FINTECH ADOPTION ON PERFORMANCE OF LISTED COMMERCIAL BANKS IN KENYA

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DECLARATION

I, the undersigned, declare that this thesis is my original work and that it has not been presented in any other university or institution for academic credit.

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DEDICATION

I dedicate this work to Jesus Christ my Creator who has been the source of inspiration throughout the journey of writing this thesis.

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TABLE OF CONTENTS

DECLARATION.....**i**

DEDICATION.....**ii**

ACKNOWLEDGEMENT.....**iii**

TABLE OF CONTENTS.....**iv**

LIST OF TABLES.....**ix**

LIST OF FIGURES.....**x**

LIST OF ABRIVIATIONATION AND ACRONONYM.....**xi**

OPERATIONAL DEFINITION OF KEY TERMS.....**xii**

ABSTRACT.....**xiii**

CHAPTER ONE.....**1**

1.0 Introduction.....1

1.1 Background to the Study.....1

1.1.1 Global Perspective of Performance of Commercial Banks.....3

1.1.2 Regional Perspective of Performance of Commercial Banks.....5

1.1.3 Local Perspective Performance of Commercial Banks.....7

1.1.4 FinTech as a Concept.....8

1.2 Statement of the Problem.....13

1.3 General Objective.....15

1.4 Specific Objectives.....15

1.5 Research Questions.....15

1.6 Significance of the Study.....16

1.7 Scope of the Study.....17

1.8 Theoretical Framework.....19

1.9 Conceptual Framework 20
1.9.1 Mobile Banking 22
1.9.2 Internet Banking 22
1.9.3 Artificial Intelligence (AI) 22
1.9.4 Blockchain Technology 23
1.9.5 Bank Performance (Dependent Variable) 23
CHAPTER TWO 25
LITERATURE REVIEW 25
2.0 Introduction 25
2.1. Resource Based View Theory 25
2.2 Financial Intermediation Theory 27
2.3 Technology Mediated Learning Theory 28
2.4 The Initial Trust Model 29
2.5 Empirical Review 31
2.5.1 Mobile Banking and Bank Performance 39
2.5.2 Internet Banking and Bank Performance 42
2.5.3 Artificial Intelligence and Bank Performance 46
2.5.4 Blockchain Technology and Bank Performance 48
2.6 Knowledge Gaps 50
CHAPTER THREE 53
RESEARCH DESIGN AND METHODOLOGY 53
3.0 Introduction 53
3.2. Research Design 54
3.3. Target Population 55
3.4. Description of the Sample and Sampling Procedures 56

3.5. Description of Research Instruments 58
3.6. Pilot Testing 59
3.6.1 Validity of Research Instrument 60
3.6.2 Reliability of Research Instrument 62
3.7. Description of Data Collection Procedures 65
3.8. Description of Data Analysis Procedures 66
3.8. Diagnostic Tests 68
3.8.1 Normality Test 68
3.8.2 Homoscedasticity Test 69
3.8.3 Multicollinearity Test 69
3.9 Ethical Considerations 69
CHAPTER FOUR 71
PRESENTATION, DISCUSSION AND INTERPRETATION OF FINDINGS ..... Error! Bookmark not defined.
4.0 Introduction 71
4.1 Instrument Return Rate 71
4.2 Demographic Information of Respondents 72
4.2.1 Name of the Bank 73
4.2.2 Job Title 74
4.2.3 Years of Working 76
4.2.4 Management Level 77
4.3 Descriptive Statistics 78
4.3.1 Mobile Banking and Bank Performance 79
4.3.2 Internet Banking and Bank Performance 85
4.3.3 Artificial Intelligence and Bank Performance 90

4.3.4 Blockchain Technology and Bank Performance 95
4.3.5 Performance of the Listed Commercial Bank 100
4.4 Diagnostic Test Results 104
4.4.1 Auto correlation 104
4.4.2 Normality Test 105
4.4.3 Heteroscedasticity Test 107
4.4.4 Multicollinearity Test 108
4.5 Inferential Statistics 110
4.5.1 Regression Analysis 112
CHAPTER FIVE 119
SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER STUDIES 119
5.0 Introduction 119
5.1 Summary of the Findings 119
5.1.1 Mobile Banking and Bank Performance 119
5.1.2 Internet Banking and Bank Performance 120
5.1.3 Artificial Intelligence and Bank Performance 121
5.1.4 Blockchain and Bank Performance 121
5.1.5 Performance of Listed Commercial Banks 122
5.2 Conclusions 122
5.2.1 Mobile Banking and Bank Performance 123
5.2.2 Internet Banking and Bank Performance 123
5.2.3 Artificial Intelligence and Bank Performance 123
5.2.4 Blockchain Technology and Bank Performance 124
5.2.5 Overall Implications for Bank Performance 124

5.3 Recommendations 125
5.3.1 Enhance Mobile Banking Platforms for Broader Impact on Bank Performance 125
5.3.2 Strengthen Internet Banking Infrastructure for Secure and Transparent Service Delivery 126
5.3.3 Leverage Artificial Intelligence for Strategic Decision Support and Personalization 126
5.3.4 Expand Blockchain Adoption for Secure, Scalable, and Cost-Efficient Operations 127
5.3.5 Policy Recommendations 127
5.4 Suggestions for Further Studies 128
REFERENCES 130
APPENDICES 148
APPENDIX A: QUESTIONNAIRE 148
Appendix B: NACOSTI Research License 157
Appendix C: University Data Collection Letter 159

LIST OF TABLES

Table 3:1 Commercial Banks in Kenya 55

Table 3:2 Sample Size of Respondents from Listed Commercial Banks in Kenya.....57

Table 4.1 Return Rate of Research Instruments 71

Table 4.2 Effect of Mobile Banking Adoption on the Performance of Listed Commercial Banks in Kenya 79

Table 4.3 Effect of Internet Banking Usage on the Performance of Listed Commercial Banks in Kenya 85

Table 4.4 Influence of Artificial Intelligence Integration on the Performance of Listed Commercial Banks in Kenya 90

Table 4.5 Role of Blockchain Technology Adoption on the Performance Metrics of Listed Commercial Banks in Kenya 95

Table 4.6 Performance of Listed Commercial Banks in Kenya 101

Table 4.7 Auto correlation Results 105

Table 4.8 Multicollinearity 109

Table 4.9 Correlation Coefficient Results 110

Table 4.10 Model Summary 112

Table 4.11 ANOVA 115

Table 4.12 Regression Coefficient.....116

LIST OF FIGURES

Figure 1. 1: The Conceptual Framework 21

Figure 4.1 Name of the Bank 73

Figure 4.2. Job Title 74

Figure 4.3 Years of Working 76

Figure 4.4 Normality Plot 106

Figure 4.5 Heteroscedasticity 107

LIST OF ABRIVIATIONATION AND ACRONONYM

AI	Artificial Intelligence
BK	Bank of Kigali
CAR	Capital Adequacy Theory
CBK	Central Bank of Kenya
COVID-19	Coronavirus Disease 2019
EOU	Ease of Use
FinTech	Financial Technology
HF	Housing Finance
I&M	Investments & Mortgages
KCB	Kenya Commercial Bank
KPMG	Klynveld Peat Macwick Goerdeler
MS Excel	Microsoft Excel
NACOSTI	National Commission for Science, Technology & Innovation
NSE	Nairobi Securities Exchange
P2P	Peer-to-Peer
PLC	Public Limited Company
PU	Perceived Usefulness
PwC	Pricewaterhouse Coopers
RBV	Resource Based View
ROA	Return on Assets
ROE	Return on Equity
SACCO	Savings and Credit Cooperative Organization
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
TMLT	Technology Mediated Learning Theory
UK	United Kingdom
USA	United States of America
US	United States
VIF	Variance Inflation Factor

OPERATIONAL DEFINITION OF KEY TERMS

FinTech Adoption	Involves the application of various digital innovations in order to offer the customers with effective and efficient financial services (Gomber et al., 2017).
Organizational Performance	Is the level to which a given firm is able to achieve its own needs and that of its stakeholders in order to grow and be sustainable (Gutterman, 2023).
Artificial Intelligence (AI)	Refers to innovative digital systems that performs activities which requires human intelligence such as customer service and data analysis to identify patterns and obtain meaningful insights (Alarifi & Husain, 2023).
Blockchain Technology	It is a computerized system permitting numerous individuals to record and manage transactions in the absence of a central authority (Wangui, 2023).
Mobile Banking	It is a platform developed by FinTech for customers to execute their financial transactions in a mobile device (Loaba, 2022).
Internet Banking	It is a web-based modality of the banking system that enables the consumers to access and transact financial services without being in the bank physically (Katutu, 2019).

ABSTRACT

Financial Technology (FinTech) referred to the integration of digital innovations such as mobile banking, internet banking, artificial intelligence, and blockchain into financial services to improve efficiency and customer experience. This study examined the effect of FinTech adoption on the performance of commercial banks listed on the Nairobi Securities Exchange (NSE), Kenya. A descriptive cross-sectional research design was adopted, targeting all 11 listed commercial banks. The study was grounded in the positivist research philosophy, which emphasised objective measurement and statistical analysis of observable phenomena. The sample comprised 77 purposively selected managers from top, middle, and lower levels involved in digital banking operations. Purposive sampling was used to ensure participants were knowledgeable about FinTech systems. Data were collected through structured Likert-scale questionnaires. Validity and reliability were ensured, with Cronbach's Alpha confirming internal consistency ($\alpha \geq 0.70$). Data were analysed using SPSS version 28, employing descriptive statistics, correlation analysis, and multiple linear regression. The correlation results indicated a strong positive and statistically significant relationship between FinTech adoption and bank performance ($r = 0.782$, $p < 0.01$), suggesting that higher levels of FinTech integration were associated with improved operational efficiency and profitability. Regression analysis further revealed that mobile banking, internet banking, artificial intelligence, and blockchain collectively explained 61.4% of the variance in bank performance ($R^2 = 0.614$, $p < 0.05$). The study concluded that FinTech adoption had a significant positive effect on the performance of listed commercial banks in Kenya. It recommended that bank management invest more in advanced digital innovations, strengthen cybersecurity measures, and provide continuous training to staff for optimal utilisation of FinTech platforms. These findings are expected to inform strategic FinTech integration for sustainable competitive advantage in the Kenyan banking sector.

CHAPTER ONE

1.0 Introduction

The first part of this chapter is devoted to providing a background examination of the organization's performance as well as the adoption of FinTech. This portion of the chapter then moves on to explain the research issue that has been discovered, which will be addressed in the subsequent section of the chapter. The study aims and the research questions are presented in the third and fourth parts of the report, respectively. The relevance of the research is being discussed in the next part, which is then followed by the scope of the investigation and the limitations of the study. The chapter comes to a conclusion with a discussion of the conceptual framework as well as the theoretical framework involved in the research.

1.1 Background to the Study

Excellent organizational performance is very essential for commercial banks that look forward to survive in the market (Nzyuko, Jagongo & Kenyanya, 2018). However, uncertainty in the business environment characterized by technological advancement and complexities in the business environment has made it difficult for a lot of banks to be confident about their sustainability (Banna, Mia, Nourani & Yarovaya, 2022). This has called for the development of enhanced technological models such as Mobile Banking, Internet Banking, Artificial Intelligence (AI), and Blockchain Technology for banks to build their competitive edge in the market and adapt to the ever-changing business environment (Wangui, 2018). Globally, the financial crisis of 2008, which adversely affected the organizational performance of commercial banks in the United States of America and Europe, has made the banks adopt FinTech, thus pulling back from some of their traditional lending operations with an aim to improve Return on Assets, strengthen Operational Efficiency, and enhance Customer Satisfaction (Schindler, 2017; Wang, Moreira & Liang, 2024).

The latest statistics indicate that more than 64% of consumers all over the world use at least one or more of the FinTech products (Pollio & Cirolia, 2022). Moreover, FinTech as at 2019 managed to obtain a market share amounting to US$187 billion and is forecasted to go up to at least US$4.7 trillion in the future (Pollio & Cirolia, 2022). The digital payment system remains FinTech's core product, holding 25% of its market (Pollio & Cirolia, 2022). With the rise of mobile and internet banking, most customers are getting comfortable using FinTech to conduct their financial transactions, reshaping the global economy (Trificana, 2025). FinTech has made it easy for people to access money and has offered innovative ways for them to save, send, invest, borrow, and manage their resources (Trificana, 2025). Furthermore, FinTech has improved customer satisfaction by reducing the time required to process financial transactions and giving clients more control over their money (Trificana, 2025).

Additionally, FinTech when compared to the traditional financial institutions has decreased the cost of transactions and provides adequate customer support to clients primarily through AI-driven chats and email support to address inquiries and complaints (Trificana, 2025). Blockchain technology has further enhanced operational efficiency by reducing fraud risks, increasing transparency, and lowering administrative costs. For instance, peer-to-peer (P2P) lending sites such as On Deck, Prosper Marketplace, and Lending Club offer reduced rates in order to open up competition for loan products in the international market (Kagan, Estevez & Kvilhaug, 2024). Similarly, mobile-only stock trading platforms such as Robinhood have removed trading fees, improving financial inclusivity and customer satisfaction (Kagan et al., 2024). Business loan providers such as Accion, Kabbage, and Funding Circles also leverage digital platforms to help start-ups easily secure working capital with fewer technicalities (Kagan et al., 2024).

The digital mindset has pressurized traditional financial institutions to adopt FinTech products as an effective strategy for survival in the current market (Kagan et al., 2024). For instance, in 2016 Goldman Sachs, an investment bank, invested in the Marcus digital platform that provides online lending services as a strategy to thrive in the new digital world and remain relevant (Kagan et al., 2024). In the near future, FinTech is predicted to improve on financial inclusivity, rely more on AI to curb fraud risks, advance real-time payments, and expand embedded finance (Trificana, 2025). Even though the industry experienced serious investment shortcomings in 2022, strategic moves were made to acquire MoneyLion, Brigit, Bridge, and other promising digital finance platforms to expand FinTech's investment capacity (Trificana, 2025). In the banking sector, FinTech systems such as equity crowdfunding, third-party payment solutions, and P2P lending are seizing a considerable market share of the credit market that traditional banks initially possessed. Consequently, these banks are forced to adopt advanced mobile banking, internet banking, AI, and blockchain-based solutions to comprehensively digitalize their operations, improve return on assets, enhance operational efficiency, and achieve greater customer satisfaction, thereby curbing the risk of corporate failure (Wang, Moreira & Liang, 2024).

1.1.1 Global Perspective of Performance of Commercial Banks

Globally, two-thirds of the consumers in all sectors uses two or more FinTech products or services which is becoming part of their daily lives (Trificana, 2025). The value of the global FinTech market as at 2024 was US $ 340.10 billion and it has been forecasted to increase to US $ 398.88 billion by the end of 2025 and its value could rise up to US $ 1,126.64 billion by the end of 2032 (Fortune Business Insights, 2025). Besides that, North America (USA and Canada) led globally by accumulating 34.05% of FinTech's market share (Fortune Business Insights, 2025). The COVID-19 pandemic that restricted physical movements catalysed the adoption of FinTech services globally (Fortune Business Insights, 2025). Thus, the global

FinTech firms providing financial transaction services were able to enjoy a surge of demand of contactless payments, e-commerce and digital wallets (Fortune Business Insights, 2025).

Due to increased cybercrime activities that has adversely affected the global financial institutions, the FinTech organizations are improving security measures to limit fraud risk and protect the privacy of the financial transactions together with the personal data provided by customers in online platforms (Fortune Business Insights, 2025). Moreover, the upsurge of demand for real-time payments in the global market has led to the provision of innovative cross-border financial transactions (Fortune Business Insights, 2025). In the United Kingdom (UK) and Europe, the banking industry has been radically affected by FinTech with regard to how they offer and utilize financial services (Karangara, 2023). FinTech adoption in the UK and Europe has improved customer service provision, enhanced competitiveness in the global banking market and financial innovations (Karangara, 2023). Though UK is dealing with legal uncertainties and data security issues in FinTech's market system (Karangara, 2023). By June 2024, UK was leading in the number of FinTech products adopted in Europe, standing at 52 out of 150 products as well as 25,000 funded start-ups (Akin, 2024).

In Vietnam, FinTech has grown from 39 enterprises in 2015 to 188 in 2021 seizing a lot of untapped opportunities that traditional banks failed to notice thus attracting interest from foreign investors (Pham, Tran, Huynh, Popesko & Hoang, 2024). Peer-to-Peer lending, digital payments, Blockchain technology, cryptocurrencies, point of sale and investement tech systems are the major FinTech services offered in Vietnam accounting for 76% of FinTech's market share (Pham et al., 2024). In 2021, Vietnam was the third nation globally in terms of FinTech transaction value after investing a total of US $ 375 million (Pham et al., 2024). In China and India, virtually all commercial banks have completely moved away from traditional business operations to digitalized business operations that involves internet banking, digital

payment and loaning services, Blockchain operations and artificial intelligence systems which has led to increased customer satisfaction and sustainable cost-saving strategies (Katutu, 2019).

