenganya, T., and Kamande, D.M. (2022). They found that an improvement in internet banking through the availability and simplicity of ICT applications, an increase in debit and credit cards, and an increase in mobile banking through transfers increased net profits. The same is true for Dongol, P. (2021). His study aimed to identify financial innovation and its impact on the financial performance of commercial banks in Nepal. 74 staff out of 115 staff from different branches of 10 commercial banks out of a total of 27 commercial banks operating in a nation were selected based on the purposive sampling method. The study adopted a descriptive survey design, with a questionnaire being the basic tool for the collection of primary data. The study reveals that the impact of internet banking services plays an important role in the banking sector by making customers satisfied and also increasing the financial performance of banks.

Wachira, V.K., et al. (2021) investigated the impact of digital financial services on the financial performance of Commercial Banks in Kenya. They used a secondary data set generated from the Central Bank of Kenya and the Communication Authority of Kenya for a period of five years (2015–2019) and multiple regression and Pearson correlations. Pearson correlations reveal a negative correlation between mobile money (registered mobile money accounts, active mobile money agents, and mobile money deposits and withdrawals), digital payments (P2P transfers), and the performance of commercial banks. The study found a positive and significant relationship between customer deposits, gross non-performing loans, and the performance of commercial banks operating in the country. As per their study, it is better for commercial banks to continuously develop more digital financial services and collaborate more with fintech companies to reach optimum financial performance.

Investment in modeling technological innovations promotes inclusion and access to financial services. This is true as long as many current and potential customers can be reached on the financial platforms. Onyango, J.O. (2022), undertook a study on mobile banking. The study selected a sample of 386 out of the study population, which totals 10,717 management cadres in the entire banking sector of Kenya. He collected primary data via questionnaires and interviews. Descriptive statistics such as frequency, percentages, weighted averages, mean, and standard deviation, inferential statistical techniques, analysis of Variance, correlation analysis, and multiple regression analysis were used for data analysis. The study found that there is a positive correlation between technological innovation in financial services and the performance of commercial banks. As well, it was also found that mobile banking, agency banking, and intelligent ATMs as technological innovations in financial services together have a significant and positive combined effect on the performance of commercial banks.

If commercial banks roll out feasible payment innovation products or services, they can win customers' trust and boost their financial performance. This is evident from the research findings of Ongayo, P., and Barasa, M.A. (2021). They examined the influence of payment innovations on the profitability of listed

commercial banks in Kenya. This study targeted managers from listed commercial banks headquarters in Nairobi. They randomly took managers of commercial banks as a sample. Primary data were collected through questionnaires. For data analysis, they applied both descriptive and inferential statistics. In the end, they found that payment innovations significantly influence the financial performance of listed commercial banks in the country.

According to Mohamud, H.H., and Warui, F. (2021), when RTGS, agency banking, EFT, and mobile banking are solely brought up or down by a single unit, financial performance increases or decreases by 0.163, 0.27, 0.197, and 0.318 units, respectively. This implies that commercial banks have significantly relied on innovative banking practices to optimize their financial performance. Scaling up the adoption of financial innovations such as RTGS, agency banking, EFT, and mobile banking in finance service provision reduces the operating costs of banks. In their study to establish the effects of electronic banking on the performance of Commercial Banks in Kenya, Sirengo, M.J., and Muturi, W.M. (2022) concluded that banks can reduce poor performance by having fewer amounts transacted via mobile banking agents and ATMs. As well, they indicated that banks can improve financial performance by encouraging increased values transacted via EFT and on POS Machines.

According to Oketch, J.R., and Weda, C. (2020), there is a positive relationship between financial innovation and the market capitalization of commercial banks. The existence of competition in the banking industry led to continuous financial innovations. Banks can increase their market share and achieve higher financial performance with reduced costs of financial transactions that can result from the adoption of process innovations (agency, mobile banking, and internet banking), product innovations (credit cards, business clubs, and unsecured loans), and institutional innovations (insurance services, credit reference bureaus, and Islamic banking). They also stated that financial innovations are essential for improving bank products and services. Hence, it is better for commercial banks to train their staff, invest in high technology, and listen to their clients so as to improve their operations and become more competitive in the banking industry.

The return on assets of banks is affected considerably by the development of FinTech. This is evident from the study done by Le, T.T., et al. (2021), who found that FinTech innovations have a positive impact on bank performance in Vietnam. Their study shows that banks adoption of mobile technologies positively impacts their fee-based income, consumer loans, and money market deposits. Investing more in FinTech technologies enhances the financial performance of banks. Ouma, S.O., and Ndede, F.W. (2020) intended to establish how digital banking technology innovations affect the financial performance of commercial banks. They used questionnaires to collect the primary data from finance and IT managers of all 42 commercial banks in Kenya. The data was analyzed using descriptive statistics. Their study concluded that the ease of access to digital banking through digital banking technology innovations has a positive influence on the financial performance of commercial banks. As well, it indicates that the turnaround time of digital banking technology innovations has a positive impact on the financial performance of commercial banks.

