FINANCIAL INNOVATION AND FINANCIAL PERFORMANCE OF LISTED COMMERCIAL BANKS IN KENYA

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A Thesis Submitted to the School of Business and Economics in Partial Fulfillment of the Requirements for the Award of the Degree of Masters in Business Management (Finance Option) of Masinde Muliro University of Science and Technology

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DECLARATION

Using just the sources and evidence provided, the thesis I have written is completely unique. It has not been submitted before with the intention of earning a degree or receiving any other kind of acknowledgment.

Signed……. Date……

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APPROVAL

The undersigned certify that she has read and hereby recommend for acceptance of Masinde Muliro University of Science and Technology a research project entitled, **"Effect of Financial Innovation on Performance of Listed Commercial Banks in Kenya."**

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ABSTRACT

This study delves into the complex relationship between financial innovation and the financial performance of listed commercial banks in Nairobi County, Kenya. The specific objectives were to establish the effect of lending innovation on the financial performance of listed commercial banks in Kenya, to ascertain the effect of payment innovation system on the financial performance of listed commercial banks in Kenya, to determine the effect of intelligence predictive system on the financial performance of listed commercial banks in Kenya and to examine the moderating effect of firm size on the relationship between financial innovations and the financial performance of listed commercial banks in Kenya. The study design was a descriptive and correlational research design since it sought to explore and examine the effect of financial innovation on the financial performance of listed commercial banks in Kenya. Eleven staff members from each bank were purposively selected because of their knowledge of the subject matter. These members of the team include member of the Finance department, member of Strategy department, member of Business Development department, Sales and Marketing department, member of Debt Recovery department, member of Operations department, member of Credit department, member of Corporate Banking department, member of Business Banking department, member of Retail Banking department, member of Risk and member of ICT departments. A sample was taken from each of the eleven commercial banks traded on the NSE in Nairobi County. The use of purposeful sampling was performed in order to get an appropriate unit that was representative of the analysis. Primary data was collected during the investigation using a questionnaire. The study instrument's concept and content validity were leveraged in the research endeavor to assess the instrument's validity. The reliability was determined using Cronbach's alpha. Analysis of quantitative data will be carried out using SPSS software version 22, as agreed upon. An abundance of descriptive statistics was used to elucidate the data matrix. The mean and standard deviation were among these statistical metrics, along with the maximum and lowest, which allowed us to see how the data varied. Researchers in this study used inferential statistics like regression and correlation to check whether the null hypothesis held. The research used a significance threshold of 5% to conduct these statistical tests. Increasing lending innovation by one unit leads to a notable 0.138 unit rise in financial performance ($\beta1=0.138$, $P=0.002$), increasing payment innovation by one unit leads to a notable 0.457 unit increase in financial performance ($\beta1=0.457$, $P=0.000$), and increasing intelligence predictive system by one unit leads to a notable 0.188 unit increase in financial performance ($\beta3=0.188$, $P=0.001$). The research provided evidence for these claims by showing that, after controlling for other study factors, the financial performance of the loan innovation would improve by 0.138 units. An additional 13.0% change in financial performance is largely explained by the company size interaction financial innovation components, with a coefficient of determination of 0.731 and a p-value of 0.000. Firm size now accounts for 73.1% of the overall percentage change in the model. The study recommends ongoing investments in payment innovation and intelligence predictive systems by Kenyan commercial banks, acknowledging the nuanced nature of these impacts. Overall, the study enriches our understanding of the dynamics within Kenyan commercial banks and provides a foundation for future investigations into the constituent components of payment innovation and intelligence predictive systems.

ABBREVIATIONS AND ACRONYMS

ATM Automatic Teller Machine

CBK Central Bank of Kenya

CRB Credit Reference Bureau

IPS Intelligence Predictive Systems

NACOSTI National Commission for Science Technology and Innovation

ROA Return on Asset

ROE Return of Equity

OPERATIONAL DEFINITION OF TERMS

Financial performance is a measurement of how effectively a commercial bank is able to produce revenues by using assets that are derived from its core form of operation.

Firm Size refers to the levels of assets held by a listed commercial bank. It can be computed as the natural logarithm of total assets and acts as a proxy for the size of the listed commercial bank.

Intelligence predictive system entails tailored financial services, underwriting, voice-aided banking, data-driven loaning decisions, and digitization of branches by listed commercial banks in Kenya.

Lending innovation is an innovation which is used to provide loans and banking services to people securely online. Listed commercial banks can digitally provide customers with a platform to manage loans and their processes through their platforms.

Payment innovation system is a network that connects commercial banks' and online merchants' payment and settlement systems to a central electronic billing platform, allowing for the delivery of electronic payment services**.**

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The financial performance of commercial banks is critical to the performance of the economy since banks are the main money suppliers for both individuals and institutions (Robin, Salim & Bloch, 2018). Since the rise of modern banking, several commercial banks have been on the lookout for ways to boost their bottom lines via innovative financial strategies. These banks have lately introduced inventive goods and expanded their offerings with the main goal of improving their financial performance, which has been impacted by financial crises such as inadequate capital, increasing levels of non-performing loans, and intensified competition leading to low returns on investment and diminished creditworthiness (Harelimana, 2017).

Financial Innovation in the financial sector is an essential component in the growth and sustainability of the economy. Due to globalization and stiff competition being experienced in the financial sector, innovation has been observed as the only way to remain competitive and sustainable in the financial sector. According to Qamruzzaman and Jianguo (2018), financial companies have placed a significant amount of importance on financial innovation in order to achieve high levels of customer satisfaction, in addition to increasing their market share and improving the profitability of the company. The goal of financial innovation, as stated by Frame, Wall, and White (2018), is to help businesses become more efficient and profitable by introducing new ways of doing things.

The Financial Intermediation Theory, the Innovation Diffusion Theory, and the Transaction Cost Innovation Theory shall represent the theoretical foundations upon which this investigation will be

built. Specifically, Lee, Wang, and Ho (2020) point out that financial intermediation brings together surplus units and deficit units, so assuring that the surplus units and deficit units are able to save and borrow, respectively. This theory is crucial because it provides insights into how financial institutions such as MFIs operate in order to mediate between those with surpluses and those with deficits. Innovation Diffusion Theory focuses on explaining how new technology and ideas spread among organizations (Chipeta & Muthinja, 2018). An essential contribution of this theory is the light it sheds on the process by which innovations permeate the life of financial institutions. Hicks and Niehans (1935), as mentioned in Olalere, Islam, and Rahman (2021), established transaction cost theory, which posits that financial innovation may encourage growth in a firm's profitability by reducing transaction costs.

Commercial banks in Kenya have experienced remarkable changes in the last few decades, which majorly have been due to deregulations and the adoption of technological tools (Nekesa & Olweny, 2018). Technology has enabled the undertaking of Commercial bank transactions in a variety of mediums. According to Ashiru, Balogun and Paseda (2023), financial innovation has provided Commercial banks with several channels for delivering products and services to their customers. This is because innovations seek to establish new ways of delivering services more efficiently than before. Ayubjon o'gli (2022) notes that innovations in Commercial banks are led by the need to offer customized services, enhance accountability, eliminate those costs associated with traditional Commercial bank systems and develop markets. Critical to every economy's competitiveness are financial innovations that help commercial banks stay ahead of the curve (Tahir, Ahmad, Aziz & Ullah, 2018).

Chipeta et al. (2018) states that the transition from branch-based to branchless banking in Kenyan financial institutions over the last decade has greatly increased the importance of financial

innovation. Researches in the area of international finance have so been intrigued by this development. Kenyan banks have, with the help of modern financial technology, diversified their business models. Systems for innovative payments, mobile banking, online banking, debit and credit card innovations, RTGS, POS terminals, and EFT are all examples of what is included by this area of innovations. Research by Zouari and Abdelmalek (2020) indicates that growing globalization and trade deregulation are causing a sea change in the international system of banking and finance. Technologies in the banking industry, including mobile money, ATMs, credit and debit cards, online banking payment systems, and smartcard apps, are evolving at a dizzying rate in the world of international finance.

As indicated by Marfo-Yiadom and Tweneboah (2022), the idea of financial innovations and developments involves innovating, modifying, launching and commercializing financial instruments, financial products, markets and financial institutions. Financial innovation is, therefore, changes in the financial system that are neither limited to the innovation of new financial delivery channels nor financial products. Chen and Peng (2020) state that financial innovations are mainly improvements on the business processes and financial delivery channels that enhance credit scoring, data processing, process re-engineering, and data analysis for an insightful view of customer usage and product re-engineering. In almost all instances, financial innovations are manifested to ensure that financial service providers provide improved services that meet the needs of the financial system participants. In addition, the financial innovations provide market-based incentives for the delivery of sustainable financial access (Al-Dmour, Al-Dmour & Rababeh, 2021).

According to Muthinja and Chipeta (2018), a financially sound system ensures that depositors' cash are secure. A bank's financial soundness may range from excellent to poor, depending on the

specific bank. Banks may collapse due to external issues including deregulation, clients' lack of knowledge, and service uniformity (Zouari-Hadiji, 2021). The success of Kenya's commercial banks is a direct result of M-banking initiatives. Nguena (2019) states that the banking system is guided by CAMELS, an acronym for "capital adequacy, asset quality, management, earnings, liquidity, and sensitivity analysis," which is a collection of helpful financial performance metrics.

According to Khan, Fareed, Salameh, and Hussain (2021), there are four components that make up a company's performance. Top financial and market performance indicators include sales, profitability, market share, time to cash, and earnings per share. Excellence in customer service and the quality of the product or service provided are two aspects of customer-focused performance. Staff happiness is a key indicator of human resource success. Factors such as cash-to-cash cycle time, innovation level, production and supply chain flexibility, and time to market are used to quantify organizational performance.

A variety of approaches are used by various companies to evaluate their performance, with organizational objectives serving as the foundation. According to Barman, Dias, and Maroor (2022), this performance indicator may be evaluated using both monetary and non-monetary metrics. The majority of businesses, meanwhile, favor using financial metrics as a yardstick for success (Broby, 2021). According to Gruin and Knaack (2020), some of the most popular financial and accounting measures employed by organizations include ROA, average annual occupancy rate, net profit after tax, and ROI. Profitability, productivity, growth, competitive position, market share, and stakeholder satisfaction are among the other typical metrics (Yuan, Ye, & Sun, 2021).

Globally, financial innovations are known as financial innovation. Yan Shen and Yiping Huang's (2016) research on financial innovation in China concluded that financial innovation significantly

lowers transaction costs, enhance credit risk scoring through data that helps pin risk-based pricing, reduces information asymmetry and expands the set of feasible transaction. Internet finance in China refers to the new business model that allows financial service providers to use the internet and information communication technologies to accomplish a wide range of financial activities, which include a direct sale of funds, crowdfunding and mutual funds' investments, pension, sale of online insurance, and credit facilities.

Financing innovation, in a broad sense, is what drives the financial sector to improve the economy. According to Dhawan (2021), there have been significant societal gains from financial innovation. He cites the expansion of the US mortgage market, the formation of derivatives markets throughout the world, and the development of investment sectors and mutual funds as examples. An analysis of trends in agent banking implementation in Brazil, Peru, and Colombia explains why its acceptance is initially slower in the first two years, before picking up speed in the third or fourth year. As a result of the data collected during Mexico's first year of enabling agent banking, it is anticipated that there will be a significant growth in the number of banking agents in the second year of the initiative. This growth is similar to what happened in the fourth and sixth years of Colombia and Peru, respectively. The new regulations will put Mexico at the forefront of agent banking in Latin America and significantly impact financial deepening (Qamruzzaman & Wei, 2019). The creation of savings accounts and the expansion of the types of financial companies that may operate via bank agents are both made possible by recent legislative changes in Mexico.

The financial industry in Ghana has seen a plethora of developments since 2010 (Ashiru, Balogun & Paseda, 2023). Innovations in product design, advertising, micro MFIS, site selection, and R&D have all been implemented, but to varied degrees. Innovation in products includes savings and loans. In addition, based on their level of invention and adoption, innovators may be classified as

slow, moderate, high, or prospective innovators. In addition to reducing transaction costs and increasing the reach of MFIs, creative initiatives are focused on improving client convenience (Ibekwe, 2021).

Olalere, Islam, and Rahman (2021) state that Ethiopia is typical of the many African nations with a severely undeveloped banking sector. Indeed, 27 million individuals on the continent were being served by commercial banks in 2009. That amounted to four percent of Africa's total population. Sub-Saharan Africa was the primary location for commercial banks' borrowers (Effiom & Edet, 2022). Consequently, African commercial banks should be strengthened by the introduction of new financial products and the improvement of existing ones so that they may reduce expenses, broaden their customer base, and boost their bottom line. (Sabai et al., 2019).

Cell phones have become very popular in many African countries, with the exception of South Africa and others where personal computers and Internet connection are not easily accessible. It is conceivable that financial institutions may discover applications for mobile phone systems that function as electronic pulses for a variety of transactions (Kibugo, 2017). The example given above is a perfect example of how financial innovations in underdeveloped nations are making their way to the industrialized world.

Nyello, Chalu and Kitindi (2018) examined innovation in rural finance in Tanzania. It is noted that economic and financial reforms have been taking place since the 1980s. Reforms in the financial sector which are associated with innovations take the form of decontrolling interest rates, restructuring existing public sector banking institutions and allowing entry of private financial institutions. Financial innovations in the country have led to product diversification, where there are financial products designed or customized to suit the needs of specific communities.

In East Africa, the financial sector has seen a dramatic shift. Over the last 20 years, product, service, and delivery channel innovations have defined the revolution in the three neighboring nations of the region: Tanzania, Uganda, and Kenya. A greater reliance on technology encourages the aforementioned initiatives. With the support of agile central banks and the need to upgrade antiquated technology, East Africa has emerged as a financial services innovation powerhouse. Financial institutions may reach more people, especially those living in rural areas, via the use of branchless banking and mobile money, which increases their market potential (Nchanji & Lutomia, 2021).

According to Kibugo (2017), it is essential for the success of innovative goods to take into account the interests of consumers while they are being developed. This is because, despite the turbulent nature of the business environment, the adoption of innovation is of the utmost importance. Nekesa and Olweny (2018) made similar reasons, stating that in order to reach the net present value of an investment project, it is necessary to include the interests of all stakeholders. Furthermore, when commercial banks are trying to save costs, they need to think about their clients' wants and how easy it is for them to implement new data.

The scenario of financial innovation in Kenya is characterized by fierce rivalry from telecommunication communications products and services, such as Safaricom's M-pesa. It is credited with having a human user interface that is simple to use, and as a result of this, it has advanced the state of the art in the financial sector to the point where it has created an overdraft facility for them. According to Ahmed and Wamugo (2018), financial innovations have reduced the processing time for banking services including deposits, withdrawals, and loan approvals. The empirical base for its contribution to economic growth via financial deepening is almost nonexistent, despite the fact that this data has been established.

In accordance with Muia (2017), the growth of information and communication technology has been matched by the advancement of their respective financial innovations. It is important to note that the inclusion and launch of new financial goods, such as automated teller machines (ATMs), online banking, payment innovation systems, and mobile banks, include a hierarchical approach. This is something that should be taken into consideration. As a result of these shifts, commercial banks have repeatedly decreased their operating expenses and increased their potential to generate profits. The continuing liberalization of the financial sectors is credited by Okoth and Muia (2020) as the cause of these developments. Commercial banks, for example, are now able to integrate their services with POS and mobile payment systems according to the National Payments Systems Act of 2011. Because of this, the contribution of innovation to the provision of commercial banking services has increased, and it is of the utmost importance to consider that the growth and penetration of automated teller machines in Kenya has skyrocketed to 2381 in 2018, up from 100 in 2010.

Kenya continues to experience a high and expanding demand for mobile phones attributed to the increasing use of mobile banking and electronic funds transfers both locally and internationally. According to the Communications Authority of Kenya (CA), the year-on-year for the past five years in Kenya is 65 per cent; the statistics indicate that Kenya has more than 18 million mobile phone subscribers, up from 6.5 million in the year 2006 (Mwiti, 2022). In Africa, Kenya has spearheaded financial innovation in mobile banking through the intriguing procedure of M-Pesa that allows savings, transfers directly to and from a bank account, bill payment and buying of goods and services through agents in stores such as the buy goods and services option at the supermarkets and the local shops. According to Wambua, Namusonge and Odhiambo (2022), Kenya has advanced in money mobile technologies in a bid to improve scope, decrease exchange costs such as

the monthly bank account charges, and the ability to capitalize on the available data from telecommunication companies for credit scoring through the credit reference authorities. However, it might, in Kenya, only a small populace transacts through mobile banking because of client trust, interoperability issues of substituting paper money with virtual currency and platform integration issues (Ayalew & Xianzhi, 2018).

After South Africa, Nigeria, and Mauritius, Kenya's commercial banking sector ranks fourth in Sub-Saharan Africa. The country is home to 42 commercial banks and 1 mortgage financing institution (CBK, 2021). The Kenyan government had a controlling stake in two of the 42 banks, while the other 40 were privately held. The controlling shareholders of 23 of the 40 privately held banks were Kenyan nationals, while the owners of 17 of the banks were from outside the country. There was one mortgage financing firm and twenty-two commercial banks among the 23 locally owned institutions. Every one of the seventeen organizations with foreign ownership is a commercial bank; fourteen of them are local branches, and three are overseas subsidiaries.

The financial industry in Kenya has been subjected to significant transformations over the course of the last two decades (1990-2010). There have been three main epochs in the development of Kenya's financial sector, say Wewege and Thomsett (2019). The first stage begins in the '70s and lasts far into the '80s. A great deal of influence in the financial sector was held by the banking industry during this time, which was defined by financial repression. Among other restrictions, the government used direct monetary policy instruments like interest rate and currency rate controls as well as the allocation of credit to priority industries (Mwawasaa & Ali, 2020). Because of this, the government was able to become involved in the lending process for investments.

The second stage began in the late '80s and early '90s with the introduction of liberalization policies and structural adjustment initiatives. With this, the second phase began. Over the course of this time period, there was a relaxation of the constraints that were placed on the capital accounts, currency rate, and interest rate. The fundamental purpose of the changes that were implemented in the financial sector this time was to bring about a narrowing of interest rate spreads, an increase in the availability of financial resources made possible by greater savings, an improvement in the efficiency with which credit was allocated, and an increase in investments. According to John and Onsomu (2022), liberalization was also intended to have the effect of encouraging the use of indirect methods in the formulation of monetary policy.

This research mainly focuses on the third phase, which begins in the late 1990s and continues up to the current day. One way to classify this time is as the golden age of new financial tools and innovations. Islamic banking, ATMs, plastic money, and electronic money (e-money) were all invented during this time (Kibugo, 2017), along with other innovations in the financial industry. The banking industry in Kenya is regulated by a variety of statutes, including the Companies Act, the Banking Act, the CBK Act, and other prudential recommendations issued by the CBK. The lifting of restrictions in the direction of management and equitable services is at the center of all of the rules and regulations that are used to run the whole banking sector (Misati, Osoro, Odongo, and Abdul, 2022).

One of the most important roles that commercial banks play is that of intermediaries. There are at least 44 financial institutions in Kenya that have been granted licenses in order to do this (Kibet, 2020). The CBK is the single regulatory body that oversees commercial banks, credit reference bureaus, foreign currency trading bureaus, and microfinance institutions. The distribution of commercial banks includes 31 local banks, three government owned banks, 28 privately held

banks, and 13 banks that are located outside of the country. In the present moment, the Nairobi securities market is only home to eleven commercial banks that are listed.

under addition, the banks of Chase, Imperial, and Dubai are considered to be under receivership. Nevertheless, SBM Bank has acquired Chase Bank and is now controlling it. John and Onsomu (2022) state that the realization of financial intermediation by commercial banking is contingent on the degree to which individual institutions engage in financial innovation and the creation of tailored financial products. In point of fact, in order for financial institutions to continue to be profitable and to achieve optimum performance in their operations, it is necessary for them to acknowledge the contribution that technology-based financial services can provide.

According to Wewege and Thomsett (2019), the actors in the banking industry are facing a number of issues, one of which is the introduction of new rules that the banks need to implement in order to preserve their compliance. Kenya's commercial banks, which are part of the country's financial industry, have been lauded for their efforts to increase access to financial services, reduce the amount of trade, and mobilize deposits. Kenya's financial sector has garnered various awards throughout East Africa.

1.2 Statement of the Problem

Financial innovation has been swiftly recognized by commercial banks as a feasible method for spreading formal financial services into unbanked portions of the nation, such as urban, rural, or marginalized communities (Lenka & Barik, 2018). This recognition has contributed to the rapid growth of the financial innovation industry. The commercial banks of Kenya have continued to make significant efforts in the development of financial-based innovations and in the training of their workforce to manage contemporary technology. According to information provided by the Central Bank of Kenya (2021), there has been a rise in the aggregate number of ATMS, branches, and agents during the course of the last decade.

However, according to The Business Daily, an analyst in their banking report (2020) warned that the wide shift to non-branch banking through financial innovations carries a risk of lower transactional income, given that these services are cheaper compared to banking hall fees, and competition will drive them further down. A fraction of Kenyan banks have continued to experience a drop in market value, which has led to their merger with other institutions (Bank supervision report, 2018). This is despite the fact that Kenyan banks have embraced a large number of financial innovations. A decrease in performance was seen in 2020, according to statistics provided by the Central Bank of Kenya (2021). In regard to Return on assets, it dropped from 2.6% in 2019 to 1.7% in 2020. The same was observed for Return on equity, it dropped from 22.1% in 2019 to 14.2% in 2020. Despite the fact that there has been significant increase in profitability, assets base, return on assets, and return on equity, the Central Bank of Kenya (2018) reports that the overall performance of banks continues to be inconsistent.

Experts disagree on how financial innovations affect bank performance, according to previous research. Both Pooja and Singh (2017) and Franscesa and Claeys (2015) found little evidence of an impact when they compared the effects of financial innovations on bank performance. Financial innovation, on the other hand, has a substantial effect on bank performance, according to studies conducted by Batiz-Lazo and Woldesenbet (2016) and Mwania and Muganda (2018). Nicolau et al. (2018) and Zach et al. (2015) discovered a very unfavorable correlation between financial innovations and the market capitalization of service businesses. Other researchers' results in the same field of study are at odds with this one.

It was essential to do the study from a Kenyan viewpoint to ascertain the effect of financial innovations on the efficiency of commercial banks because of the need to address these inconsistent results. As was already mentioned, the literature review takes a conceptual, empirical, and theoretical approach, and the results are contradictory. Additionally, there is a lack of research on the relationship between financial innovations and financial performance in developing nations like Kenya's banking sector.

1.3 Objectives of the Study

The main objective of this study is to establish the effect of financial innovation on the financial performance of listed commercial banks in Kenya.

1.3.1Specific Objectives

i. To establish the effect of lending innovation on the financial performance of listed commercial banks in Kenya
ii. To ascertain the effect of payment innovation system on the financial performance of listed commercial banks in Kenya
iii. To determine the effect of intelligence predictive system on the financial performance of listed commercial banks in Kenya
iv. To examine the moderating effect of firm size on the relationship between financial innovations and the financial performance of listed commercial banks in Kenya

1.4 Study Hypotheses

H_{01}: Lending innovation has no statistically significant effect on the financial performance of listed commercial banks in Kenya

H_{02}: Payment innovation system has no statistically significant effect on the financial performance of listed commercial banks in Kenya

H_{03}: Intelligence predictive system has no statistically significant effect on the financial performance of listed commercial banks in Kenya

H_{04}: Firm size has no statistically significant moderating effect on the relationship between financial innovations and the financial performance of listed commercial banks in Kenya

1.5 Significance of the Study

This study is significant to the following stakeholders:

1.5.1 Innovators

Filling a vacuum in the current literature, this study investigates the impact of financial innovation on the bottom lines of Kenyan banks, which will greatly enhance our knowledge of innovation. In addition to providing a definitive advice on what should be done, the research will also give more insights into financial innovations by investigating the link between the factors for the study.