1.1.2 Regional Perspective of Performance of Commercial Banks

FinTech adoption in Africa is relatively young when compared to other global regions since most of the FinTech business players came into the African market after 2011 (Behren & Musanhu, 2017). Currently, there are three major FinTech hubs in Africa in terms of size, namely South Africa accounting for 45%, Kenya accounting for 22%, and Nigeria accounting for 15% (Behren & Musanhu, 2017). Seven main segments in the FinTech sector have dominated the African market, including money transfers and payments, enabling processes and technology, eMarketplaces, banking and lending, InsureTech, financial data analytics, together with savings and investment (Behren & Musanhu, 2017). As of 2020, 10% of all transactions in Africa were digital, with FinTech revenues rising to US$4–6 billion and characterized by 3–5% market penetration, which is still low compared to other continents (McKinsey & Company, 2022). Nevertheless, supportive government policies in various African nations and increased foreign investments are catalyzing the rapid growth of FinTech in Africa (Nach, 2024).

The greatest breakthrough of FinTech penetration in Africa was the introduction of digital financial transactions through mobile banking and internet banking, which have been able to tap rural markets where traditional banking infrastructure is limited (Nach, 2024). The mobile payment system has enhanced convenience in conducting financial transactions and has fostered financial inclusion across both high- and low-income groups (Nach, 2024). Furthermore, these digital platforms have provided diverse financial solutions, including affordable credit, remittance services, investment platforms, and insurance products, which directly contribute to improved customer satisfaction (Nach, 2024).

In addition, Artificial Intelligence (AI) and Blockchain Technology are increasingly being adopted in Africa's financial systems to strengthen fraud detection, reduce operational inefficiencies, and increase transparency in transactions. By improving security and efficiency, these technologies enhance banks' ability to improve operational efficiency while optimizing resources. However, challenges such as legal uncertainty remain barriers to FinTech adoption, since regulatory frameworks in some African countries have not been reviewed to ease the operations of digital businesses (Appiah & Agblewornu, 2025). Operational inefficiencies such as cyber-attacks, data breaches, and fraud are also hindering adoption, while the relatively low uptake of Peer-to-Peer lending and crowdfunding continues to weaken the competitiveness of African financial systems in the global market (Appiah & Agblewornu, 2025).

Evidence across the continent shows mixed results. For example, banks in Ghana and Nigeria have increased their level of profitability and competitiveness due to the adoption of e-payment and e-commerce services (Katutu, 2019). This reflects an improvement in return on assets as a measure of bank performance. Conversely, in Ethiopia, most banks are still struggling to achieve efficiency since they have not fully adopted FinTech solutions (Katutu, 2019). In East Africa, slow adoption of FinTech has contributed to an increase in non-performing loans in Rwanda, Uganda, South Sudan, and Burundi, thereby adversely affecting financial performance (Kenya Financial Sector Stability Report, 2023). Moreover, inadequate adoption of mobile and internet banking services has limited credit uptake by both individual and corporate consumers (Kenya Financial Sector Stability Report, 2023). The slow digital adoption has also weakened banks' ability to overcome increased credit risks and stringent monetary policies in the region (Kenya Financial Sector Stability Report, 2023).

1.1.3 Local Perspective Performance of Commercial Banks

Today, Kenya is among the top four FinTech hubs in Africa, besides Egypt, Nigeria, and South Africa (Malyshev, 2025). This is because Kenya has a very supportive regulatory framework that facilitates FinTech adoption and because most Kenyans rely on mobile banking and internet banking services to conduct their financial transactions (Malyshev, 2025). Kenya has made considerable progress in expanding its digital financial services since 2006, with the financial inclusion rate shooting up to 89% in 2019 from 26.7% in 2006 (Adhing'a & Gatauwa, 2023). As of 2024, the M-PESA mobile payment services accounted for 61 million transactions every day, covering a large share of digital bill payments, peer-to-peer (P2P) transfers, lending, savings, and merchant transactions (Malyshev, 2025). This explains why Kenya is ahead in mobile money usage at 68.66% in Africa, followed closely by Ghana and Gabon at 59.69% and 57.67% respectively (Musamali, Jugurnath & Maalu, 2025). The Kenyan digital payment market is projected to grow by 14.1% annually from 2024 to 2028, with the market value expected to increase up to US $14.54 billion by the end of 2028 (Malyshev, 2025).

FinTech adoption has greatly promoted the growth and expansion of small and medium-sized enterprises (SMEs) in Kenya by availing cheaper and more accessible credit services to SME owners through digital platforms, thereby boosting their businesses and improving the overall economy (Tiony & Yin, 2024). This has also led to the creation of numerous job opportunities in Kenya (Zhang, 2020). Specifically, the adoption of mobile and internet banking has enhanced customer satisfaction by improving convenience and accessibility of financial services. Similarly, Artificial Intelligence (AI) applications, such as automated customer service and fraud detection systems, have helped banks improve their operational efficiency. Moreover, the adoption of Blockchain Technology has enhanced transparency, reduced transaction costs, and increased the security of financial transactions, thereby contributing to improved return on assets for Kenyan banks.

Despite the successful penetration of FinTech services in Kenya, challenges such as cybersecurity threats and infrastructural deficits have limited the full potential of FinTech adoption (Chen & Zhang, 2019). Nonetheless, the sector continues to attract significant investment. For example, Kenya secured US $482 million in venture funding for FinTech adoption in 2022 (Santosdiaz, 2022). The FinTech subsectors in Kenya demonstrate this diversification: the lending subsector accounts for 30% of all FinTech services, followed by the payments subsector at 27%, and the Blockchain subsector at 15% (Santosdiaz, 2022). These subsectors show the growing importance of mobile banking, internet banking, AI, and blockchain technology in influencing key organizational performance outcomes such as return on assets, operational efficiency, and customer satisfaction in the Kenyan banking industry.

1.1.4 FinTech as a Concept

FinTech consists of two words, namely; financial (Fin) and technology (Tech) (Gomber, Koch & Siering, 2017). FinTech involves the application of various digital innovations in order to offer the customers with effective and efficient financial services (Gomber et al., 2017). FinTech emerged in the 1860s when PENTELEGRAPH was invented to help the banking institutions to verify signatures (Zeidy, 2022). Then in 1918 the Telegraph & Morse code system was developed to promote electronic fund transfer in the financial system (Zeidy, 2022). The 1960s saw the emergence of FinTech 2.0 which led to the introduction of ATM machines to process withdrawal transactions and in 1971, the first electronic stock market (NASDAQ) was established in USA (Zeidy, 2022). Then in the 1980s, the first online banking and electronic trade systems were developed, for instance, in 1982, E-trade was conceived (Zeidy, 2022). In the late 1990s, E-commerce was revolutionized after PAYPAL systems were introduced to promote cashless payments (Zeidy, 2022).

In the early 2000s more sophisticated FinTech products under the categories of FinTech 3.0 and 3.5 emerged, they comprised of Bitcoin cryptocurrency systems in 2009 and P2P payment systems in 2011 together with other more advanced systems such as InsurTech, RegTech and Wallets (Zeidy, 2022). FinTech adoption improves the efficiency of the financial markets through the delivery of financial services in a digitalized way that is less costly and less time consuming (Wu, Pathan & Zheng, 2024). Examples includes online banking, peer-to-peer lending and Crowdfunding platforms that are used for payment services, loan disbursements, cash deposit and investment services (Wu et al., 2024). It also includes digitalized risk management and data processing systems for market support services such as Block-chain technology, Robo-advisors, Artificial Intelligence and Machine Learning (Wu et al., 2024).

FinTech adoption has made it easy for consumers to access financial products offered by the financial institutions thus improving financial inclusivity (Kipkoech, 2023). Besides that, it has enhanced security in financial transactions thus winning the trust of the customers and improving their level of satisfaction and loyalty to the given financial institutions (Sharma, Gupta & Taneja, 2024). There are several conceptualizations of FinTech adoption that have been developed research scholars such as Koyo (2017), Le, Mai, Phan, Nguyen and Le (2021), Katutu (2019), Wangui (2023) together with Ghode, Yadav, Jain and Soni, 2023). These conceptualizations include mobile banking, internet banking, Artificial Intelligence (AI) and Blockchain technology.

Koyo (2017) and other research scholars such as Chepkorir, Kemboi and Bett (2022) together with Kipkoech (2023) conceptualized FinTech adoption as mobile banking. Mobile banking is a platform developed by FinTech for customers to execute their financial transactions in a mobile device (Loaba, 2022). Mobile banking has cut down on the reliance of physical branches and has provided customers timely access and processing of loan products,

convenient payment services, secured cloud saving platforms and ability to check and manage personal finances (Anwar, 2019; Loaba, 2022). Le et al. (2021) together with Kipkoech (2023) observed that mobile banking systems with digital payment services considerably improves the financial performance of commercial banks in Vietnam and Kenya respectively. Mobile banking had been operationalized as frequency of transactions through mobile phones. Mobile banking with digital payment systems offers the much needed convenience and efficiency of financial transactions to the customers thus boosting their level of satisfaction (Okino, 2013). This study borrowing from the works of Le et al. (2021), Koyo (2017) and Kipkoech (2023) will conceptualize FinTech adoption as mobile banking, which will be the first independent variable denoting FinTech adoption.

Besides that, Katutu (2019), Kagan et al. (2016), De Young, Lang and Nolle (2015) together with Hernando and Nieto (2016) conceptualized FinTech adoption as internet banking. Internet banking can be defined as a web-based modality of the banking system that enables the consumers to access and transact financial services without being in the bank physically (Katutu, 2019). Internet banking has decreased the operational costs incurred by the banks and the reduction of regulatory costs due to increased transparency thus leading to improved profitability (Katutu, 2019). Kagan et al. (2016) observed that the provision of a wide range of banking services through the various internet platforms led to improved financial performance of American banks between 2005 and 2015. Similarly, De Young, Lang and Nolle (2015) who carried out a study in Oslo, Norway observed that the adoption of internet banking led to the improved financial performance of the banks between 2006 and 2010. Hernando and Nieto (2016) also observed that internet based banking leads to decreased operational expenses which consequently leads to improved return on assets. Besides that, Katutu (2019) who focused on tier one commercial banks in Kenya observed that the adoption of internet banking leads to

increased transaction of finances via the web-based platforms of the given commercial banks thus leading to their improved financial performance.

Borrowing from the studies carried out by, Katutu (2019), De Young et al. (2015), Kagan et al. (2016) and Hernando and Nieto (2016), FinTech adoption will also be operationalized as internet banking involving fund transfer, bill payments and wealth management through online financial platforms. Thus, internet banking will be our second independent variable.

Alarifi and Husain (2023), Wangui (2023), Kombe and Wafula (2018) together with Madugba, Egbide, Jossy, Agburuga and Chibunna (2021) conceptualized FinTech adoption as Artificial Intelligence (AI). Artificial intelligence (AI) can be referred to as innovative digital systems that performs activities which requires human intelligence such as customer service and data analysis to identify patterns and obtain meaningful insights (Alarifi & Husain, 2023). AI is instrumental in evaluating and managing the environmental risks linked to the lending activities (Dwivedi, Alabdooli & Dwivedi, 2021). AI-powered solutions have played an important role in attending to customer needs and solving customer complaints thus enhancing efficiency and prompt delivery of banking services (Wangui, 2023). Studies carried out by Kombe and Wafula (2018), Wangui (2023), Ene, Abba and Fatokun (2019) together with Madugba, Egbide, Jossy, Agburuga and Chibunna (2021) observed that AI leads to increased efficiency and customer satisfaction thus enhancing the banks' profits. This is because AI-powered solutions such as virtual assistants and Chatbots provides precise solutions to customer queries thus reducing the response times which eventually leads to improved customer satisfaction and connections to more customers (Ahamed & Mallick, 2019). Moreover, the automation of basic tasks in the bank such as queuing, balance inquiries, money counting and account transfers has reduced the workload of the employees in order to focus on more complex tasks (Nazaritehrani & Mashali, 2020).

Borrowing from the studies carried out by Alarifi and Husain (2023), Wangui (2023), Kombe and Wafula (2018), Ene, Abba and Fatokun (2019) together with Egbide et al. (2021), FinTech adoption will also be conceptualized as Artificial Intelligence (AI). This will be the third independent variable of the study. Guided by the aforementioned studies, AI will specifically be operationalized as use of AI for customer service, fraud detection and data analysis.

Finally, FinTech adoption has been conceptualized as Blockchain technology by research scholars such as Wangui (2023), Ghode, Yadav, Join and Soni (2023), Oburu (2018), Dotun and Adesugba (2021) together with Brotoboh and Ekwevubge (2020). Blockchain technology is a computerized system permitting numerous individuals to record and manage transactions in the absence of a central authority (Wangui, 2023). One of the instrumental features of Blockchain technology is that it provides a highly secured and transparent system for managing financial transactions (Ghode, Yadav, Jain & Soni, 2023). Thus, it limits fraudulent financial transactions, reduces transactional costs and improves speedy transactions in an efficient way (Tseng, Liang & Nguyen, 2023). Blockchain systems dictates for transactions to be recorded in a block which is joined to the previous block thus sealing off any loopholes that could lead to fraud (He, 2021).

Oburu (2018), Dotun and Adesugba (2021) together with Brotoboh and Ekwevubge (2020) observed that Blockchain technology considerably improves the financial performance of banks in Kenya and Nigeria respectively. Additionally, Tadese and Gidey (2021) also observed that Blockchain technology considerably increases the financial performance of banks in Ethiopia. Borrowing from the studies carried out by Oburu (2018), Dotun and Adesugba (2021), Brotoboh and Ekwevubge (2020), Ghode et al. (2023) and Wangui (2023) FinTech adoption will be conceptualized as Blockchain technology. This will be our fourth independent

variable. Blockchain technology will specifically be operationalized as security checks, cross border payments and transparency in finance.

1.2 Statement of the Problem

The integration of Financial Technology (FinTech) into banking operations has become a transformative force globally, redefining how financial services are delivered, accessed, and consumed. Despite the central role of the banking sector in Kenya's economic growth and development (Abdullahi, 2020), the performance of listed commercial banks has shown a negative trend from 2019 to 2024. Specifically, return on Assets (ROA) decreased by 0.07%, non-performing loans rose from 11% to 13.33%, and the capital adequacy ratio dropped from 17.91% to 17.21% (KPMG, 2024). Net profitability further declined by 9.1% from Kshs 241.52 billion in 2022 to Kshs 219.21 billion in 2023 (Kenya Bankers Association, 2024). These declines point to weakening financial health, despite significant investments in digital banking transformation.

The adoption of FinTech solutions such as mobile banking applications, blockchain technology, internet banking, and artificial intelligence (AI) is increasingly evident among commercial banks. This trend has been largely driven by a tech-savvy population, a high mobile phone penetration rate of over 91% (CAK, 2024), and supportive regulatory frameworks established by institutions such as the Central Bank of Kenya (CBK). However, the impact of FinTech adoption on operational efficiency and customer satisfaction has been uneven. For example, while mobile money usage in Kenya is among the highest globally at 68.66% (Musamali, Jugurnath & Maalu, 2025), some listed banks continue to report rising cost-to-income ratios, reflecting inefficiencies in integrating digital innovations into core banking models (KPMG, 2024).

Furthermore, despite Kenya having over 200 active FinTech startups and being ranked among Africa's leading FinTech hubs (FSD Kenya, 2023), the performance of traditional banking institutions particularly those listed on the Nairobi Securities Exchange (NSE) has not uniformly mirrored this innovation growth. These eleven listed banks hold more than 60% of the total banking sector assets in Kenya (KBA, 2024), yet some continue to experience low returns on assets, operational inefficiencies, and declining customer satisfaction levels. For instance, customer complaints regarding delayed digital services increased by 14% between 2022 and 2023, showing that the quality of FinTech-enabled services has not always met consumer expectations (Ndine et al., 2022). Moreover, the cost-to-income ratio among listed banks rose from 55% in 2021 to 59% in 2023, signaling declining operational efficiency despite digital investments (KPMG, 2024).

Although all NSE-listed commercial banks have introduced FinTech-driven services such as mobile banking apps, AI-enabled customer support, and blockchain trials, the scale, scope, and efficiency of these innovations vary significantly. There is limited empirical evidence to show whether FinTech adoption has directly translated into improved ROA, cost efficiency, or customer experience. In a rapidly evolving digital landscape, failure to understand and measure the effectiveness of FinTech strategies may expose banks to increased risks, inefficiencies, and loss of market share (Ndine et al., 2022; KPMG, 2024).

Existing literature by Chepkorir et al. (2022), Ndine et al. (2022), Katutu (2019), and Wangui (2023) treats FinTech broadly and lacks disaggregation of its specific components such as mobile banking, internet banking, AI, and blockchain technology. This creates a conceptual gap, as the isolated effects of these innovations on ROA, efficiency, and customer satisfaction remain unexplored. Moreover, a contextual gap exists since most studies did not focus on NSE-listed banks in Kenya, instead targeting non-listed or international institutions, ignoring the unique regulatory and operational context of the Kenyan market. Methodologically, past

studies relied on cross-sectional designs, limiting their ability to identify causal relationships or assess the strategic value of FinTech using frameworks such as the Balanced Scorecard (BSC).