As per Wanalo, E.M., et al. (2020), agency banking and the use of ATMs have positive effects on the financial performance of banks. whereas bank liquidity has a negative but significant effect on the financial performance of banks. The researchers concluded that technological financial innovations have a positive effect on the financial performance of commercial banks. They suggest commercial banks establish robust risk identification, assessment, and control measures and adhere to the liquidity guidelines that are issued by the industry regulator so as to improve their financial wellness.

In their study on the influence of banking innovations on the financial performance of Kenya Commercial Bank, M'mata, H.M., and Weda, C. (2022) found that agency banking, internet banking, debit, and credit cards have a positive relationship with commission-based income and positively relate to interest-based income. Automated Teller Machine (ATM) systems compensate for wrongful deductions, and ATM problems are settled to the clients' satisfaction. This study suggests the bank enhance its agency banking by increasing the number of agency banking points across the country, develop mobile banking by enhancing customer-friendly mobile applications so as to improve transactions by the clients, increase the number of ATMs and update innovation that touches on transactions through ATMs, and raise debit and credit cards by liaising with the customers to get their suggestions on how to improve the debit and credit cards.

According to Naidu, T., & Rani, P. (2020), financial services are improved with the use of technology if commercial banks make all of their banking services technology-based services, promote and educate all of their customers to transact all financial transactions by using technology, train customers of all retails and commercial banks about using alternative channels for banking and financial channels, launch attractive incentive plan to attract and habituate customers on all banking transactions, and expand their marketing strategies by increasing their linkages with various business enterprises, companies, shopping malls, ticketing sites, travel sites, tax paying websites and E-commerce websites to increase the use of technology based banking and financial services.

Ngwa, N. (2020) did research on electronic banking transactions and how these transactions affect the performance of Commercial Banks in Cameroon. The study used financial records of those commercial banks from 2006 up to 2018. In analyzing the data, regression analysis, correlation analysis, and descriptive analysis were applied. In the end, the study found that mobile money transactions, domestic funds transfers, and electronic payments terminals have positive impacts on ROA, while prepaid cards and international or foreign transactions have negative impacts on the ROA of the banks. The study concluded that e-banking transactions have a significant impact on the profitability of banks. It is better for commercial banks to increase their level of direct participation in the mobile banking

market, international transfer transactions, electronic payment terminals, and e-banking technology and innovation.

3. Methodology of the Study

3.1 Research design

As per the Research Methodology textbook written by Kothari in 2004, research design is the conceptual structure within which research is conducted; it represents the blueprint for the collection, measurement, and analysis of data. As such, the design includes a blueprint of what the researcher does, from the formulation of the hypothesis and its operational implications to the final analysis of the data.

The main objective of this study is to investigate financial innovation and its impact on the financial performance of commercial banks. To achieve this goal, descriptive and diagnostic research designs were used with a qualitative research approach. As Kothari states in his book on research methodology, descriptive research studies are studies that are concerned with describing the characteristics of a particular individual or group. Diagnostic studies examine the frequency of occurrence of one thing or its relationship to another. Studies that examine whether certain variables are related are examples of diagnostic research studies. To evaluate the practice of financial innovation in commercial banks, the study used a descriptive research design. The researcher collected data to describe and substantiate the financial innovation data. On the other hand, a diagnostic research design was used to identify and examine the impact of financial innovation on the financial performance of commercial

3.2 Target population and Sampling Method

The target population is the population to which a researcher wishes to generalize the results of the study (Mugenda, 2003). The target population of this study is the commercial banks operating in Ethiopia. According to the 2021–2022 annual report of the National Bank of Ethiopia, 25 commercial banks have been operating in the country. By using the purposive sampling method, eighteen senior banks that were established before 2014 and have invested their capital in financial innovation are selected as the sample[8]. This was done based on information obtained from their websites and from the analysis of their financial statements. Subsequently, 1,249 branches of these commercial banks were surveyed through a convenience sampling method.

3.3 Data collection instruments

Both primary and secondary data were used for the study. The researcher accessed websites, financial statements, textbooks, dictionaries, encyclopedias, internet searches, journals, newspapers, dissertations, and magazines with relevant citations. Secondary data was used to prepare questionnaires. The questionnaires were prepared in Likert-scale format. They are designed on a scale of 1 to 7 (1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither disagree nor agree, 5 = somewhat agree, 6 = agree, 7 = strongly agree), with each respondent having to rate each statement. The questionnaires were administered to the study participants through the drop-and-pick method. The researcher used enumerators to distribute copies of the questionnaires to the study participants, 1,249 branch managers of commercial banks. To ensure a response, the researcher himself and the enumerators participated and clarified the questions. Later, within one month, we collected the questionnaires from the respondents. Document analysis was used to collect secondary data from relevant documents of commercial banks to determine the extent of a commercial bank's investment in financial innovation. Content validity, convergent validity, and discriminant validity are used to test the validity of the questionnaires.