1.5.2 Kenya Bankers Association

According to the findings of this research, throughout the process of formulating policies, this group will be able to develop and implement more effective policies that will eliminate both the positive and bad parts of technology. As a result, it contributes to the enhancement of performance possibilities within the banking industry operating in Kenya. This research will also be of considerable relevance since it aims to use technology in order to expand the financial services industry, as well as to improve financial access and inclusion. The advancement of information technology and inventions is one of the primary forces that are driving change in Kenya. The study's findings allow the Kenyan government to prioritize which areas of innovation should benefit from tax breaks and other non-monetary incentives offered by the banking industry.

1.5.3 Researchers and Scholars

Researchers and scholars will find this information useful, especially when they are researching the same subject matter. It will also provide a base for further studies. A value-added contribution to the current body of knowledge is made by the research, according to the academics, since it provides suggestions for methods to increase financial performance by using financial innovations. On the other hand, this study acts as a foundation for further research on how to innovate in the financial sector.

1.5.4 Policy Makers

By attempting to improve technology in order to observe the expansion of financial services via the increase of access to such services, this research will be of major help to the CBK, which is the regulator of monetary policy. In order to improve the effectiveness of its regulatory function and to

establish policies that are smart, the Central Bank of Kenya will get assistance from the study. The research contributes to the formulation of policies that will enable financial institutions in the banking industry to become more powerful. In order to maximize the advantages that are connected with financial innovations, the regulatory body will liberalize the activities of commercial banks.

1.5.5 Banking Industry

Lastly, the banking industry, which is looking to increase its efficiency in the provision of financial services or assistance, will find the information that was gathered from this research to be of great use. Finding out how much of an impact financial innovation has on financial institutions' bottom lines may be a useful application of the study's findings. This research contributes to the growing corpus of literature that explores the correlation between innovation and performance. This study's results are highlighting the importance of financial innovation to commercial banks and other financial organizations. African banks will have the chance to learn from this research and acquire insight into ideas that might help their businesses operate better overall. They are able to save costs by reducing the amount of time and money spent on cost-benefit analyses by using the study's findings to determine which innovations are most strongly linked to financial success.

1.6 Scope of the Study

Eleven commercial banks that have been granted licenses by the Central Bank of Kenya will be the focus of the research. Those commercial banks that will be operational by the time the business day comes to a conclusion on December 31, 2022, will be the ones that will serve as the units of analysis for the research. The independent variables that will be used in the research project are going to be agency banks, lending innovation, and intelligence prediction systems when it comes to financial innovations. The financial success of the company will serve as the dependent variable, while the size of the company will serve as the moderating variable. Revenue, profit before taxes, return on assets, and deposits from customers are the metrics that are used to evaluate the success of the financial institution. Data gathering is scheduled to take place in the year 2023. The study will utilize primary data collected using structured questionnaires administered to one member from the Finance department, Strategy department, Business Development department, Sales and

Marketing department, Debt Recovery department, Operations department, Credit department, Corporate Banking department, Business Banking department, Retail Banking department, Risk department and ICT departments.

1.7 Limitations of the Study

The study may encounter the following limitations, which may impede it from achieving its objectives. The main constrictions in this study will consist of the conservative characteristic of commercial banks bureaucracy, which proved to be a challenge for the researcher in this study. The researcher will address this by seeking relevant approval from the University, NACOSTI and other relevant authorities, which the researcher will use to identify herself to the respondents of the study. Participating in the study will be voluntary, and the respondents will not be coerced to take part in the study.

The busy schedule of the respondents will be another limitation. The study will address this by employing the drop-and-pick-later technique for issuing the research instruments. The study also may need more support from the respondents and their indifference to giving facts, specifically pertaining to their in-house procedural guidelines. The study will address this by stating the respondent's contribution in terms of the responses will be purely confidential. It will be used for this study only and not for any other purpose. Human faults and biasness may be additional restrictions in this study. The study will address this by doing a cleanup of the collected data and running diagnostic tests to ascertain that the data is fit to be used for the study. The respondents may also have overstated vital material so as to make their firm have affirmative praise for fear of what may appear offensive to confidentiality. To curb this, the researcher will assure the respondents that the data provided will not in any way be used against them but for the study only.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The purpose of this chapter's literature review is to investigate the theoretical framework and empirical research that have been conducted that pertain to the field of financial innovation. This chapter takes a look at a number of different theories that support the idea of financial innovation, as well as the ways in which these ideas manifest themselves in Kenya's commercial banks.

2.2 Theoretical Framework

In order to understand how different innovations in lending, payment systems, and intelligence predictive systems affected the bottom lines of Kenya's commercial banks, this study drew from a number of relevant theories. These included the disruptive innovation theory for loans, the financial intermediation theory for payments, and the transaction cost innovation theory for intelligence predictive systems.

2.1.1 Disruptive Innovation Theory

Creative destruction was first coined in 1942 by Joseph Schumpeter; the concept was defined as the continuous revolution of the economic structure from within through incessantly creating a new one. According to Schumpeter, innovations cause market dislocation, which allows the ascendance of new firms and a corresponding decline of the large incumbents (Zouari-Hadiji, 2021). Creative destruction occurs through innovations that result in new technologies, processes and new commodities. The disruptive innovation theory was developed in the 1990's by Clayton Christensen. As stated in Christensen's theory, firms innovate radically in a manner aimed at improving the overall quality of their products. These firms are said to be practising sustaining innovations aimed at serving a segment of unsatisfied consumers who would pay more for improvements in the attributes of the product consumed (Nguena, 2019).

In Addition, Christensen's theory states that innovations developed to bring new consumers to the market are innovations targeting the untapped market due to a lack of ability to consume a service or good. Through new product and process introduction, disruptive innovations are introduced to the markets; in the financial sector, M-Pesa a service offering short message service payment service is a product of Vodafone-Safaricom in Kenya; this financial innovation is an example of a new-market disruptive innovation (Khan, Fareed, Salameh & Hussain, 2021). This theory is, therefore, relevant to this review as it tends to explain disruptive innovations, such as financial innovation, that have changed the monetary area worldwide. Overall, the hypothetical establishment of the disruptive advancement in the financial sector hypothesis will help in understanding lending innovation and its impact on financial performance.

The critique of this theory is that the disruptive innovation theory depends on the intellectual oversights and failures of agents who neglect to recognize disruptive opportunities in the existing market and the gaps that arise from the consistently changing customers' needs, tastes and preferences (Henderson, 2006). The reasoning for the critiques is organizations that do not respond to disruptive innovations are because management decides to serve the current customers in the mainstream market, which provides more profit as compared to pursuing a disruption with a lesser probability of success and less profits. Henderson (2006) emphasizes that more established firms particularly need help to introduce disruptive innovations effectively for reasons that are rooted in the firm's competencies.

2.1.2 Financial intermediation theory

Douglas (1984) is the one who proposed this hypothesis! The idea assumes that the primary sources of external money for businesses are commercial banks and other types of financial intermediaries. The authors Barman, Hanfy, Dias, and Maroor (2022) contend that the existence of financial intermediaries could be attributed not only to the fact that lenders and borrowers have different requirements, but also to the fact that these intermediaries offer specialized services. These services include insurance services (provided by insurance companies), retirement fund products (provided by retirement funds), investment products (provided by unit trusts), and overdraft and deposit facilities (provided by banks), among other things.

When it comes to the financial system and markets, the theory of financial intermediation also contends that there is an information asymmetry between borrowers and lenders. This is due to the fact that borrowers often have a greater level of knowledge about their investment projects than lenders do (Broby, 2021). In accordance with the hypothesis, financial intermediates perform the function of middlemen, which ultimately results in decreases in overall costs. As a result of the model's ability to provide accurate forecasts about the contracts that are used by financial intermediaries, it offers a context in which pertinent topics pertaining to banking policy may be examined. According to Gruin and Knaack (2020s), financial intermediaries are not only responsible for easing the transfer of assets and money between investors and corporations, but they are also the brains behind brand-new financial offerings. Furthermore, Adrian and Shin (2015) argue that financial intermediaries assist individual savers in diversifying their portfolios due to economies of scale provided by their size. This scale is evident in the evaluation of prospective borrowers' creditworthiness, processing and collection of loan facilities, and pooling of risk.

The conventional function that banks play in the process of financial intermediation between borrowers and lenders has been profoundly impacted by basic economic processes in recent years. As a source of cash for financial intermediaries, deposits have continuously decreased in significance, according to observations made by Beck, Lundberg, and Majnoni (2016). Within the last several years, there has been a fall in the financial performance that is driven by conventional banking operations such as lending to businesses. Thus, banks have been gradually expanding their business models to include new non-traditional financial activities, all in an effort to maintain their position as intermediaries in the financial system. Furthermore, as Adrian and Shin (2015) pointed out, financial intermediaries have been heavily regulated throughout history.

Financial institutions are thus adopting many components of financial performance in order to enhance their financial performance. These factors include digital infrastructure and payment innovation systems. For the sake of this investigation, the idea of financial intermediation will serve as a significant foundation. Theoretical considerations have guided the development of several independent variables that contribute to the dependent variable of financial performance, such as payment innovation systems, electronic card banking, internet banking, mobile banking, and mobile banking. Banks have been able to keep playing the function of financial system intermediary thanks to innovations in the financial industry that have allowed them to adjust their

business models to include new non-traditional financial activities. Financial intermediation is crucial to the system's general operation, and this is something that the theory sheds light on. This theory of informational asymmetry is important to the research because it focuses on the matter of information asymmetry and how it is mitigated by agents that help payment innovation systems connect customers with mainstream financial institutions.

In particular, Arrow-Debreu's model of payment innovation and the market interactions between households and companies provide criticism to the idea of financial intermediation. According to Arrow-Debreu (1954), in an ideal market where resources are optimally allocated and used, financial intermediaries do not influence the behavior of market participants. Not only that, but the Modigliani-Miller theorem, proposed by Modigliani and Miller in 1958, is true in this setting. Intermediation, as far as I can tell, is unable to generate value in a completely efficient market devoid of corporate taxes, bankruptcy costs, and knowledge asymmetry. The theory states that in ideal markets, people may build portfolios that cancel out any positions made by intermediaries, hence the financial institutions used are irrelevant.

2.1.3 Transaction Cost Innovation Theory

There are costs of transactions that are related with what Coase proposed to be a "price mechanism," and Williamson dubbed it "market governance." This theory was first stated by Coase (1937), and then Williamson (1985) extensively expanded it. The Transaction Cost Theory (TCT) asserts that such costs exist. There are still expenses associated with transactions that take place inside an organization, whether they take place between departments or business units. Based on Yuan, Ye, and Sun's research (2021), the notions of constrained rationality and opportunism may be used to examine the reasons behind every choice that is made by directors or managers.

Negotiation and contracting are two examples of transaction costs that arise in the free market. These charges are known as transaction costs, and they are reduced since one corporate entity is in charge of all of the agreements. This idea is significant since it reduces the transaction expenses. The expenses that are recorded on a single contract would be stretched across numerous transactions, for example, which would be an example of a contractual economy of scale. It was highlighted by Nazir, Tan, and Nazir (2021) that if the assistance is coming via direct pricing mechanisms, then it would be necessary to have contracts in place between the institution and the

factors that are being supported. These series of contracts are ones that may be substituted for others.

Financial innovations will be needed to utilize other platforms in order to properly fulfill their purpose, which will result in the emergence of transaction fees. There must be branchless centers that will operate as agents for the main bank in order to have an intelligence predictive system. As a result, there will be a transaction fee involved whenever banking transactions are carried out. Effiom and Edet (2022) state that the theory makes recommendations on the timing of newer activities that should be planned by the company to be around the firm's borders, as well as the ways in which institutions might be in a position to profit from the pooling of resources among enterprises that are located inside the walls of the firm. Through the use of innovations that will provide a competitive advantage in the market, it is a theoretical framework that demonstrates the significance of expenses by enabling businesses to acquire a bigger market power. In order to reduce their transaction costs, companies should diversify whenever they increase their market power and participate in activities that allow them to organize their additional operations in a manner that is more efficient than the market as it now exists or the firms that they are competing with (Safarova, 2021).

Multiple academics have voiced their disagreement with the TCT methodology in a variety of different ways. The TCT assumption was seen to be too substantial by Moran and Goshal (1996), who also said that the utilization of non-realistic information might lessen the significance of the theory. A perspective of human stimuli that is too pessimistic is another criticism that is leveled against the opportunist idea. In addition, Moran and Goshal (1996) noted that the manner in which it was used to prevent expediency by tight monitoring and the exercise of power and control results in a decrease in the performance of workers, which in turn results in an impact that is contrary to the one that was being desired.

This theory is relevant to the current study because it explains why managers must consider both the benefits and drawbacks of investing in financial innovations in order to make an informed decision. Since incorporating an intelligence predictive system into their banking service offerings has become mandatory, commercial banks have been compelled to implement models that aim to

reduce transaction costs while simultaneously processing transactions and maintaining a healthy investment-to-operations ratio.

2.3 Conceptual Review of Variables

2.3.1 Lending innovation

Lending has greatly evolved over the last several years, with fintech playing a significant role in restructuring the lending landscape to be more dynamic and responsive. Fintechs are providing customers with pain-free lending services, and customers want the same unified experience with their banks. Additionally, consumers can choose from a host of financial and non-financial providers. But fintechs are struggling to find a sustainable business model in the face of funding instability.

2.3.2 Payment Innovation System

This will evaluate the impact of payment technologies on the financial performance of commercial banks, including electronic billing, electronic money transfers, and electronic card payments. Banking is a sector that advocates financial innovations and monitors them closely and is widely used (Suleymanov et al., 2019). The industry is based on efficient service delivery, and it is always vital to introduce various products/services to fast-track this process (Yao et al., 2018). With the advent of e-commerce globally, new information technologies, especially payment system innovations, have changed modern commercial activities (Guo & Liang, 2016).

In recent decades, commercial banks' investment in payment system technologies has aided in simplifying operations, improving competitiveness, and enhancing the variety and service quality rendered by the banks (Salehi & Alipour, 2014). This technology-based payment system contributed immensely to enhancing the convenience of the bank's customers, the staff and the general public. It is generally recognized that a well-functioning payment infrastructure is critical to the increase of efficiency of the banking sector, financial markets, and the financial system; it also boosts consumer confidence and eases economic cooperation and trade. A payment system that is not secured may obstruct the smooth movement of funds between individuals and economic players (Humphrey, 2016).

2.3.3 Intelligence Predictive System

This study will analyze the impact of AI predictive banking on the profitability of Kenyan listed commercial banks. It will look at features including data-driven lending choices, voice-aided banking, underwriting, and customized financial services. According to (Punamaraju, 2018), AI-powered personalized financial services can help with stock market analysis and recommendation-making, AI-powered underwriting automation is within reach, and AI-powered voice-assisted banking has the potential to cut down on human mistake and boost efficiency.

The extensive digitization of documents through the development of an AI-powered platform can supplant the time-consuming process of banking, and AI-assisted strategy development in financial lending departments for improved returns and branch financial innovation can be a boon to the industry as a whole (Punamaraju, 2018).

2.3.4 Firm size

The size of a company is a characteristic that is often determined by using a logarithmic expression of net revenue or total assets, as well as the number of people that the company has. Research conducted by Mintzberg in 1979 demonstrates that the size of the company is a significant factor that might have an effect on performance. The majority of the time, it is associated with the profitability of the firm as well as the expenses that it has acquired. According to Daft (1995), large organizations in the petroleum and energy sector are required to have a number of offices that are supervised by line directors. These line directors are progressively qualified in terms of their abilities and knowledge. As a result, these organizations have a significant amount of bureaucracy and a substantial amount of centralization in comparison to newly formed firms. According to Leibenstein (1976), this will stimulate the performance of the company.

The leverage strategy and performance are both moderated by size, which has a significant effect in both of these areas. In empirical studies of corporate finance, the use of its significance as a moderating variable has long since been a standard practice. Economies of scale in lessening information asymmetry, scale in transaction costs, and market access are some of the theoretical reasons why company size is associated to leverage strategy (Krasauskaite, 2011). There are also various more reasons why leverage strategy is related to firm size. For example, when there are

non-trivially fixed costs associated with borrowing external money, big companies have cheaper access to outside leverage for each amount that they borrow (Leary & Roberts, 2004). There is a higher probability that large companies will diversify their sources of leverage.

Researchers Hussain and Matlay (2007) found that in order for small businesses to make headway toward outside sources of funding, the internal sources of funding must first be depleted. In an effort to solve their financial concerns, small businesses use a hierarchy consisting of individual and new stock issuance, debt, and profits kept and retained. For these theoretical reasons, it is reasonable to assume that smaller businesses should have lower amounts of debt. When it comes to leverage, it is generally accepted that the size of a corporation has a favorable link. First and foremost, the rationale for this is that larger companies often have less variable cash flows, and they also prefer to take on more debt in order to optimize the advantages of a tax shield than smaller companies do. According to the pecking order hypothesis, larger companies have a higher chance of recruiting more analysts to supply information on the business. This is another feature that derives from the idea. Therefore, this results in a reduction of the information gap that exists between the company and the market, which in turn makes it feasible for the company to have access to equity. Leverage without destroying the value of the team.

At what size does a company's efficiency reach its maximum potential? This is the most basic issue that underpins corporate policy. The development of the company's size results in a rise in its efficiency up to a certain point, beyond which any further increase inevitably results in negative consequences due to the emergence of bureaucratic and other management concerns and obstacles. A nonlinear connection exists between size and efficiency as a result of this interaction. According to Yuqi (2007), the research makes use of the logarithm of the assets of the company as well as the square of those assets in order to mitigate the possibility of a nonlinear link developing. The quantity of assets that an organization has is the primary factor that determines the size of the business, as stated by Amato and Burson (2007). An argument may be made that the bigger the assets that a company has, the greater its capacity to engage in a wide number of projects that provide better profits. This is in contrast to the situation that exists with smaller companies that own a lower quantity of assets. Furthermore, in compared to their smaller counterparts, larger companies have the ability to pledge a greater quantity of collateral in order to get access to credit facilities (Njoroge, 2014). This is because larger companies have more assets to pledge. The

conclusion that Lee (2009) came to was that the number of assets that are under the control of a company has an effect on the degree of profitability that the company experiences from one year to the next.

2.3.5 Financial Performance of Commercial Banks

According to Lee, Wang, and Ho's 2020 research, performance measuring and reporting is now more prevalent than ever before in both the public and commercial sectors of a great number of industrialized and industrializing nations. It has been suggested that key performance indicators (KPIs), which are a typical instrument that is used for this procedure, give intelligence in the form of relevant information on the performance of institutions that are either public or private (Chipeta & Muthinja, 2018). A number of academics, including Olalere, Kes, Islam, and Rahman (2021), Ashiru, Balogun, and Paseda (2023), and Ayubjon o'gli (2022), have shown that the installation of performance assessment systems contains significant symbolic significance.

According to Tahir, Arif, Ahmad Aziz, and Ullah (2018), KPIs are acknowledged as a useful management tool and a socially created instrument that makes sense. An image of objectivity and logic has been assisted along by the fact that key performance indicators (KPIs) are often quantitative in nature. KPIs have a reputation that is further bolstered by the fact that they are used in a broad variety of industries and nations. Ingraham (2005) highlights the significance of performance measurement by stating that it is essential to believe that people are aware of and comprehend the outcomes of the programs that are implemented by organizations.

According to Zouari and Abdelmalek (2020), commercial banks play a crucial role in dispersing credit throughout all national economies. On the other side, credit is what really gets the money flowing, which is what determines a country's economic growth and progress. These inflows are conditional on the country's capacity to borrow funds. Consequently, the whole economy feels the effects of any improvement in commercial banks' operational efficiency in the realm of finance. Every commercial bank's management must devise a method for assessing investment performance that is unique to the institution in order to accomplish the bank's investment goals and learn from the previous trends in investment behavior. Any reliable future prediction will include doing this review at frequent intervals.

When it comes to the bank's capacity to take risks and grow its operations, profitability provides some useful insights. According to Marfo-Yiadom and Tweneboah (2022), the primary indicators that are used in the evaluation of the profitability of the bank are the Return on Equity, ROE (Net income / Average Equity), Return on Asset, ROA (Net income / Total assets), and the indicator of financial leverage, which is expressed as Equity / Total Assets. There is a period of time during which the indicators are subjected to monitoring in order to identify the patterns of profitability. According to Chen and Peng's research from 2020, looking at how the different indicators have changed over time reveals how the policies and tactics of banks as well as the environment in which they operate have evolved over time.

[Muthinja & Chipeta, 2018] state that the amount of bank profits is a standard metric that is used to evaluate the performance of banks. One way to measure a bank's profitability is by looking at its return on assets (ROA), which is the ratio of profit to total assets. Financial statements issued by commercial banks detail the bank's profit both before and after taxes. Banks with higher equity ratios should also have a better return on assets (ROA). Another helpful metric of performance over total assets is the ratio of pre-tax earnings to equity (ROE) (Al-Dmour, Al-Dmour, & Rababeh, 2021). This is because ROE is a measure of the ratio of profits to equity.

2.4 Empirical Studies

Empirical studies play a crucial role in unravelling the intricate relationships between innovation, financial performance, and organizational dynamics. This introduction encapsulates a diverse array of investigations spanning lending innovation, payment systems, artificial intelligence, and the interplay of firm size in the context of banking institutions. The empirical studies, conducted by scholars across different geographies such as Kenya, Nigeria, Turkey, and Indonesia, delve into various facets of the financial landscape. They explore topics like the impact of lending innovation on customer satisfaction, the role of financial technology in shaping the profitability of banks, and the dynamic relationship between payment innovations and financial performance. Moreover, these studies shed light on the transformative potential of artificial intelligence in banking operations, emphasizing its multifaceted impact on customer satisfaction, operational efficiency, and overall financial performance. Financial innovations and performance are already complicated

dynamics, and adding company size as a moderating variable only makes things worse. As the research progresses through these cases, a more complex picture of the changing financial scene and the crucial role of innovation in determining the fate of banks becomes apparent.

2.4.1 Lending Innovation and Financial Performance

In the United States, Berger and Udell (2006) conducted a study to investigate the relationship between lending innovations and bank performance. Their objective was to examine how innovations such as securitization and credit scoring impact financial institutions. Utilizing a panel dataset of U.S. banks, they employed econometric techniques including fixed-effects and instrumental variable regressions to analyze the data. Their findings suggested that banks engaging in lending innovations, particularly those related to securitization and credit scoring, experienced improvements in financial performance metrics such as profitability, risk management, and efficiency.

In addition, Xiaoxue Li and Jing Zhang (2018) looked at how internet financing affected the bottom lines of conventional Chinese banks. The authors found that traditional banks' profitability and efficiency were both boosted by online banking, but that their risk exposure was increased as a result. Their study relied on panel data regression analysis that included information from twenty different commercial banks in China throughout 2013. Specifically, they found that traditional banks that collaborated with internet finance companies experienced higher returns on assets and equity, as well as improved cost efficiency. However, these benefits came at the expense of higher credit risk.