This study, therefore, seeks to address the gap by examining the influence of FinTech adoption on the financial performance of listed commercial banks in Kenya. Specifically, it will assess how various FinTech components mobile banking, internet banking, AI, and blockchain technology correlate with performance indicators such as Return on Assets (ROA), operational efficiency, and customer satisfaction. The findings will offer valuable insights for bank executives, investors, and policymakers seeking to align FinTech innovation with sustainable banking performance in the Kenyan market.

1.3 General Objective

The general objective of this study is to examine the effect of FinTech adoption on the performance of listed commercial banks in Kenya.

1.4 Specific Objectives

i. To examine the effect of mobile banking adoption on the performance of listed commercial banks in Kenya.

ii. To assess the impact of internet banking usage on the performance of listed commercial banks in Kenya.

iii. To determine the influence of artificial intelligence integration on the performance of listed commercial banks in Kenya.

iv. To analyse the relationship between the adoption level of blockchain technology and the performance metrics of listed commercial banks in Kenya.

1.5 Research Questions

i. How does mobile banking influence the performance of listed commercial banks in Kenya?

ii. To what extent does internet banking contribute to the performance of listed commercial banks in Kenya?

iii. In what ways does the integration of artificial intelligence affect the performance of listed commercial banks in Kenya?

iv. What relationship exists between the adoption of blockchain technology and the performance outcomes of listed commercial banks in Kenya?

1.6 Significance of the Study

This study holds significance for multiple stakeholders across the financial sector:

Commercial banks will gain practical insights into how the adoption of FinTech tools such as mobile banking, internet banking, artificial intelligence, and blockchain technology can improve performance indicators like operational efficiency, cost reduction, customer satisfaction, and return on investment. By understanding these effects, banks can better align their innovation strategies with profitability goals and optimize their service delivery models.

Government and regulatory authorities will benefit from the findings by gaining evidence-based insights into the relationship between FinTech adoption and banking performance. This information is crucial in designing policies and regulatory frameworks that encourage responsible innovation, protect consumers, and promote financial inclusion while ensuring the stability of the financial system.

FinTech developers and technology providers will benefit by understanding which innovations are most impactful to bank performance. This enables them to tailor their products and services to meet the actual operational needs of the banking industry and foster more targeted, user-centric innovation.

Investors and shareholders will find the study valuable in understanding the role of digital innovation in enhancing bank competitiveness. With clearer visibility on the performance

outcomes of technology adoption, they can make more informed investment decisions in FinTech-savvy banking institutions.

The academic and research community will benefit from the study's contribution to the growing body of scholarly knowledge in financial innovation and institutional performance. Future researchers especially those exploring other financial institutions such as insurance firms and SACCOs will find it useful as a reference point for comparative or extended studies on the effect of FinTech across different sectors.

The general public and bank customers will indirectly benefit from enhanced customer experience through increased access, speed, reliability, and security of banking services. The study promotes service models that are more efficient and customer-friendly.

1.7 Scope of the Study

This study primarily focused on evaluating the influence of FinTech adoption on the performance of commercial banks listed on the Nairobi Securities Exchange (NSE) from 2019 to 2024. The performance of these banks was examined in relation to four specific FinTech components: mobile banking, internet banking, artificial intelligence, and blockchain technology. These components were selected based on their relevance, prevalence in Kenya’s banking landscape, and their capacity to digitally transform banking operations for improved service delivery and competitive advantage.

The study targeted eleven commercial banks listed on the NSE, chosen because they consistently provided publicly available, reliable, and verifiable data concerning both FinTech adoption and organizational performance. These banks were also bound by corporate governance rules, transparency regulations, and shareholder accountability, making them ideal for studying FinTech integration. Their relatively higher regulatory compliance and investment

in innovation made them well-suited to evaluating how advanced technologies influenced strategic outcomes.

The unit of observation in the study included top-level bank officials directly involved in digital transformation and FinTech strategy. Specifically, the respondents included Chief Technology Officers (CTOs), Heads of Digital Banking, Heads of Information and Communication Technology (ICT), and Chief Operating Officers (COOs). These professionals were purposively selected because of their direct knowledge and experience with the implementation and operationalization of FinTech initiatives in their institutions. A total of 77 respondents participated, selected using purposive sampling to ensure data relevance and depth.

Data for the study was collected through standardized questionnaires tailored to assess respondents' perceptions, experiences, and observations regarding the impact of the four FinTech strategies on the performance of their institutions. The data collection process focused exclusively on primary data to maintain freshness, accuracy, and contextual relevance. The study did not include secondary data such as financial statements, archived reports, or regulatory filings.

The analysis was conducted using SPSS version 28, applying both descriptive and inferential statistics to explore patterns and relationships. Multiple linear regression analysis was employed to examine the effect of the independent variables (mobile banking, internet banking, artificial intelligence, and block chain technology) on the dependent variable (bank performance). The study aimed to offer evidence-based insights into how the adoption of specific FinTech solutions contributed to improvements in efficiency, customer service delivery, innovation, and profitability.

1.8 Theoretical Framework

This study will be grounded on the Technology-Organization-Environment (TOE) Framework developed by Tornatzky and Fleischer (1990). The TOE framework offers a comprehensive model for examining how organizations adopt and implement technological innovations such as FinTech. It emphasizes that the adoption of technology within an organization is influenced by three key contexts: technological, organizational, and environmental.

The technological context encompasses the characteristics of the FinTech innovations being adopted, including their relative advantage, complexity, and compatibility. In the banking sector, technologies such as mobile banking, online banking, artificial intelligence (AI), and blockchain are seen as tools that can enhance service delivery, efficiency, and innovation. According to Mutua (2013), Kipkoech (2023), and KPMG (2024), these technologies help automate operations, enhance data security, and streamline workflows, thereby improving performance.

The organizational context refers to the internal resources, structures, and capabilities of a bank that influence FinTech adoption. These include bank size, technical infrastructure, and human capital. As noted by Abusalma (2021) and Mutuku and Nyaribo (2015), the presence of a skilled workforce and adaptive organizational culture significantly contributes to innovation readiness and flexibility in adopting new technologies like AI.

The environmental context includes external factors such as competition, regulatory pressures, and customer expectations. The growing demand for digital financial services in Kenya, combined with a competitive financial environment and regulatory reforms by the Central Bank of Kenya, create an enabling or constraining environment for FinTech adoption. According to Chepkorir et al. (2022), Alotaibi and Alghamdi (2022), and Wangui (2023), environmental factors are crucial drivers in influencing the pace and scope of technological innovation in banks.

This framework assumes that FinTech adoption is not only a technical decision but also a strategic and organizational process that impacts multiple performance dimensions. These include operational efficiency, customer satisfaction, innovation capacity, and financial performance such as Return on Assets (ROA). Prior studies, including those by Fibriyanti and Nurcholidah (2021), Boy-White, Kindness, and Kvilhaug (2024), and Yoewono and Prabowo (2024), have linked FinTech innovations to improved financial outcomes and customer experiences.

In this study, the TOE framework provides a structured approach for analyzing how technological, organizational, and environmental factors interact to influence the performance of listed commercial banks in Kenya. The framework will guide the examination of how the adoption of mobile banking, internet banking, artificial intelligence, and blockchain affects customer value, internal process efficiency, innovation capacity, and financial sustainability.

1.9 Conceptual Framework

This study explores the effect of FinTech adoption on the performance of commercial banks listed on the Nairobi Securities Exchange (NSE). The conceptual framework presents FinTech adoption as the independent variable comprising mobile banking, internet banking, artificial intelligence (AI), and blockchain technology and bank performance as the dependent variable. Each FinTech component is expected to influence bank performance through various operational and customer-driven outcomes.

Independent Variable

FinTech adoption **Dependent Variable**

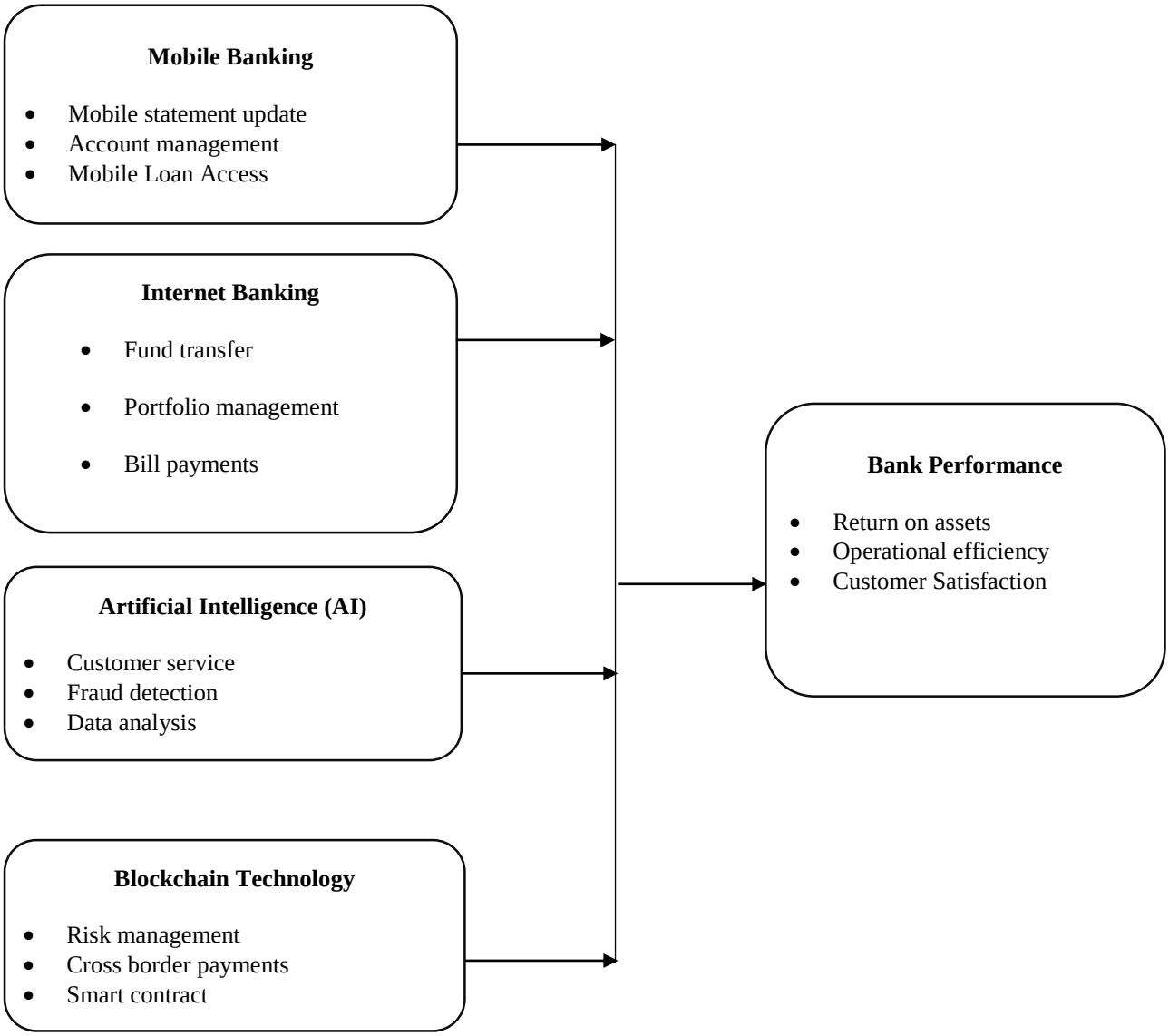


Figure 1. 1: The Conceptual Framework

1.9.1 Mobile Banking

Mobile banking involves using mobile devices to conduct financial transactions such as checking account balances, transferring funds, and making payments. It provides convenience, real-time access, and cost efficiency for both banks and customers. According to Boy-White and Kvilhaug (2024), mobile banking adoption improves customer experience, increases transaction volumes, and contributes positively to bank profitability and financial performance, particularly return on assets (ROA). Mobile platforms also enhance financial inclusion by reaching underbanked populations, especially in developing economies like Kenya.

1.9.2 Internet Banking

Internet banking allows customers to perform financial transactions via online platforms. It enhances accessibility, service delivery speed, and transparency, enabling banks to serve customers remotely and efficiently. Mao, et al., (2023) indicate that internet banking significantly enhances customer satisfaction and loyalty, leading to higher retention rates. Additionally, it enables banks to reduce branch-related costs and automate routine services, thereby improving operational efficiency and overall organizational performance.

1.9.3 Artificial Intelligence (AI)

Artificial intelligence (AI) in banking refers to the use of smart systems to automate customer service, detect fraud, provide predictive analytics, and personalize offerings. AI tools such as chatbots and machine learning models improve decision-making and reduce manual errors. Alotaibi and Alghamdi (2023) assert that AI contributes to operational efficiency, risk reduction, and customer engagement. These outcomes lead to better resource utilization, quicker turnaround times, and stronger financial performance.

1.9.4 Blockchain Technology

Blockchain is a secure, decentralized ledger system that enhances transparency and trust in financial transactions. It eliminates intermediaries, reduces fraud, and ensures transaction integrity. According to KPMG (2024), blockchain adoption allows banks to streamline cross-border payments, reduce transaction costs, and improve data security. These advantages support greater compliance, customer trust, and internal control all of which strengthen a bank's overall performance.

1.9.5 Bank Performance (Dependent Variable)

Bank performance in this study refers to the overall effectiveness and outcomes achieved by commercial banks listed on the Nairobi Securities Exchange as a result of FinTech adoption. It is viewed as a multi-dimensional concept that includes financial performance, operational efficiency, customer satisfaction, and innovation capacity. Financial performance is commonly measured using indicators such as Return on Assets (ROA), Return on Equity (ROE), and net profit margins, which reflect the bank's ability to utilize its resources effectively (Fibriyanti & Nurcholidah, 2023). Operational performance focuses on cost reduction, speed of service delivery, and accuracy of internal processes, all of which are positively influenced by the automation and digital capabilities introduced by FinTech innovations like artificial intelligence and blockchain (Alotaibi & Alghamdi, 2023). Customer satisfaction, another key dimension, is improved through enhanced service accessibility, personalization, and digital engagement made possible by mobile and internet banking platforms (Mao, Obote, & Yoweri, 2023). In addition, innovation capacity reflects the bank's ability to develop and implement new financial products or processes in response to changing market demands and technological advancements. As highlighted by Boy-White and Kvilhaug (2024), banks that successfully integrate FinTech tools tend to achieve stronger market competitiveness, better risk

management, and long-term sustainability. Thus, this study assesses how these varied aspects of performance are influenced by the strategic implementation of FinTech solutions.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter is made up of three sections. The first section discusses the four theories linked to each variable and their relevance to the specific objectives. The section also discusses the criticisms which the given theories faces. The second section is the empirical review which discusses the studies which investigated the effects of FinTech adoption or organizational performance. The final section discusses the contextual, theoretical, conceptual and the methodological gaps observed from the studies reviewed and how they are going to be filled.

2.1. Resource Based View Theory

The earliest pioneer of the Resource Based View (RBV) theory was Wernerfelt (1984) when he developed the concept that the product and the resources of the firm are related to each other in that for a product to be competitive then the firm has to exploit the resources it possesses in the business environment. The theory was later on expounded by Barney (1986) by proposing that for a firm to achieve sustained competitive advantage then it must employ rare, valuable and inimitable resources in developing its products and services. This concept has become the cornerstone of RBV which subsequent research scholars have relied on up to date (Armando, 2017). It has been argued that if organizations have similar resources that subjects them to compete in the same way, then they will not be able to attain sustained competitive advantage thus lowering their overall organizational performance (Armando, 2017). Sustained competitive advantage can be realized by exploiting the internal strengths of the firm (Armando, 2017). These internal strengths can only be achieved through responding to environmental opportunities that have not been explored while at the same time minimizing external threats that could arise and overcoming internal weaknesses (Armando, 2017).

Barney (1986) posited that the internal resources which firms can employ to achieve sustained competitive advantage comprises of; all assets, knowledge, organizational processes, information and capabilities that are controlled by the firm and are heterogeneous in nature. For firms to be strategic, they must develop products and services that are rare in the market but highly demanded by the customers in order for value to be created (Armando, 2017). Moreover, they must be costly to be imitated by the business rivals and must be developed in such a way that they are non-substitutable (Armando, 2017). The RBV is linked to mobile banking which is the first independent variable of the study. This is because most banks have customized their mobile banking services to be unique, inimitable and non-substitutable with regards the loan products they offer and how quick they can be processed (Loaba, 2022; Kipkoech, 2023). Moreover, the loan repayment time periods and the grace periods offered by the banks through mobile banking are different made with an aim of attracting and expanding their customer base (Anwar, 2019; Loaba, 2022). Therefore, in line with the first specific objective, this study will seek to establish how mobile banking has been employed by the listed commercial banks in Kenya as a unique, inimitable and non-substitutable resource for achieving strategic competitive advantage in the Kenyan financial market.

The RBV suffers from several criticisms. The first criticism is linked to the concept of the value of a particular resource (Armando, 2017). This is because Priem and Butler (2001) pointed out that it is hard to determine whether a given resource is valuable or it is just idiosyncratic. Besides that, Aragón-Correa and Sharma (2003) contended that a firm is not a closed system as hypothesized by RBV since the firm is subject to external forces such as the political environment, the legal system and the socio-cultural environment. Finally, RBV has been criticized for lacking a definite level of analysis since the resource analysis levels in the RBV literature are mixed (Priem & Butler, 2001).