3.4 Data Analysis

The study used Pearson correlation, analysis of variance, and multiple regression analysis to determine the relationships among the variables in the study. Correlation analysis examines the joint variation of two or more variables to determine the extent of correlation between two or more variables. Among the relationship measures, Karl Pearson's correlation coefficient is the most commonly used measure in the statistics of variables. Considering its importance and regular use, Pearson's correlation coefficient was used for the study. Also, multiple regression analysis is used when the researcher has a dependent variable that he assumes is a function of two or more independent variables. The objective of this analysis is to make a prediction about the dependent variable (financial performance) based on its covariance with all the independent variables involved (financial innovations). For this reason, the researcher used multiple regression analysis to determine the relationship between financial innovations and financial performance. The multiple linear regression model was conducted using the ordinary least squares (OLS) method. According to Brooks (2008), OLS is a method for estimating the slope and intercept in a linear regression model. In this study, OLS regression was used to estimate the linear equation.

3.5 Model specification

Model specification refers to determining which independent variables should be included in or excluded from a regression equation. In general, the specification of a regression model should be based primarily on theoretical considerations rather than empirical or methodological ones. A multiple regression model is actually a theoretical statement about the

[8] Commercial Bank of Ethiopia, Development Bank of Ethiopia, Awash Bank, Dashen Bank, Bank of Abyssinia, Wegagen Bank, Hibret Bank, Nib International Bank, Cooperative Bank of Oromia, Lion International Bank, Oromia International Bank, Zemen Bank, Bunna International Bank, Berhan Bank, Abay Bank, Addis International Bank, Debub Global Bank, and Enat Bank.

causal relationship between one or more independent variables and a dependent variable (Allen, 1997).

Model specification is the first and most important stage of regression analysis, followed by parameter estimation and the interpretation of those parameters. The estimation of the parameters of a model and the interpretation of those parameters depend on the correct specification of the model (Allen, 1997). Regression analysis is also useful for quantifying the effects of various simultaneous influences on a single dependent variable. In a simple regression model, we employ only one independent variable and examine its relationship with our dependent variable. For this reason, we face an omitted variable bias. However, in a multiple regression model, we examine two or more independent variables. Therefore, a multiple regression model is essential to reduce the impact of omitted variable bias and better analyze the relationship between financial innovation and financial performance.

According to Gujarati (2011), the general form of a linear regression model can be written as follows:

$$Y_i = \beta_o + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} \ldots + \beta_k X_{ki} + u_i$$

Where, Y_i is the i^{th} observation of the dependent variable, $X_{1i}....X_{ki}$ are the i^{th} observations of the independent variables, β_1 is the intercept, $\beta_o,...,\beta_k$ are known as the slope coefficient. Collectively, β_1, and β_o to β_k are known as regression coefficients or regression parameters. u_i is the i^{th} observation of the stochastic error term, and n is the number of observations.

Thus, the effect of financial innovations on financial performance of commercial banks of Africa can be modeled as follows:

$$FP_i = \beta_o + \beta_1 MB_i + \beta_2 ATM_i + \beta_3 OB_i + \beta_4 AB_i + u$$

Where *FP* represents Financial Performance, *MB* represents Mobile Banking, *ATM* represents Automated Teller Machines, *OB* represents Online Banking, *AB* represents Agency Banking, B_o represents a constant term, *i* denotes Commercial Banks, $\beta_{1, 2, 3, \& 4}$ denote parameters to be estimated, and *u* represents a random, or stochastic error term for bank i, which is a catchall for all those variables that were not included in this model and assumed to have a mean of zero (negligible).

$$Yi = \beta o + \beta 1 X1i + \beta 2 X2i + \beta 3 X3i \ldots + \beta k Xki + ui$$

Where, Yi is the ith observation of the dependent variable, X1i....Xki are the ith observations of the independent variables, β1 is the intercept, βo,...,βk are known as the slope coefficient. Collectively, β1, and βo to βk are known as regression coefficients or regression parameters. ui is the ith observation of the stochastic error term, and n is the number of observations.

Thus, the effect of financial innovations on financial performance of commercial banks of Africa can be modeled as follows:

$$FPi = \beta o + \beta 1 MBi + \beta 2 ATMi + \beta 3 OBi + \beta 4 ABi + u$$

Where FP represents Financial Performance, MB represents Mobile Banking, ATM represents Automated Teller Machines, OB represents Online Banking, AB represents Agency Banking, Bo represents a constant term, i denotes Commercial Banks, β1, 2, 3, & 4 denote parameters to be estimated, and u represents a random, or stochastic error term for bank i, which is a catchall for all those variables that were not included in this model and assumed to have a mean of zero (negligible).

4. Results

4.1.1 Validity tests

It is vital to test the accuracy of responses obtained by data collection instruments. It is with validity that the responses of research participants (branch managers of commercial banks) are examined to know whether their responses well represent the responses of similar non-research participants (other branch managers). In fact, it is when the input of data analysis is accurate and representative of the true population that we obtain accurate findings. In this study, questionnaires were used to collect data from 1,249 branch managers.