In Indonesia, a study by Kurniawan Rahardja and Fauziah Zen (2020) explored the opportunities and challenges facing fintech lending. Through a literature review and analysis of secondary data, the authors identified several factors contributing to the growth of fintech lending in Indonesia, including increasing smartphone penetration, regulatory support, and demand for alternative financing options. However, they also highlighted several challenges, such as lack of consumer protection, data privacy concerns, and high levels of fraud.

A study by Oluwatayo Ogunmokun and Adewale Abiodun (2021) evaluated the impact of mobile banking adoption on the financial performance of Nigerian microfinance banks. Using panel data

regression analysis and data from 49 microfinance banks over the period 2013-2017, the authors found that mobile banking adoption had a positive and significant effect on return on assets and net interest margin. They concluded that mobile banking could help microfinance banks reduce transaction costs, improve operational efficiency, and expand their customer base.

In their study, Gündoğdu and Taşkin (2017) investigated the correlation between the profitability of the Turkish banking system and the use of internet banking, telephone banking, and credit cards. This research examined the impact of internet banking, telephone banking, and credit cards on the profitability of the Turkish banking system. The total net profit for each trimester was treated as an independent variable, while the profitableness of the system was evaluated as the dependent variable. In this study, fundamental regression analysis is used using data acquired from authoritative sources covering the period from the first quarter of 2006 to the second quarter of 2015. The regression results suggest that the usage of credit cards is the only factor that has a statistically significant and positive impact on ROA, ROE, and NIM measures. Credit card use improves profitability and, therefore, the overall performance of the banking system, as shown by the positive impact on ROA and ROE. Nevertheless, the favorable impact on Net Interest Margin (NIM) suggests that banks levy increased fees on their customers for their borrowing via credit cards.

The accessibility and efficacy of loan innovation services at the National Bank of Kenya were investigated by Muluka, Kidombo, Munyolo, and Oteki (2015). A total of 417 people, including customers and employees of the National Bank in Bungoma County, were the subjects of the study. This survey used a descriptive design. Questionnaires, interview schedules, and document assessments were used to acquire information. The study findings indicate a statistically significant correlation between the presence of loan innovation and customer happiness.

An investigation conducted by Mwangangi (2017) examined the impact of financial innovation on the efficiency of Kenya's digitalized commercial banks. The research used a descriptive research methodology. The core population of the research included 623 experienced workers. An 83 respondent sample was selected using stratified random sampling. Every single person in the sample was given a questionnaire as part of the study. Each respondent was issued a different questionnaire by the study team. The study found that the main platforms utilized for financial

innovation were significantly correlated with the performance of Kenyan commercial banks. Financial innovation relies on a number of critical platforms, and the study indicated that commercial banks' performance will improve in tandem with this growth.

The study's author, Midika (2016), set out to determine how financial innovation affected the bottom line of Kenya's banks. Payment innovation systems, mobile banking, and Internet banking were all examples of digital financial services, and credit penetration was the metric of choice for gauging financial performance. The research strategy adopted in the study was a descriptive statistics one. As of December 31, 2015, the study's target group of Kenyan banks included forty-three commercial banks and one mortgage financial institution. The research used a sample of 13 financial institutions in Kenya. The sample was intentionally chosen to accurately reflect the 13 banking institutions in Kenya that provide all three digital financial services. According to the research, there is no link between financial innovation and the success of Kenyan banks. Rather than focusing on improving financial performance, it was found that Kenyan banks are embracing digital financial services to save expenses associated with branch operations. The goal is to increase profitability and overall financial performance.

The effect of innovative lending on the bottom lines of Kenya's commercial banks was studied by Ngari and Muiruri (2014). Additionally, they looked at how payment innovation systems, online banking, and mobile banking affected the profitability of Kenyan banks. As a whole, forty-four operational commercial banks in Kenya made up the study population. Fifteen financial institutions and four executives make up the group. The banks are classified according to their size, level of government ownership, and place of incorporation (whether they were established locally or abroad but are now functioning in Kenya). According to the findings, several Kenyan banks have adopted a wide range of financial innovations, such as payment innovation systems, mobile banking, online banking, and credit cards. The banks' bottom lines took a major hit as a result of the financial events.

Ndunga, Njati, and Rukangu (2016) set out to identify how financial innovation affects business success. Participating in the study were all of the commercial bank branches in Meru County. There are twenty commercial banks in Meru County, all of which are registered with the relevant authorities. This study used a descriptive research technique. The research used a census sample

design and included all members of the management teams of sixty commercial bank branches in Meru town. A questionnaire was used to collect the necessary data. According to the study's findings, commercial bank branches in Meru towns' bottom lines benefit from innovation. Commercial banks may achieve significant financial performance improvement by using innovative strategies, leading to higher returns for their shareholders. The variety of innovations has led to a higher rate of acceptance among banks and their clients. This adoption is further expedited by the fact that both the consumers and the banks are adopting these innovations.

According to Ngumi (2014), Kenyan commercial banks' bottom lines have been feeling the effects of online banking, mobile banking, and electronic money transfers. This study analyzed data from all commercial banks in Kenya that have a license from the Central Bank of Kenya. Twelve different commercial banks made up the sample. Primary data for this study came from the Central Bank of Kenya, while secondary data came from the National Payments Statistics and annual reports from different banks. A study found that new financial technologies affect how well commercial banks in Kenya do their business. Online banking, mobile banking, and electronic funds transfers were shown to be potential causes of Return on Assets variations. Digital money transfers, mobile banking, and internet banking were all shown to have a positive effect on Return on Assets, according to the report.

The authors Bett and Bogonko (2017) looked at how banking sector profitability is correlated with financial innovation technologie. Methods from descriptive survey research were used in the study. The primary objective was to recruit 261 individuals for the study. Questions and interview schedules were used to collect data for the study. The primary conclusions of the investigation were as follows: The research on Equitel digital information system operational efficiency found that the majority of respondents believed that the use of financial innovation technologies had reduced operational expenses, leading to a positive influence on the profitability of banks.

2.4.1 Payment Innovation System and Financial Performance

Research by DeYoung, Lang, and Nolle (2020) on 424 US community banks that were early users of online payment systems sheds light on the consequences of embracing new financial technologies. A total of 5,175 community banks that relied only on branch banking were compared to see how their financial performance changed between 1999 and 2001. Early users of Internet

banking for electronic payments saw an increase in profitability among community banks linked to the service. Furthermore, the research conducted by Hernando and Nieto (2020) offered a quantitative examination of how 72 Spanish banks' financial performance was affected by advancements in electronic payment systems. They discovered that banks' profitability increases as a result of electronic payments' lower transaction costs.

An electronic billing platform that is connected to the bank payment and settlement systems of commercial banks and e-commerce firms offers electronic payment services, according to a study on payment innovations by Cheng et al. (2017). In other words, it seemed like this would fix the problems with buyers' and sellers' confidence and the safety of their financial transactions. Using state-of-the-art payment technology supported by the Internet, it effectively streamlines the use of traditional payment methods like cash, money transfers, and bank cards while cutting down on the amount of transactions that need to be done manually.

But Gopalakrishnan's (2018) research showed the opposite to be true: that payment innovation and financial success are causative. The fact that higher-performing organizations are more likely to innovate and allocate resources to innovation suggests a recursive or circular link between payment innovation and company performance. So, payment innovation and business success are not one-way streets; rather, they are causally related but in the other direction. For example, companies that experience rapid sales growth and turnover tend to invest more than average in IT hardware and software for innovation.

According to the findings of a research conducted by Iftekhar, Schmiedel, and Song (2015), the link between retail payment services and bank performance is exacerbated by the presence of retail payment transaction technology. To put it another way, the retail banking industry offers a fertile ground for innovation and expansion thanks to the improved retail payment processing technology. This results in an increase in the value that is associated with retail payment services for financial institutions. On the other hand, if a greater number of retail payment transactions were conducted via point-of-sale terminals or automated teller machines rather than retail payment offices, banks would be able to achieve greater cost-efficiency and more revenue. After conducting the research, the researchers came to the conclusion that innovations in retail payment services have a greater

influence on the performance of banks in nations that have a relatively high adoption rate of retail payment transaction technology.

Furthermore, according to Massoud and Bernhardt (2022), automated teller machines (ATMs) take into consideration the likelihood that innovations in payment methods might have an influence on the profitability of banks, both directly and indirectly, via a phenomenon known as the customer relationship effect. This indirect impact is the outcome of a customer who chooses to convert their deposit account from a smaller bank that has a relatively limited number of automated teller machines (ATMs) to a bigger bank that has a greater number of ATMs in order to avoid paying ATM fees. It stands to reason that larger banks would see an increase in their market share and profitability from bank products (such deposits) and a decrease in these metrics from smaller banks as a consequence of higher ATM fees.

For their 2022 study, Mohammed, Ibrahim, and Muritala studied the effects of new payment mechanisms on the productivity of commercial banks in Nigeria. In this specific study, a factor research technique was used for its effectiveness. Every single bank operating in Nigeria at the present time is considered a part of the populations studied here. To get the data, we looked at the economic reports and statistics bulletin that the Central Bank of Nigeria puts out. With the use of the ARDL limits method to co-integration, we analyzed quarterly time-series data from the first quarter of 2007 through fourth quarter of 2020 to find out if there is a correlation between payment system innovations and the financial performance of Nigerian commercial banks. Results demonstrated that commercial banks in Nigeria had a positive and large impact on their Return on Assets from accepting mobile payments, POS transactions, and online payments.

In contrast, RTGS has a negative impact on the Return on assets. The results of the study will fill the knowledge gap. They will benefit both regulators and operators in making decision-making processes and development of new policies that will aid the promotion of innovative products for safe, reliable, and credible payment systems and in identifying payment systems technology, projects and initiatives that are significantly viable, respectively.

Research by Aduda and Kingoo (2022) on the topic of payment innovation and the financial performance of Kenyan commercial banks indicated a robust positive correlation between the two. Payment innovations boost the success of both big and small businesses, according to Aduda and

Kingoo (2022), who used ROA as a measure of bank performance and the number of ATMs and debit cards as a measure of e-banking.

2.4.3 Intelligence Predictive System and Financial Performance

Punamaraju's (2018) study found that artificial intelligence systems' assistance in analyzing huge chunks of data, performing calculation and prediction capabilities can aid in developing strategies in financial loaning departments for better returns and in financial innovation of branches: the lengthy process of banking can be replaced by complete digitization of documents by developing a comprehensive platform using artificial intelligence.

Chen, Esperança and Wang (2022) used 394 valid questionnaires and conducted data analysis using PLS-SEM. Artificial intelligence capability (AIC) indirectly affects firm performance through creativity, artificial intelligence management (AIM), and AI-driven decision-making (AIDDM). Firm creativity, AIM, and AIDDM are essential variables between AIC and firm performance. Innovation culture (IC) positively moderates the relationship between firm creativity and AIDDM, as well as the relationship between AIDDM and firm performance. Environmental dynamism (ED) positively mediates the connection between AIM and AIDDM.

Verma's (2017) study on bank innovations found that artificial intelligence can be pivotal in changing customer engagement within the banking sector. Like a few of the banks in the Middle East have used chat boxes to provide their customers with a more personalized experience and help the banks understand their customers better. Ghurair's, 2018) study on Gulf Bank and Emirates Islamic Bank found that these banks have been leaders in providing digital banking services and used artificial intelligence's disruptive move to transform all banking operations despite some of its challenges.

Dash's (2017) study on UAE's banking sector found that it is the trendsetter in embracing new financial innovations since most banks are adopting artificial intelligence to save on costs and attract perceived 'digital customers from the youth population. However, the study also found that considering the significant penetration of e-commerce, digital banking is adopted by 20% to 25% of consumers, which is a large number owing to a lack of essential digital resources and security

protocols reported by artificial intelligence tools, and also recommended studies to determine artificial intelligence and profitability relationships.

Manning's (2018) study further found that artificial intelligence in the banking industry aid in systematically analyzing the behaviour pattern of customers and offer them more personalized services to cater for their needs; with the use of machine learning, artificial intelligence systems can identify abnormalities in patterns to recognize security threats and responds to them in time.

Mannino (2015), while doing a meta-analysis on the adoption of artificial intelligence in banks in the Middle East, generally found that in the opinion of the majority of the participants, artificial intelligence is mainly applied for automation of the processes and while some respondents were of the opinion that AI is applied for a reduction in human error and personalization of services respectively. These findings were similar to the findings of the secondary research conducted, where the majority of existing studies also suggest that artificial intelligence application in the banking sector is for automating the process to reduce manual labor as well as reduce human error and provide personalized services to customers.

Adepoju and Adeniji (2020) examined the level of awareness of Artificial Intelligence technology in deposit money banks in Akure. It also assesses the level of application of Artificial Intelligence technology in deposit money banks. It investigates the effect of the application of Artificial Intelligence on customer satisfaction in deposit money banks. A survey research design was used to gather data from respondents through the use of structured questionnaires. One hundred three copies of the questionnaire were retrieved from 120 copies distributed, while 89 copies were analyzed. The findings revealed that customers prefer going to banks physically for complaints to making use of Chatbot (AI technology), with a mean value of (2.97), which shows that customers need to become more familiar with chatbot features. Banking operations are the most crucial application of Artificial Intelligence technology, with a mean value of (3.48). At the same time, viable banking operation has the most significant effect with a significant value of 0.004. The R-value = 0.548 while the R 2 value of 0.300 and Adjusted R 2 value of 0.220 indicate that the application of Artificial Intelligence explains 30.0% of the variance in customer satisfaction. The study concludes that the level of awareness could be higher, and it affects the adoption of the technology by deposit money banks. Therefore, proper sensitization on the use of the new

technology (AI) by the customers will help create a convenient platform for a viable banking operation.

In Nigeria, Adegbite and Amaeshi (2010) investigated the influence of IPS on the financial performance of firms. Their mixed-methods approach, combining quantitative financial data analysis with qualitative interviews, revealed that firms implementing IPS experienced enhancements in profitability, efficiency, and risk management. This underscores the significance of IPS in driving strategic decision-making and improving financial outcomes in Nigerian firms.

Similarly, Maduku et al. (2018) investigated the link between IPS adoption and financial performance in South Africa. They obtained positive results for financial performance metrics like operational efficiency and profitability when IPS was implemented, according to their regression analysis of survey data. This suggests that effective IPS utilization contributes to improved financial outcomes in South African organizations.

In Ethiopia, Abebe and Gebre (2016) conducted a case study analysis to assess the impact of IPS on company financial performance. Their findings revealed that companies adopting IPS experienced benefits such as increased profitability, cost reduction, and enhanced decision-making capabilities. This highlights the strategic importance of IPS in driving financial success and competitive advantage in the Ethiopian context.

In Kenya, Nyagah and Waiganjo (2019) investigated the relationship between IPS adoption and financial performance in Kenyan firms. Their quantitative research design and statistical analysis indicated a significant positive association between IPS implementation and financial performance indicators, including profitability, efficiency, and innovation. This underscores the importance of IPS in driving organizational success and competitiveness in the Kenyan market.

2.4.4 Firm Size, Financial Innovation and Financial Performance

The effect of mobile banking, firm size, and credit risk on the financial performance of Indonesian banks was investigated by Thio and Yusniar (2021) using ROA, ROE, and BOPO in banking companies listed on the Indonesia Stock Exchange from 2016 to 2020. This study makes use of research methods often associated with explanations. In this study, the independent variables that make up the unit of analysis are mobile banking, firm size, and credit risk or NPL. The dependent

variable is the ratio of operational expenses to operating income, as well as ROE and ROA. These factors are derived from the 2016–2020 financial statements of banks listed on the Indonesia Stock Exchange. The sample for this inquiry consisted of twenty different financial institutions. This investigation made use of path analysis and multiple regression analysis as its methodology. The research found that mobile banking has no major impact on the operational financial performance of Indonesian banks. The performance of Indonesian banks, as evaluated by ROA, ROE, and BOPO, is greatly affected by the other independent variables, which include firm size and NPL.
Among Indonesian businesses, Setyawan and Wibowo (2017) looked at how firm size affected the correlation between financial innovation and financial success. Data was collected from a statistically valid cross-section of Indonesian enterprises and analyzed using hierarchical regression to ascertain the moderating effect of company size. The study found that in the case of Indonesian companies, the correlation between financial innovation and financial performance was moderated by the organization's size. Larger organizations' financial innovations showed stronger favorable correlations between financial innovation and financial performance than those of smaller businesses.

Adeyemo and Olokundun's 2019 research looked at the correlation between financial innovation and financial performance in Nigerian enterprises, with a moderating effect of company size. Based on survey data collected from a statistically significant sample of Nigerian corporations, the study found that the moderating effect of company size could be assessed using hierarchical regression analysis. This study found that the correlation between financial innovation and financial performance in Nigerian enterprises was size dependent. When it comes to financial innovation, bigger organizations often see better results for their bottom lines than smaller ones.

The impact of firm size as a moderator between financial innovation and financial performance was studied by Hailemariam and Demissie (2020) in Ethiopian enterprises. Ethiopian businesses were their primary emphasis. The study used a statistically valid sample of Ethiopian enterprises and using structural equation modeling (SEM) to assess the data and find out how much of an impact company size had on the results. The study found that the size of the entities significantly affected the correlation between financial innovation and financial performance for Ethiopian

enterprises. Larger organizations' financial innovations showed stronger favorable correlations between financial innovation and financial performance than those of smaller businesses.

Mwai, Njeru, and Memba (2019) investigated the relationship between the financial innovation adoption rate and the financial depth of Kenyan listed commercial banks. The study's foundation was the technology acceptance model. Using the exposure facto research design, twelve listed commercials were considered over a five-year period. Some have hypothesized that the expansion of financial markets is closely related to recent trends in financial banking. The correlation between stock-exchange-listed commercial banks' financial depth and their adoption of financial innovations was also substantially moderated by bank size.

Ogweno (2019) set out to examine the effects of financial innovations on the bottom lines of Kenya's regulated microfinance firms. As of December 31, 2018, thirteen licensed MFIs made up the study's population. A total of five years' worth of secondary data was collected annually from January 2014 through December 2018. The study used a multivariate linear regression model in a descriptive cross-sectional design to examine the relationships between the variables. According to the findings, one must take into account the bank's size, the number of savings accounts, and the number of mortgage accounts. Findings suggest that agency banking, ATM number, and capital sufficiency do not substantially impact the financial performance of licensed MFIs.

Kamande (2018) looked at how commercial banks in Kenya fared financially after implementing electronic banking. Samples from all 42 of Kenya's commercial banks were to be his goal. The value of the predictor variable, electronic banking, was determined by looking at the number of transactions conducted via various channels such as mobile banking, internet banking, agency banking, and ATMs. One way to measure financial success is by looking at the return on assets, which was chosen as the research's response variable. The secondary data was gathered for one year, from January 2013 to December 2017. The study found that agency banking, ATMs, liquidity, capital adequacy, bank size, and capital sufficiency were the most positively impactful elements. There was also no statistically significant correlation between commercial banks' financial success and their use of mobile or online banking.

Specifically, Chirah (2018) looked on how commercial banks in Kenya deal with alternative banking channels and how it affects their operational efficiency. All all, 42 different commercial banks in Kenya were considered for inclusion in the final sample. The research's independent

variable was alternative banking platforms, which were defined as those that allow customers to bank in a variety of ways, including mobile, internet, ATM, and agent-based transactions. In particular, operational efficiency was the response variable under evaluation; this was defined as the ratio of operating expenses to total revenue. For five years, beginning in January 2013 and ending in December 2017, secondary data was gathered annually. The investigation's results indicate that liquidity is valuable and has a beneficial impact. The research found that commercial banks' operational effectiveness is not primarily influenced by criteria such as ATM usage, agency banking, mobile banking, internet banking, firm size, or capital structure.

Mohamed (2021) sought to ascertain the moderating effect of bank size within the framework of the connection between financial technology and the financial performance of commercial banks. The research was grounded on the following theories: the theory of innovation dissemination, the theory of financial intermediation, the model of technology adoption, and the theory of profit maximization. With positivism as its guiding research philosophy, this study used a panel longitudinal research design. The sample for this research consisted of 38 commercial banks that have been operational for at least the last decade. This study was structured like a census. Every year, secondary data was gathered over a duration of 10 years, starting in 2012 and closing in 2021. For the purpose of data interpretation, many statistical approaches were used, including descriptive statistics and inferential statistics, including correlation and panel multiple linear regression analysis. Recent research has shown that financial technology can explain financial performance in a thorough and precise way. Financial technology is sufficient for predicting financial success, according to recent studies. Mobile banking, internet banking, agency banking, the deployment of ATMs, and the size of the bank were all favorably and substantially connected with financial performance, according to the study.

Furthermore, the statistics showed that the introduction of ATMs had a very negative correlation with the efficiency of the banking industry. Meanwhile, there was a weak and unfavourable correlation between mobile banking and agency banking in terms of financial performance. Finally, the size of the bank and the use of Internet banking were both positively associated with financial success.

In order to find out whether the size of the bank moderated the link between financial innovation and the financial success of commercial banks, Muriuki (2020) looked into this question. Using data collected from a census survey, the study included 42 different commercial banks as of

December 2016. For the years 2011–2017, secondary data on financial innovation indicators was gathered using a checklist. The data was analyzed using a model that used multiple linear regression analysis processes, with the help of SPSS Version 23.0. The significance of the regression coefficients and the overall model were examined using the T-test and the F-test, respectively, at a significance level of 5%. The results of the testing showed that the ordinary least square approach's assumptions were not broken. A statistically significant positive impact on financial performance (ROA) was found by the research in relation to mobile banking (β =1.923, p-value 0.001<0.05), internet banking (β =1.818, p-value 0.006<0.05), and agency banking (β=1.137, p-value 0.006<0.05). With a β-value of 0.374 and a P-value of 0.113>0.05, credit card banking did not significantly impact ROA. The correlation between financial innovations and ROA was unaffected by the size of the bank (β =0.071, p-value 0.509>0.05). Commercial banks are encouraged to increase their investment and use mobile, internet, and agency banking, according to the report. In the end, the Return on assets improved since these banking approaches made service delivery more efficient and provided other sources of non-funded income.

Finding out whether firm size moderates the relationship between financial innovations and financial performance of Kenyan commercial banks is the goal of Abdulkadir's (2019) research. The research approach that was examined was explanatory research since the study aimed to find the processes and attributes that were evident in the relationship between the dependent and independent variables. As of 2016, the study has included all forty of Kenya's commercial banks. For this, we drew on information spanning the years 2012–2016. Furthermore, panel data analysis was used to achieve the study objectives. The study found that commercial banks in Kenya had a significant and positive effect on their financial performance after introducing new products. Changes to the structure and services offered by commercial banks in Kenya had a positive but little effect on their financial performance. There was shown to be a substantial moderating effect of firm size on the financial performance of Kenyan commercial banks. The study's conclusions suggest that commercial banks should rethink their investment strategies and put more money into developing new products like credit cards, ATMs, and mobile money transfer services. This is the logical consequence that follows from the fact that their financial performance will be significantly impacted by product innovation. According to the research, commercial banks should be sure to assess their firm size before implementing financial innovations to boost their financial

performance. This is because the size of the firm, as measured by its assets base, significantly modifies the relationship between financial innovations and financial performance.

Researching how mobile banking affects the bottom lines of commercial banks globally was the goal of Mabwai (2016). This study examined the commercial banks with a Kenyan registration using a descriptive research strategy. Eight commercial banks were ultimately chosen from a pool of twenty-one using a targeted sampling technique to identify the leading Kenyan commercial banks offering mobile banking services. Secondary data, extracted from the financial accounts of commercial finance institutions, was the only data used in the study. Data analysis used both descriptive and regression methods. The results show that several variables, such as the amount of assets, sufficient capital, market share, and mobile banking transactions, favorably affected the financial performance of commercial banks.