2.2 Financial Intermediation Theory

The earliest pioneer of the Financial Intermediation theory was Gurley and Shaw (1960). Its foundation stems from the Agency theory and information asymmetry (Kemboi, 2018). The theory emphasizes how financial intermediary is important in eliminating the information asymmetry between the depositors and the borrowers (Kemboi, 2018). In the context of the banking industry, the banks act as the intermediator by taking the depositors' money from the financial market since the money is surplus thus leading to depositors to entrust the banks to store it from them, then the banks lend out the money received from the depositors to the borrowers who are experiencing financial deficits (Scholtens & Wensveen, 2003). Financial intermediaries are very essential for creating and distributing financial goods and services (Kemboi, 2018). Market imperfections such as high transaction costs (that can cause inconveniences), information asymmetry and government regulations necessitates the presence of financial intermediaries such as banks (Mutuku & Nyaribo, 2015; Yasin, 2018).

The theory is linked to the second independent variable of the study which is internet banking. This is because banks are employing internet banking systems to encourage customers to deposit or transfer their money online into their bank accounts without physically going to the bank and based on those platforms the banks can easily avail the given finances as loan products digitally to the borrowers who are need of money (Katutu, 2019). Thus, eliminating information asymmetry in cases whereby the borrowers are in need of finances but cannot access it or in cases whereby the depositors are in need to save their surplus money into their bank accounts without necessarily going physically to the banks especially with regards to those who have large sums of money in MPESA, Airtel Money or Paypal platforms (Katutu, 2019; Kenya Financial Sector Stability Report, 2023). The theory is relevant to the second specific objective since it seeks to establish how internet banking has enabled to eliminate

information asymmetry and high transactions costs between the depositors and the lenders thus leading to improved organizational performance among the listed commercial banks in Kenya.

The major shortcoming of the Financial Intermediation theory is that it fails to consider factors such as interest rates and liquidity hazards in managing financial risks (Scholten & Wensveen, 2000). This is because the given risks play an important role in preserving the stability of the financial intermediaries (Scholten & Wensveen, 2000). Besides that, Scholten and Wensveen (2003) contended that the Financial Intermediation theory does not provide a deeper explanation of the behaviour of real-life financial intermediaries in varying political, socio-economic and legal environments.

2.3 Technology Mediated Learning Theory

The Technology Mediated Learning Theory (TMLT) was initially conceived and proposed by Gupta and Bostrom (2009). The theory posits that access to numerous tools and resources such as AI technologies leads to optimal learning, effectiveness, convenience and productivity in the banking industry (Kassa & Worku, 2025). The theory argues that the adoption of AI technologies facilitates effective learning by expanding the spectrum of information available with regard to how organizational processes should run and it also improves both individual and organizational performance (Kassa & Worku, 2025). Thus, the theory is linked to the third independent variable which is AI since AI improves productivity and human capabilities by automating routine tasks that are time consuming thus saving enough time for employees to focus on highly complex responsibilities (Russel & Norvig, 2015). Consequently, employees become more productive and the customers gets satisfied with the services offered to them especially in the banking industry, thus improving organizational performance (Russel & Norvig, 2015).

The theory is relevant to the third specific objective of the study since it seeks to establish if the AI mediated tools and processes of the listed commercial banks in Kenya effectively smoothens banking operations thus improving employee capabilities, productivity, customer satisfaction and financial performance. TMLT has been criticized for solely focusing on individual learning rather than team-based learning which a lot of research scholars have established to be the most effective way of being productive (Mayers & Schwemmle, 2023). Besides that, TMLT has been criticized for widening the gap between the people who can access and be conversant with technology and those who are not able to access technology, thus creating unequal learning opportunities that makes those who cannot be able to access technology be less effective and productive (Bower, 2019). Finally, TMLT has been criticized for being a source of distraction thus detaching the users of technology from the society which can negatively affect their social and emotional skills (Bower, 2019).

2.4 The Initial Trust Model

The Initial Trust Model was originally conceived and proposed by McKnight, Larry and Norman (1998). The theory scrutinizes the factors together with the processes that are instrumental in making two parties to trust each other in business transactions (Mahadih, Ssentumbwe & Afula, 2023). The theory argues that trust is initially formed due to institutional-based factors, social-categorization processes and individual disposition to trust (Mahadih et al., 2023). In the business environment, trust is developed at the beginning of the relationship between a given business entity and a given client (Metcalf, Mohr, Yung, Metcalf & Craig, 2015). High initial trust levels is the banking industry are created only when the automated banking systems assures the customers that their financial transactions will be secured and will not be vulnerable to theft or technical failure (Metcalf et al., 2015). Based on institutional based trust factors, Blockchain technology is usually employed by banks as a security measure to secure the financial transactions of the customers thus creating the initial

trust among the clients in order for them to procure the products and services offered by the given banks (Ali, Ally & Elikana, 2020).

This is because clients have to be confident that the banking systems being marketed to them are secure before they can embark on financial transactions such as saving their money digitally, checking their account balances, transferring funds and applying for loans (Khan, Zairah, Rahim & Maarop, 2020). Based on social categorization process, clients will adopt the services of the banks which in the past has always secured their financial transactions and has always ensured that they do not experience in-house fraud cases, online theft or technical failure (Khan et al., 2020). This is the reason as to why most banks through Blockchain technology employ security measures such as two-factor authentication, encryption and regulatory protection measures to secure the financial transactions of customers (Ali et al., 2020). With reference to individual disposition to trust, clients who are naturally trusting than other people due to being assured by the banks through online advertisements that their financial transactions will be secured, will make them to adopt the services offered by those given banks ((Mahadih et al., 2023).

Thus this theory is linked to the fourth independent variable of the study which is Blockchain technology. Since it is an institutional-based trust factor employed by banks in Kenya to assure their potential clients that their financial transactions will be secured in order for the given clients to develop an initial trust with them and engage in business with them. In line with the fourth specific objective, this study will investigate if Blockchain technology employed by the listed commercial banks in Kenya performs security checks for the its clients before they engage in online financial transactions and offers secured cross border payments with limited fraud risk thus enhancing customer satisfaction, customer retention and improved financial performance.

Cao, Zhang, Ma, Qin and Li (2020) together with McKnight and Chervany (2006) criticized the Initial Trust Model for oversimplifying the process of trust development without accounting for the emotional, cognitive and situational factors that truly leads to trust formation. The theory has also been criticized for failing to accurately predict long-term trustworthiness since trust evolves as people get more exposed in the business market and information about each other (Campagna, 2011). Finally, the theory neglects the socio-cultural factors that affects trust formation (Cao et al., 2020).

2.5 Empirical Review

A research named Impacts of FinTech on Performance of Listed Commercial Banks in Vietnam on PhD. Understanding the connection between adoption of FinTech and the organizational performance of commercial banks that are listed in the Vietnamese stock exchange, Tran Thanh Thu in the University of Greenwich reveals the connection between the two. The study is carried out in the geographical setting characterized by Vietnam, where a period of five years is defined, between 2018 and 2023, and the sample size is composed of 27 listed commercial banks. The study will have an empirical basis involving analysis of the role of diverse FinTech innovations in the performance of important key metrics in the banking industry of an emerging economy.

The paper used the text mining method to retrieve the extent of FinTech adoption in the identified group of banks and used the multiple regression mechanism to assess how it influenced the performance metrics. The independent variables were the concern of specific components in FinTech adoption like the core banking implementation, the banking applications, digital payment systems, internal technology ability, CASA (Current Account Savings Account) ratio, and the capital scale. The dependent variables which acted as a proxy of performance in an organization were the; return on assets (ROA), return on equity (ROE), service revenue and shareholder returns.

The conclusion found out that the CASA ratio and capital magnitude were important predictors of the FinTech adoption among the listed banks. Besides, some components of FinTech had an influence on performance, which was different. Although the deployment of banking applications had a positive impact on the ROA and service revenue, core banking implementation and digital payment systems were the factors that have negative impacts on both ROA and service revenue, this could be because they are costly to implement and there is operational complexity surrounding them. Conversely, the internal technology capability was positively associated with ROE and service revenue implying that internal technological strength is essential in the achievement of better performance results. Interestingly, the study also found out that more the level of FinTech adoption, the lower the short-term shareholder returns, which shows that there was a trade-off of short-term profitability and investments in long term innovations.

Even though the study does not clearly discuss the theoretical frameworks that are used, the analysis seems to have used concepts that relate to the Technology Acceptance Model (TAM) and Innovation Diffusion Theory (IDT), especially in the context of technological innovation adoption and on the effects it has on organizational results. This paper ends by noting that banking facilities should adopt a long-term strategy when it comes to the adoption of FinTech. It suggests the investment of financial institutions in internal technologies enhancement and encourages policymakers to design the supportive regulatory system that promotes the long-term incorporation of FinTech. Also, the study offers a worthwhile addition to the already existing bodies of knowledge as it offers a fine-tuned insight into the intricate nature of connection between FinTech adoption and bank performance especially in the scenario of an emerging economy such as Vietnam.

In a research article titled, Impact of FinTech Adoption on Bank Performance Using CAMEL Model: A Study of Selected Indian Banks (Sheetal Sharma, 2025) available at the Journal of

Information Systems Engineering & Management, it is examined how integration of FinTech influences the financial performance of the Indian commercial banks. The study is set in the Indian banking environment and utilizes the CAMEL approach to rank the banks according to a certain model that has been used since decades as a means to determine the stability and performance of banks, and this approach drafts up five important elements, namely: Capital Adequacy, Asset Quality, Management Efficiency, Earnings, and Liquidity. The research revolves around the four major Indian banks namely State Bank of India (SBI), Punjab National Bank (PNB), Axis Bank, and HDFC Bank. The descriptive characteristics and the regression analysis based on the Pooled Ordinary Least Squares (POLS) with the help of E-Views software have been applied to the secondary data extracted in the annual reports of these banks.

Return on Assets (ROA) and Return on Equity (ROE) was used as a measure of performance; these ratios are very well understood examples of profitability and efficiency measures in the financial industry. The result indicated that both Asset Quality and Management efficiency are two of the CAMEL components that exert a statistically significant influence on the bank performance. In particular, both ROA and ROE were determined to be negatively impacted by poor asset quality, and inefficient management practices, which has given direct evidence of an existence of an association between intra-company operational control and profitability. No such trend could be seen in Capital Adequacy which further indicated that even though regulatory capital is required, it does not necessarily mean that the increase in the same can be directly related to better returns. Additionally, it was established that Earnings had an adverse effect on ROE, indicating the problems that may occur in terms of income volatility in FinTech-based banking. There were mixed results in liquidity; some indicators of liquidity aided the performance, but certain indicators brought a negative impact to the profitability; hence there is a need to optimize liquidity strategies.

With the modernization and digitalization of the financial landscape in India, Indian commercial banks need to focus on internal operations to ensure that they remain steady in competitive advantage and financial sustainability. It is noted that to take optimum advantage of the developments of FinTech, the study places emphasis on diversity in liquidity strategy, the weakness in asset quality, and the asset management practice. When technological change is matched with the good institutional practices, banks have an opportunity to reduce the risk, as well as, to achieve enhanced service delivery and profitability. FinTech has an impact on the organizational performance of the Indian banking system in a multifaceted way, which should be considered in the future research widening of the scope of the analysis by including the macroeconomic conditions and a variety of financial indicators.

Chien-Chiang Lee, Wenjie Ni, and Xiaoming Zhang (2023) a study titled FinTech Development and Commercial Bank Efficiency in China and published in Global Finance Journal engage in an in-depth empirical investigation of the effect of advancing the development of financial technologies on the operational efficiency of Chinese commercial banks. Based on the consumer theory, disruptive innovation theory, and the technology spillover theory, the researchers examined the way the emergence of FinTech has changed the conventional practices of the banking industry. The research exploited dynamic panel data model by applying the Generalized Method of Moments (GMM) analysis to understand the connection between FinTech development and bank efficiency. Text mining methodology was used to develop a FinTech development index, whereas the total factor productivity of banks was calculated by efficiently using the DEA-Malmquist model. The details ranged between 2012 and 2019 involving 74 commercial banks that formed a strong basis of longitudinal analysis.

The results indicated that the overall adverse impact of FinTech development on the efficiency of the Chinese commercial banks has occurred irrespective of its transformative effects. By

particular, development of FinTech has had negative effect on the debt part of the banking process increasing debt expenses and decreasing efficiency. The paper also revealed that the effects of FinTech on the various types of banks were highly differentiated with the rural and urban commercial banks being more severely affected than the joint stock banks, which were not affected as badly. At the regional level, banks established in the Eastern region of China were identified as more vulnerable to FinTechnology disruptions since the rate of digitalization in these regions is higher. On these grounds, the study suggests that commercial banks should undertake strategic changes with a view of improving their capacities in advancing technological integration without necessarily incurring efficiency losses. Equally, policymakers are advised to create region-dedicated and bank-type-sensitive regulatory regimes that can be able to sustain the healthy adoption of FinTech but without weakening financial stability. The implications insight entailed in the study can be immensely crucial to the existing body of knowledge on FinTech and efficient banking and the industry players require aspiring to make their way through the challenging technological environment of the banking industry in China.

The article under analysis is named The Impact of Fintech Innovation on the Performance of Commercial Banks in Bangladesh written in the University of Dhaka by Saful Islam Antor (2024). The study is geographically located in a country where the geographical center of the country is Bangladesh; it explores the impact of FinTech innovations namely regulatory technology, blockchain technology and mobile banking on financial performance of selected commercial banks in Bangladesh. The research was based on a mixed-method approach since it incorporated both the qualitative and quantitative analysis in order to evaluate the adoption, effectiveness, and challenges of these technologies.

The analysis was made up of a sample of 20 Bangladesh commercial banks. Return on Assets (ROA), Non-Performing Loan (NPL) ratio as well as Net Interest Margin (NIM) were some of

the key banking performance indicators. Other than these, there were bank-specific factors including log total assets, capital adequacy ratio (CAR) and the cost to income ratio that were incorporated in the empirical model. The study has also taken into consideration the presence of macroeconomic factor such as growth in inflation, growth in GDP, and interest rate spread.

Although the research article never mentioned or referred to any particular theoretical framework, one can presume by the writers that it had its foundation in innovation diffusion theory and financial performance theory, because, what the research article wants to know is how the system-wide effect of technology diffusion on the results of an organization is done. The study results have revealed that the FinTech innovations can contribute as the main factor to the performance and the sustainability of the operations within the sphere of commercial banks in Bangladesh. The use of technology, including the blockchain and mobile banking technologies, was linked to the promotion of increased efficiency in operations and competitiveness, whereas the use of regulatory technology facilitated the adjustment of banks to compliance requirements. But there were also other challenges that were identified, and that is the implementation cost and lack of infrastructure and regulatory challenges.

The researchers advise that in order to maintain competitive advantages, commercial banks in Bangladesh ought to invest actively on appropriate FinTech platforms, digital infrastructure enhancement, and integrate their strategies with the emerging trends in technology. Moreover, it proposes friendly policies by the regulators to promote the responsible use of FinTech. To sum up, the study highlights that the effective use of FinTech can help boost r-development, profitability and customer-focused innovation in the commercial banking sector in Bangladesh.

The research by Ibrahim Dodo Ahmed, Mohammad Nura Ibrahim Naala, and Lawal Saulawa Gambo (2025), the article titled Impact of Financial Technology (FinTech) Investment on Financial Performance of Listed Deposit Money Banks in Nigeria, provides a Scholarly empirical research on the effect of FinTech investment on major financial performance criteria

in Nigerian banking segment. The study is positioned in the background of the fast-paced transformation of a digital financial landscape and tends to analyze the unique impact of operational expenditure (FintechOpex) and capital expenditure (FintechCapex) on Net Interest Margin (NIM) and Return on Assets (ROA) based on a sample of twelve listed commercial banks over a decade (20142023). The dimensions it used in econometric modeling of panel data include Pooled Ordinary Least Squares (POLS) method, Fixed Effects Model (FEM) and Random Effects Model (REM), which is backed-up with Breusch-Pagan test of heteroskedastic and the Hausman test of model selection. It was established that the Fixed Effects Model was most applicable specification.

According to the results of the work, there is a rather specific connection between FinTech investment and bank performance. The short-term operational technology spending shown by FintechOpex did not also have a statistically significant effect on NIM or ROA, which suggests that there can be lower returns of such spending soon. On the contrary, FintechCapex showed a statistically significant positive effect on both performance measures leaving an impression that long-term capitalized expenditures on the FinTech infrastructure are more likely to result in real financial payoff. Also, the findings indicate that there are significant positive correlations between liquidity and financial performance, which shows that good liquidity management practices foster profitability. Researchers finish their research with concrete advice to banking institutions: focusing on strategic, long-term investments in FinTechs, the reconstruction of the operation budget line aimed at the implementation of performance-driven technology, as well as using digital technologies and predictive analytics to reinforce positive effects on liquidity and lending patterns. These findings not only add value to the existing literature on the subject of FinTech integration but also defines the way forward on effective strategy and implementation avenues by bank management, policymakers, and financial strategists in emerging economies.