Before regression analysis, I tested the accuracy of their responses and the extent of their representativeness with the rest of the branch managers who did not participate in the study through validity tests. Specifically, the study used content, convergent, and discriminant validity. By reviewing the relevant literature and pilot-testing these data collection instruments, content validity was assured. Investigating the value of factor loadings, Cronbach's alpha, composite reliability, and average variance extracted (AVE), the study determined convergent validity. whereas the Fornell-Larcker criterion, Heterotrait-Monotrait Ratio (HTMT), and cross loadings were used for testing discriminant validity.

4..1.2 Convergent validity

Convergent validity is the measure of the correlation between indicators or questions within a latent construct (study variables). This study consists of five latent constructs (mobile banking, ATMs, online banking, and agency banking) that measure financial innovation and financial performance. Within each of these constructs, 3-5 indicators or questions are used. As long as they are of similar construction, they should be highly correlated to each other. This study examined construct validity by using factor loadings, Cronbach's alpha, composite reliability, and average variance extracted (AVE). According to Hair et al. (2014), the threshold levels for factor loading, Cronbach's alpha, composite reliability, and average variance are 0.7 or 0.5, 0.7, 0.7, and 0.5, respectively. The results shown in Table 1 indicate that all item loadings are above 0.7 except for one item (AB3) with factor loadings of 0.666, which is higher than the 0.5 threshold. This implies that there are no more loading issues. As well, the Cronbach's alpha of all constructs is above 0.7, ranging from 0.737

to 0.936. The composite reliability of two constructs (mobile banking and online banking) is greater than 0.7. For the rest of the three constructs, composite reliability is less than 0.7 and greater than 0.6. This still satisfies the 0.6 threshold recommended by Fornell and Larcker (1981). The AVE of all constructs is above 0.5 and satisfies the 0.5 threshold suggested by both Hair et al. (2014) and Fornell and Larcker (1981). Hence, the results indicate good convergent validity.

Table 1: Results of the confirmatory factor analysis

Constructs	Items	Loadings	Cronbach's alpha	Composite reliability	Average Variance extracted
MB	MB1	.765	.901	0.7124358	.712
	MB2	.842			
	MB3	.890			
	MB4	.867			
	MB5	.851			
FP	FP1	.821	.873	0.6524408	.651
	FP2	.845			
	FP3	.808			
	FP5	.755			
	FP6	.807			
ATM	ATM1	.709	.744	0.637363667	.636
	ATM2	.867			
	ATM3	.811			
OB	OB1	.880	.936	0.7908184	.790
	OB2	.890			
	OB3	.882			
	OB4	.882			
	OB5	.912			
AB	AB1	.891	.737	0.664779	.664
	AB2	.870			
	AB3	.666			

Source: SPSS Output and researcher's compute (2023)

4.1.3 Discriminant Validity

Different items are used to measure each construct. As long as the constructs are unrelated, there should be no significant correlations among their results. An indication of the extent of this difference between constructs is known as discriminant validity. To assess discriminant validity, the study adopted three approaches. First, discriminant validity is assessed by comparing the relationship between the correlations among constructs and the square root of the Average Variance Extracted (AVE) of constructs (Fornell and Larcker, 1981). Second, it was assessed by the heterotrait-monotrait Ratio (Henseler, Ringle, and Sarstedt, 2015). Third, it examined the items in the item loading and cross loadings to construct the correlations. Let us get to the details of these three tests.

1. Discriminant validity - Fornell-Larcker criterion

Fornell and Larcker (1981) suggested that each construct's AVE should be compared to the inter-construct correlation of that same construct and all other reflectively measured constructs; the shared variance between all constructs should not be larger than their AVEs. This means that the AVE should be greater than the variance between the construct and other constructs in the study, or the squared correlation between two constructs. Hence, the square root of the AVE of each construct should be greater than its correlation with any other construct in the assessment. To examine the extent of correlations between the independent variables and the dependent variable, Table 2 presents the Pearson correlation results. This table was used as an input to compute the average variance extracted (AVE) shown in Table 3.

According to the Pearson correlation results in Table 2, all of the financial innovation-related independent variables are correlated with the financial performance of commercial banks, showing a correlation coefficient of 0.446, 0.505, 0.390, and 0.363 for mobile banking, ATM, online banking, and agency banking, respectively. The highest correlation was between ATMs and financial performance (0.505), followed by mobile banking (0.446) and online banking (0.390). This implies that ATMs are a key innovative banking practice that correlates significantly with the financial performance of commercial banks. This result is similar to the regression coefficient result shown in Table 9, in which ATM is the independent variable with the highest regression coefficient (0.307). All correlations had a Sig. Value (0.000) lower than 0.01, indicating each variable is significantly correlated with the other variables. As shown in Table 3, the square roots of the AVE (emboldened values) are higher than the correlations among constructs (values other than the emboldened values). Therefore, there is good discriminant validity.