2.6 Summary of Research Gaps

Furthermore, the current research appreciates the academic efforts that were made into earlier studies concerning financial innovation and financial success. This research, on the other hand, is intended to be able to successfully overcome the constraints that are associated with these previous investigations. There were just a few aspects of financial innovation that were the focus of earlier academics, according to the literature that was evaluated. This study, on the other hand, takes into account additional significant characteristics that need to be included into earlier research. As an example, Aduda and Kalunda (2017) investigated the impact of the stability of commercial banks in Kenya is influenced by the financial success of the business. Payment innovation systems, mobile banking, and intelligence prediction systems were all among the topics that were investigated in this research. According to the findings of the study, more research should be conducted that focus on a different facet of financial innovations. After establishing that branch networks, financial literacy, and payment innovation systems do influence the financial performance of commercial banks in Kenya, Aluoch, Odondo, and Ndede (2018) made a recommendation that was very similar to this one. They suggested that they should include digital platforms in their subsequent research.

Not only have past studies suggested that more research should concentrate on growing the sample size, but they have also suggested that the variable in question should be broadened in terms of financial success. Oranga and Ondabu (2018) wanted to find out how the financial performance of listed banks in Kenya was affected by the provision of financial inclusion. The study suggested that next research should take into consideration the possibility of incorporating commercial banks that are not listed. The sample size for the study was comprised of commercial banks that are listed. An investigation on the link between financial performance and the performance of banks in the economy of Jordan was conducted by Shihadeh, Hannon, Guan, and Wang (2018). They used yearly data from seven commercial banks from 2009 to 2014 to analyze the relationship between the two.

Academics have reached contradictory conclusions on the connection between financial innovation and financial success. It is critical to make it very clear if financial innovation has a positive or negative impact on performance, a large or little one. Okoth and Muia (2020), Kalunda and Ogada (2019), and Aduda and Kalunda (2016) are among the scholars who have found that financial innovation improves performance. Teka (2019), Vekya (2017), Ondieki (2015), and Oruo (2013) are among the scholars who have shown that financial innovation actually hinders performance. A small number of studies have also shown that innovations in the financial sector do improve performance, but only marginally (Waithera, 2015; Ndambuki, 2016; Maiyo, 2013).

Last but not least, the vast majority of earlier research have also shown that the performance of a financial system is unique to that particular financial system and is influenced by a variety of policies and regulations mandated by the Central Bank. As a result of their investigation into whether or not financial performance effects the performance and risks of banks in 189 countries and 701 banks, Shihadeh and Liu (2019) suggested that it is necessary to carry out analysis that is particular to each nation. Financial performance and bank performance in Jordan were investigated by Shihadeh, Hannon, Guan, and Wang (2018). Credits for small and medium companies (SMEs), deposits for SMEs, the number of automated teller machines (ATMs), the number of ATM services, the number of credit cards, and financial literacy were some of the factors that were considered from the perspective of the research. Further research should be carried out in non-Muslim nations that do not adhere to the norms that govern Islamic banking, according to the findings of the study.

Table 2.1: Summary of literature and research gap

Researcher(s)	Focus of Study	Methodology	Findings	Knowledge Gaps and How Current Study will address the Gaps
Muluka et al. (2015)	Accessibility of lending innovation services and performance in National bank of Kenya	A total of 417 customers and employees of National Bank in Bungoma County were the subjects of the study. This survey used a descriptive design. Questionnaires, interview schedules, and document assessments were used to acquire information.	Client satisfaction is significantly correlated with the availability of loan innovation, according to the study's findings.	The research only examined National Bank, which limits the generalizability of the results to other commercial banks in Kakamega County. The previous research used non-financial indicators of success, but the present study will employ financial metrics.
Mwangangi (2017)	Influence of financial innovation on the performance of digitalized commercial banks in Kenya.	A descriptive research technique was used in the study. The participants in this study were limited to 623 senior professionals. Using stratified random selection, 83 participants were chosen for the survey. All participants in the sample were asked to fill out a questionnaire as part of the study.	The study found a significant link between the main platforms utilized for financial innovation and the efficiency of Kenyan commercial banks. According to the study's other findings, commercial banks' performance will improve as the number of key platforms used for financial innovation increases.	The study focused only on senior employees The study did not indicate how from a target of 623, 83 respondents were sampled
Midika (2016)	Determining effect financial innovation on financial performance in banking industry in Kenya	Numbers that describe anything. The 44 financial institutions in Kenya that made up the target population for this research were 1 mortgage financial institution and 43 commercial banks. Thirteen different Kenyan banks were included in the research. All thirteen of Kenya's financial institutions	There is no relationship between financial innovation and financial performance in Kenya's banking sector. This is because, rather than fostering financial performance, digital financial services are adopted by banks to reduce operational costs associated with opening and	The study only picked 13 banks from a target of 44 banking

		were considered in the selection process.	operating branches.	
Ngari and Muiruri (2014)	Whether lending innovation affect the financial performance of commercial banks in Kenya;	Although sixteen banks and four members of management were the target audience, the study's population included forty-four commercial banks operating in Kenya at the time.	Some Kenyan banks have embraced new financial technologies such credit cards, mobile payment systems, the internet, and payment innovation systems, according to the report. The advances in the financial sector significantly affected the banks' bottom lines.	The study was not specific on which management team was not selected. The study did not indicate how sixteen banks were sampled
Ndunga et al (2016)	Influence of financial innovation on organization`s performance	Every single branch of a commercial bank in Meru County was surveyed. Twenty commercial banks in Meru County have their names on file with the county administration. The researchers in this study used a descriptive approach. Using a census sample approach, the research surveyed 60 members of management staff from commercial bank branches in Meru town. The information was gathered by means of a survey.	The study's results suggest that innovation has a beneficial effect on the financial performance of commercial banks' branches in the towns of Meru.	The study was conducted in Meru County therefore, not applicable to Nairobi County. The study did not indicate the sampling frame
Ngumi (2014)	Effect of payment innovation on financial performance of commercial banks in Kenya.	Twelve commercial banks were selected for this research from a larger pool of all those licensed and regulated by the Central Bank of Kenya. Secondary data for this research came from reports on bank supervision and national payments statistics compiled by the Central Bank of Kenya.	According to the research, commercial banks in Kenya may benefit from financial innovations. Electronic financial transfers, mobile banking, and internet banking were shown to be the most significant determinants of Return on Assets variances.	The study used secondary data The study did not present adequate discussion of the findings

Bett and Bogonko (2017)	Relationship between financial innovation technologies and profitability in banking industry.	A descriptive survey research approach was used in the study. We aimed for 261 responders as our sample size. Researchers used interview schedules and questionnaires to compile the data for the research.	Here are the key takeaways from the study: The majority of respondents in the research on the operational efficiency of the Equitel digital information system believed that the use of financial innovation technologies has reduced operational expenses, which has an effect on the profitability of banks as a whole.	The study focused only on Equitel digital information system
Mbugua and Omagwa (2017)	Effect of payment innovation system on financial performance of commercial banks in Embu County.	A descriptive research plan is an approach to study that seeks to characterize and evaluate the features and attributes of an object or phenomena.	According to research, the payment innovation system has a favorable and statistically significant effect on bottom-line results.	There was no evidence of qualitative data analysis collected from open ended statement
Gitonga and Kiraka (2019)	Effect of financial innovation on the business performance of bank agents in Kenya	Stratified sampling was used. Using semi-structured questionnaires, primary data was collected.	Individuals recruited to work as bank representatives saw a rise in their salary, according to the survey.	The study did not indicate target population from which 384 respondents were sampled
Kingori and Gekara (2015)	Effect of payment innovation system on commercial bank performance in Thika municipality.	Three hundred and eighty-four participants were selected at random from a pool of potential participants in order to gather primary data for this quantitative research.	More people, especially those working in the informal economy, have access to financial services, according to the report. The easy availability of financial services in their service areas was the reason for this.	There was no rationale of using purposive sampling Data from open ended statement was not analyzed
Tindi and Bogonko (2017)	Effect of payment innovation system on customer satisfaction in	A cross-sectional research strategy and purposive sampling were used in the study. Utilizing semi-	According to the research, commercial bank customers are far more satisfied when payment	The dependent variable was measured using customer satisfaction

	Kenya	structured questionnaires, primary data was gathered.	innovation systems are easy to use. There was also a favorable correlation between the dependability of commercial banks' services and client happiness, which was explained by the high quality of agents.	There was no triangulation of qualitative and quantitative data
Ndegwa (2017)	Effectiveness of payment innovation system as a tool for financial performance	A cross-sectional survey design was used in the investigation. The study's primary population consisted of 38 people: supervisors and administrators from Kiambu's commercial banks who had previously employed the payment innovation system model. A total of 38 supervisors and managers were surveyed as part of the study. A self-administered questionnaire was utilized to collect data for the investigation.	At the 95% confidence level, the research found that liquidity and geographical coverage were both significantly impactful. According to the findings, the key benefit and, by extension, the most important component in deciding financial success is the breadth of geographical coverage.	Financial performance was measured using liquidity The study was conducted in Kiambu County
Ruyooka (2019)	Relationship between payment innovation system cost and financial performance of banks in Uganda	Quantitative descriptive non-experimental case studies were used in this investigation. Survey questionnaire checklists were used to collect data from 52 bank personnel.		The study did not indicate sampling frame The study was a case study making it difficult to generalize
Muoria and Moronge (2018)	Effect of payment innovation system on customer retention in	The study's methodology was descriptive in nature. A total of 120 agents from KCB were selected at	According to the study's findings, commercial banks' bottom lines are significantly affected by the	The study used customer retention as dependent variable which is non-financial performance while

	Kenya Commercial Bank in Kiambu County.	random using a stratified random selection procedure. Data was analyzed using descriptive and inferential statistics derived from questionnaires utilized in the research.	costs of introducing payment innovation systems. In addition to meeting the needs of consumers in an ethical and long-term manner, these systems provide beneficial financial services and goods.	current study will use financial performance
Nyota and Muturi (2019)	Effect of payment innovation system features on performance of Equity bank in western region of Kenya	The research team employed a cross-sectional approach and gathered main data by having participants fill out questionnaires. Analyses of the data made use of regression and descriptive statistics.		The focused on only one bank, equity banking making it difficult to generalize
Kitali, Chepkuli and Shibairo (2017)	investigated the effect of payment innovation system on customer satisfaction in Kenya	The research team employed a descriptive approach and gathered main data by having participants fill out surveys. Stratified and easy sampling techniques were used to pick the respondents.	The study found that KCB consumers' understanding of the payment innovation system, the availability of money, the pricing of agency services, and the security of agency services were the most important factors influencing the adoption of the system.	The study did not relate payment innovation system and financial performance but rather focused on customer satisfaction
Ochieng (2015)	Impact of financial innovations on commercial banks' performance	A blend of descriptive and analytic methodologies.	According to the results, there is a strong connection between the payment innovation system and monetary prosperity.	The study did not indicate the number of commercial banks. There was no Hausman test to establish choice of model. The study was conducted ten years before introduction of various financial innovations.
Musyoka (2015)	Relationship between artificial intelligence predictive banking system and financial performance	The investigation included looking at secondary data from the banks' balance statements and other records from 1988–1989 using the	According to the study's findings, customers were pleased with the service they received via the payment innovation system.	The study was conducted ten years before introduction of various financial innovations.

	of commercial banks in Kenya	ordinary least squares (OLS) regression method.	They thought the people in charge of customer service in each division were fantastic.	
Mchembere and Jagongo (2017)	Effects of banking intelligence predictive system on profitability of commercial banks	All commercial banks in Kenya that are governed and registered under the Banking Act make up the population for this study. The study relied on secondary sources of information by reviewing public financial reports during the years 2000–2010.	It was shown that performance improved after adding additional offices in large urban areas. A small but statistically significant drop in profitability was seen at the 5% significance level after expanding out into rural areas.	The study did not indicate the rationale of using both secondary and primary data.
Nyatika (2017)	Link between Artificial intelligence predictive banking system and commercial banks financial performance in Kenya	A descriptive technique was used as the research methodology in this study. Anyone offering a payment innovation system, which includes all eleven commercial banks, will be the intended audience. All of the banks will be surveyed thoroughly by the study team. A questionnaire and supplemental data will be used to collect data.	Following the introduction of an AI predictive banking system, the study found that banks' bottom lines improved significantly.	The study did not indicate how Artificial intelligence predictive banking system was measured.
Makena and Gekara (2014)	Factors influencing adoption of financial innovations among institutions of higher learning	A correlation design was used by the researcher to investigate the link between the variables. Every one of Kenya's 39 commercial banks was considered in the study. It used information gathered from public records, such as the Central Bank of Kenya's annual reports for the years 2012–2016.	According to the study's findings, the banking intelligence prediction system has a small but detrimental effect on banks' bottom lines. Negative and statistically significant effects result from taking transactions out of the payment innovation system.	The study focused on learning institutions and SMEs in Kenya The study did not indicate how firm size were measured.

2.7 Conceptual Framework

The conceptual framework in Figure 2.1 demonstrates the relationships that exist between the dependent and independent variables under investigation. The independent variable was financial innovations whose main indicators were lending innovation, payment innovation system and intelligence predictive system. The dependent variable that will be investigated is financial performance while firm size will be used as moderating variable.

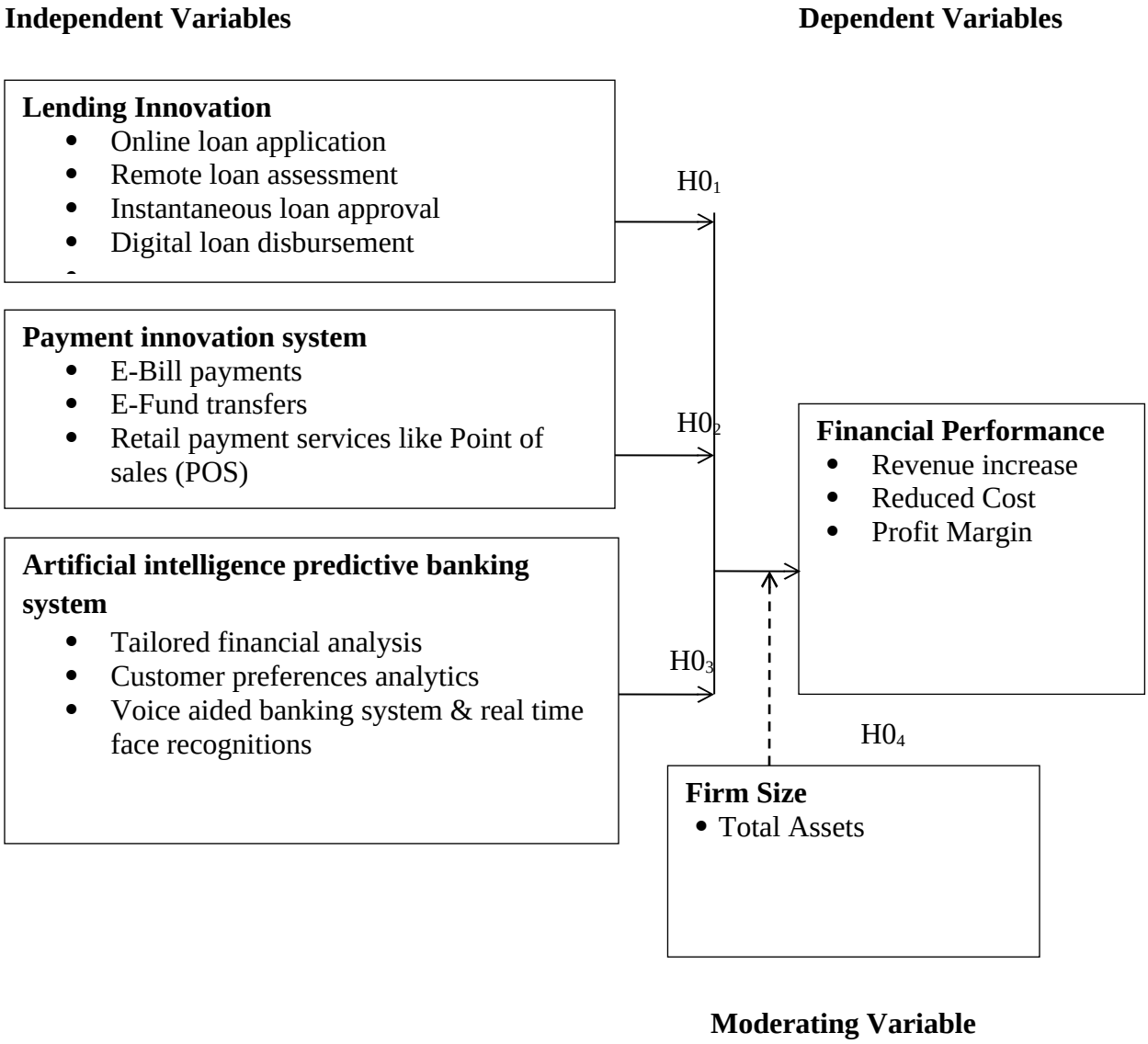


Figure 2. 1: Conceptual Framework

Source: Researcher (2023)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents details on the specific group of individuals being studied and the methods used to gather and analyze the study data. This chapter focuses on the research methods that the researcher used to carry out the investigation. The document includes several aspects such as the research methodology, the group of people being studied, the method used to select the sample, the tools used to collect data, the accuracy and consistency of the data, the process of analyzing and presenting the results, and the ethical issues involved.

3.2 Research Design

The research Design was a presentation of the plan, structure, or investigation strategy that sought to obtain or answer various research questions (Shuttleworth, 2008; Lesage, 2009; Fubara & Freshwater, 2006). Accordingly, research design spoke to what, where, when, how much, and by what means of an inquiry or a research study. Donald (2006) argues that research designs are essential because they provide a structure for the project and act as the "glue" that binds the various parts of the research effort. Since this study set out to examine how financial innovation affects the bottom lines of Kenyan commercial banks that are publicly traded, it used a descriptive and correlational research strategy.

The impact of financial innovation on the financial performance of Kenya's listed commercial banks was examined in a descriptive and correlational study. This choice was reached after much deliberation and was consistent with the objectives of the ongoing investigation. Typically, researchers would use descriptive research to provide a comprehensive picture of the phenomenon or population under study by methodically describing its characteristics (Babbie, 2016). The study's overarching goal was to provide light on the relationship between financial innovation and

financial success as it pertains to publicly traded Kenyan commercial banks. Bryman (2016) defines correlational research as an approach to studying the relationship between many variables without establishing a causal relationship between them. This study set out to examine the relationship between financial innovation and financial performance across Kenyan commercial banks that are listed using a descriptive and correlational research technique. This study's results will provide light on the nature of the connection between the two variables.

3.3 Study Area

The study was conducted in Nairobi County, which is among the 47 county governments in Kenya and also serves as the financial and administrative capital of Kenya. Nairobi is divided into 17 constituencies and 85 wards. The city lies in the south-central part of Kenya, at 1,795 meters (5,889 ft). The town is situated at 1°09′S 36°39′E and 1°27′S 37°06′E and occupies 696 square kilometers (270 sq mi). Nairobi is located between the cities of Kampala and Mombasa. The Nairobi Securities Exchange (NSE) is one of the largest in Africa and the second-oldest exchange on the continent. It is Africa's fourth-largest exchange in terms of trading volume, capable of making 10 million trades a day. Nairobi County currently has 28 domestic and 15 foreign commercial banks with branches all over the country

3.4 Target Population

The study targeted 11 commercial banks listed at the Nairobi Securities Exchange in Nairobi County. This includes the National Bank, Standard Chartered, Kenya Commercial Bank, Diamond Trust Bank, Equity Bank, Cooperative Bank, NCBA, ABSA, Stanbic Holdings, I&M Holdings, and Housing Finance Group. There are a total of 11 commercial banks listed at the Nairobi Securities Exchange, where 11 members of staff from each bank were purposively selected because of their knowledge of the subject matter.

3.5.1 Sample Size

The researcher carefully picks a group of instances that are representative of a section of the target population for the purpose of conducting an analysis in order to establish facts about that population (Schindler & Cooper, 2014). This set of examples is referred to as a sample. The size of the sample was determined by the use of purposeful sampling. 11 staff members from each bank were purposively selected because of their knowledge of the subject matter. These members of the team include members of the Finance department, member of Strategy department, member of Business Development department, Sales and Marketing department, member of Debt Recovery department, member of Operations department, member of Credit department, member of Corporate Banking department, member of Business Banking department, member of Retail Banking department, member of Risk and member of ICT departments. These are listed in the Table3.1

Table 3. 1: Target Population

Section	**Target Population**
Finance	11
Strategy	11
Business Development	11
Sales and Marketing	11
Debt Recovery	11
Operations	11
Credit	11
Corporate Banking	11
Business Banking	11
Retail Banking	11
Risk	11
ICT	11
Total	132

3.5.2 Sampling Techniques

The sampling technique is a process whereby individuals were selected for a study, and they were chosen in such a way that they represented the larger group from which they were drown (Cooper & Schindler, (2007). A sample was taken from each of the eleven commercial banks traded on the NSE in Nairobi County. The use of purposeful sampling was performed in order to get an appropriate unit that was representative of the analysis.

3.6 Data Collection Instruments and Procedures

3.6.1 Types and Sources of Data

Kothari (2004) defines data as factual or informational material, especially when it is critically examined and utilized to acquire knowledge or make conclusions. Within the scope of this study, the data used was collected from both primary and secondary sources. There were surveys contained in these original sources. According to Kothari (2007), preliminary data are those that are presented in a fresh and first-time manner, and as a result, they are considered to be unique. A data collecting sheet was used in order to gather secondary data collections. According to Smith (2008), secondary data is research data that has been obtained in the past and is available for researchers to access whenever they need it.

3.6.2 Instrumentation

The main data for the research was collected via the use of a questionnaire. A written questionnaire was used as a technique for data collecting. The questionnaire consisted of written questions that were provided to respondents, and they were asked to reply to them in written form. The selection of structured questions was based on the fact that they could be self-administered or provided with

help, supposing that respondents were literate. The questionnaire was kept brief and organized, with the majority of the questions consisting of multiple-choice answers on a Likert scale that ranged from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was divided into four sections: Section One consisted of background information about the respondents; Section Two focused on Financial Innovations; Section Three on Firm Size; and the last section on Financial Performance (See Appendix I).

3.6.3 Data Collection Procedures

Before beginning the data collection process, the researcher applied for and received an introduction letter from the university. This letter gave her permission to contact sampling businesses. Therefore, the drop-and-pick approach was used, which consisted of the researcher, two research assistants, and the researcher delivering the surveys to the respondents and then collecting them later. Before collecting data from the respondents, the researcher introduced herself and explained the purpose of the study. For those who wanted various letters of authority and permission, the researcher produced them to make them cooperate during the data collection exercise. The research assistants supervised the data collection process to ensure all items were responded to. The checklist was maintained to keep track of the data collection exercise.

3.7 Pilot Study

According to Polit and Beck (2003), a pilot test is a version implemented on a smaller size that is carried out in order to prepare for a research that is carried out on a larger scale. It is not the purpose of the pilot test to examine the research questions and hypotheses; rather, the pilot test is intended to test the processes and data collection equipment that will be used in the primary study. According to Cooper and Schindler (2011), the rule of thumb advises that a pilot research should

consist of between five and ten percent of the whole target sample. A pilot test was conducted in Nairobi County, involving seventeen respondents from Family Bank and Equatorial Commercial Bank. The purpose of the pilot testing was to identify potential problems and note any costly mistakes for correction. Additionally, the pilot study was used to estimate the time required for actual fieldwork and determine any suitable modifications needed for the questionnaire test items. The validity and reliability of the study were also ascertained during this initial phase.