Carlos Maundu (2022) carried out the study entitled Measuring the Adoption of Risk and Compliance-based FinTechs in Commercial Banks in Kenya to accomplish a Master thesis at the University of Nairobi. The study was geographically located in Kenya and looked at embracing of the risk and compliance driven financial technologies with the specific emphasis on the Anti-Money Laundering (AML) and Combating the Financing of Terrorism (CFT) fintech in the Kenya commercial banking sector. The aim was to empirically investigate the progress and forces behind the adoption of FinTech risk and compliance purposes particularly at a time when the adoption has not taken off as should be the case regardless of various regulatory initiatives such as regulatory sandboxes.

Two frameworks based on major theoretical backgrounds supported the proposed study and these were the Diffusion of Innovation (DOI) Theory and the Technology-Organization-Environment (TOE) Framework. The analysis of both internal and external factors leading to the adoption of FinTech systems in Kenyan banking situation was based on these theories. The factors of consideration were: technology compatibility, perceived barriers and government regulations which are considered as factors that influenced adoption.

The study used a quantitative research design with the researcher deploying a survey research design to collect data using a questionnaire format on 37 commercial banks in Kenya. The factorial analysis was applied to study findings on underlying constructions and logistic regression was used to examine the hypotheses. To differentiate the adopters and non-adopters, the logistic regression model was used; however, the study has identified a limitation when it did not investigate interactions between independent variables, moderators and control variables.

The results indicated that compatibility of the technology to the existing systems, regulatory support, and the existence of perceived adoption barriers were indicators that showed significant influence on adoption of risk and compliance-based FinTechs. In the research, it

was found that adoption depends on institutional readiness as well as the regulatory environment. The study has provided recommendations that focus on the necessity to increase the capacity of the institutions involved, the improved integration of the FinTech solutions with the existing systems, and positive governmental regulation to promote adoption and reduce its barriers. The article will be of paramount importance to commercial banks, policymakers, as well as regulators in Kenya, that aims to enhance the security and compliance in the financial sectors through the incorporation of technology.

2.5.1 Mobile Banking and Bank Performance

The study of Cleveland (2016) tried to establish the influence of mobile banking on efficiency of the American banks. To suit its needs, the study examined statistical data, collected at different resources, such as company reports and academic publications. Most of the US banks have started offering us mobile banking application services and also, sms banking and WAP banking. The survey also reported a large rate of mobile banking adoption (78 percent in the US). Some of the numerous mobile banking services offered included monitoring of account balances as well as recent purchases, transferring money across accounts, deposit of check by use of phone camera, bill payment via banking application, and funds sent to third parties. The findings indicated that the performance of banks rose after introducing mobile banking.

Ahmadi and Narci (2020) examined how the Turkish banking industry utilised mobile banking services and how their application affected customer satisfaction and retention. The survey involved four hundred individuals and the research plan used was correlational. In major part, data collection was done through the use of questionnaires. To ascertain the relationship between the variables, simple regression analysis was done. The data shows that mobile banking is seen as an important tool of ensuring retention of clients in the Turkish banking sector (beta = 0.322; p-value = 0.000 < 0.05). Additionally, it was indicated that consumers

were more satisfied with mobile banking (0.314, p-value = 0.000 < 0.05). Researchers discovered that mobile banking has a remarkable effect on satisfaction of the customers and customer churning among banks.

The research by Yoewono and Prabowo (2024) set out to establish the extent of influence on banks in Indonesia by the emergence of mobile banking apps, whether at all. The research surveyed two hundred and fifty big senior bankers of the twenty-five largest banks in Indonesia. To achieve its objectives, the research study was based on primary information which was obtained through the surveys. Those building blocks of the concept were the perceived utility, perceived security, web features, perceived price on transactions, perceived ease of use, and overall impression of a mobile banking app. The four measures included financial performance, customer happiness, internal business process, as well as learning and growth to gauge the success of the bank. The investigation was done through a structural equation modeling method known as Partial Least Squares. The study has revealed that mobile banking applications greatly reduce paper work, facilitate easy customer access to the banks, increase customer satisfaction and as a result, the bank makes a lot of business.

The study by Nwayen, Ukpong, and Uwah (2024) attempts to acquire some answer to the question of whether or not banks, listed on the Nigeria Stock Exchange made more profit in the instances, when they accepted mobile payments. Profitability was measured using the figure of return on assets. The judgmental selection technique has been used in choosing five banks to be part of the study, and the period of study is 2010-2019. Therefore, fifty observations have been captured. A panel data regression model was applied to achieve the aims of the study. The findings of this study show that mobile payment systems contribute hugely towards profitability in the Nigerian Stock Exchange listed banks. The introduction of mobile banking leads to an improvement in the effectiveness of the Nigerian banks, which is

evidenced in the results obtained by Muhammad, Abdulmalik and Halima (2022) and Okoro, Nnam, Joe and Obizuo (2024).

Ogbobe and Ezeala (2024) set out to establish how mobile banking has affected the returns on equity (ROE) and profits per share (EPS) of the deposit money banks in Nigeria. Based on an ex post facto research design, the research educed the relevance of information between 2015 and 2023 in the annual reports of ten of the twenty-two deposit money institutions. The panel data regression analysis was used to demonstrate the effect of mobile banking on earning per share and return on equity. Based on the findings of the study, mobile banking substantially improves the ROE and the EPS of the Nigerian deposit money banks. These findings were consistent with previous findings by Akwam and Yua (2021), who had already established that mobile banking enhances the ROI of the Nigerian deposit money companies.

In a local context, Otieno (2018) analyzed the impacts of the adoption of mobile banking on financial performance of banking institutions in Kenya. The concept of mobile banking was initially characterized as the amount of annual transactions that were done through mobile bank systems and number of customers who use M-banking services. In the study, the financial measure used in calculating the performance was the return on assets. The research was carried out on all, forty-three commercial banks holding operating licenses in Kenya. The secondary data on research variables was obtained by research team at: the websites and the financial reports of the study banks; the Central Bank of Kenya website. Multiple linear regression was performed to analyse panel data. The results indicated that mobile banking in Kenya is highly influential in improving the performance of commercial banks in Kenya, as it applies to the total volume of transactions that are engaged in by mobile banking. The findings of this study confirmed the findings of Yoewono and Prabowo (2024), Cleveland (2016) and Okoro and

Okoro (2024) who indicated that banks in Nigeria, Indonesia, and the United States realized a massive increase in their financial performance following the adoption of mobile banking.

2.5.2 Internet Banking and Bank Performance

At the global level, Islam, Kabir, Dovash, Nafee and Saha (2019) tried to find the impact that introducing internet banking had on the profitability of the banks in Bangladesh. Profitability of the given banks was measured with regards to the returns on equity and returns on assets. The research was concentrated on thirty named banks that were studied with the help of census technique that studied each of the banks. Secondary data was obtained through the analysis of annual reports of the targeted banks. The paired samples t -test model was used to determine the changes in profitability of the listed banks after they introduced online banking in their offering. It is important to mention that it was revealed in the results that when internet banking was adopted in Bangladesh, the return on equity and the return on assets was far less. Moreover, contrary to the findings by Lafi (2023), that the financial performance of French banks rose really high following the implementation of the concept of online banking, the results turned out to be different. Islam et al. (2019) argued that the deployment of internet banking at an early period contributed to poor financial performance of Bangladesh banks due to high costs incurs during the initial stages.

The purpose of the study by Yasin (2018) is to determine whether internet banking impacts on the profitability of Ethiopian commercial banks and how. The study takes an empirical approach where it was conducted in Africa. A dummy variable that had an integer value of 1 in case a bank had adopted online banking and 0 if not, was an indicator that a bank had adopted online banking. Financial health of a company was measured in terms of the return on assets calculated as the net income before taxes divided by the total assets. This paper took the explanatory research type to collect quantitative data using the financial statements of the

targeted banks. This information was further applied in the panel data multiple regression analysis to show how online banking affected financial performance. The sample used in the investigation was selected using 10 banks, and the number of observations done over the period of 2010-2016 was 70. The Stata version 12 was employed in regression analysis. Based on the findings, online bank does improve the financial performance of Ethiopian banks but just in a small amount.

To gain insights into the interdependence of online banking services provided in view of consumer satisfaction in the context of a regional setting, Moa, Obote, and Yoweri (2017) conducted their own research on the banking sector in Uganda. One of the main concepts behind online banking services was to create accounts that are easier to access, manageable as well as user-friendly. The research was conducted on 3,752 individuals; this comprised 3240 individual persons and 512 business clients. The 351 respondents upon whom the study had been settled involved 302 one-self individuals and 86 corporate clients. A stratified proportional sample was applied by the researchers. Upon verification of the validity and reliability of the questionnaire in the pilot test, the study resorted to a structured questionnaire to collect primary data among the targeted customers. The multiple linear regression analysis was used to achieve the goal of the study. As per the findings, customer satisfaction in the Ugandan banking industry rises by a huge margin of 0.308 units with just a unit increase in online banking services (p-value = 0.000 < 0.05). Based on the research, banks can ensure a consistent demand about their online bank services by ensuring they constantly innovate and even improve on the same.

At a lower scale, in Kenya, Mutuku and Nyaribo (2015) carried a study to find out how IT has changed productivity in three commercially different banks that are based in Nairobi. One of the aspects of IT that were considered through the evaluation was the online banking. To

achieve its research objectives, the research employed a descriptive research design which involved surveying a particular population in an attempt to collect and analyze quantitative data. A random pick of 150 workers was done amongst 540. The research administered structured questionnaires to the targeted participants in a bid to obtain primary (quantitative) data in a form to be analyzed. To analyze the data thus obtained, the research employed multiple linear regression analysis with the SPSS. As the research findings demonstrate, the impact of online banking on the efficiency of workers in the Kenyan banking industry is great (0.257; p-value = 0.009 < 0.05). To optimise their procedures used in providing the much-desired financial services to its customers, the study recommended that the banks should reward their staff to fully embrace online banking. One of the missing information is that among the nine named banks, only three of the banks in Nairobi, Kenya were to be taken into consideration in the research. Moreover, the study did not assess the other performance indexes in the organization such as financial performance, corporate retention, and customer contentment, which presents a conceptual gap. The study will help to seal that gap of knowledge by dissecting how online banking has affected the operational effectiveness, customer satisfaction, ROI, ROE and cost of assets (CAR) of every listed bank in Kenya.

The study by Ndine et al. (2022) aimed to ascertain how online banking influences bottom line of the Kenyan-based commercial banks that are listed in the Nairobi Stock Exchange. In the research, internet banking was defined as the accumulation of all the online banking operations and the amount of online platform operation of a particular fiscal year. It also behaved contrastingly as to the research by Yasin (2018), which decided to quantify financial success as a measure of the return on assets by treating it as return on equity. The explanatory research design entailing a quantitative methodology was employed to show how the use of online banking affects the financial performance. The probe covered the subject of 42 commercial banks in Kenya. Given that the main aim of conducting this research was to study commercial

banks listed at the Nairobi Securities Exchange, a purposeful sampling strategy was used by the researcher to select each of the eleven banks that will be used in the study. The variables of the study were drawn upon secondary sources such as publications that were mounted in the web fronts of the participating commercial banks and the Central Bank of Kenya. This research was performed under descriptive statistics and multiple linear regression models in SPSS version 25. Based on the findings of the study, listed commercial banks in Kenya experienced negative changes in their return on equity following introduction of online banking. Among the theoretical weaknesses that were reported in regard to the Financial Intermediation theory included the fact that the study failed to show how online banking has improved the performance of organizations by eliminate knowledge asymmetry and high costs of transactions among the organization borrows and lenders.

The aim of the study by Ajaya (2020) was to establish how Kenya commercial banks performed financially on introduction of online banking by all of them. Abdulkadir (2018) employed log of cumulative money transferred using online banking websites by quarter to assess internet banking whereas Milinovic (2014) applied the amount of gain that was generated on the assets per quarter as a measure of financial performance. To compile our sample, we utilised the secondary data available in 40 Kenyan banks annual reports between the year 2010 and 2019. This led to four hundred observations being achieved. The research employed the multivariate regression analysis in order to achieve its objectives. Based on the findings, the bottom lines of the banks in Kenya took an upward trend once they begin to provide online banking. According to Ndine et al. (2022), the state of financial performance of commercial banks listed in the Nairobi Securities Exchange in Kenya was tremendously bad when consumers opted to bank through online banking. This is not so in our findings. Nevertheless, these findings were comparable to those in the study by Katutu (2019) that showed an increase in financial performance of top-tier banks in Kenya after the introduction

of online banking due to additional customers that transact business using the web platforms. A possible theoretical weakness that was observed with regard to the Financial Intermediation theory was that the study failed to show how online banking has been able to increase in organizational performance through elimination of knowledge asymmetry and high transaction cost between borrowers and lenders.

2.5.3 Artificial Intelligence and Bank Performance

To obtain the answer, Al-Ababneh and Andrusiak (2023) developed a study aiming to find out how effective the AI systems are within the context of Credit Agricole Bank in Ukraine on a global scale. The study inquiry was as based on a quantitative technique. We conducted an analysis between 2020 and 2021. To accomplish this being the case, not only descriptive analysis, but also econometric was used during the research. As per the results written in the study, individuals are applying AI in producing legal opinions and voice bot systems are offering financial transaction services. The findings also indicated that the operating expenses of the given bank have plunged considerably and enhanced working efficiency of the personnel due to AI. These findings supported the arguments of Ene et al. (2019), Madugba et al. (2021), and Wangui (2023), who all indicated that AI has increased the efficiency of commercial banks, thus making their customers happier and their bottom lines. According to the Technology Mediated Learning hypothesis, the study has not shown how the accessibility of AI technology has encouraged efficient studies among employees and how automation of routine processes has brought augmented productivity.

Abusalma (2021) carried out a research to establish the influence of the use of AI in relation to the productivity of workers in commercial banks in Jordan. The AI metrics that were discussed were neuronal networks, experience systems, intelligent systems and genetic algorithms. The research study was descriptive in design since it was based on a survey

method. The population of the study used 319 managers in 16 various banks in Amman, Jordan. To obtain the direct information or data that would be analyzed by the research, a structured questionnaire containing five agreement values in a Likert scale was requested to the managers. A multiple linear regression model was used to perform a statistical analysis on the main data and indicate how AI influences work performance. The findings indicated that after applying technologies in the field of AR, such as genetic algorithm, intelligent systems, and taking AI into consideration, the workers in commercial banks greatly improved their experience in Jordan. Other performance measures such as customer happiness, return on asset, return on equity as well as CAR were not taken into account; there was conceptual gap because only job performance was focused on. Consequently, such a research has an opportunity to explore the role of AI in the performance of organizations, which will be determined using CAR, return on assets, personnel productivity, pleased customers, and retention levels.

The goal of Liliana, Margaret, Chosani, and Phillipa (2023) was to find out whether and how conversational AI influenced the efficiency of the operations of Zimbabwean banks. The study employed mixed-method design where it collected quantitative and qualitative information in form of interviews and questionnaires to address the research questions. The 10 banks which were selected to be part of the research had a total number of 100 respondents but with the aid of both quota and purposive selection methods, 92 respondents were selected. The study used the descriptive analysis to achieve its research purpose. Conversational AI undermines the productivity of the Zimbabwean banks due to the fact that they offer superior and enjoyable responses to consumer enquiries and automate routine processes. Conversational AI results in faster and more comfortable financial services (Huang & Rust, 2018). The other advantages of conversational AI chatbots are its ability to shorten wait times, quicker responders, and more customized customer interactions (Huang & Rust, 2018). Automation of the loan origination

process, client segmentation, and credit rating is one of the ways that Al helps banks to evade the default risk that may affect their performance (Liu & Lu, 2020).

Awosusi (2025) researched into the effects of usage of artificial intelligence on the performance of Access Bank in Nigeria. To fulfill the objective of the research, a number of academic publications were comprehensively compared and examined with the help of the theme technique. The work established that AI has made financial transactions more efficient, reduced fraud and improved customer services. Also, the findings indicated that AI has lowered costs of operation and caused workers to be more productive hence leading to improved financial outcomes. These changes as the implementation of AI marketing strategies i.e., the Internet of Things (IoT) and virtual augmented reality (VAR) have increased customer awareness and attracted more customers to utilize services of commercial banks, which means increased financial efficiency (Abdulsalam, 2024).

2.5.4 Blockchain Technology and Bank Performance

Khadka (2020) conducted a research that aimed at establishing whether and how far the global implementation of the Blockchain technology has influenced the effectiveness of the financial institutions. It was possible to satisfy the purpose of the research by examining four thousand scientific articles published during the period between 2015 and 2021. As per the findings, the Blockchain technology has simplified the process of conducting due research on clients, funding international trade and direct payment activities between borders. Further, the findings indicate that the financial performance of banks has been enhanced as a result of implementation of BlockChain technology, where the inefficiency problem on account of eradication of third party players has been stepped up. Egiyi and Udeh (2020) concur and claim that blockchain technology allows random financial transactions to be recorded in real time and the financial assets of the respective bank to be tracked. The data can be shared in a

transparent manner without intruding the privacy of any other party and only those members present with access privileges to a specific network share data (Egiyi & Udeh, 2020). The study did not have appropriate methodology because it did not collect measurable information in the form of either primary or secondary sources to determine the ways in which the Blockchain technology was affecting the performance of banks. Moreover, little is known with regard to the implications of the technology of Blockchain on the operating efficiency of listed public banks in Kenya.