Table 2: Pearson Correlation

		MB	FP	ATM	OB	AB
MB	Pearson Correlation	1	.446**	.420**	.377**	.231**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	1249	1249	1249	1249	1249
FP	Pearson Correlation	.446**	1	.505**	.390**	.363**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	1249	1249	1249	1249	1249
ATM	Pearson Correlation	.420**	.505**	1	.289**	.192**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	1249	1249	1249	1249	1249
OB	Pearson Correlation	.377**	.390**	.289**	1	.310**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	1249	1249	1249	1249	1249
AB	Pearson Correlation	.231**	.363**	.192**	.310**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	1249	1249	1249	1249	1249

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

Source: SPSS Output (2023)

Table 3: Fornell-Larcker criterion

Construct	MB	FP	ATM	OB	AB
MB	**0.844**				
FP	.446**	**0.807**			
ATM	.420**	.505**	**0.798**		
OB	.377**	.390**	.289**	**0.889**	
AB	.231**	.363**	.192**	.310**	**0.815**

Source: SPSS Output and researcher's compute (2023)

Table 4: HTMT ratio

Construct	MB	FP	ATM	OB	AB
MB					
FP	0.503				
ATM	0.517	0.628			
OB	0.410	0.429	0.345		
AB	0.280	0.449	0.259	0.371	

Source: Researcher's compute (2023)

2. Discriminant validity - HTMT ratio

The HTMT method investigates the ratio of between-trait correlations to within-trait correlations of two constructs. In other words, it examines the correlations of items or questions across constructs with the correlations of items within a construct. Henseler, Ringle, and Sarstedt (2015) suggested the heterotrait-monotrait ratio of correlations (HTMT) for discriminant validity. According to their recommendation, whenever the HTMT value is less than 0.90, discriminant validity is established between two constructs. The result of the HTMT ratio in Table 4 is less than 0.9, ranging from 0.259 to 0.628. This result implies that there is sufficient discriminant validity.

3. Discriminant validity - Cross Loadings

The study examined the items in the factor loadings and cross-loadings to construct the correlations (Gefen and Straub, 2005). In Table 5, emboldened numbers are the factor loadings; otherwise, cross loadings All items measuring a construct have higher loadings greater than 0.6 and smaller loadings for other constructs. This implies that there was no misunderstanding from the respondents while they filled out the questionnaire, and the questions were well structured. Table 5 indicates that all factor loadings of the corresponding constructs (emboldened items in the table) are greater than the cross loadings of the other constructs. In other words, the cross-loading for each construct is very low as compared to its corresponding factor loadings. This shows good discriminant validity.

Table 5: Loadings and cross loadings

Construct	Item	OB	MB	FP	AB	ATM
Online Banking (OB)	OB1	**.880**	.003	.001	.007	.037
	OB2	**.890**	-.019	.035	-.020	.040
	OB3	**.882**	-.033	.013	-.004	.071
	OB4	**.882**	.049	-.016	.025	-.055
	OB5	**.912**	.009	-.034	.008	-.058
Mobile Banking (MB)	MB1	-.005	**.765**	.107	-.021	-.040
	MB2	.022	**.842**	-.021	.040	-.026
	MB3	-.002	**.890**	-.040	-.001	.015
	MB4	-.002	**.867**	-.027	.021	.025
	MB5	-.002	**.851**	.007	-.062	.040
Financial Performance (FP)	FP1	.014	-.023	**.821**	-.086	.002
	FP2	.039	.006	**.845**	-.031	-.048
	FP3	-.022	.022	**.808**	.117	.007
	FP4	-.026	.055	**.755**	.019	.043
	FP5	-.017	-.033	**.807**	-.002	.037
Agency Banking (AB)	AB1	-.034	-.025	-.050	**.891**	.100
	AB2	.004	-.012	-.063	**.870**	.017
	AB3	.063	.022	.141	**.666**	-.181
Automated Teller Machine (ATM)	ATM1	.036	.050	-.055	-.060	**.709**
	ATM2	.027	-.105	.087	-.046	**.867**
	ATM3	-.041	.093	.014	.100	**.811**

Source: SPSS output (2023)

4.1 Multicollinearity Analysis

To ensure that multicollinearity, or collinearity, for short, in the study model was not a problem, the study examined the variance inflation factors (VIF) and tolerance (TOL) values of the financial innovation-related independent variables (mobile banking, ATM, online banking, and agency banking). The VIF indicates whether an independent

variable has a strong linear relationship with the other independent variables. Its inverse is called TOL. The generally used threshold value for the VIF is 10. When VIFs are less than 10 or when tolerance values are greater than 0.1, multicollinearity is not an issue (Mason & Perreault, 1991). The results in Table 6 show that the VIF and TOL values of the independent variables range from 1.131 to 1.343 and 0.745 to 0.884, respectively. Hence, multicollinearity is not an important issue in this study.

Table 6: Multicollinearity Statistics

Variable	Tolerance	VIF
Mobile Banking	.745	1.343
Automated Teller Machine	.799	1.251
Online Banking	.790	1.265
Agency Banking	.884	1.131

4.2 Regression analysis

After demonstrating the validity of the data gathered through survey questionnaires, the study tested the hypothesized relationships between the independent variables (mobile banking, ATMs, online banking, and agency banking) and the dependent variable (financial performance) using regression analysis. The results of this analysis can be found in Tables 7, 8, and 9. They show the results of regression analysis on the full dataset without a bootstrapping approach.