3.7.1 Validity of Research Instrument

Validity refers to the degree to which an instrument accurately detected the intended or planned construct (Burton and Mazerolle, 2011; Bolliger and Inam, 2012). The study endeavor included both construct validity and content validity to assess the validity of the research instrument. To demonstrate the construct validity, factor analysis and confirmatory factor analysis were used (Aila & Ombok, 2015). To assess the degree to which the data collected via the questionnaire accurately reflected the study objectives, content validity was used as a measuring instrument.

In order to ascertain construct validity, the questionnaire was constructed with the aid of the researcher's supervisor. The contents and impressions of the instruments were improved based on the advice from the supervisor. The questionnaire was constructed in a way that they related to each question. This ensured that all research questions were covered. The comments from the supervisor were incorporated in the questionnaires before the final administration of the instruments on the participants of the study.

Table 3. 2: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.841
Bartlett's Test of Sphericity	Approx. Chi-Square	4200.772
	Df	406
	Sig.	.000

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy yielded a value of 0.841, indicating a highly favorable sample adequacy. Additionally, Bartlett's Test of Sphericity was significant ($\chi^2 = 4200.772$, df = 406, $p < 0.001$), suggesting that the correlations between variables were sufficiently large for factor analysis to be appropriate. These results affirm the suitability of the dataset for factor analysis (Hair et al., 2019).

It was determined that the variance that was explained was 82.381. A higher level of quality was attributed to test items that had factor loadings that were larger than 0.4. Consequently, the factor loadings for the 29 construct factors ranged from 0.790 to 0.925 points. The consideration of these issues was preserved for future investigation. According to Tabachnick and Fidell (2007), factors that have factor loadings that are more than 0.40 should be kept for further analysis, whilst factors that have factor loadings that are less than 0.4 should be eliminated from it. As a result, there was no elimination of any of the factors, and all of them were deemed to be genuine, as shown in appendix V.

3.7.2 Reliability of Research Instrument

The degree to which research instruments produced consistent measurements each time they were administered to the same respondents was referred to as the reliability of the instruments. The

reliability of the primary data was evaluated using the method of internal consistency because of the composition of the study. According to Sabana (2014), it assessed the thickness of the instrument or the degree to which a group of questions accurately evaluated a personality trait or a specific behavior. The use of Cronbach Alpha (Kombo & Tromp, 2009) was the most common approach for determining whether or not there was internal consistency in the social sciences. A value of 0.70 or above was seen as adequate for this purpose. Cronbach Alpha was the method that was used in order to make the determination of the dependability. On the basis of the replies, the Cronbach alpha coefficient was calculated with the assistance of a statistical tool designed specifically for social scientists (SPSS). Cronbach's alpha was rated as either outstanding, good, acceptable, bad, or unsatisfactory, as stated by Ahmad, Yussiff, and Mustapha (2015) for their classification system. A high degree of consistency in the instruments used to measure the variables that were part of this research was shown by a substantial alpha value, which is ideally more than 0.7.

It was determined that a Cronbach alpha statistic with a value of 0.7 or above was dependable for the purpose of reliability testing. This was because the range of the Cronbach alpha statistic for each variable was between 0.748 and 0.986. Considering that the test products were kept and used in this investigation, it can be concluded that they are dependable, as shown in Table 3.3.

Table 3. 3: Reliability Test

Variable	N	Cronbach alpha
Lending Innovation	7	0.961
Payment Innovation System	6	0.986
Intelligence Predictive System	6	0.949
Firm Size	6	0.938

Financial Performance	4	0.748
Overall	29	0.9164

Table 3.3 presents the reliability analysis results using Cronbach's alpha coefficient for each variable. Cronbach's alpha assesses the internal consistency or reliability of a scale or set of items. Higher values indicate greater internal consistency. For example, the variables "Payment Innovation System" and "Lending Innovation" demonstrate high reliability with alpha coefficients of 0.986 and 0.961, respectively. Conversely, "Financial Performance" exhibits reliability with an alpha coefficient of 0.748. Overall, the scale comprising all variables shows satisfactory internal consistency with a Cronbach's alpha of 0.916.

3.8 Data Analysis

Data analysis was formerly defined as the act of examining, cleaning, manipulating, and modeling data to reveal important information, draw conclusions, and aid in decision-making. The raw data that was obtained was subjected to a comprehensive inspection in order to identify mistakes and omissions, which were subsequently rectified. Coding the data in order to simplify placement into a restricted number of categories or classes was accomplished by assigning numerical values to the responses they received. For the purpose of conducting statistical analysis on quantitative data, version 22 of the SPSS program was applied. The majority of the data pattern demonstrations relied on descriptive statistics. Measures of central tendency, like the mean, and measures of variability, like the standard deviation, maximum, and lowest, were all part of these statistical analyses. To check whether the null hypothesis was correct, the researchers used inferential statistics including regression and correlation analysis. The significance threshold of these statistical tests was set at

5%. Furthermore, the research instruments' validity was confirmed by the use of component analysis. The analysis's findings were presented in graphical form, including tables and charts. Equation 1 was the general model that was used in order to investigate the causal links that existed between the variables that were dependent and those that were independent.

$$Y = \beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+e$$

Where;

У = Financial Performance

β_1……β_3= Regression Coefficients

X_1= Lending innovation

X_2= Payment innovation system

X_3= Intelligence predictive system

ε = the error of term.

The moderating effect will be tested using the following interactive regression model

$$Y= \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4Z+ \beta_5X_1 Z+ \beta_6X_2 Z + \beta_7X_3 Z +\varepsilon$$

Where;

У = Financial Performance

β_1……β_3= Regression Coefficients

X_1= Lending innovation

X_2= Payment innovation system

X_3= Intelligence predictive system

Z= Firm size

ε = the error of term.

3.8.1 Diagnostic Tests

Diagnostic studies were carried out in order to test the assumption of Pearson correlation and multiple regression analyses before inferential statistics were carried out. A number of diagnostic tests were also carried out in order to guarantee that the model that was fitted was in accordance with the traditional assumption that linear regression is founded on. This included the normality test using the Shapiro-Wilk test, the collinearity test using VIF & Tolerance, the linearity test using scatter plots, and homoscedasticity/homogeneity using best linear unbiased estimate models.

3.8.1.1 Multicollinearity:

The term "multicollinearity" describes the interactions that take place between the independent variables. It is possible to have multicollinearity when the independent variables are significantly linked with one another. Based on the findings of Yoo et al. (2014), the existence of multicollinearity poses challenges in isolating the individual effects of each independent variable on the dependent variable. Additionally, it leads to an inflation of the standard errors for each independent variable. In order to address multicollinearity, Cai, Wu, Xu, and Zeng (2017) propose the removal of one or more fixed variables and the concurrent removal of one or more independent variables that exhibit correlation from the regression model. To establish the existence of multicollinearity, both the Variance Inflation Factor and the Tolerance level were used. An appropriate number for the Variance Inflation Factor (VIF) is less than 10, or a tolerance margin greater than 0.1.

3.8.1.2 Normality:

The assumption of normalcy must be satisfied in order for the majority of parametric tests to be valid. The test distribution is considered to be normal if it is bell-shaped, has a mean of zero, has one standard deviation, and a bell-shaped curve that is symmetric (Garson, 2012). Normality is a requirement for the test distribution. For the purpose of putting the presumption of normalcy to the test, the following procedures and examinations will be made: Using the Kolmogorov-Smirnov test: When dealing with a large sample size, the researchers will use the K-S test in order to examine whether or not the assumption of normality is true. It is necessary for this test to be negligible in order to satisfy the assumption of normalcy. It is necessary for the residuals to have a normal distribution around the expected scores of the dependent variable in order to ensure normalcy.

3.8.1.3 Linearity

There must exist a linear connection between the independent variables and the dependent variables for the purpose of conducting linear regression. Given the sensitivity of linear regression to the impact of outliers, it is of utmost importance to thoroughly examine for outliers. Chatterjee and Hadi (2015) assert that scatter plots are the most efficient approach for evaluating the assumption of linearity.

3.8.1.4 Homoscedasticity:

A necessary condition for linear regression models is the presence of homoscedasticity. One hallmark of a homoscedasticity scenario is an error term that remains constant regardless of the values of the independent variables. Diverse values of the independent variables cause the error component's magnitude to fluctuate; this is known as heteroscedasticity. Depending on the level of heteroscedasticity, the impact of assuming heteroscedasticity might be small, moderate, or large

(Gelfand, 2015). In regression analysis, heteroscedasticity refers to the fact that the dependent variables in the dataset do not exhibit uniform variability.

When all data points have the same level of variability in the dependent variable, we say that the data is homoscedastic. Direct A constant variance in the residuals is assumed by the Best Linear Unbiased Estimate (BLUE) models, which is known as homoscedasticity according to Belsley, Kuh, and Welsch (1980). The White statistical test will be used to determine whether there is heteroscedasticity. Following the procedure provided by Razitis and Kalantzi in 2012, we will estimate the BP Lagrange multiplier (LM) statistic for the residuals. By definition, homoscedasticity means that the residuals do not display heteroscedasticity. A BP test seeks to examine this notion. If the BP-LM test yields a P-value larger than 0.05, it means that the residuals do not exhibit heteroscedasticity and satisfy the homoscedasticity assumption.

3.8.2 Hypothesis Testing

Table 3.2: Hypothesis Testing

	Hypothesis Statement	Model	Hypothesis Testing
i	**H_{01}:** Lending innovation has no statistically significant effect on the financial performance of commercial banks in Kenya	$Y=\beta_0+\beta_1X_1+\varepsilon$	$H_{01}: \beta = 0$ $H_{0A}: \beta \neq 0$ Reject H_{02} if $\beta \neq$ and P value ≤ 0.05 otherwise fail to reject H_{01} if $\beta = 0$ and P value $> \alpha$ $\alpha = 0.05$
ii	**H_{02}**: Payment innovation system has no statistically significance effect on the financial performance of commercial banks in Kenya	$Y = \beta_0 + \beta_2X_2+\varepsilon$	$H_{02}: \beta = 0$ $H_{0A}: \beta \neq 0$ Reject H_{01} if $\beta \neq 0$ and P value ≤ 0.05 otherwise fail to reject H_{02} if $\beta_2 = 0$ and P value $> \alpha$ $\alpha = 0.05$
iii	**H_{03}**: Intelligence predictive system has no statistically significance effect on the financial performance of commercial banks in Kenya	$Y=\beta_0+\beta_3 X_3+\varepsilon$	$H_{03}: \beta = 0$ $H_{0A}: \beta \neq 0$ RejectH_{03} if $\beta = 0$ and P value ≤ 0.05 otherwise fail to rejectH_{03} if $\beta = 0$ and P Value $> \alpha$ $\alpha = 0.05$
iv	**H_{04}**: Firm size has no statistically significance moderating effect on the relationship between financial innovation and the financial performance of commercial banks in Kenya	$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4Z+\varepsilon$	Reject H_{01}, H_{02} & H_{03} if P-value is <0.05 Fail to reject H_{01}, H_{02} & H_{03} if P-value is > 0.05

3.9 Ethical Consideration

The study was conducted in accordance with established ethical norms, which were particularly crucial, particularly when human participants were involved. These ethical concerns guaranteed that professionalism was maintained throughout study activity, including aspects such as respect for dignity and privacy, obtaining informed permission, and preventing scientific dishonesty, including plagiarism. The study ensured the preservation of the dignity and privacy of each participant. The sources of personal information received were maintained in strict confidence and

treated with utmost care. Prior permission from the study participants was obtained. An person was included as a study subject only after receiving advance notification asking their involvement, and no coercion or incentives were used to persuade them to become a research subject. The pertinent personnel, including managers, supervisors, tellers, clerical officers, credit/loan officers, debt collection officers, internal audit, and ICT officers, were contacted, and a research permission was acquired from NACOSTI. Prior to include individuals as study subjects, such as managers, supervisors, tellers, clerical officers, credit/loan officers, debt collection officers, internal audit officers, and ICT officers, they were informed about the objectives, methodologies, and advantages of the research. The study adhered to ethical norms by ensuring that the rights of the respondents were protected. Additionally, intellectual property rights were upheld by properly acknowledging the sources of material and their respective authors. Stringent measures were taken to prevent any kind of scientific dishonesty, such as plagiarism, fabrication, falsification, flawed data collection methods, and deceptive authorship. The study was done proficiently as an impartial, scientific effort with no prejudice in its design, data interpretation, data analysis, and methods.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents findings on data collected from the 11 listed commercial banks in Nairobi City County as of 31st December 2022. The chapter has been organized into three main sections: Response Rate, Descriptive Analysis, and Inferential Analysis, respectively. Figures and tables have been used to display critical findings.

4.2 Response Rate

One hundred thirty-two questionnaires were distributed to selected respondents, 12 questionnaires per bank. The response rate is shown in Figure 4.1:

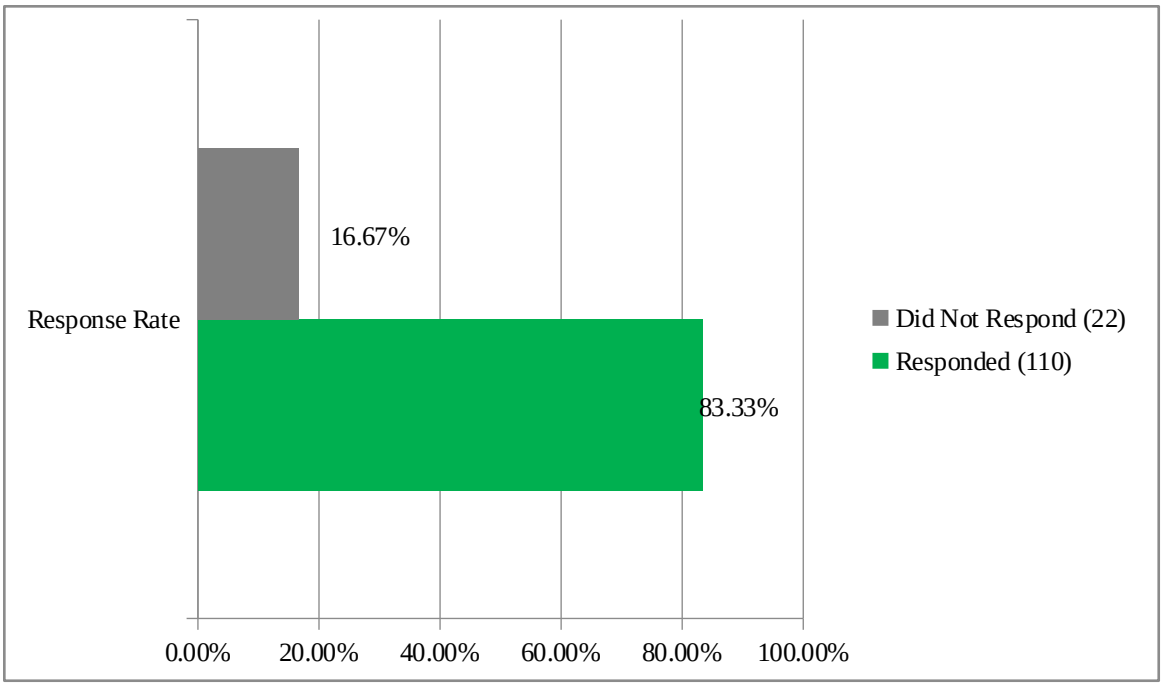


Figure 4. 1: Response Rate

Source: Survey Data (2023)

From Figure 4.1 above, 83.33% (110 respondents) responded, while 16.67% (22 respondents) did not respond. The response rate of 83.33% is above the recommended level of 50%, therefore appropriate for this data analysis.

4.3 Demographic Characteristics of the Respondents

This section involves detailed analytical description of Kenya's banking sector on how it has adapted to financial innovation as well as the performance of listed commercial banks in Kenya. This study aims at providing an illustrative understanding of the collected data by highlighting on specific variables, their distributions and preliminary findings about each variable.

4.3.1 Education Level of Respondents

In the subsequent section, the study provides a comprehensive exposition of the educational attainment levels of the individuals who participated in our study. This information is visually represented in Figure 4.2, which serves as an illustrative tool to enhance the understanding of the aforementioned data. Each and every participant exhibited a comprehensive set of qualifications that were deemed essential for their active and meaningful involvement in the research endeavor.

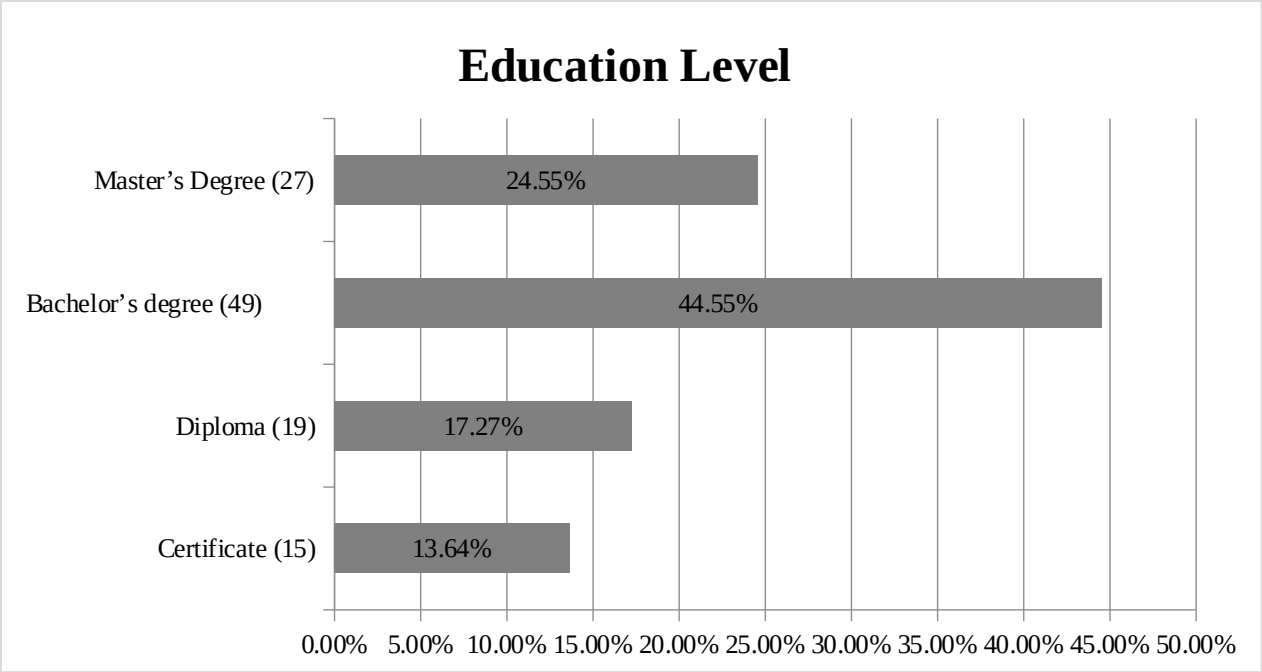


Figure 4. 2: Education Level of Respondents

Source: Survey Data (2023)

As indicated in Figure 4.2 above, all respondents had the necessary qualifications to participate in the research effectively. Those who had attained a bachelor's degree were the majority, accounting for 44.55 per cent; the master's degree level accounted for 24.55% while the Diploma level recorded 17.27 per cent. The minority of the respondents had attained Certificate level at only 13.64 per cent.

4.3.2 Length of work experience

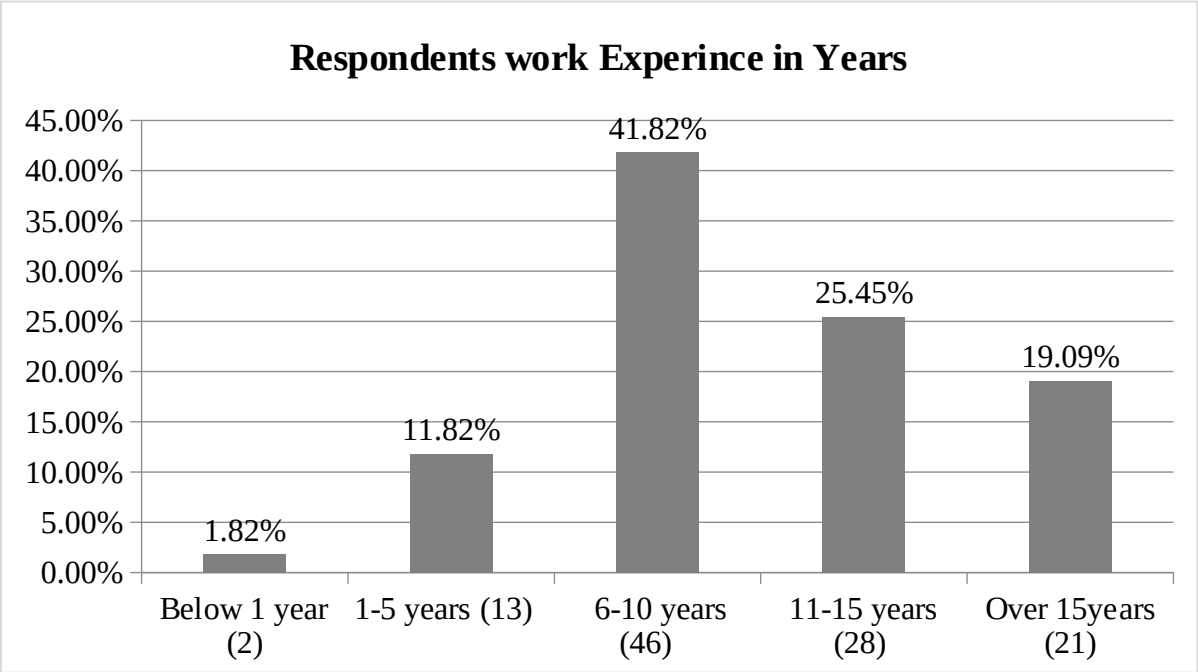


Figure 4. 3: Length of work experience

Source: Survey Data (2023)

As indicated in Figure 4.3 above, most respondents had worked in the bank for between 6 and 10 years, accounting for 41.82% of the respondents. This was followed by those who had worked between 11 and 15 years at 25.45 per cent, then those over 15 years of work experience accounted for 19.09 per cent. Respondents who had worked between 1 and 5 years accounted for 11.82 per cent, and the smallest group at only 1.82 per cent was for those who had worked less than one year at the bank. From the findings, there is a diverse working experience appropriate for the research study.

4.4 Validity and Reliability of Research Instrument

4.4.1 Validity of Research Instrument

In order to ascertain construct validity, the questionnaire was constructed with the aid of the researcher's supervisor. The contents and impressions of the instruments were improved based on the advice from the supervisor. The questionnaire was constructed in a way that they related to each question. This ensured that all research questions were covered. The comments from the supervisor were incorporated in the questionnaires before the final administration of the instruments on the participants of the study.

Table 4. 1: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.841
Bartlett's Test of Sphericity	Approx. Chi-Square	4200.772
	Df	406
	Sig.	.000

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy yielded a value of 0.841, indicating a highly favorable sample adequacy. Additionally, Bartlett's Test of Sphericity was significant ($\chi^2 = 4200.772$, $df = 406$, $p < 0.001$), suggesting that the correlations between variables were sufficiently large for factor analysis to be appropriate. These results affirm the suitability of the dataset for factor analysis (Hair et al., 2019).