Susilo, Suryawijaya, Isnaini, and Khant (2024) carried out an inquiry into the impact of the Blockchain technology on productivity of workers within businesses within Java-Bali, Indonesia. To figure out how the Blockchain technology can influence the efficiency of workers, the research followed the survey method to collect quantitative data that were supposed to be collected by its target audience and analyzed. A sample size of three hundred and fifty workers was used to participate in the research with the aim of utilizing a purposeful sampling method. Structured questionnaires were adopted to collect the primary data of the above mentioned respondents. The structural model evaluation was the used analysis. According to the results, blockchain technology can highly improve the productivity of the workers. The study investigated the impact that Blockchain technology had on workplace productivity. The study adopted the use of the primary data to help it ascertain whether there is a relationship between the use of Blockchain technology and enhanced productivity in the workplace. The study found out that Blockchain technology increases efficiency in the blockchain, the security of data and increases the transparency which translates to an improved performance outcome of the business.

In the African continent, Odukwu, Promise, Chidozie, and Owelechi (2023) sought to establish the effect that the Blockchain technology had on the financial performance of the Nigerian

listed banks. Success was gauged in financial terms in terms of returns with assets. The research included a correlational research strategy which was based on descriptive research strategy and exploratory research decision. In the eleven Nigerian banks that participated in the research, 9 of them were selected by chance using the Nigerian Exchange Group. A list of nine financial institutions that would participate in the study was selected in a systematic random selection approach. Secondary data were provided by consulting the financial reports of the given institutions, with the view of analyzing them. Analyzing started in 2016 and proceeded until 2021. The ordinary least square regression model was used in the analysis of the data. The research shows that blockchain technology increases the financial performance of the listed banks in Nigeria greatly. In line with this, Brotoboh and Ekwevubge (2020) and Tadese and Gidey (2021) discovered that Blockchain technology can enhance the financial performance of Ethiopian and Nigerian Banks, respectively, to a considerable extent. The findings were synonymous with those researches. Among the information that was not included, the analysis touched on the financial success but no other key performance indicators that mattered such as customer happiness, level of customer retention and productivity of staff. Consequently, this study has the opportunity to study the influence of the Blockchain technology on the organizational performance, which will be calculated using CAR, customer satisfaction, staff productivity, returns on assets and returns on equity.

2.6 Knowledge Gaps

These research gaps raise the need to conduct a theory-informed, methodologically sound and context-sensitive study on examining the correlation between FinTech adoption and the performance of the listed commercial banks in Kenya. In order to address this informational gap, however, limited empirical literature aims to focus on the listed commercial banks in Kenya specifically, whereas the banking industries of other countries such as Vietnam (Nguyen, 2024), India (Sharma, 2025), China (Lee, Ni, & Zhang, 2023), Nigeria (Ahmed,

Naala, & Gambo, 2025), and Bangladesh (Antor, 2024) have received focused attention of studies. The Kenya-based research has largely dwelled on the risk and compliance-based FinTech solutions instead of exploring the entire spectrum of innovations in the context of performance. This has barred researchers to explore issues such as internet banking, block chain technology, artificial intelligence and mobile banking.

Most of the existing literature refers to FinTech adoption as a concept, but it does not decompose it into specific technologies, and there is also no reference to specific financial or operational performance measures, so it remains a concept gap. Both the non-financial as well as financial impact of these innovations to such metrics as capital adequacy ratio (CAR), customer retention rate (CRR), net interest margin (NIM), and return on assets (ROA) remains under research. This is the reason why our current knowledge regarding various finance-related subjects is highly restricted in terms of its generalizability and completeness.

The very fact that basic regression techniques and cross-sectional survey have been utilized frequently in Kenya goes to show that there has been a methodological vacuum. In an attempt to mitigate the constraints of endogeneity and reflect the effects of time, more advanced panel data econometric analysis has been utilized, such as the Fixed Effects Model (FEM), Pooled Ordinary Least Squares (POLS) and Generalized Method of Moments (GMM), in a number of global studies (Lee et al., 2023; Ahmed et al., 2025). Owing to their restricted area of approach in methodology, local studies are unable to extrapolate their findings over time and different financial institutions due to the limited ability of such findings to provide high impacts in terms of causal inference.

Other than that, studies carried out in Kenya have not resorted to utilizing complete theoretical frameworks hence leaving a theoretical gap. Although theories such as TAM, IDT, and CSI are commonly applied in studies undertaken at a global level so as to guide the results, most of the Kenyan studies are implementing only the Technology-Organization-Environment (TOE)

framework, also referred to as DOI. Due to this fact, the theoretical basis of the study of the effects of FinTech implementation and performance is narrowed and its interpretational value weakened.

A study that is grounded in reality and empirically strong thus supported by solid and empirical data and specific to the conditions of Kenya financial institutions is urgently required to investigate the effects of the adoption of the FinTech on the operational efficiency of publicly-traded commercial banks in Kenya. The use of this method would enhance academic knowledge and enable practitioners and lawmakers to conveniently sail in the digital revolution in the banking industry with practical insights.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

This chapter provides a detailed explanation of the research design, the population to be studied within the banking sector, the sampling techniques to be used to select the respondents, the research instruments to be used for data collection, the procedures to be followed during data collection, and this study's data analysis techniques.

3.1. Research Philosophy

This study was grounded in the positivist research philosophy, which emphasizes the use of objective observation, measurement, and analysis to generate factual and generalizable findings (Creswell & Creswell, 2023). The positivist paradigm was considered appropriate because the research aimed to establish empirical relationships between specific FinTech adoption variables mobile banking, internet banking, artificial intelligence, and blockchain technology and the performance of listed commercial banks in Kenya.

Positivism assumes that reality is objective, stable, and can be studied independently of the researcher’s influence (Saunders et al., 2019). In alignment with this assumption, the study relied on structured questionnaires to collect quantifiable data from top-level banking officials, ensuring that responses were based on observable experiences and operational realities rather than subjective interpretation.

This philosophical stance also aligned with the study’s use of statistical analysis methods, including descriptive statistics and multiple linear regression, to test hypotheses and determine the strength and significance of relationships between independent and dependent variables

(Sekaran & Bougie, 2020). The approach enhanced the validity and reliability of the findings by producing results that could be verified and replicated in similar contexts.

Furthermore, the positivist orientation ensured minimal researcher bias by maintaining a clear separation between the investigator and the respondents (Bell et al., 2022). The focus remained on measurable outcomes such as efficiency, customer service delivery, innovation, and profitability, thereby providing evidence-based insights to guide strategic FinTech adoption in Kenya's banking sector.

3.2. Research Design

This study adopted a descriptive cross-sectional research design. This design was appropriate as it enabled the researcher to obtain and interpret data at a specific point in time, providing a comprehensive overview of the existing relationship between FinTech adoption specifically mobile banking, internet banking, artificial intelligence (AI), and blockchain technology and the performance of commercial banks listed on the Nairobi Securities Exchange (NSE). The design supported the analysis of multiple variables across various banks concurrently, allowing for efficient comparisons without requiring long-term observation.

The study employed a quantitative research approach, relying exclusively on primary data. Primary data was collected through a structured questionnaire administered to relevant bank personnel. This ensured that the information gathered reflected the direct experiences, observations, and perceptions of individuals involved in the adoption and implementation of FinTech initiatives within their institutions.

This approach provided a robust platform to explore how FinTech innovations were being implemented and how they related to performance outcomes across the banking sector. It also facilitated the identification of prevailing trends and correlations among the study variables at a single point in time (Creswell & Creswell, 2023).

3.3. Target Population

The target population consisted of 11 commercial banks listed on the Nairobi Securities Exchange (NSE) in Kenya, selected based on their regulatory compliance and leadership in FinTech adoption (CBK, 2020; Kenya Bankers Association, 2024). The respondents included staff across top, middle, and lower management levels, specifically Chief Financial Officers (CFOs), Directors of Digital Banking (DDBs), IT Managers, Heads of Digital Channels, Operations Managers, Customer Service Managers, and IT Support Managers, as they are directly involved in the implementation and management of FinTech-related activities and overall bank performance.

Table 3.1 Commercial Banks in Kenya

Banks	**Target Population**
KCB Group Plc	1
Equity Group Holdings	1
Co-operative Bank of Kenya Plc	1
NCBA Group Plc	1
Stanbic Holdings Plc	1
I&M Holdings Plc	1
Standard Chartered Bank Kenya Ltd	1
Diamond Trust Bank Kenya Ltd	1
HF Group Plc	1
ABSA Bank Kenya Plc	1
BK Group Plc	1
Total	**11**

3.4. Description of the Sample and Sampling Procedures

To determine the sample size, the study employed specific procedures based on the total population drawn from the 11 commercial banks listed on the Nairobi Securities Exchange (NSE) in Kenya. The study targeted a total of 77 respondents selected from departments directly involved in FinTech strategy and operations. These included Chief Financial Officers (CFOs), Directors of Digital Banking, Heads of IT, Blockchain and AI Experts, Operations Managers, Customer Experience Managers, and Support Staff who engaged with mobile banking, internet banking, blockchain, and artificial intelligence systems.

The study used simple random sampling to select one eligible staff member per job role in each department across the selected banks. This method ensured that every eligible participant had an equal chance of being chosen, promoting fairness and reducing bias in the selection process.

In addition, purposive sampling guided the selection of staff with direct professional experience in the adoption and implementation of FinTech innovations. These individuals provided rich and relevant data due to their strategic roles in driving digital banking transformation.

This combination of sampling techniques enhanced the credibility and generalizability of the findings by ensuring both the relevance of the data (through purposive sampling) and fairness in participant selection (through simple random sampling), as supported by Etikan and Bala (2019) and Palinkas et al. (2020).

The study involved a total of 77 respondents, whose distribution was presented in Table 3.2 (Creswell & Poth, 2018; McCombes, 2019).

Table 3.2 Sample Size of Respondents from Listed Commercial Banks in Kenya

Commercial Bank (Listed on NSE)	Chief Financial Officer (CFO)	Directors of Digital Banking (DDB)	Information Technology (IT) Manager	Head of Digital channels	Operations manager	Customer service manager	IT Support Manager	Total Respondents per Bank
1. KCB Group Plc	1	1	1	1	1	1	1	7
2. Equity Group Holdings Plc	1	1	1	1	1	1	1	7
3. Co-operative Bank of Kenya Plc	1	1	1	1	1	1	1	7
4. NCBA Group Plc	1	1	1	1	1	1	1	7
5. Stanbic Holdings Plc	1	1	1	1	1	1	1	7
6. I&M Holdings Plc	1	1	1	1	1	1	1	7
7. Standard Chartered Bank Kenya Ltd	1	1	1	1	1	1	1	7
8. Diamond Trust Bank Kenya Ltd	1	1	1	1	1	1	1	7
9. HF Group Plc	1	1	1	1	1	1	1	7
10. ABSA Bank Kenya Plc	1	1	1	1	1	1	1	7
11. National Bank of Kenya	1	1	1	1	1	1	1	7
Total	11	11	11	11	11	11	11	77

3.5. Description of Research Instruments

This study employed a structured questionnaire to gather primary data, as it enabled efficient collection of standardized responses and enhanced the objectivity, reliability, and comparability of results across respondents (Kumar, 2022). The questionnaire was designed using a 5-point Likert scale, which is widely adopted in organizational and social science research to measure perceptions and attitudes. The scale consisted of 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree, capturing the varying intensity of agreement or disagreement on each item (Bryman, 2021).

The questionnaire was divided into three sections. The first section collected demographic information about the respondents. The second section assessed the independent variables related to FinTech adoption, including mobile banking, internet banking, blockchain, and artificial intelligence. The third section evaluated the organizational performance of listed commercial banks in Kenya.

To ensure clarity and support effective quantitative analysis, all questionnaire items were closed-ended. Moreover, the instrument was self-administered, allowing respondents to complete it at their convenience, thereby reducing interviewer bias and enhancing response accuracy (Sekaran & Bougie, 2023).

3.6. Pilot Testing

Table 3.3

Sample Size Table

Banks	Target Group/Designation	Sample Size (10%)
Bank of Africa	Product Manager, Business Analyst Manager	2
Sidian Bank	Product Manager, Business Analyst Manager	2
Family Bank	Product Manager, Business Analyst Manager	2
EcoBank	Product Manager	2
Total		**8**

Source*:* Field Data (2025)

According to Saunders, Lewis, and Thornhill (2023) and Creswell and Creswell (2023), 1–10% of the total sample size is appropriate for pilot testing. In this study, eight respondents, as shown in Table 3.3, (approximately 10% of 77) were selected randomly from Kenyan commercial banks listed on the NSE but not included in the main study. These include Product Manager and Business Analyst Manage

The pilot study aims to test clarity, structure, and relevance of the questionnaire in line with the study's objective on FinTech adoption and bank performance. Insights gained will guide improvements in reliability, coherence, and instrument effectiveness before full deployment.

3.6.1 Validity of Research Instrument

To ensure the validity of the research findings, validity referred to the degree to which the research instrument measured the constructs adequately (Saunders, Lewis, & Thornhill, 2023). Construct validity was important and was demonstrated in this study, which examined the performance of the listed commercial banks in Kenya following their adoption of FinTech. The theoretical characteristics of the adoption of FinTech such as internet banking, blockchain technology, mobile banking, and artificial intelligence along with the basic measures of organizational success, shaped each of the items in the questionnaire. To ensure that these items were conceptually accurate and applicable to their context, they were formulated based on recent academic research. Creswell and Creswell (2023) stated that after conducting the pilot study, the instrument was refined by taking into account the feedback from the pilot study. This raised the validity of the instrument by ensuring that each respective question was clear, relevant, and consistent with the nature of the research.

To guarantee that the research instrument had reliability and consistency in measuring the same construct across all items, the research focused on internal consistency. This approach was suitable to ensure that the structured questionnaire, which followed the format of Likert-scale questions, captured the same concepts (Hair et al., 2023).

Table 3.4

Construct Validity

Correlations

		Mobile Banking	Internet Banking	Artificial Intelligence	Blockchain Technology	Bank Performance
Mobile Banking	Pearson Correlation	1	.420**	.462**	.398**	.521**
	Sig. (2-tailed)		.001	.000	.001	.000
	N	77	77	77	77	77
Internet Banking	Pearson Correlation	.420**	1	.377**	.331*	.496**
	Sig. (2-tailed)	.001		.001	.004	.000
	N	77	77	77	77	77
Artificial Intelligence	Pearson Correlation	.462**	.377**	1	.449**	.548**
	Sig. (2-tailed)	.000	.001		.000	.000
	N	77	77	77	77	77
Blockchain Technology	Pearson Correlation	.398**	.331*	.449**	1	.513**
	Sig. (2-tailed)	.001	.004	.000		.000
	N	77	77	77	77	77
Bank Performance	Pearson Correlation	.521**	.496**	.548**	.513**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	77	77	77	77	77

*. Correlation is significant at the 0.05 level (2-tailed).

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

3.6.2 Reliability of Research Instrument

Reliability was defined as the extent to which a research instrument repeatedly and consistently provided the same type of data when applied under the same conditions (Saunders, Lewis, & Thornhill, 2023). The items under each construct including mobile banking, internet banking, blockchain technology, and artificial intelligence fitted well in this study since it used the assessment of internal consistency reliability to evaluate them coherently. The research examined the impacts of FinTech adoption on the performance of listed commercial banks in Kenya.

To evaluate this, the study employed Cronbach's Alpha, which is a statistical indicator of dependability. Cronbach's Alpha measured the extent to which items within a scale were correlated, providing an indication of the uniformity of responses among similar items (Hair, Page, & Brunsveld, 2023). In line with social science research standards, an internal consistency value of 0.70 or higher was deemed acceptable (Bell, Bryman, & Harley, 2022). This approach enhanced the credibility of the study's results by ensuring that the measuring scales were coherent both conceptually and statistically.

Table 3.5

Reliability Test

Variables	**Cronbach's Alpha based on Standardized Items**	**Number of Items**
Mobile Banking	0.734	12
Internet Banking	0.716	12
Artificial Intelligence	0.708	12
Blockchain Technology	0.721	12

The reliability of the research instrument was assessed using Cronbach's Alpha, which measures the internal consistency or average correlation of items in a survey instrument to assess its reliability. For the construct "Mobile Banking," the Cronbach's Alpha value was 0.734 across 12 items, indicating a high level of internal consistency. This suggests that the scale used to assess mobile banking adoption is both consistent and dependable.

Similarly, "Internet Banking" recorded a Cronbach's Alpha of 0.716, also based on 12 items. This value reflects a good level of internal reliability, suggesting the instrument adequately captures the essential dimensions of internet banking in the context of FinTech adoption. The variable "Artificial Intelligence" achieved a Cronbach's Alpha of 0.708, which meets the acceptable threshold of 0.7. This demonstrates that the items related to AI are well-aligned and reliable for measuring its impact on banking performance. Lastly, "Blockchain Technology" yielded a Cronbach's Alpha of 0.721, confirming the strong internal consistency of the 12 items measuring this variable.