4.2.1 Regression Model Summary

Table 7 summarizes the results of the regression model. It presents an R, R square, adjusted R square, and standard error of the estimate (sample standard deviation). R is a measure of the association between dependent and independent variables. R Square is an overall measure of the fit of the estimated regression model. It gives the percentage of the total variation in the dependent variable (financial performance) that can be explained by all the independent variables included in the study. The adjusted R Square measures the reliability of the regression results by explicitly taking into account the number of independent variables included in the model. The value of the R square is adjusted for the degrees of freedom, which are determined by the number of independent variables in the model (Gujarati, 2011).

Table 7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.627[a]	.394	.392	.825

a. Predictors: (Constant), AB, ATM, OB, MB

As the R square, or the coefficient of determination, is the proportion or percentage of the total variation in the dependent variable explained by the regression model, it lies between 0 and 1. The closer it is to 1, the better the fit, and the closer it is to 0, the worse the fit (Gujarati, 2011). However, in social science research like this one, a regression model with an R square as low as 0.10-0.20 (10%-20%) is still a good model (Cooper and Schinder, 2013). According to Table 7 results, the R value is 0.627, revealing the strength of the association between the dependent variable and independent variables. whereas the R square is 0.394, or 39.4%, indicating that the model explains 39.4% of the variance in financial performance. That is, holding other factors (not included in this study) constant, the value of mobile banking, ATMs, online banking, and agency banking contributes to 39.4% of the variance in the financial performance of commercial banks, while the other factors account for 60.9% of the variability. As long as this study falls under the category of social research and the R square is much larger than the 10–20 percent threshold suggested by Cooper and Schinder, this model is well fitted.

This result also suggests that commercial banks generate a much greater profit from branch banking than from branchless or digital banking. They have a tremendous opportunity to integrate digital banking with their banking. This is true in underdeveloped and developing countries where technology is not widely available to many people. The adjusted R square value of 0.392, which is almost identical to the value of the R square (0.394), indicates that the results obtained are also reliable. Furthermore, it showed that there was no temptation to increase the R square by incorporating independent variables into the model. We can therefore rely on the regression model that has been developed to explain the financial performance trends of commercial banks.

4.2.2 Analysis of Variance

The significance of the regression model was examined through the use of variance analysis. Using a 2-tailed test, the significance of the model was tested at a 95% confidence level. That means, in testing the significance level, the statistical significance is considered significant when the p-value (Sig. value in this study) is less than or equal to 0.05. It is shown in Table 8 with a P-value of 0.000, which is less than 0.05. This indicates that the regression model is statistically significant in predicting the financial performance of commercial banks. As well, it also reveals that the variation in the results is insignificant and cannot result in a great difference in the case of a change in the study units. Thus, the model can be relied upon to explain the effect of financial innovations on the financial performance of commercial banks. The overall ANOVA outcomes in Table 8 imply that the regression model is statistically significant at F = 201.792, Sig. = 0.000.

Table 8: Analysis of Variance (ANOVA) results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	549.010	4	137.253	201.792	.000[b]
	Residual	846.129	1244	.680		
	Total	1395.140	1248			

a. Dependent Variable: FP

b. Predictors: (Constant), AB, ATM, OB, MB

Source: SPSS Output (2023)

4.2.3 Regression Coefficients

In order to verify the proposed research model for the relationship between the dependent variable (financial performance) and financial innovation-related independent variables, the regression coefficients were computed by SPSS and presented in Table 9 below. These regression coefficients indicate the effect that would occur on the financial performance of commercial banks in an attempt to change (increasing or decreasing) financial innovation variables (mobile banking, ATMs, online banking, and agency banking). Their Sig. values or p values (presented in the same table) measure the effect of each independent variable on the dependent variable.

Table 9: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.341	.215		1.585	.113
	MB	.261	.034	.198	7.738	.000
	ATM	.307	.022	.338	13.701	.000
	OB	.174	.028	.154	6.183	.000
	AB	.271	.031	.205	8.726	.000

a. Dependent Variable: FP
Source: SPSS Output (2023)

As per the SPSS-generated results of the regression model coefficients in Table 9, the regression model that describes the relationship between commercial banks financial performance and financial innovations becomes: *FP = 0.341 + 0.261MB + 0.307ATM + 0.174OB + 0.271AB*. This regression model implies that, taking all financial innovation-related independent variables (mobile banking, ATMs, online banking, and agency banking) as constant at zero, the financial performance of commercial banks as a result of these independent variables is 0.341. It also shows that, taking all other independent variables at zero, a unit increase in mobile banking will lead to a 0.261 increase in financial performance; a unit increase in ATMs will lead to a 0.307 increase in financial performance; a unit increase in online banking will lead to a 0.174 increase in financial performance; and a unit increase in agency banking will lead to a 0.271 increase in the financial performance of the commercial bank. For instance, taking mobile banking, we can interpret the beta coefficient in such a way that, keeping other independent variables constant, a 10% increase in mobile banking will lead to a 2.61% increase in the financial performance of the commercial bank. The positive results of beta coefficients imply that all four financial innovation-related variables have a positive relationship with the financial performance of commercial banks.