It was determined that the variance that was explained was 82.381. A higher level of quality was attributed to test items that had factor loadings that were larger than 0.4. Consequently, the factor loadings for the 29 construct factors ranged from 0.790 to 0.925 points. The consideration of these

issues was preserved for future investigation. According to Tabachnick and Fidell (2007), factors that have factor loadings that are more than 0.40 should be kept for further analysis, whilst factors that have factor loadings that are less than 0.4 should be eliminated from it. As a result, there was no elimination of any of the factors, and all of them were deemed to be genuine, as shown in appendix V.

4.4.2 Reliability Test

Cronbach's alpha was used to conduct reliability tests for each variable, resulting in a range of 0.748 to 0.986. A Cronbach's alpha score of 0.7 or above was regarded to indicate dependability. The test items were preserved and used in this investigation, therefore being deemed trustworthy, as shown in Table 4.3.

Table 4. 2: Reliability.

Variable	N	Cronbach alpha
Lending Innovation	7	0.961
Payment Innovation System	6	0.986
Intelligence Predictive System	6	0.949
Firm Size	6	0.938
Financial Performance	4	0.748
Overall	29	0.9164

Table 4.2 presents the reliability analysis results using Cronbach's alpha coefficient for each variable. Cronbach's alpha assesses the internal consistency or reliability of a scale or set of items. Higher values indicate greater internal consistency. For example, the variables "Payment Innovation System" and "Lending Innovation" demonstrate high reliability with alpha coefficients of 0.986 and 0.961, respectively. Conversely, "Financial Performance" exhibits reliability with an

alpha coefficient of 0.748. Overall, the scale comprising all variables shows satisfactory internal consistency with a Cronbach's alpha of 0.916.

4.5 Descriptive Statistics

4.5.1 Lending innovation

Table 4.3 serves as a valuable resource for understanding how lending innovation has impacted various facets within financial services and banking operations. By analyzing this table, the study gained insights into respondents' perceptions and experiences concerning the ramifications of lending innovation on service penetration, loan availability, operational costs, and convenience. The data presented in Table 4.3 not only sheds light but also illuminates key patterns emerging from these responses providing us with a deeper understanding of how lending innovations influence different aspects within the sector. Furthermore, to quantify the extent to which these effects are observed across participants' perspectives accurately; the study employs aggregate scores and standard deviations—a statistical measure that offers additional precision when evaluating this influence comprehensively.

Table 4. 3: Lending Innovation

Lending Innovation	N	Mean (M)	Standard Deviation (S.D.)
Lending Innovation has led to better financial services penetration	110	3.38	1.01
There has been an increase in the number of loans to customers via lending innovation	110	4.09	1.09

The bank has various lending innovation platforms to enhance the accessibility of financial services.	110	3.00	1.36
Operational costs associated with lending innovation are manageable	110	3.67	1.22
Application and processing of loans through lending innovations	110	4.07	0.69
Access to loans through digital apps and software	110	4.21	1.09
Application and processing of loans online (Internet/web)	110	4.03	1.21
Aggregate Score	**110**	**3.78**	**1.01**

Source: Survey Data (2023)

Table 4.3 suggests a good influence that was created as banks made lending innovation as this promoted services penetration (M = 3.38, SD = 1.01). Additionally, it was observed that lending Innovation has resulted in a significant rise in several loans offered to customers (M = 4.09, SD = 1.09). These findings also show the existence of many innovations in lending platforms within the banking industry trying to increase financial services availability (M= 3.00, SD= 1.36). The respondents seemed to view these operational costs as linked to lending innovation (M=3.67, SD=1.22).

Moreover, lending Innovation was rated positively (M = 4.07, SD = 0.69). Another positive aspect is the possibility of taking out loans using various digital applications and software (M = 4.21, SD = 1.09). The appraisal and the process of taking online loans (Internet/web) were also viewed as being convenient (M=4.03, SD=1.21). It is thus clear from Table 4.2 that the aggregate score was 3.78, which shows that lending Innovation influences the performance of commercial banks in Kenya to a great extent, with a standard deviation of 1.01.

4.5.2 Payment Innovation System

This section delves into the domain of payment innovation systems in the commercial banking industry, exploring their implications and effects. Table 4.4 effectively summarizes significant discoveries pertaining to electronic payment services, electronic funds transfer systems, and electronic bank card payments with regards to their impact on bank operations and profitability. This table provides valuable insights by showcasing respondents' perspectives on diverse facets of payment innovation such as cost reduction, trust augmentation, and fortification of financial transaction security. Through aggregate scores accompanied by standard deviations, it quantifies the comprehensive influence exerted by these innovative payment systems on the performance metrics of commercial banks operating within Kenya's financial landscape.

Table 4. 4: Payment innovation system

Payment innovation system	N	Mean (M)	Standard Deviation (S.D.)
The bank has varied electronic payment services for its customers	110	3.95	1.07
The bank has realized an increase in profitability after adopting an adequate electronic funds transfer system	110	4.63	0.63
The electronic billing system really saves on banks' transaction costs	110	2.75	1.37
Adoption of adequate electronic bank card payments saves on banks' transaction costs and improves bank profitability	110	4.35	0.82
The bank used electronic payments as a solution to address issues related to trust and security in financial transactions with its clients.	110	3.06	0.94
Generally, secure and upgraded electronic payment	110	3.92	0.91

systems save on transaction costs and boost bank profitability			
Aggregate Score	**110**	**3.78**	**0.88**

Source: Survey Data (2023)

Table 4.4 reveals that the bank's provision of various electronic payment services to its customers was perceived positively (M = 3.95, SD = 1.07). Furthermore, adopting an adequate electronic funds transfer system was associated with a substantial increase in profitability (M = 4.63, SD = 0.63). Conversely, the assessment of the electronic billing system suggested that it might not be as cost-efficient as other innovations (M = 2.75, SD = 1.37).

However, the adoption of an effective electronic bank card payment system was found to both save on transaction costs and enhance bank profitability (M = 4.35, SD = 0.82). Respondents acknowledged that adopting electronic payments was driven by the need to address issues related to trust and financial transaction security (M = 3.06, SD = 0.94). In addition, a consensus was that secure and upgraded electronic payment systems significantly reduce transaction costs and improve bank profitability (M = 3.92, SD = 0.91). The aggregate score, reflecting the overall impact of payment innovation systems on banking performance, has a mean of 3.78 with a standard deviation of 0.88.

4.5.3 Intelligence Predictive System

This section aims to explore the implementation and consequences of intelligence predictive systems within the realm of commercial banking. Table 4.5 provides a concise overview of significant discoveries concerning the application of artificial intelligence (AI) across diverse banking functions, such as error reduction, customer preference analysis, fraud prevention, and

recommendation provision. The table offers valuable insights into respondents' perspectives on both the efficacy and ramifications associated with AI systems. By utilizing an aggregate score in conjunction with standard deviation measurements, this table effectively measures the overall impact that intelligence predictive systems have had on enhancing performance levels within Kenyan commercial banks.

Table 4. 5: Intelligence predictive system

Intelligence predictive system	N	Mean (M)	Standard Deviation (S.D.)
The bank has adopted artificial intelligence systems in several bank operations to minimize human error	110	1.62	1.00
An artificial intelligence system that is both practical and capable of analyzing consumer preferences and switching intents is available at the bank.	110	1.58	0.64
The bank has an aided banking system and real-time face recognitions to assist customers in decision-making and deterring fraud	110	3.90	1.51
The installed artificial intelligence aids the bank in analyzing stock markets and helps provide recommendations as per the financial goals of individual customers.	110	3.25	1.40
Artificial intelligence systems provide support to the bank in the analysis of huge amounts of data, the performance of computations, and the ability to make predictions, which helps the bank make choices about investment, lending, and underwriting.	110	3.28	0.94
Generally, the adoption of a customized artificial intelligence system by the bank has boosted the bank's profitability	110	3.22	0.89

Aggregate Score	**110**	**2.81**	**0.91**

Source: Survey Data (2023)

Results from Table 4.5 offer numerous perspectives on how AI is adopted and used by banks in their operations. The study reveals that the implementation of artificial intelligence systems to curb mistakes made by men in a banking setting scored relatively low (M = 1.62, S.D. = 1.00). The effectiveness of the artificial intelligence system for studying consumer preference switch also received moderate (M = 1.58, SD = 0.64). Customer support and fraud prevention measures, such as real-time face recognition, as well as voice-assisted banking systems, were seen positively by many (M = 3.90, SD = 1.51).

The banks also saw A.I. systems in a positive light as they helped interpret various stock market scenarios and provided different recommendations depending on individual goals (M = 3.25, SD = 1.40). The respondents recognized the importance of artificial intelligence in handling large volumes of information analysis, calculations, and predictability scores about decision-making involving lending, investments, and underwriting (M=3.28, SD = 0.94). In general, customized artificial intelligence systems led to an increase in profitability (M=3.22, SD=0.89). A combination score of 2.81 and a standard deviation of 0.91 denotes the impact of intelligence predictive systems on the bank's performance in aggregate.

4.5.4 Financial Performance

This section delves into the realm of financial performance and its correlation with the integration of financial advancements within the commercial banking industry. Table 4.6 consolidates essential discoveries pertaining to how these innovations have affected diverse indicators of performance. This compilation elucidates the repercussions on operational expenditures,

expansion of clientele, overall revenue generation, and customer loyalty resulting from embracing financial innovations. The data presented in Table 4.6 furnishes valuable observations regarding the consequences that arise from incorporating such advancements into banks' operations, thereby offering a holistic outlook on their impact as a whole.

Table 4. 6: Financial Performance

Financial Performance	**N**	**Mean (M)**	**Standard Deviation (S.D.)**
Implementation of financial innovations has resulted in a reduction in operation cost	110	4.42	0.66
The customer base has increased as customers can access financial services via financial innovations	110	3.95	0.99
Financial Innovation has led to an increase in gross revenue	110	4.04	0.80
The bank recorded a consistent increase in the number of retained customers	110	3.19	1.01
Aggregate Score	**110**	**3.90**	**0.82**

Source: Survey Data (2023)

As presented in table 4.6, it reveals different areas of effects that financial Innovation has on critical performance indices. Indeed, an analysis shows that through the adoption of financial innovations, there is a significant reduction in running cost operations (M = 4.42, SD = 0.66). This implies that financial innovations have significantly cut operational costs by improving the efficiency of operations. More so, the research demonstrates that financial innovations have led to a widening customer base. These innovations have enabled customers to access financial services more easily (M = 3.95, SD=0.99).

In addition, financial innovations have impacted on the total revenue in favour of banks (M = 4.04, SD = 0.80). It means that new products and methods of revenue realization due to financial innovations have contributed towards improvement in revenue generation. The data shows, however, that financial Innovation only made a slight increase in the number of retained customers (M = 3.19, SD = 1.01). The aggregate score of 3.9 with a standard deviation of 0.82 indicates the overall financial performance of banks towards Financial Innovation.

4.5.5 Performance of the Commercial Banks

Financial performance of commercial banks in Kenya was examined in this part with a particular focus on ROA and ROE. Figure 4.4 provides a visual representation of the trends in ROA and ROE from 2015 to 2022. The figure underscores the notable changes in financial performance during this period, including a significant increase in ROE in 2022, and a slight rise in ROA.

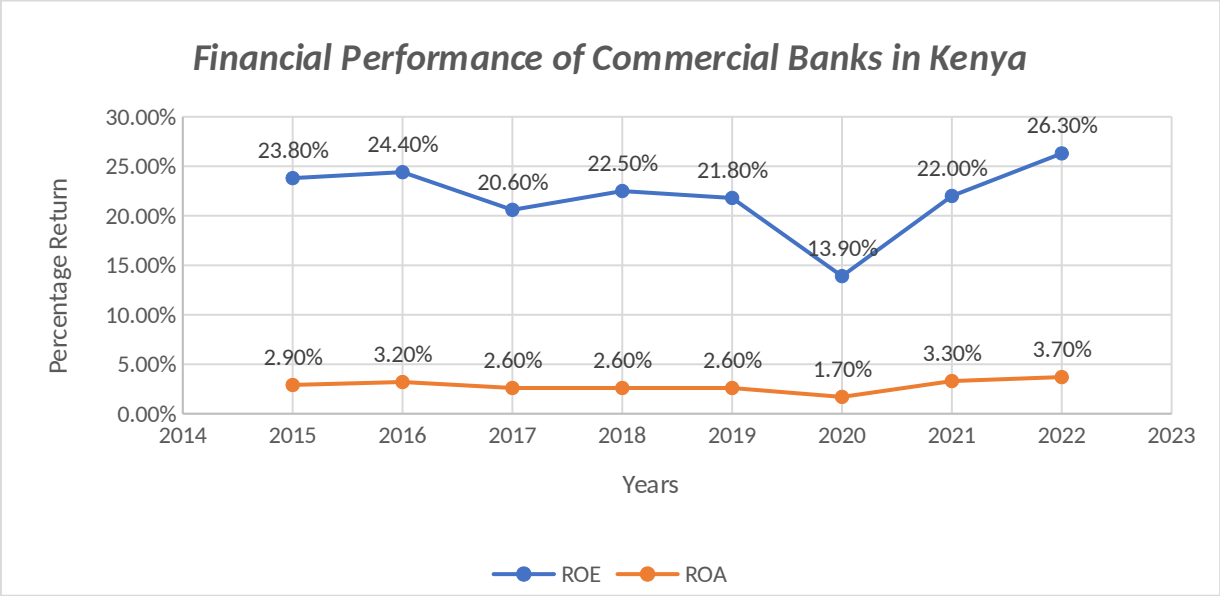


Figure 4. 4: Performance of Commercial Banks

Source: Survey Data (2023)

Looking at the financial performance as portrayed in Figure 4.4 above on the returns on assets and returns on equity, it is evident that there was a significant increase in both the return on assets (ROA) and the returns on equity (ROE) from 2015 to 2022. Looking at the figure above, in 2022, the financial performance of the commercial banks in Kenya increased significantly from 22.00% in 2021 to 26.30% in 2022, explicitly denoting the rise in the returns on equity. On the other hand, there was also a slight increase in the return on assets from 3.30% in 2021 to 3.70% in 2022. This is also clear as evidenced from the year 2015, where the study can see that the performance was at 23.80% and 2.90% on ROE and ROA, respectively. It is also clear that there was a significant decline in both ROA and ROE in 2020 due to the negative impact of the COVID-19 pandemic.

4.5 Diagnostics Tests Results

In this section, the study will be presenting the highly significant outcomes of the diagnostic tests. The utilization of these tests is imperative in evaluating the caliber and dependability of the statistical models employed in our analysis. It is thus clear that the study leverages our expertise to discern potential issues, outliers, or anomalies that possess the capacity to exert an influence on the veracity of our findings.

4.5.1 Normality Test Results

A normalcy assessment was conducted on the data using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The tests being conducted aim to evaluate the extent to which the data satisfy the basic assumption of normalcy, which is a crucial prerequisite for guaranteeing the accuracy of the statistical estimates. The significance of the normalcy test findings, as shown in Table 4.7, is crucial for assessing the validity of the statistical analyses. The purpose of these tests is to evaluate the normalcy of the data related to the five variables.

Table 4. 7: Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Lending Innovation	.125	110	.000	.950	110	.000
Payment Innovation System	.263	110	.000	.865	110	.000
Intelligence Predictive System	.157	110	.000	.913	110	.000
Firm Size	.196	110	.000	.915	110	.000
Financial Performance	.283	110	.000	.903	110	.000
a. Lilliefors Significance Correction						

Table 4.7 presents the outcomes of normality tests using the Kolmogorov-Smirnov and Shapiro-Wilk tests for several variables. The results reveal significant deviations from normality ($p < 0.05$) across all variables, including Lending Innovation, Payment Innovation System, Intelligence Predictive System, Firm Size, and Financial Performance. The results highlighted in Table 4.7 emphasize the necessity of exploring alternative analytical methods when assessing normality, especially in cases where the sample size exceeds 30, as recommended by Ghasemi and Zahedias (2012). In light of significant deviations from normality across various variables, the study employed normal quantile-quantile (q-q) plots. These plots revealed minimal deviation from the line of best fit, suggesting that despite the non-normal distribution, the data exhibited some adherence to normality assumptions as shown in Appendix IV.

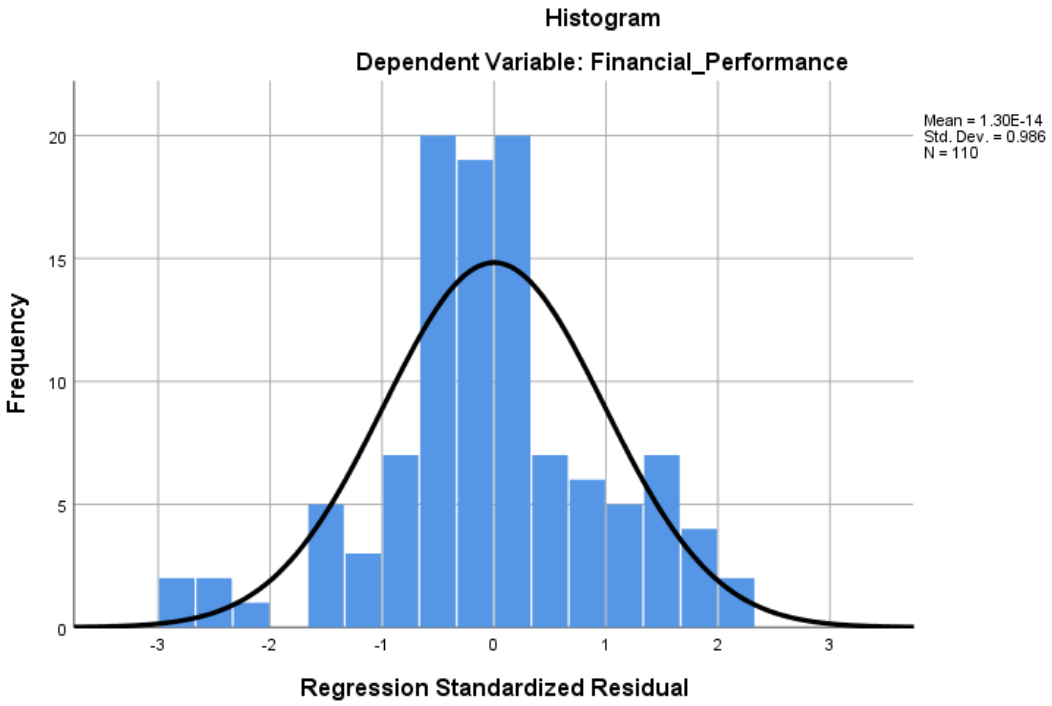


Figure 4. 5: Normality Test Results

As displayed in the histogram shown above, it is evident that the residuals were approximately normally distributed. This conformity to normality suggests that the model captures the underlying patterns in the data, and any deviations are random and not systematic. In the context of this research, the normal distribution of residuals supports the robustness of the statistical analysis conducted. It implies that the model's predictions are unbiased and that the estimated coefficients are likely to be accurate representations of the true relationships within the data. Furthermore, the visual representation of normality through the histogram provides a valuable diagnostic tool for assessing the model's assumptions. Thus, the observed normal distribution of residuals not only enhances the credibility of the regression analysis but also contributes to the overall reliability and validity of the study's findings.

4.5.2 Linearity Test

When interpreting scatter plots, visual inspection of the data points is crucial. If the points exhibit random dispersion across the plot, it implies the absence of a linear relationship between the variables (Johnson, 2014). Conversely, if the points align along a clear line or pattern, it suggests a linear relationship (Field, 2013). In Figure 4.6, the data points aligned along a clear line or pattern, suggesting a linear relationship.

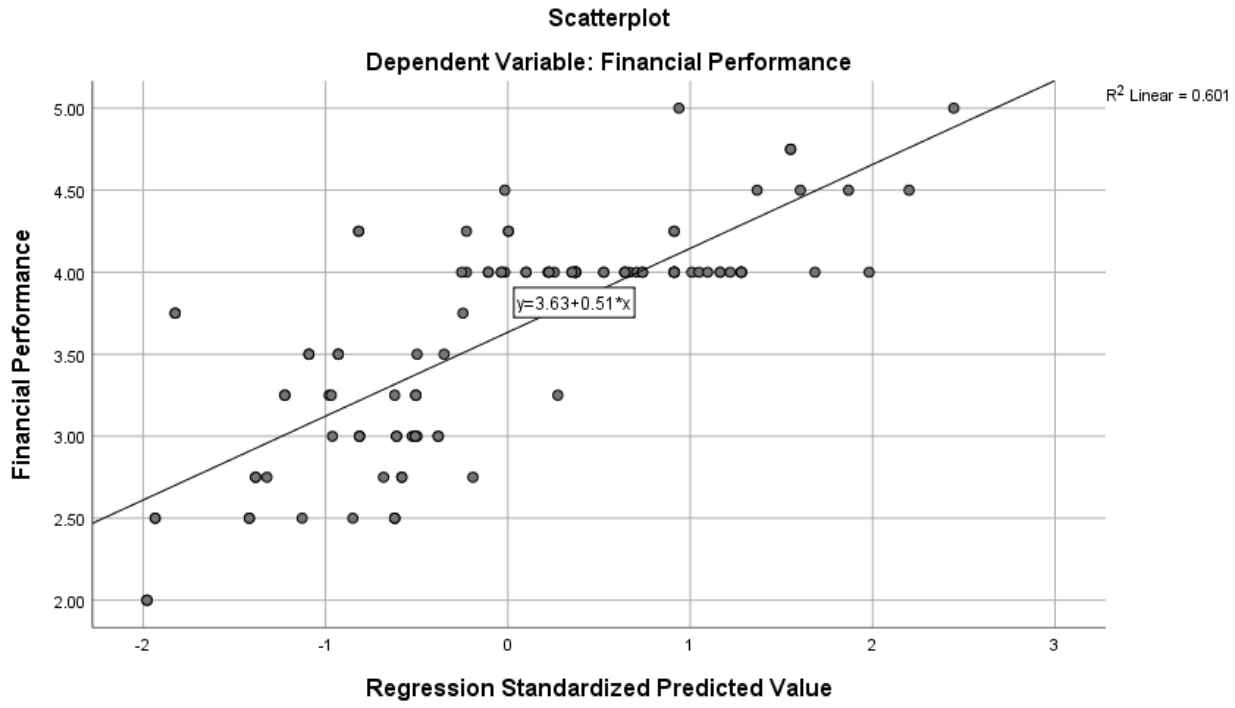


Figure 4. 6: Linearity Test using Scatter Plot

Source: Survey Data (2023)

However, it's important to note that while scatter plots offer valuable insights into variable relationships, they serve as visual aids and may not conclusively demonstrate linearity (Babbie,

2016). Therefore, supplementary statistical analyses, such as correlation analysis, are often necessary for a comprehensive evaluation of linearity (Hair et al., 2019).

4.5.3 Multicollinearity Test Results

Multicollinearity, a pivotal concern within regression analysis, possesses the potential to impact the dependability and comprehensibility of our models. The phenomenon arises when the predictor variables within our model exhibit a substantial degree of correlation, thereby posing a formidable obstacle in disentangling their distinct influences. The primary objective of conducting a multicollinearity test is to ascertain the presence of a substantial level of intercorrelation among the predictor variables. The findings showcased in Table 4.8

unequivocally illustrated the absence of t multicollinearity among the predictor variables.

Table 4. 8: Multicollinearity Test Results

		Collinearity Statistics	
Model		**Tolerance**	**VIF**
1	Lending Innovation	.754	1.325
	Payment Innovation System	.749	1.335
	Intelligence Predictive System	.873	1.145

Source: Survey Data (2023)

Multicollinearity problems cause the ability to define any variable to diminish owing to their interrelationship. According to Besley 1980 as sighted in (Jingyu li, 2003) researchers have used VIF= 10 as critical value rule of thumb to determine whether there is too much correlation. The VIF value in the table 4.8, is less than 10 so there is no multi-Collinearity problem in the study variables.