Overall, all four variables surpassed the recommended threshold of 0.7 (Bell, Bryman, & Harley, 2022), indicating that the questionnaire items are reliable, cohesive, and suitable for further statistical analysis. The internal consistency levels across the board validate the integrity of the measurement tool and its readiness for use in inferential procedures such as regression and structural equation modelling.

3.5.3 Pilot Response Rate

Table 3.6

Pilot Test Results

Research Instrument	Administered	Completed	Response Rate (%)
Questionnaire for FINTECH adoption and Banks' Performance	8	8	100%
Bank of Africa	2	2	100%
Sidian Bank	2	2	100%
Family Bank	2	2	100%
EcoBank	2	2	100%

Source: Field Data (2025)

The pilot study was conducted with 8 respondents drawn from four commercial banks in Kenya. The banks and designations included: Bank of Africa (Product Managers and Business Analyst Managers), Sidian Bank (Product Managers and Business Analyst Managers), Family Bank (Product Managers and Business Analysts), and EcoBank (Chief Financial Officer). This pilot sample represented 10% of the total study population (77 respondents), aligning with Stewart's (2025) recommendation that a pilot sample of 10–30% of the total population is appropriate for pre-testing research instruments.

The results, as presented in Table 3.6, indicate that all 8 administered questionnaires were completed and returned, resulting in a 100% response rate across all participating banks. This exceptionally high response rate underscores the feasibility and clarity of the research instrument.

The pilot test was instrumental in identifying and addressing potential issues such as ambiguous wording, inconsistent phrasing, and the interpretability of questionnaire items. The feedback obtained helped to refine and streamline the instrument, ensuring it was lucid, coherent, and

contextually appropriate. As emphasized by Williams-McBean (2019), pilot testing is a crucial methodological step that enhances the reliability and validity of the data collection instrument. It reinforces the confidence that the tools used are capable of capturing accurate, consistent, and meaningful data for the main study. Furthermore, the pilot process facilitated an improved structure for the data collection phase, contributing to a more robust research design for assessing FINTECH adoption and bank performance in Kenyan state corporations.

3.7. Description of Data Collection Procedures

A letter of identification from the Catholic University of Eastern Africa was obtained to facilitate the acquisition of research permission from the National Commission for Science, Technology and Innovation (NACOSTI), which officially authorized the study to be conducted in Kenya. In line with ethical research guidelines, each questionnaire was accompanied by a formal letter of introduction explaining the purpose of the study, assuring respondents of confidentiality and anonymity, and emphasizing that participation was entirely voluntary (Omondi & Cheruiyot, 2023). During data collection, the researcher personally distributed and collected the questionnaires at designated times. Researchers have observed that allowing respondents adequate time to complete the instrument significantly improves response rates (Mutua & Mwangi, 2024).

To ensure that the questionnaire was transparent and aligned with the study's objectives, it was thoroughly reviewed prior to data collection to identify and correct any ambiguities or inconsistencies. Furthermore, the instrument was carefully designed to be concise, relevant, and comprehensive in order to facilitate ease of response while preserving the richness and reliability of the data collected (Koech & Otieno, 2023).

3.8. Description of Data Analysis Procedures

Upon completion of data collection, the researcher went through each questionnaire to ensure it was fully completed. Thereafter, the responses were coded and entered into SPSS Version 28, also known as the Statistical Package for the Social Sciences. The study used both inferential and descriptive statistics to analyze the data (Mugenda & Mugenda, 2022).

Proportions and frequencies were used to describe the demographic information. Means and standard deviations were applied to provide insights into the central tendencies and variability of the research variables (Kothari & Garg, 2019). To simplify interpretation and allow comparison, the results were presented in tables.

Inferential statistics were applied in various ways. A Pearson correlation analysis was used to determine the direction and strength of linear relationships between the independent variables (online banking, mobile banking, artificial intelligence, and blockchain technology) and the dependent variable (bank performance). When necessary, Spearman rank correlation was used to test relationships among ranked variables (Bryman & Bell, 2020).

The study also examined the extent to which the independent variables predicted the dependent variable using multiple regression analysis. Prior to this, summated scores for each construct were calculated to form composite indices of the independent variables. An average score was also computed for bank performance using the same method. Sekaran and Bougie (2023) affirmed that this approach enhanced the dimensional consolidation of measurement items while maintaining data integrity.

The regression model to be applied is as follows:

$$Y=\beta 0+ \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$$

$$Performance=\beta 0+\beta 1(MB) +\beta 2(IB) +\beta 3(AI) +\beta 4(BT) +\epsilon$$

Where Y= Bank Performance

β0- constant (y- y-intercept)

$\beta 1, \beta 2, \beta 3, \beta 4$– Beta co- efficient.

X1= Mobile banking

X2= Internet banking

X3= Artificial intelligence

X4= Blockchain technology

ε- Error term accounting for unexplained variability

Application of the model can be expressed as follows:

$P = \beta_0 + \beta_1 MB + \beta_2 IB + \beta_3 AI + \beta_4 BT + \varepsilon$

Where:

P = Bank Performance

β_0 = Constant (intercept)

β_1, β_2, β_3, β_4 = Beta coefficients

MB = Mobile Banking

IB = Internet Banking

AI = Artificial Intelligence

BT = Blockchain Technology

ε = Error term accounting for unexplained variability in the model

The presentation included descriptive statistics that summarized respondents' perceptions of the implementation and effectiveness of digital technologies such as mobile banking, internet banking, artificial intelligence, and blockchain technology. Additionally, it presented inferential analysis results that examined the relationship between these technological innovations and the performance metrics of listed commercial banks in Kenya. The data was clearly organized with relevant subheadings and visual aids, which supported clarity and understanding of the findings.

3.8. Diagnostic Tests

To ensure that the multiple linear regression model used in the study was valid and reliable, several diagnostic tests were conducted. These tests assessed whether the data met key assumptions of regression analysis, namely autocorrelation, normality, heteroscedasticity, and multicollinearity.

3.8.1 Normality Test

A normality test was conducted to determine whether the residuals were normally distributed, which was essential for regression analysis (Hair et al., 2023). The Shapiro-Wilk test was used, as it is effective for small to medium sample sizes (Malato, 2023). If the p-value was greater than 0.05, the assumption of normality was considered satisfied (Nyongesa, 2018). If the assumption was violated, logarithmic or square root transformations were applied. If transformation failed, a non-parametric test such as Spearman's rank correlation was used (Banerjee, 2020).

3.8.2 Homoscedasticity Test

To test whether the variance of residuals was constant across levels of the independent variables, Levene's Test was used. A p-value greater than 0.05 indicated that the assumption of homoscedasticity was met (Gastwirth, Gel, & Miao, 2009). If the assumption was violated, the data was transformed, or non-parametric techniques were adopted to handle heteroscedasticity.

3.8.3 Multicollinearity Test

Multicollinearity was examined using Variance Inflation Factor (VIF) and Tolerance values. A VIF below 5 and Tolerance above 0.1 indicated the absence of multicollinearity (Ringle, Wende, & Becker, 2015). If the values suggested multicollinearity, corrective steps such as removing or combining variables were taken (Newson, 2024; Rutecki, 2022).

3.9 Ethical Considerations

Ethical concerns were addressed to ensure that the research was trustworthy and that the rights of participants were not violated at any point during the study. To access the listed commercial banks and ensure that the study corresponded to the requirements of institutional ethical procedures, the researcher obtained an official letter of introduction from the Catholic University of Eastern Africa prior to data collection, as specified by Saunders, Lewis, and Thornhill (2023). Informed consent was sought by assuring participants that their participation was voluntary and that they could choose to withdraw at any time without facing any form of punishment (Creswell & Creswell, 2023).

Each participant was fully informed about the purpose of data collection, the aims of the study, and the intended use of the data obtained. The questionnaire contained no identifying or personal details to ensure the confidentiality and anonymity of participants. To further reduce the possibility of unwanted access, the research team securely stored all data, locking it away and granting access only to authorized personnel (Bell, Bryman, & Harley, 2022).

The researcher presented themselves as honest and open throughout the process, ensuring that the information was displayed objectively and truthfully, without attempting to tailor it to suit the presumptions of any individual (Gray, 2023). The study also adhered to professional

standards, thereby enhancing scholarly and policy discussions through its ethical commitment to transparency, voluntary participation, confidentiality, and data security.

CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION AND DISCUSSION OF FINDINGS

4.0 Introduction

This chapter presents, discusses, and interprets the findings derived from the primary data collected through structured questionnaires and interview guides. Quantitative data was analyzed using the Statistical Package for Social Sciences (SPSS) and presented in frequency distributions, alongside descriptive and inferential statistics. The chapter begins with the response rate and demographic profile of the respondents, followed by an in-depth analysis of the relationship between Mobile Banking, Internet Banking, Artificial Intelligence, Blockchain Technology, and the performance of listed commercial banks in Kenya. It concludes with the results of a multiple regression analysis to examine the relationships among the study variables.

4.1 Instrument Return Rate

Table 4.1 Return Rate of Research Instruments

Category	Instrument distributed	Instrument Returned	Percentage
Managers	77	77	100%

Source: Field Data 2025

Table 4.1 presents the return rate of research instruments distributed to management staff across the 11 listed commercial banks in Kenya. A total of 77 questionnaires were administered to carefully selected respondents, including Chief Financial Officers (CFOs), Directors of Digital Banking, IT Managers, Heads of Digital Channels, Operations Managers, Customer Service Managers, and IT Support Managers key stakeholders responsible for the implementation and oversight of fintech innovations within their respective institutions. All 77 questionnaires were duly completed and returned, resulting in a 100% response rate.

This complete return rate signifies maximum engagement and participation from the targeted respondents, thereby ensuring a robust and comprehensive dataset for analysis. The exceptional response rate exceeds the widely accepted 70% threshold cited in quantitative research standards, as supported by Poynton, DeFouw, and Morizio (2019), making the data highly reliable and representative of the targeted population.

Moreover, such a perfect response rate reflects the effectiveness of the data collection strategy employed by the researcher, which may be attributed to the clarity of the research instruments, the relevance of the research topic to the respondents' professional roles, and the trust established between the researcher and the participants. This high level of cooperation not only eliminates the potential for non-response bias but also enhances the generalizability and validity of the findings. Ultimately, the 100% return rate strengthens the credibility of the study and assures that the insights derived truly reflect the perspectives and experiences of fintech practitioners within Kenya's listed commercial banks.

4.2 Demographic Information of Respondents

This section presents the demographic characteristics of the respondents who participated in the study on Fintech Adoption on Performance of Listed Commercial Banks in Kenya. The demographic information collected included the name of the bank, job title, years of work experience, and management level. The purpose of gathering this information was to gain a general understanding of the background and professional profiles of the participants involved in fintech implementation across the selected commercial banks. The findings are summarized and analyzed below.

4.2.1 Name of the Bank

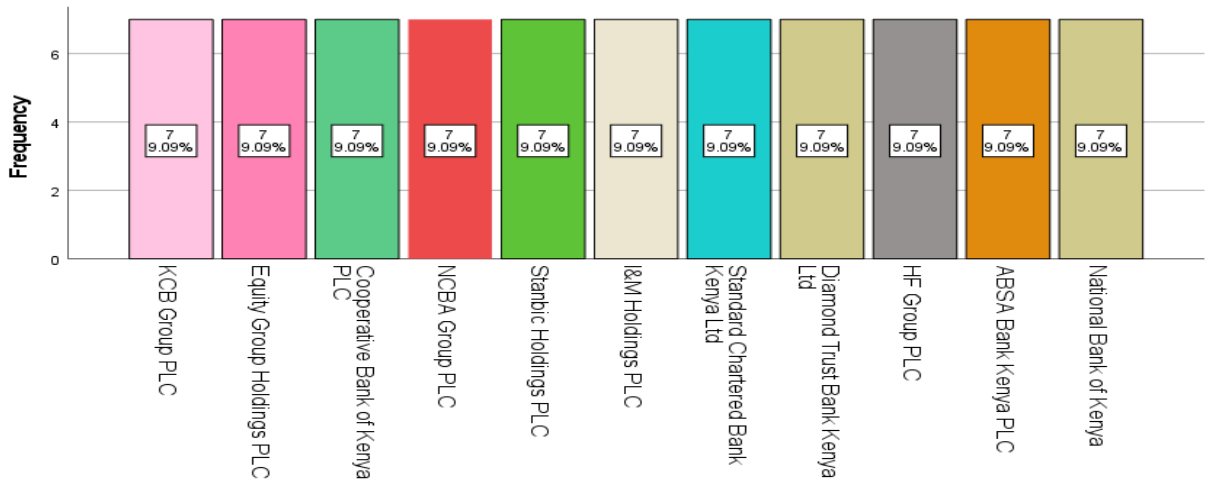


Figure 4.1 Name of the Bank

Source: Field Data 2025

The study sought to determine the distribution of respondents based on the commercial banks they represented. A total of 77 participants were drawn evenly from 11 commercial banks listed on the Nairobi Securities Exchange (NSE). The data collected on this variable is summarized in Table 4.2, which shows that each of the 11 banks contributed exactly 7 respondents, accounting for 9.09% of the total sample per bank. This consistent pattern indicates a deliberate and balanced sampling approach across all the targeted institutions.

The uniform representation across the banks suggests that the study successfully ensured equal participation from each commercial bank. This eliminated the risk of overrepresentation or underrepresentation, thereby enhancing the fairness, neutrality, and comparability of the results. Such a strategy is particularly critical in multi-institutional research where skewed participation could introduce bias and compromise the validity of findings.

Moreover, the even distribution of respondents strengthens the reliability and generalizability of the study outcomes. It ensures that the perspectives captured reflect the fintech adoption

experiences and performance outcomes across all listed commercial banks in Kenya. This design also supports cross-bank comparisons and allows for equitable formulation of recommendations and policy suggestions relevant to the entire sector. Ultimately, the balanced participation contributes to a more robust and representative understanding of how fintech is shaping performance in Kenya's banking industry.

4.2.2 Job Title

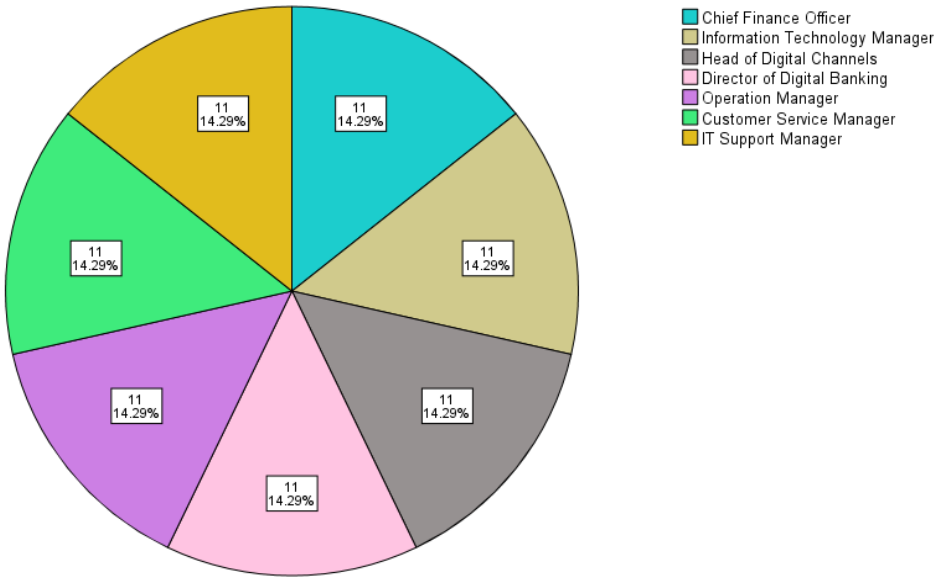


Figure 4.2. ***Job Title***

Source: Field Data 2025

The study examined the job titles of respondents involved in the implementation and management of fintech within the 11 listed commercial banks in Kenya. This demographic variable was critical in identifying the diversity of expertise and roles engaged in fintech adoption processes. Each of the seven job titles had 11 respondents, accounting for 14.29% of the total sample per category. This shows that the sample was designed to achieve equal representation from all key roles directly involved in the fintech landscape within the banking

sector. The uniform spread demonstrates intentional and structured sampling to ensure that no single professional role dominates the findings.

The balanced representation of job titles implies that data was collected from a wide spectrum of managerial and technical positions, thereby allowing the study to capture holistic insights on fintech adoption from strategic, operational, and technical viewpoints. This diversity enhances the validity of the data by integrating views from decision-makers, systems implementers, and end-user support professionals.

By involving top executives like Chief Executive Officers, as well as technical and operational roles such as IT Managers and Customer Service Managers, the study ensures that its findings reflect the full organizational engagement required in fintech initiatives. This strategic inclusion of multiple perspectives makes it possible to understand how different roles perceive, support, and influence fintech implementation and its impact on bank performance. Additionally, the equal participation fosters cross-functional comparison and allows for recommendations that are well-informed, inclusive, and applicable across different levels and departments in the banking sector.