The reported Sig. Values (0.000, which is lower than 0.05 at the 95% confidence level) in Table 9 indicate that the positive relationship between independent variables and the dependent variable is statistically significant. Specifically, the results in Table 9 indicate that mobile banking (β = 0.261, Sig or p value of 0.000 < 0.05), ATM (β = 0.307, p value of 0.000 < 0.05), online banking (β = 0.174, p value of 0.000 < 0.05), and agency banking (β = 0.271, p value of 0.000 < 0.05) have positive and statistically significant effects on the financial performance of commercial banks. Thus, all of the research hypotheses (H1, H2, H3, and H4) are supported or accepted.

5. Discussion and Conclusion

This study explores financial innovation and its effects on financial performance based on a qualitative research design. It classifies financial innovation factors into mobile banking, ATMs, online banking, and agency banking. The findings of this study support all the hypotheses, thus confirming that financial innovation is a useful predictor of financial performance in commercial banks. These findings show that all four financial innovation factors significantly affect financial performance in commercial banks. ATMs, mobile banking, and agency banking seem to be more important than online banking in terms of financial performance. The potential explanation is that commercial banks are earning more income from their automated teller machines (ATMs), their mobile applications used by clients to conduct banking transactions and pay their utility expenses, and banking services provided to people in remote areas via bank agents. This corresponds with the studies of Lagat, C., and Kising, D.T. (2018), Gambo, N. (2020), and Mbizi et al. (2022).

6. Limitations and Future Directions

There are a few restrictions on this study. First of all, Ethiopia was the setting for this investigation. If this study had been conducted in another nation, the findings might have been different. Researchers should continue to validate their findings in many nations with various levels of development (underdeveloped, developing, and developed) in the future. To demonstrate whether similar financial innovation practices exist and have a similar impact on the financial performance of commercial banks, it is essential to broaden the study's focus. Second, the current study used commercial bank financial performance as a dependent variable. Its investigation was therefore restricted to commercial banks. However, large entities such as insurance companies, microfinance institutions, telecommunication companies (Ethio Telecom and Safaricom in the case of Ethiopia), hospitals, clinics, health care centers, universities, colleges, schools, and other organizations also use innovations in providing their services. As a result, researchers can examine innovations and how they affect these economic organizations' financial performance and level of service.

Third, this study used only qualitative data gathered through questionnaires. This was on account of a lack of easy access to financial innovation-related data such as the number of transactions processed and income generated from ATMs, mobile banking, online banking, and agency banking. For scholars working in commercial banks and in a position to access this data, it is suggested to use both qualitative and quantitative research approaches. Fourth, financial innovation-

related independent variables are four in number, and the regression model of the current study accounts for only 39.4% of variations in financial performance. This implies that more variables need to be incorporated and branch banking services should be examined in contrast to digital banking. Therefore, future research can use other financial innovation-related variables and branch banking factors to study their effects on financial performance.

5. Research Implications

7.1. Theoretical implications

This study advances the state of knowledge considerably. First, it adds to the existing literature by testing and confirming a model that accounts for financial innovation during the inflationary period. Commercial banks work extremely hard to reduce their spending when inflation is high. They use financial innovation as a strategy to reduce operating costs. They specifically look for financial innovations that have high returns and minimal costs. The current analysis shows that agency banking, mobile banking, and ATMs are financial innovations with lower costs than other financial innovations. The cost of an ATM is lower than the associated service fees. In addition, the cost of creating and maintaining mobile banking apps is minimal compared to their revenue. The commission paid to bank representatives is the only expense associated with agency banking. Thus, this study contributes to the body of knowledge on financial innovation by showing that commercial banks use ATMs, mobile banking, and agency banking as cost-effective innovations to reduce their operating costs and maintain profitability, especially in times of inflation. Second, this study gathered information from a wide variety of commercial bank branches, many of which have extensive knowledge of financial innovations and their impact on bank financial performance. Compared to other commercial bank staff, they are better able to respond to financial innovations and can do so accurately. This supports the findings of previous studies that collected information from employees other than branch managers and used only secondary data from financial statements. Consequently, this study adds to existing knowledge about financial innovation and financial performance.

7.2. Managerial implications

Based on the results of this study, it contributes to improving the financial performance of commercial banks by working on financial innovation. First, this study suggests that commercial bank managers design and implement effective financial innovation strategies and tactics that will help reduce their operating costs and thus improve their financial performance. A strategy is needed to make ATMs, mobile banking, online banking, and agency banking secure and free from system failures that affect their effective operation. Within these strategies, it is better to find a way to implement the investment plan for the expansion of ATMs, mobile applications, agency banking, and online or internet banking platforms. Since all commercial banks offer the same services to their customers, they develop strategies to be more innovative than their competitors. This helps them to introduce new and effective financial products, reduce their operating costs, satisfy their customers, and thus gain a competitive advantage in the banking sector. how important it is to empower clients and create awareness about digital banking and its security issues. Indeed, financial and digital literacy help customers use all of the available and diversified financial services and protect their security.