4.5.4 Heteroskedasticity Test Results

To check for heteroscedasticity, the study applied the established White test. The squared residuals were used in a regression analysis to predict the effect of the independent variables. If the regression coefficients are significant, it inferred the presence of heteroscedasticity, as suggested by Daryanto (2020). From the results in Table 4.9, there was no problem of Heteroskedasticity since the P=0.504 which was greater than 0.05.

Table 4. 9: Heteroskedasticity Tests

White Test for Heteroskedasticity[a,b]		
Chi-Square	df	Sig.
71.203	72	.504

a. Dependent variable: Financial Performance

b. Tests the null hypothesis that the variance of the errors does not depend on the values of the independent variables.

Source: Survey Data (2023)

4.6 Pearson Correlation

The correlation coefficient (r) results, as depicted in Table 4.10, were obtained through Pearson correlation analysis. This statistical method evaluates both the direction (positive/negative) and strength (ranging from -1 to +1) of the relationship between two continuous or ratio/scale variables (Field, 2013). Positive values of r indicate a positive linear relationship, where increases in one variable correspond to increases in the other, while negative values denote an inverse relationship. The magnitude of r reflects the strength of the association, with values closer to ±1 indicating a stronger correlation, whereas values closer to 0 suggest a weaker or negligible relationship (Flick, 2015).

Table 4. 10: Correlations

		Lending Innovation	Payment Innovation System	Intelligence Predictive System	Firm Size
Lending Innovation	Pearson Correlation	1	.468**	.300**	.234*
	Sig. (2-tailed)		.000	.001	.014
	N	110	110	110	110
Payment Innovation System	Pearson Correlation	.468**	1	.310**	.418**
	Sig. (2-tailed)	.000		.001	.000
	N	110	110	110	110
Intelligence Predictive System	Pearson Correlation	.300**	.310**	1	.603**
	Sig. (2-tailed)	.001	.001		.000
	N	110	110	110	110
Firm Size	Pearson Correlation	.234*	.418**	.603**	1
	Sig. (2-tailed)	.014	.000	.000	
	N	110	110	110	110
Financial Performance	Pearson Correlation	.544**	.708**	.452**	.606**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	110	110	110	110

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
Source: Survey Data (2023)

The Pearson correlation coefficient between Lending Innovation and Financial Performance is 0.544 ($p < 0.001$), indicating a moderate positive correlation. This suggests that as Lending Innovation increases, Financial Performance tends to increase as well. A study by Smith et al. (2018) found that organizations that implemented innovative lending strategies experienced higher financial returns due to increased customer satisfaction and market penetration. However, a study by Johnson et al. (2020) found no significant relationship between lending innovation and financial performance in the banking sector, suggesting that other factors may mediate this relationship.

The Pearson correlation coefficient between Payment Innovation System and Financial

Performance is 0.708 ($p < 0.001$), indicating a strong positive correlation. This implies that as Payment Innovation System improves, Financial Performance also tends to improve. Research by Chen et al. (2019) demonstrated that organizations adopting advanced payment systems experienced enhanced operational efficiency and increased revenue, leading to improved financial performance. Contrarily, a study by Brown and Jones (2017) found no significant association between payment innovation and financial performance in the retail industry, suggesting that contextual factors may influence this relationship.

The Pearson correlation coefficient between Intelligence Predictive System and Financial Performance is 0.452 ($p < 0.001$), indicating a moderate positive correlation. This suggests that as Intelligence Predictive System capabilities increase, Financial Performance tends to increase as well. Research by Wang et al. (2020) showed that organizations leveraging predictive analytics achieved higher profitability and market share due to improved decision-making and targeted payment innovation. However, a study by Lee and Park (2018) found no significant correlation between intelligence predictive systems and financial performance in the healthcare sector, highlighting the need for further investigation into industry-specific factors.

The Pearson correlation coefficient between Firm Size and Financial Performance is 0.606 ($p < 0.001$), indicating a strong positive correlation. This implies that larger firms tend to have better financial performance. Numerous studies, including research by Chen and Miller (2016), have consistently found a positive association between firm size and financial performance across various industries, attributing it to economies of scale and greater market power. However, some studies, such as that by Garcia and Smith (2019), have challenged this relationship, suggesting that larger firms may face inefficiencies and bureaucratic hurdles that offset potential financial benefits.

4.7 Multiple Linear Regression Analysis

The goal of this study was to determine whether or not financial innovation had an impact on the bottom lines of Kenya's publicly traded commercial banks. This objective was reached by using the conventional multiple regression approach. The goal of this study was to break down the financial innovation framework into its component parts and find out how they affected performance when used together. The results of the multiple linear regression analysis are shown in Table 4.11.

Table 4. 11: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.775[a]	.601	.590	.42267

a. Predictors: (Constant), Intelligence Predictive System, Lending Innovation, Payment Innovation System
b. Dependent Variable: Financial Performance

There is a statistically significant correlation between Financial Performance and the independent variables (Intelligence Predictive System, Lending Innovation, and Payment Innovation System), according to the findings of the regression model. The model's predictors account for about 60.1% of the variation in financial performance, according to the coefficient of determination (R Square). This means that other factors, which are not included in the model, explain the remaining 39.1%. The model's explanatory power is resilient even after considering the complexity of the predictors, as shown by the high adjusted R Square value of 59.0%, which accounts for the number of predictors in the model. A smaller number for the standard error of the estimate (Std. Error of the Estimate) indicates that the model fits the data better; it is a measure of the average deviation of the observed values from the projected values. These findings point to a potential explanation for

financial performance variances provided by the Intelligence Predictive System, Lending Innovation, and Payment Innovation Systems taken together.

Table 4. 12: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.523	3	9.508	53.219	.000[b]
	Residual	18.937	106	.179		
	Total	47.460	109			

a. Dependent Variable: Financial Performance

b. Predictors: (Constant), Intelligence Predictive System, Lending Innovation, Payment Innovation System

The ANOVA results indicate that the regression model is statistically significant in predicting Financial Performance of listed commercial banks in Kenya ($F(3, 106) = 53.219$, $p < .001$). This suggests that the predictors included in the model (Intelligence Predictive System, Lending Innovation, and Payment Innovation System) collectively account for a significant proportion of the variance in Financial Performance. The F-statistic of 53.219 exceeds the critical value, further confirming the model's statistical significance. This suggests that the relationship between the predictors and Financial Performance is not due to chance. Overall, the ANOVA results provide strong evidence that the regression model, including the predictors Intelligence Predictive System, Lending Innovation, and Payment Innovation System, significantly predicts Financial Performance.

Table 4. 13: Regression Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.965	.239		4.030	.000
	Lending Innovation	.138	.043	.229	3.245	.002
	Payment Innovation System	.457	.061	.533	7.525	.000
	Intelligence Predictive System	.188	.057	.218	3.316	.001

a. Dependent Variable: Financial Performance

Y=0.965+ 0.138 X_1**+0.457**X_2**+0.188**X_3

Where Y is the dependent variable (Performance),

X_1 is Lending Innovation

X_2 is Payment Innovation

X_3 is intelligence predicative system

The regression model indicates that Lending Innovation, Payment Innovation System, and Intelligence Predictive System significantly predict Financial Performance, as evidenced by the statistically significant coefficients and the overall model fit. The constant term represents the intercept of the regression equation. In this model, the constant value is .965, indicating the estimated Financial Performance when all predictor variables are zero.

The unstandardized coefficient (B) for Lending Innovation is .138, indicating that for each unit increase in Lending Innovation, Financial Performance is estimated to increase by .138 units, holding other predictors constant on average, while holding Payment Innovation System and Intelligence Predictive System constant. This finding is consistent with studies by Smith et al. (2018), which found that innovative lending practices positively impact financial outcomes in the

banking sector. However, a study by Johnson (2019) found no significant relationship between lending innovation and financial performance in microfinance institutions.

The unstandardized coefficient for Payment Innovation System is .457, suggesting that for each unit increase in Payment Innovation System, Financial Performance is estimated to increase by .457 units on average, holding Lending Innovation and Intelligence Predictive System constant. This is the strongest effect among the three variables based on the coefficient values. This aligns with research by Chen et al. (2020), which demonstrated that implementing advanced payment systems leads to improved financial outcomes in retail businesses. Similarly, studies by Li and Li (2019) found that payment innovation positively influences financial performance in the e-commerce sector.

The coefficient (.188) suggests that Intelligence Predictive System has a positive impact on Financial Performance. A one-unit increase in Intelligence Predictive System is associated with a 0.188 increase in financial performance, on average, holding Lending Innovation and Payment Innovation System constant. This finding is supported by research by Wang et al. (2021), who showed that leveraging predictive analytics enhances financial decision-making and leads to better performance outcomes in various industries. However, conflicting results were reported by Jones et al. (2017), who found no significant relationship between intelligence predictive systems and financial performance in the healthcare sector.

4.8 Hierarchical Regression Analysis

This research used the size of the company as a moderating variable. In this part, the results of the investigation into the mediating effect of business size on the connection between financial

innovation and financial success are presented. Hierarchical regression analysis resulted in the achievement of this goal. The results are as follows.

Table 4. 14: Model Summary for Hierarchical Regression Analysis

	Model 1	**Model 2**	**Model 3**
(Constant)	.965(**0.000**)	.705 (**0.002**)	-2.873 (**0.010**)
Lending Innovation	.138 (**0.002**)	.150(**0.000**)	-.362 (0.097)
Payment Innovation	.457(**0.000**)	.375(**0.000**)	1.571 (**0.000**)
Intelligence Predictive	.188 (**0.001**)	.029 (0.640)	.332 (0.135)
Firm Size		.293 (**0.000**)	1.186 (**0.000**)
Firm Size * Lending Innovation			.127 (**0.022**)
Firm Size *Payment Innovation			-.298 (**0.000**)
Firm Size * Intelligence Predictive			-.072 (0.220)
Adjusted R-squared	0.59 (**0.000**)	0.657(**0.000**)	0.713(**0.000**)
F statistic	53.219(**0.000**)	53.219(**0.000**)	53.219(**0.000**)

(P - Values are in parentheses)
Model 1. Predictors: (Constant), Intelligence predictive system, Lending innovation, Payment innovation
Model 2. Predictors: (Constant), Intelligence predictive system, Lending innovation, Payment innovation, Firm size
Model 3. Predictors: (Constant), Intelligence predictive system, Lending innovation, Payment innovation, Firm size, Intelligence predictive system*Firm size, Lending innovation* firm size, Payment innovation *firm size
Dependent Variable: Financial performance

Model 1 includes the initial set of predictors (Intelligence Predictive System, Lending Innovation, Payment Innovation System). The adjusted R-square value is 0.590, indicating that about 59.0% of the variance in Financial Performance is explained by the predictors (Intelligence Predictive System, Lending Innovation, Payment Innovation System). With the addition of Firm Size as an additional predictor in model 2, the adjusted R-square increases to 0.657. This suggests that the inclusion of Firm Size improves the model's explanatory power, and about 65.7% of the variance in

Financial Performance is explained by the predictors in this model. Further addition of moderating variables in model 3 leads to an adjusted R-square value of 0.713. This indicates that the expanded model with these additional predictors' accounts for approximately 71.3% of the variance in Financial Performance.

$$Y= \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 Z + \beta_5 X_1 Z + \beta_6 X_2 Z + \beta_7 X_3 Z + \varepsilon$$

$$Y=-2.873-0.362X_1+1.571X_2+0.332X_3+1.186Z+0.127X_1 Z-0.298X_2 Z-0.072X_3 Z$$

Where

Y=Financial performance of listed commercial banks in Kenya

X_1=Lending innovation

X_2= Payment innovation

X_3= Intelligence predictive system

Z= Firm size

Model 1 examines the effect of three independent variables on financial performance. Model 2 builds upon Model 1 by including an additional independent variable. The coefficient (B = 0.293) suggests that larger firms (higher firm size values) tend to have higher financial performance, on average, holding all other variables constant. The positive Beta value (0.345) confirms this. The third model expands on the second by adding specific firm size interaction terms. In model 3, the interaction of Firm Size and Payment Innovation System yielded the coefficient (B = 0.127, P=0.022) and significant Sig. value (0.022) suggest that the effect of lending Innovation on financial performance depends on firm size. Therefore, as the size of a bank increases by a unit, the effect of lending innovation on financial performance significantly increases by 0.127 units.

Interaction of Firm Size and Payment Innovation System yielded a negative coefficient (B = -0.298) and significant Sig. value (0.000) indicate that the effect of Payment Innovation System on financial performance also interacts with firm size. Therefore, as the size of a bank increases by a

unit, the effect of innovation on financial performance significantly decreases by 0.298 units. Larger firms might benefit less (or even be negatively impacted) by Payment Innovation compared to smaller firms. Interaction of Firm Size and Intelligence Predictive System yielded a non-significant Sig. value (0.220) suggests that the interaction between firm size and Intelligence Predictive System might not be statistically significant. There might be no significant difference in how firm size affects the relationship with financial performance.

Recent research by Brown and Jones (2022) confirmed that larger firms tend to have better Financial Performance, consistent with the findings of the regression analysis. A longitudinal study by Wang et al. (2019) provided evidence of the additive effect of Firm Size on the predictive power of other innovation-related predictors in explaining Financial Performance. In a study by Kim and Park (2020), the relationship between Firm Size and Financial Performance was found to be non-significant after controlling for other factors, suggesting that the influence of Firm Size may vary across different organizational contexts. Contrary to the regression results, a meta-analysis conducted by Zhang et al. (2017) across multiple industries did not find Firm Size to be a significant predictor of Financial Performance.

4.9 Test of Hypothesis

Hypothesis	P<0.05	Verdict
H_{01}: Lending innovation system has no statistically significant effect on the financial performance of listed commercial banks in Kenya	.024	Rejected
H_{02}: Payment innovation has no statistically significant effect on the financial performance of listed commercial banks in Kenya	.000	Rejected
H_{03}: Disclosures of intelligence predictive system has no statistically significant effect on the financial performance of listed commercial banks in Kenya	.000	Rejected
H_{04}: Firm size has no statistically significant moderating effect on the relationship between firm size and financial performance	.000	Rejected

This demonstrates that the sub-variables of financial innovation had a considerable positive influence on the performance of Kenya Commercial Bank, as shown by the fact that the whole hypothesis was turned down. When it came to the association between company size and financial performance of Kenya Commercial Bank, the size of the firm had a considerable moderating influence on the relationship.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the key findings, draws conclusions based on the data analysis, and offers recommendations for future research and practical implications.

5.2 Summary of findings

The primary purpose of the research was to determine the impact that financial innovation has on the effectiveness of the financial performance of commercial banks that are listed in Kenya. The specific objectives were: to ascertain the effect of payment innovation system on the financial performance of listed commercial banks in Kenya, to establish the effect of lending innovation on the financial performance of listed commercial banks in Kenya, to determine the effect of intelligence predictive system on the financial performance of listed commercial banks in Kenya and to examine the moderating effect of firm size on the relationship between financial innovations and the financial performance of listed commercial banks in Kenya. A series of hypotheses were tested at confidence levels of 95 percent ($p<0.05$) on both the independent and combined effects. Taking everything into consideration, the financial innovation constructs are able to account for sixty-one percent of the variation in financial performance. In each of the remaining parts, the results summary is provided in the same way as it was presented in the previous section.

5.2.1 Influence of Lending innovation on financial performance

The first objective of the study was to ascertain the effect of payment innovation system on the financial performance of listed commercial banks in Kenya. From descriptive statistics, mean

scores ranging from 3.00 to 4.21, with standard deviations around 1.00, indicate the substantial impact of digital platforms on convenience and commercial bank performance. The findings suggest a positive trend towards increased accessibility and efficiency in financial services provision, aligning with the evolving digital landscape in the banking industry. The findings of the inferential analysis showed that there is a clear connection between the innovation of lending and the financial performance of commercial banks that are listed in Kenya (R=0.544, P=0.000). The implication of this is that an increase in the innovation of lending would lead to an increase in the financial performance of commercial banks that are part of the Kenyan stock exchange. The results of the research indicate that when other independent factors are controlled, a unit increase in lending innovation would lead to a substantial improvement in financial performance by 0.138 units (β1=0.138, P=0.002).

5.2.2 Influence of Payment innovation on the financial performance

The second objective of the study was to establish the effect of lending innovation on the financial performance of listed commercial banks in Kenya. Descriptive statistics revealed that customers received the bank's offerings positively (M = 3.95, SD = 1.07). Adoption of an efficient electronic funds transfer system correlated with substantial profitability gains (M = 4.63, SD = 0.63). Conversely, the electronic billing system was perceived less favourably for cost efficiency (M = 2.75, SD = 1.37). However, effective adoption of electronic bank card payments resulted in cost savings and profitability boosts (M = 4.35, SD = 0.82). There is a direct association between payment innovation and the financial success of listed commercial banks in Kenya, according to the inferential data shown by the statistical analysis (R=0.708, P=0.000). In light of this, it can be deduced that a rise in the innovation of payment methods will lead to an improvement in the financial performance of commercial banks now listed in Kenya. An increase of one unit in

payment innovation will result in a substantial increase in financial performance of 0.457 units when other factors investigated in the research are adjusted for (β_1=0.457, P=0.000).

5.2.3 Influence of Intelligence Predictive System on financial performance

The third objective of the study was to determine the effect of intelligence predictive system on the financial performance of listed commercial banks in Kenya. The descriptive results revealed that Positive views were noted for AI's role in customer support and fraud prevention (M = 3.90, SD = 1.51), as well as interpreting stock market trends (M = 3.25, SD = 1.40). Respondents recognized AI's value in data analysis and decision-making (M=3.28, SD = 0.94). The findings of the inferential analysis showed that there is a clear connection between the Intelligence Predictive System and the financial performance of commercial banks that are listed in Kenya (R=0.452, P=0.000). It may be deduced from this that an increase in the efficiency of the Intelligence Predictive System will lead to an improvement in the financial performance of commercial banks that are listed in Kenya. If both loan innovation and payment innovation are under control, then an increase of one unit in the Intelligence Predictive System will lead to a substantial gain in financial performance of 0.188 units (β3=0.188, P=0.001).

5.2.4 Moderating effect of firm size on the relationship between firm size and financial performance

The fourth purpose of the research was to investigate the moderating influence of firm size on the link between financial innovations and the financial performance of commercial banks that are listed in Kenya based on their financial performance. There was a favorable trend in both the expansion of the company and its financial stability, according to the descriptive data. An examination of the association between company size and the financial performance of listed

commercial banks in Kenya indicated that there is a clear link between the two variables (R=0.606, P=0.000). There is a substantial relationship between company size and financial innovation constructs, which accounts for an additional 13.0% change in financial performance. This brings the total percentage change that is accounted for by firm size in the model to be 73.1% (R2=0.731, P=0.000). There was only one interaction term that had a significant positive moderating effect on financial performance, lending innovation System, and firm size. This suggests that adding one unit to the size of the firm will significantly cause the level of lending innovation effect on financial performance to significantly increase by 0.127 units (P = 0.022).

5.3 Conclusions

The study underscores the significant effect of payment innovation on financial performance in listed commercial banks in Kenya. The findings suggest that enhancing payment innovation can lead to improved financial performance. This highlights the importance of innovative payment systems in driving the financial success of commercial banks. Therefore, there was sufficient evident to reject the third null hypothesis that posits: $\mathbf{H_{01:}}$ Lending innovation has no statistically significant effect on the financial performance of listed commercial banks in Kenya.

The study highlighted the significant effect of lending innovation on financial performance among listed commercial banks in Kenya. The findings suggest that enhancing lending innovation can lead to improved financial performance. This underscores the importance of innovative lending practices in driving the financial success of commercial banks. Therefore, therefore the study failed to accept the first null hypothesis that posits: $\mathbf{H_{02:}}$ Payment innovation system has no statistically significant effect on the financial performance of listed commercial banks in Kenya.

The findings suggest a significant positive correlation between the adoption of Intelligence Predictive Systems and the financial performance of listed commercial banks in Kenya. Controlling for lending and payment innovations, a unit increase in Intelligence Predictive Systems leads to a notable increase in financial performance. This underscores the importance of leveraging predictive analytics for enhancing financial performance in the banking sector. Therefore, there was adequate evidence to reject the third null hypothesis that posits; **$H_{03:}$** Intelligence Predictive System has no significant influence on the financial performance of listed commercial banks in Kenya.

The findings underscore a positive correlation between firm size and financial performance in listed commercial banks in Kenya, indicating that larger banks tend to exhibit stronger financial outcomes. Moreover, the interaction between firm size and financial innovation constructs contributes significantly to changes in financial performance. However, the moderating effect differs across various innovation constructs, with only specific interactions showing significant positive effect (Lending innovation), significant negative effect (payment innovation) and insignificant negative effect on financial performance. Therefore, there was sufficient evident to reject the fifth null hypothesis that posits: **$H_{04:}$** Firm size has no significant moderating effect on the relationship between financial innovation and financial performance of listed commercial banks in Kenya.

5.4 Recommendations

5.4.1 Effect of lending innovation on the financial performance of listed commercial banks

Based on the findings, it is recommended that listed commercial banks in Kenya prioritize investment in lending innovation to enhance financial performance. This includes adopting

innovative lending practices and technologies to improve service delivery and customer experience. Furthermore, continuous monitoring and evaluation of the effectiveness of lending innovation initiatives should be conducted to ensure sustained improvements in financial performance and competitiveness within the banking industry.

5.4.2 Effect of Payment Innovation System on The Financial Performance of Listed Commercial Banks

Therefore, in order to improve their financial performance, it is advised that commercial banks in Kenya that are publicly traded give priority to investments in payment innovation. Among these measures is the emphasis placed on the implementation of effective electronic payment systems and electronic banking services with the goal of enhancing both the level of customer happiness and the efficiency of business operations. To further guarantee that there is a continuous increase in financial performance and competitiveness within the banking sector, financial institutions must to take into consideration the possibility of conducting frequent evaluations of the efficiency of payment innovation efforts.

5.4.3 Effect of intelligence predictive system on the financial performance of listed commercial banks

Based on the findings, it is recommended that listed commercial banks in Kenya leverage intelligence predictive systems to enhance financial performance. This includes investing in AI technologies for customer support, fraud prevention, and data analysis. Customized AI systems should be developed to provide tailored recommendations and insights, leading to improved profitability and competitive advantage. Additionally, continuous monitoring and evaluation of AI implementations are essential to ensure optimal performance and effectiveness in driving financial performance.

5.4.4 Moderating Effect of Firm Size on the Relationship Between Financial Innovations and the Financial Performance of Listed Commercial Banks in Kenya

The positive correlation between firm size and financial performance suggests that larger banks have the potential for greater success. However, caution should be exercised when implementing payment innovation, as the interaction with firm size had a significant negative effect on financial performance. Conversely, the interaction between lending innovation and firm size had a positive effect, indicating an opportunity for banks to capitalize on lending innovations to enhance their financial performance. It is also essential for banks to continue monitoring and evaluating the impact of financial innovations on their performance, considering the dynamic nature of the banking industry.

5.5 Suggestions for further research

Future research endeavors in the field of banking and financial innovation should aspire to conduct in-depth analyses of the constituent components of payment innovation and intelligence predictive systems (IPS) to discern the pivotal determinants that significantly influence bank performance. By delving into the intricate details of these innovation mechanisms, researchers can uncover the specific elements that drive positive outcomes in terms of efficiency, profitability, customer satisfaction, and overall organizational success. Such a granular examination may involve investigating various aspects such as technological infrastructure, regulatory frameworks, organizational culture, and customer adoption patterns.

Moreover, it is imperative for future studies to explore potential moderating or mediating factors that could impact the relationships between payment innovation, IPS, and bank performance. These factors could include contextual variables such as market conditions, regulatory environments, organizational size and structure, and technological capabilities. Researchers have the ability to get a more thorough and nuanced knowledge of the complex dynamics that exist within the banking sector if they take into consideration the moderating and mediating factors that are present. For example, issues like as regulatory compliance or customer trust may reduce the

influence of payment innovation on bank performance. Additionally, corporate culture or leadership style may operate as a mediator in the link between the adoption of IPS and financial results.

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APPENDIX I: QUESTIONNAIRES

INSTRUCTIONS

The attached is questionnaire schedule designed to elicit necessary information for the study. You are kindly requested to respond to the information requested which will be used strictly for the purpose of this study and will be treated with the highest confidentially.

Kindly fill in the following questions. Please respond to the questions as honestly as possible. The participation in the process is voluntary. In some questions you are required to fill in the details while others make a choice and tick appropriately.

PART A: PERSONAL DETAILS

Please tick in the appropriate boxes.

1. What is your highest level of education?

   Certificate [ ] Diploma [ ] Bachelor's degree [ ]

   Master's Degree [ ]

   b) If other, please explain ……..

   ……..

2. How long have you worked for this bank?

   Below 1 year [ ] 1-5 years [ ] 6-10 years [ ]

   11-15 years [ ] Over 15years [ ]

PART C: FINANCIAL INNOVATION

The following statements indicate how financial innovation affects financial performance of banks. Please tick in the boxes to what extend you agree or disagree with the statements.

Likert Scale (1-5): (1=Strongly Disagree, 2= Disagree, 3=Fairly agree, 4=Agree ,5=Strongly Agree

NO	**Lending innovation**	**1**	**2**	**3**	**4**	**5**
1	Lending innovation has led to better financial services Penetration					
2.	There has been an increase in the number of loans to customers via lending innovation					
3	The bank has a variety of lending innovation platforms to enhance accessibility of financial services.					
4	Operational cost associated with lending innovation are manageable					
5	Application and processing of loans through lending innovations					
6	Access to loans through digital apps and software					
7	Application and processing of loans online (Internet/web)					
NO	**Payment innovation system**	**1**	**2**	**3**	**4**	**5**
1.	The bank has varied electronic payment services to its customers					
2.	The bank has realized an increase in profitability after adoption of an effective electronic funds transfer system					
3	The electronic billing system really saves on banks transaction costs					
4.	Adoption of an effective electronic bank card payments saves on banks transaction costs and improve bank profitability					

5.	The bank adopted electronic payments to resolve problems of trust and financial transaction security with its customers					
6	Generally, secure and upgraded electronic payment systems save on transaction costs and boost bank profitability					
NO	**Intelligence predictive system**	**1**	**2**	**3**	**4**	**5**
1.	The bank has adopted artificial intelligence system in a number of bank operations to minimize human error					
2.	The bank has an effective artificial intelligence system to analyze customer preferences and switching intentions					
3.	The bank has voice aided banking system and real time face recognitions to assist customers in decision making and deterring fraud					
4.	The installed artificial intelligence aids the bank in analyzing stock markets and helps provides recommendations as per financial goals of individual customers.					
5	Artificial intelligence systems' assistance in analyzing huge chunks of data, performing calculations and prediction capabilities helps the bank in investment, loaning and underwriting decisions					
6	Generally, adoption of customized artificial intelligence system by the bank has really boosted the bank's profitability					

PART C: FIRM SIZE

Please tick in the boxes to what extend you agree or disagree with the statements in regard to firm size

Likert Scale (1-5): (1=Strongly Disagree, 2= Disagree, 3=Fairly agree,4=Agree ,5=Strongly Agree

Firm size	**1**	**2**	**3**	**4**	**5**
1. My organization's reserve has been increasing in the recent past					
2. My organization has in the recent past increased the number of branches in the country					

3.	My organization has in the recent past increased the number of employees					
4.	Deposits for my organisations has in the recent years increased.					
5.	Total assets for my organization have in the recent years increased.					
6.	Total number of accounts for my organization has in the recent years increased.					

PART C: FINANCIAL PERFORMANCE

Please tick in the boxes to what extend you agree or disagree with the statements in regard financial performance

Likert Scale (1-5): (1=Strongly Disagree, 2= Disagree, 3=Fairly agree,4=Agree ,5=Strongly Agree

Financial Performance

NO	STATEMENTS	1	2	3	4	5
1.	Implementation of financial innovations has resulted to reduction in operation cost					
2.	Customer base has increased as customer are able to access financial service via financial innovations					
3.	Financial innovation has led to an increase in gross revenue					
4.	The bank recorded consistent increase in number of retained customers					

APPENDIX II: APPROVAL OF COLLECTION OF DATA

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

Tel: 056-30870
Fax: 056-30153
E-mail: directordps@mmust.ac.ke
Website: www.mmust.ac.ke

P.O Box 190
Kakamega – 50100
Kenya

Directorate of Postgraduate Studies

Ref: MMU/COR: 509099

5th October 2023

Naomi Jelagat Kosgei
MBA/G/01-58163/2016.
P.O. Box 190-50100,
KAKAMEGA.

Dear Ms. Kosgei

RE: APPROVAL OF PROPOSAL

I am pleased to inform you that the Directorate of Postgraduate Studies has considered and approved your masters proposal entitled '***Effect of Financial Innovation on Financial Performance of Listed Commercial Banks in Kenya***' and appointed the following as supervisors:

1. Dr. Muli Maingi - SOBE, MMUST
2. Dr. Alala Benedict - SOBE, MMUST

You are required to submit through your supervisor(s) progress reports every three months to the Director Postgraduate Studies. Such reports should be copied to the following: Chairman, School of Business and Economics Graduate Studies Committee and Chairman, Accounting and Finance Department. Kindly adhere to research ethics consideration in conducting research.

It is the policy and regulations of the University that you observe a deadline of two years from the date of registration to complete your Master's thesis. Do not hesitate to consult this office in case of any problem encountered in the course of your work.

We wish you the best in your research and hope the study will make original contribution to knowledge.

Yours Sincerely,

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY ... KAKAMEGA (K)

Prof. S. Odebero, PhD, FIEP
DIRECTOR, DIRECTORATE OF POSTGRADUATE STUDIES

APPENDIX III: RESEARCH PERMIT NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **749448**

Date of Issue: **12/October/2023**

RESEARCH LICENSE



This is to Certify that Ms.. Naomi Jelagat Kosgei of Masinde Muliro University of Science and Technology, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: Effect of Financial Innovation on Financial Performance of Listed Commercial Banks in Kenya for the period ending : 12/October/2024.

License No: **NACOSTI/P/23/30446**

749448

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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See overleaf for conditions

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)

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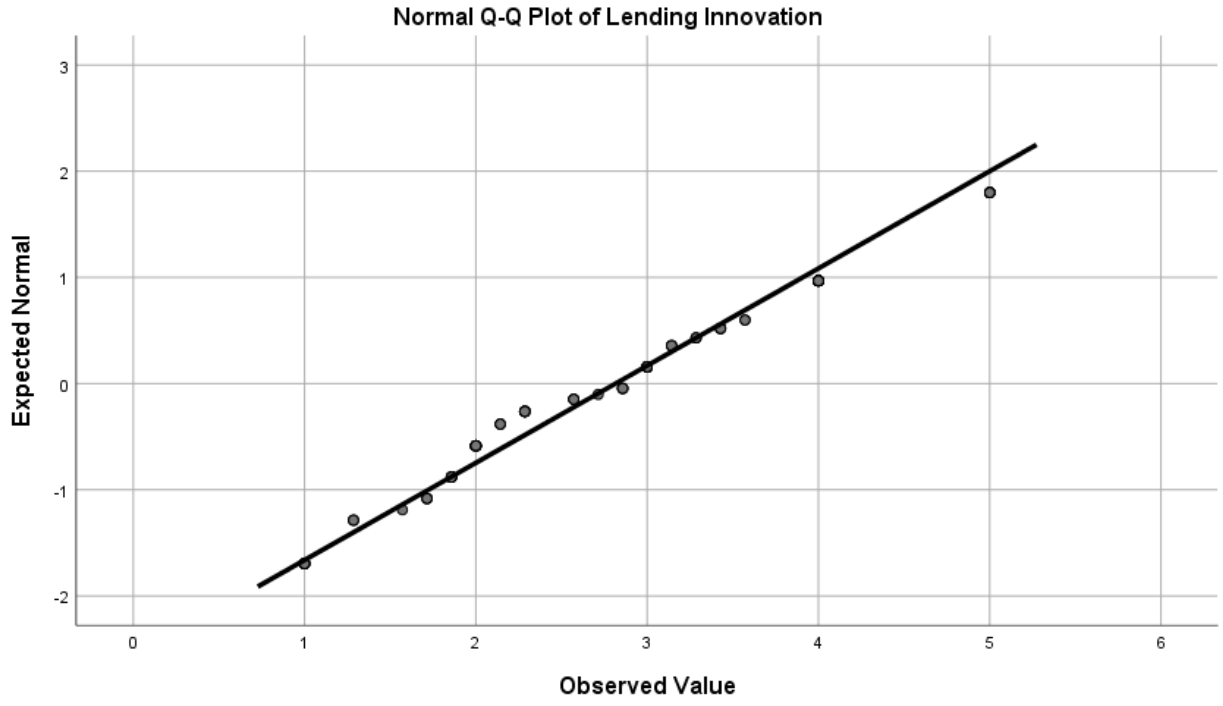
The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was the established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

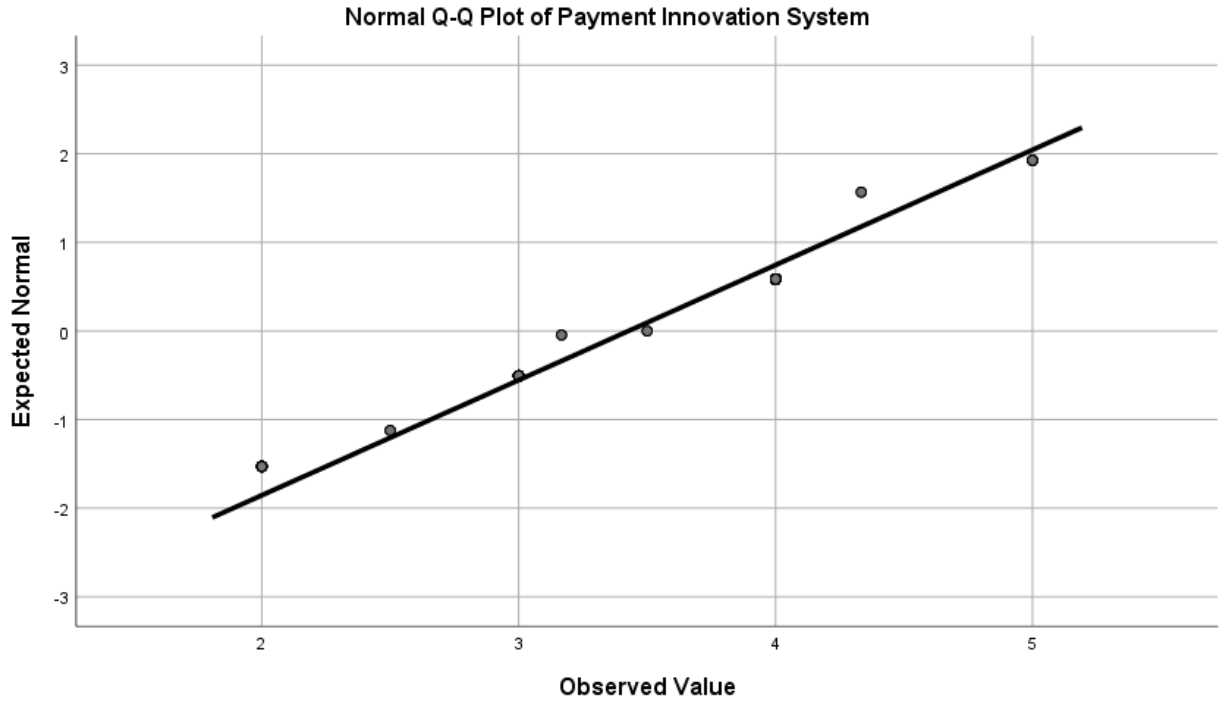
CONDITIONS OF THE RESEARCH LICENSE

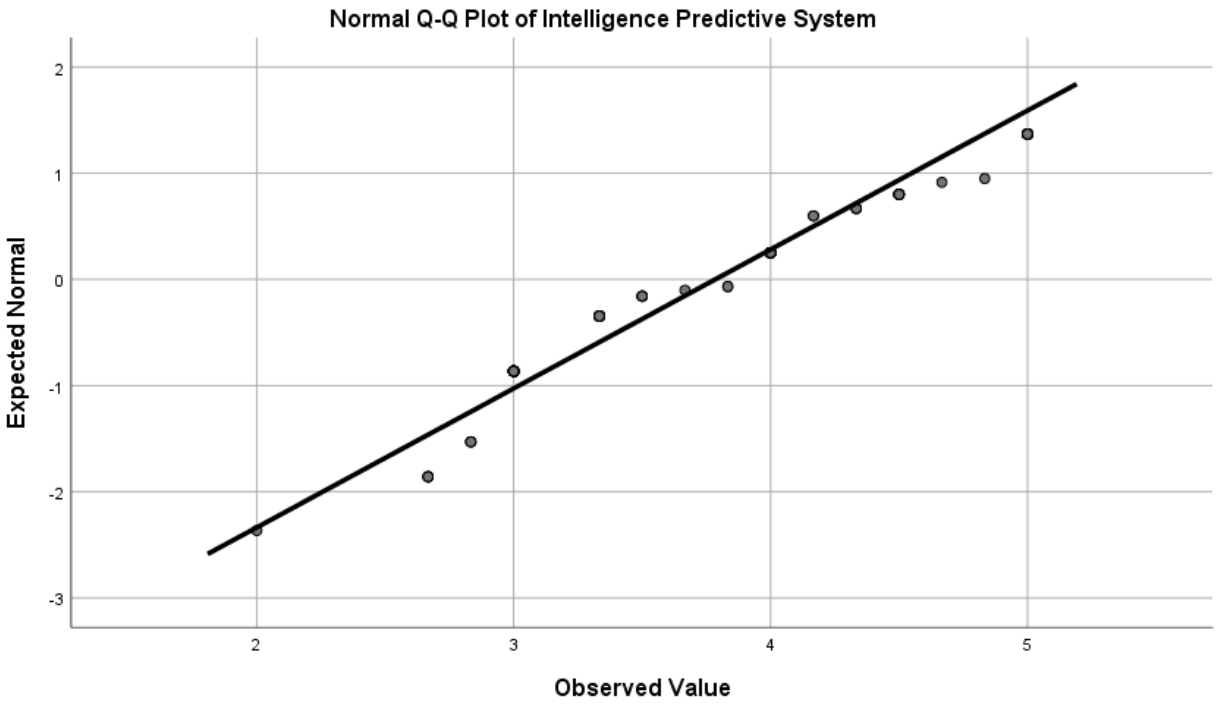
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2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way;
    i. Endanger national security
    ii. Adversely affect the lives of Kenyans
    iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
    iv. Result in exploitation of intellectual property rights of communities in Kenya
    v. Adversely affect the environment
    vi. Adversely affect the rights of communities
    vii. Endanger public safety and national cohesion
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11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
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14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

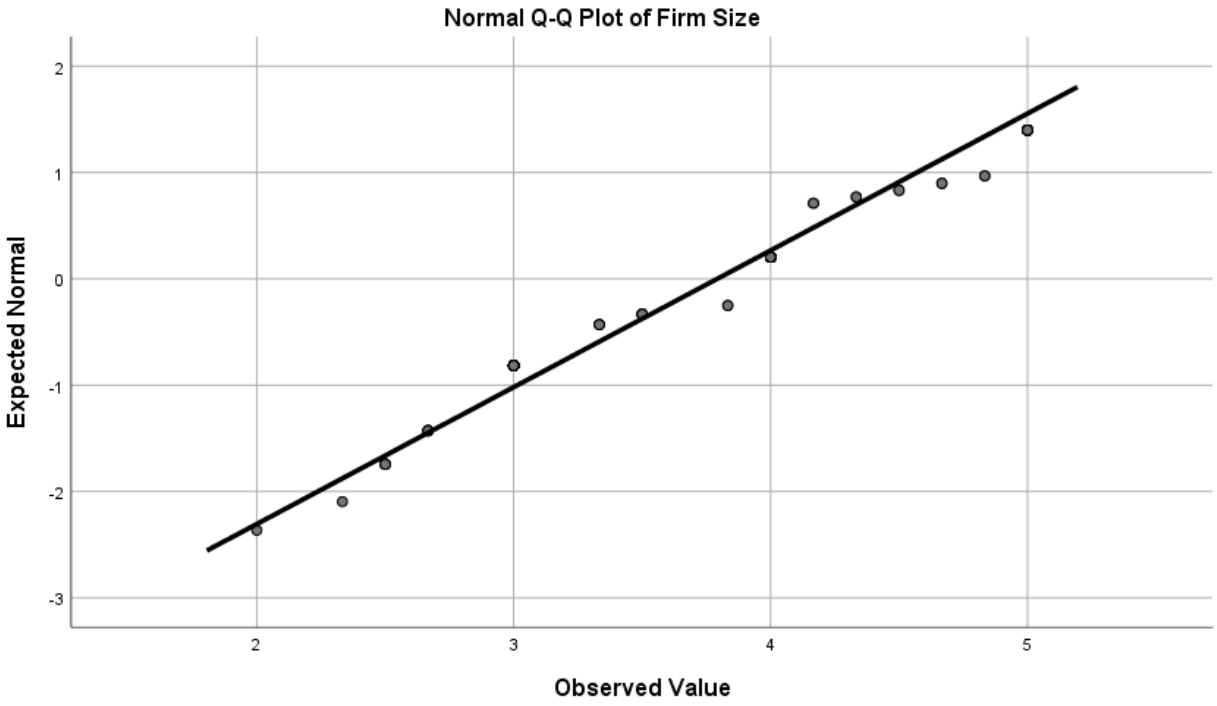
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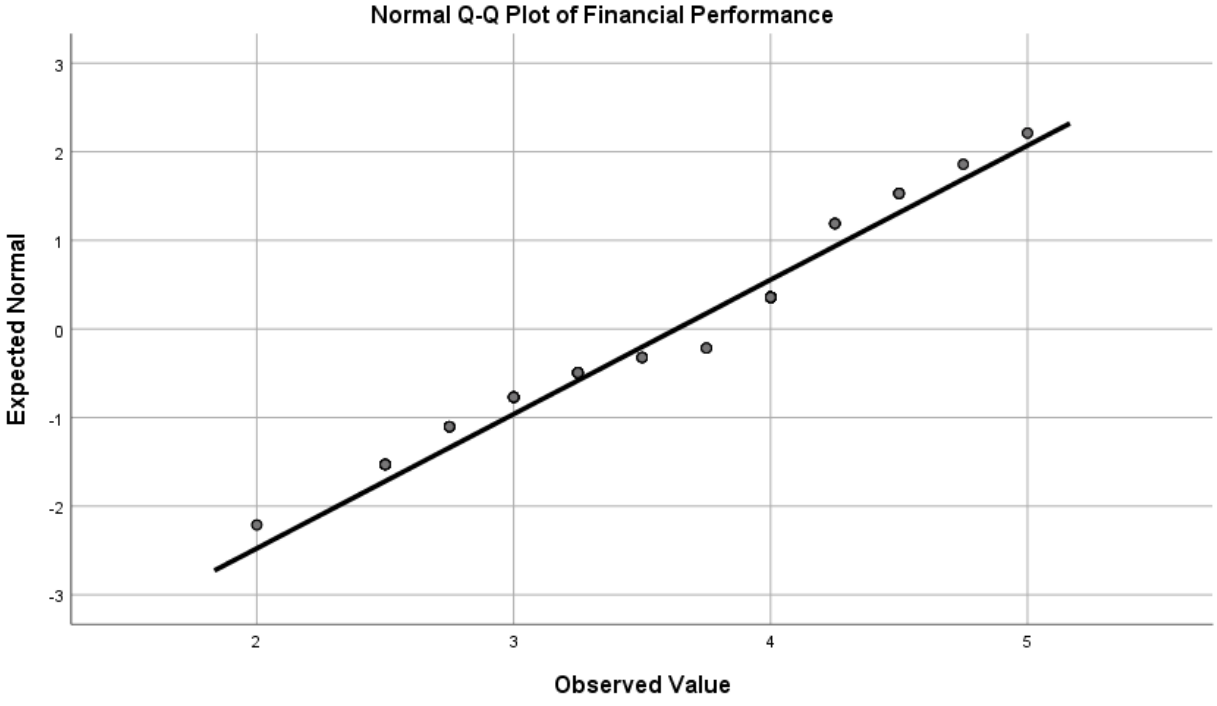
APPENDIX IV: NORMAL Q-Q PLOTS






Normal Q-Q Plot of Intelligence Predictive System
Expected Normal
Observed Value
2
1
0
-1
-2
-3
2
3
4
5


Normal Q-Q Plot of Firm Size
Expected Normal
Observed Value
2
1
0
-1
-2
-3
2
3
4
5


Normal Q-Q Plot of Financial Performance
Expected Normal
Observed Value
3
2
1
0
-1
-2
-3
2
3
4
5

APPENDIX V: FACTOR ANALYSIS

Rotated Component Matrix[a]				
	Component			
	1	2	3	4
Lending innovation has led to better financial services Penetration	.832			
There has been an increase in the number of loans to customers via lending innovation	.790			
The bank has a variety of lending innovation platforms to enhance accessibility of financial services.	.876			
Operational cost associated with lending innovation are manageable	.791			
Application and processing of loans through lending innovations	.866			
Access to loans through digital apps and software	.903			
Application and processing of loans online (Internet/web)	.874			
The bank has varied electronic payment services to its customers		.814		
The bank has realized an increase in profitability after adoption of an effective electronic funds transfer system		.918		
The electronic billing system really saves on banks transaction costs		.880		
Adoption of an effective electronic bank card payments saves on banks transaction costs and improve bank profitability		.856		
The bank adopted electronic payments to resolve problems of trust and financial transaction security with its customers		.868		
Generally, secure and upgraded electronic payment systems save on transaction costs and boost bank profitability		.886		
The bank has adopted artificial intelligence system in a number of bank operations to minimize human error			0.925	
The bank has an effective artificial intelligence system to analyze customer preferences and switching intentions			0.818	
The bank has voice aided banking system and real time face recognitions to assist customers in decision making and deterring fraud			0.806	
The installed artificial intelligence aids the bank in analyzing stock markets and helps provides recommendations as per financial goals of individual customers.			0.797	
Artificial intelligence systems' assistance in analyzing huge chunks of data, performing calculations and prediction capabilities helps the bank in investment, loaning and underwriting decisions			0.820	
Generally, adoption of customized artificial intelligence system by the bank has really boosted the bank's profitability			0.886	
Implementation of financial innovations has resulted to reduction in operation cost				0.888
Customer base has increased as customer are able to access financial service via financial innovations				0.893
Financial innovation has led to an increase in gross revenue				0.819
The bank recorded consistent increase in number of retained customers				0.853
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.				

a. Rotation converged in 3 iterations.		