Second, the study recommends that managers increase their investment in financial innovation. With effective financial innovation, commercial banks can reduce the cost of financial transactions and thus increase their financial performance. In particular, it is highly beneficial for commercial banks to acquire new and modern ATMs, develop effective mobile apps, develop effective platforms for online banking, and increase the number of bank agents and representative banks. In addition, investment in human resources and financial technology research and development is also an important means of improving financial performance.

Third, this study provides suggestions for managers to enter into strategic partnerships with telecommunication companies (Ethio Telecom and Safaricom), shopping malls, tour operators, the ministry of revenues, oil companies, universities, colleges, hospitals, clinics, health centers, religious institutions, non-governmental organizations, hotels, and other business enterprises to promote the use of financial innovation-based banking or digital platforms for financial services. If all these financial institutions conduct their financial transactions through digital banking, they can generate a large amount of service fees and revenue. Just think of the number of customers who shop at shopping malls every day, the transaction value of various oils purchased for cars at various oil centers, and the tuition fees paid by private students for universities, colleges, and schools. How much money is collected from religious organizations at each religious feast? Undoubtedly, commercial banks can mobilize a huge amount of cash from those economic entities. Hence, entering into strategic partnerships with these organizations plays a major role in generating revenue from financial innovations that prove effective for digital banking services.

Fourth, the study encourages managers to place ATMs in places where there are many people, especially near supermarkets, grocery stores, hotels, hospitals, and other well-known places. This will provide customers with easy access to ATMs for financial transactions. With greater convenience, the number and value of transactions will increase, which will increase the financial performance of commercial banks. In addition, people appreciate the convenience of many easily accessible ATMs and become bank customers. In this way, commercial banks can expand their market share and attract customers. As for mobile banking, it is better for managers to develop, implement, and disseminate the latest and most effective mobile apps that can be used for all transactions (a wide range of services), especially for utility payments, oil prices, taxes, tuition fees, and other routine and large payments. As long as mobile apps are easy and the latest, mobile banking will become a convenient mode for many mobile users, especially those living in rural areas. Agency banking yields high returns when managers increase the number of agency banking outlets by encouraging individuals and businesses to sign up as bank agents for this service. To improve the performance of mobile banking and agency making, ensuring good infrastructure, especially electricity, mobile networks, and roads, is pivotal for commercial

banks. With this infrastructure, mobile banking subscribers can easily make their financial transactions. Banking agents can easily get cash and electronic funds and serve customers at any time. Thus, mobile banking and agency banking help commercial banks provide financial services and earn income in a region where there are no or few financial institutions on account of a lack of or low financial institutional infrastructure. It is better if commercial banks make their online banking easily accessible. Fast banking services and convenience lead customers to choose online banking for their transactions. This increases banks' income from this banking system and promotes their financial performance. How much service income can banks generate when large companies process their large payments, such as payroll, utilities, and other administrative, marketing, and operational costs, through online banking? In fact, a huge amount of revenue can undoubtedly be generated.

ACKNOWLEDGEMENT

The work described in this study was supported by the **Chinese Government Scholarship.**

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APPENDIX 1

Survey Questionnaire Items

Constructs	Items	Measures	Sources
Mobile Banking (MB)	MB1	Mobile banking enables the bank to provide a better quality service at a low cost.	(Dongol, P., 2021)
	MB2	Mobile banking has led to an increase in the financial performance of the bank.	
	MB3	Mobile banking is renewed on time and customers get informed on time to acquire them	
	MB4	The customer care department of the bank also plays an important role in mobile banking services.	
	MB5	Mobile banking was introduced to gain customers from the market.	
Automated Teller Machine (ATM)	ATM1	ATM reduces congestion in banking halls	(Tonui et al., 2020)
	ATM2	ATM gives convenience to bank customers	
	ATM3	ATM has increased the income of banks last year	
Online Banking (OB)	OB1	Online banking is important for today's banking sector.	(Dongol, P., 2021)
	OB2	Online banking has low maintenance costs and a high level of profitability.	
	OB3	Online banking also puts additional profit on the bank.	
	OB4	Customers feel more satisfaction from the online banking service provided by the bank.	
	OB5	Online banking helps to reduce the more paper work in a bank.	
Agency Banking (AB)	AB1	Agency banking has increased the bank's product and service offering.	Onyango, J.O. (2022)
	AB2	Customer feedback is easily captured on this platform.	
	AB3	Income from agency banking has high margins, thus contributing positively to profitability.	
Financial Performance (FP)	FP1	Return on assets of the last year was higher than before	
	FP2	Return on equity of the last year was higher than before	
	FP3	Net interest income of the last year was higher than before	
	FP4	Profit before tax of the last year was higher than before	
	FP5	Earnings per share of the last year was higher than before	