4.2.3 Years of Working

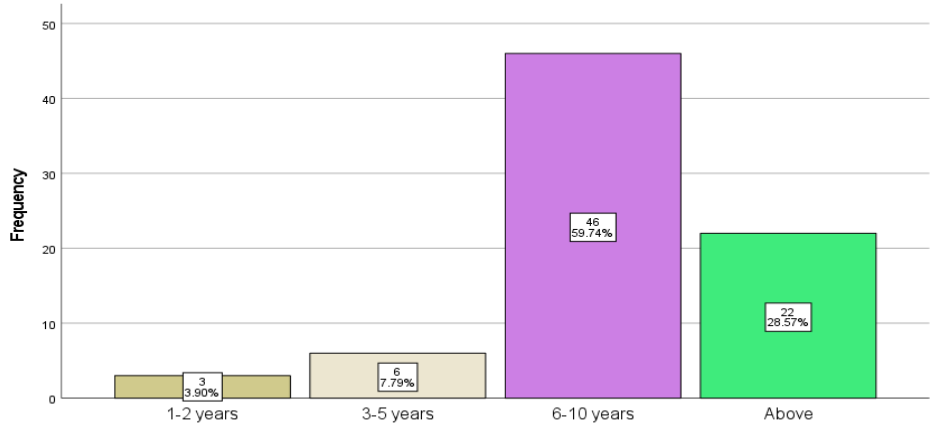


Figure 4.3 Years of Working

Source: Field Data 2025

Figure 4.3 presents the work experience of respondents involved in the study on fintech adoption and its impact on the performance of listed commercial banks in Kenya. The objective was to understand the depth of institutional knowledge and exposure to digital transformation among the participants. The findings revealed that a majority of respondents, 46 (59.74%), had worked for 6–10 years, followed by 22 (28.74%) with more than 10 years of experience. Smaller groups had 3–5 years (6 respondents, 7.79%) and 1–2 years (3 respondents, 3.90%) of experience. This indicates that most respondents had substantial exposure to operational and technological systems within their institutions, suggesting they are well-positioned to assess the long-term impact of fintech implementation.

The data shows that 88.48% of participants had over six years of experience, representing a workforce largely composed of mid-career and senior professionals. These respondents likely possess firsthand knowledge of both legacy systems and modern fintech solutions, enhancing the credibility of their perspectives. While the group with less than five years of experience was smaller, their inclusion contributes a valuable, adaptive viewpoint toward digital

innovation. Overall, the distribution demonstrates a professionally diverse and balanced workforce, where seasoned expertise and emerging innovation intersect. This mix strengthens the study's findings and highlights the need to integrate institutional memory with new ideas for effective and sustainable fintech adoption in Kenya's banking sector.

4.2.4 Management Level

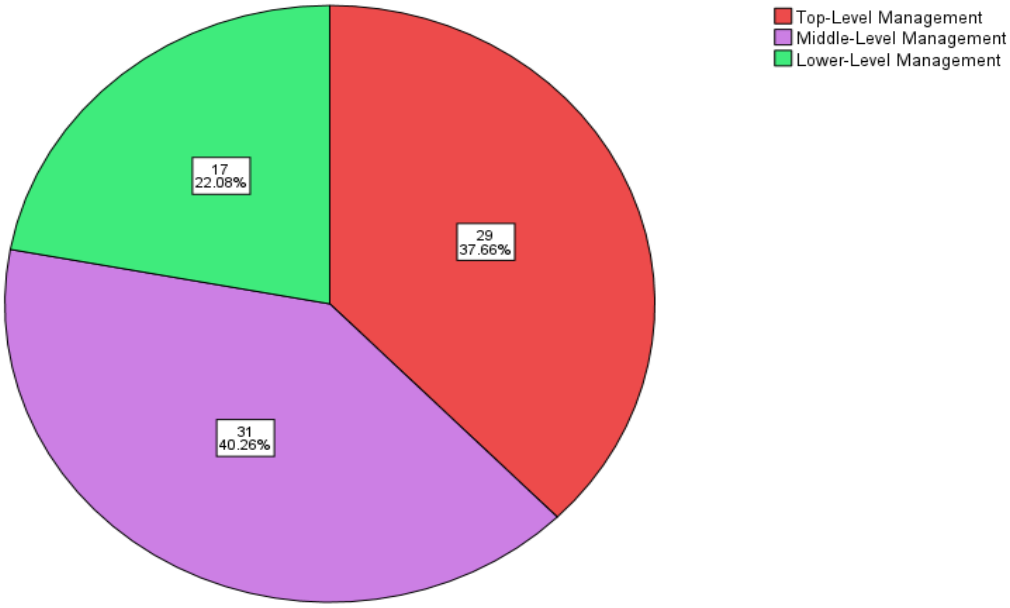


Figure 4.4. Management Level

Source: Field Data 2025

Figure 4.4 presents the management levels of the respondents who participated in the study examining the influence of fintech adoption on the performance of listed commercial banks in Kenya. This variable was included to help understand how different tiers of management engage with and perceive fintech implementation within the banking environment. The categorization into top-level, middle-level, and lower-level management allows for a comprehensive analysis of strategic decision-making, operational oversight, and ground-level execution of fintech systems.

The findings show that the largest proportion of respondents, 31 (40.26%), were from middle-level management, followed closely by 29 (37.66%) from top-level management. The smallest group comprised 17 respondents (22.08%) from lower-level management. These results indicate that the majority of the study participants hold influential or supervisory roles within their institutions, giving them access to valuable insights into both the strategic planning and practical implementation of fintech systems.

The distribution suggests that middle and top-level managers together accounting for 77.92% of respondents are the most actively involved in fintech-related decisions, strategies, and performance evaluations. Their dominance in the sample enhances the quality and relevance of the data, as these roles typically oversee budgeting, technology procurement, compliance, and performance metrics. Meanwhile, the representation of lower-level management, though smaller, is important in providing feedback on end-user experience, operational challenges, and adoption barriers at the implementation stage.

Overall, the presence of respondents across all three management levels allows the study to present a well-rounded understanding of fintech adoption from policy formulation to execution. The findings benefit from perspectives that span strategic leadership, departmental coordination, and frontline service delivery. This inclusive approach strengthens the study's validity and enables more comprehensive and actionable recommendations that address the diverse realities within the banking sector's organizational hierarchy.

4.3 Descriptive Statistics

This section presents the descriptive statistics derived from the respondents' data. The analysis includes measures such as percentages, means, and standard deviations, offering a summary of the general trends and patterns observed in the responses. To enhance clarity and

understanding, each table is accompanied by a narrative interpretation explaining the key findings and insights drawn from the data.

4.3.1 Mobile Banking and Bank Performance

The study utilized a 5-point Likert scale to assess the effect of mobile banking adoption on the performance of listed commercial banks in Kenya. Respondents were presented with a series of statements related to mobile banking and asked to indicate their level of agreement, reflecting their perceptions of its influence on various aspects of bank performance.

Table 4.2 Effect of Mobile Banking Adoption on the Performance of Listed Commercial Banks in Kenya

Statement	***Mean***	***Std***
Mobile statement update has made it easy to access information on customers' bank balance	4.70	.461
Mobile statement updates are real time for every activity	4.36	.484
Transaction details are easily accessible from the mobile platform	4.38	.650
Mobile statement can be downloaded as PDF files and printed for record keeping or for the purpose of presenting evidence	4.47	.502
Account management has made it simple and quick to open accounts on the mobile app	4.49	.576
Account management has allowed simple updates of security pins and passwords	2.05	1.062
Account management has allowed users to pay bills digitally, view transaction history, transfer funds, and check balances	2.13	1.080
Account management tool is a reliable tracker of the users' expenses, budget and savings performance	2.08	.997
The mobile loan application process is easy and user-friendly	4.31	.568
Mobile loan approval time is fast	4.42	.636
The loan terms (e.g. interest rate, repayment period) are clear	4.51	.576
Repayment through mobile banking is simple and efficient	4.64	.484
Average	**4.18**	**0.67**

Key: SD (1) = Strongly Disagree D (2) Disagree MA (3) = Moderately Agree A (4) = Agree SA (5) =Strongly Agree

Source: Field Data (2025)

Table 4.2 presents the responses of 77 participants regarding the effect of mobile banking adoption on the performance of listed commercial banks in Kenya. The analysis highlights the frequency, percentage distribution, mean scores, and standard deviations for each item, offering insights into how mobile banking features influence service delivery, operational efficiency, and customer experience.

Regarding the statement “Mobile statement update has made it easy to access information on customers’ bank balance”, 23 respondents (29.9%) agreed, while 54 respondents (70.1%) strongly agreed. This item recorded a high mean score of 4.70 and a standard deviation of 0.461, indicating strong consensus and low variability. These findings suggest that real-time access to customer account information is one of the most appreciated benefits of mobile banking. For the statement “Mobile statement updates are real-time for every activity”, 49 respondents (63.6%) agreed, and 28 respondents (36.4%) strongly agreed, yielding a mean of 4.36 and a standard deviation of 0.484. This indicates general agreement and confidence in the real-time nature of mobile banking notifications, which enhances operational transparency and customer trust.

In response to the statement “Transaction details are easily accessible from the mobile platform”, 7 respondents (9.1%) moderately agreed, 34 respondents (44.2%) agreed, and 36 respondents (46.8%) strongly agreed. The mean score was 4.38 with a standard deviation of 0.650, reflecting favorable views and moderate variability regarding ease of accessing transaction data. When asked if “Mobile statements can be downloaded as PDF files and printed for record keeping or for the purpose of presenting evidence”, 41 respondents (53.2%) agreed and 36 respondents (46.8%) strongly agreed. This item had a high mean of 4.47 and a

low standard deviation of 0.502, suggesting respondents widely support the mobile platform's documentation functionality.

Regarding "Account management has made it simple and quick to open accounts on the mobile app", 1 respondent (1.3%) disagreed, 36 respondents (46.8%) agreed, and 40 respondents (51.9%) strongly agreed. This resulted in a high mean of 4.49 and a standard deviation of 0.576, indicating broad satisfaction with mobile-based account onboarding processes. In contrast, when asked whether "Account management has allowed simple updates of security pins and passwords", 26 respondents (33.8%) strongly disagreed, 34 (44.2%) disagreed, 6 (7.8%) moderately agreed, 9 (11.7%) agreed, and only 2 (2.6%) strongly agreed. This item had a low mean of 2.05 and a standard deviation of 1.062, suggesting dissatisfaction and limited trust in mobile banking's ability to handle sensitive account modifications securely.

Similarly, for the statement "Account management has allowed users to pay bills digitally, view transaction history, transfer funds, and check balances", 22 respondents (28.6%) strongly disagreed, 38 (49.4%) disagreed, 5 (6.5%) moderately agreed, 9 (11.7%) agreed, and 3 (3.9%) strongly agreed. With a mean of 2.13 and standard deviation of 1.080, this item also reflects skepticism or underutilization of full account management features via mobile banking. When evaluating the statement "The account management tool is a reliable tracker of users' expenses, budget, and savings performance", 24 respondents (31.2%) strongly disagreed, 33 (42.9%) disagreed, 11 (14.3%) moderately agreed, 8 (10.4%) agreed, and 1 (1.3%) strongly agreed. The resulting mean was 2.08 with a standard deviation of 0.997, further confirming limited confidence in advanced financial tracking features on mobile platforms.

On a positive note, for "The mobile loan application process is easy and user-friendly", only 1 respondent (1.3%) disagreed and 1 (1.3%) moderately agreed, while 48 (62.3%) agreed and 27 (35.1%) strongly agreed. This resulted in a high mean of 4.31 and a low standard deviation of

0.568, suggesting strong approval of mobile loan services. For “Mobile loan approval time is fast”, 1 respondent (1.3%) disagreed, 3 (3.9%) moderately agreed, 36 (46.8%) agreed, and 37 (48.1%) strongly agreed. The mean score of 4.42 and standard deviation of 0.636 reflect high confidence in the speed of loan approval via mobile platforms.

In evaluating “The loan terms (e.g., interest rate, repayment period) are clear”, 1 respondent (1.3%) disagreed, 35 (45.5%) agreed, and 41 (53.2%) strongly agreed. This statement received a mean of 4.51 and a standard deviation of 0.576, suggesting respondents found mobile loan products to be transparent and well-communicated. Lastly, for “Repayment through mobile banking is simple and efficient”, 28 respondents (36.4%) agreed and 49 (63.6%) strongly agreed. With a mean of 4.64 and standard deviation of 0.484, this item reflects broad satisfaction with the mobile loan repayment process.

The average mean across all items was 4.18, with an overall standard deviation of 0.67, reflecting strong agreement on the positive effects of mobile banking adoption on core service delivery, particularly in areas related to transactions, loan services, and real-time updates. However, features related to personalized account management—such as expense tracking and PIN/password updates received low ratings, indicating areas where mobile platforms need significant improvement to match user expectations.

These findings support the results of Ahmadi and Narci (2020), who concluded that mobile banking enhances customer satisfaction and client retention in the Turkish banking sector. Their study found that efficient digital banking tools are key drivers of improved service delivery and loyalty. Similarly, Yoewono and Prabowo (2024) found that mobile banking applications in Indonesia significantly reduced paperwork, improved customer access, and contributed positively to banks' internal processes and financial outcomes. These parallels

affirm that mobile banking adoption is a global driver of performance improvement, provided platforms address both transactional and advanced management needs

In the qualitative analysis of how mobile banking influences the performance of commercial banks in Kenya, responses gathered from participants across eleven institutions—including KCB, Equity, Cooperative Bank, NCBA, Stanbic Bank, T&M Bank, Standard Chartered Bank, Diamond Trust Bank Kenya Ltd, HF Group, Absa Bank, and National Bank of Kenya—highlighted consistent and insightful patterns.

Across the data, respondents unanimously acknowledged that mobile banking has significantly enhanced profitability. This was largely attributed to increased transaction volumes, emergence of new digital revenue streams, and substantial reductions in operational costs. Statements such as *"mobile banking has cut costs and increased profits through digital transactions"* and *"we've seen more income from mobile-based products"* reinforced this sentiment.

Operational efficiency was another strong theme. Participants emphasized that automation of routine inquiries and transactions had eased workload pressures on staff and improved system performance. As one respondent noted, *"mobile banking allows seamless services with fewer errors and better uptime,"* demonstrating how automation has transformed daily banking operations.

The impact on customer satisfaction was also broadly emphasized. Respondents frequently pointed to the 24/7 availability, user-friendly interfaces, and enhanced security of mobile platforms as drivers of improved client experience. A manager from Equity Group stated, *"convenience is key mobile banking keeps our customers happy and loyal."*

Additionally, cost reduction emerged as a key benefit, with reduced foot traffic in branches and shorter service times leading to more productive staff deployment. The technology has also

expanded customer reach, particularly in underserved and remote areas, contributing to digital inclusion and financial accessibility.

Digital engagement and transformation were highlighted as increasingly important dimensions. Banks reported using mobile platforms to provide real-time updates, targeted marketing, and personalized services. These advances not only improved service quality but also encouraged a culture of innovation and agility. One respondent from Absa remarked, *"mobile banking is more than a service channel it's a strategic lever for transformation."*

Notably, respondents pointed out improvements in internal accountability and transparency, citing the ability to digitally track and audit customer interactions and transactions. Lastly, several banks indicated that mobile banking had optimized support systems, freeing up staff to handle more complex and value-adding customer issues instead of routine queries.

In summary, while individual banks emphasized different strengths based on their contexts and strategies, the consensus across the sector affirms that mobile banking has become a cornerstone of improved profitability, efficiency, customer experience, and strategic agility in Kenya's commercial banking landscape.

The qualitative findings from this study strongly resonate with the work of Ahmadi and Narci (2020), who established that mobile banking significantly enhances customer satisfaction and retention in the Turkish banking sector. This aligns with the respondents' views across Kenyan commercial banks, where mobile banking was credited with boosting profitability, operational efficiency, and customer experience. Just as Ahmadi and Narci found that mobile banking contributes to client loyalty and improved service delivery, Kenyan bank managers emphasized 24/7 accessibility, cost reduction, and strategic digital transformation as key outcomes, confirming mobile banking's role as a vital performance enabler in the financial sector.

4.3.2 Internet Banking and Bank Performance

The study employed a 5-point Likert scale to examine the effect of internet banking usage on the performance of listed commercial banks in Kenya. Respondents were asked to indicate their level of agreement with several statements designed to capture their perceptions of how internet banking influences key dimensions of bank performance.

Table 4.3 Effect of Internet Banking Usage on the Performance of Listed Commercial Banks in Kenya

Statement	***Mean***	***Std***
Fund transfer through internet banking is real-time	4.70	.461
Fund transfer has a two-factor authentication to protect users from making wrong transactions	2.57	1.261
Internet banking systems limit the amount that can be transferred online to curb theft risk and mismanagement of funds	4.61	.491
The online fund transfer system fees are transparent	2.43	1.105
Users can track the performance of their investments via online portfolio management systems	4.38	.859
Online portfolio management provides real-time updates on stock prices for effective decision-making	2.13	.732
Online portfolio systems auto-generate bonuses, stock dividends, and splits which can be withdrawn in real-time	2.03	1.135
Online portfolio management systems are secured from unauthorized access and fraud risks	4.30	.608
Internet banking system uses PayPal services for international transactions	4.36	.605
Online bills payment system permits scheduled payments to avoid late fees	4.49	.503
Online bills payment is highly secured and cost-effective	4.70	.461
Bills payment through internet banking is convenient and less time-consuming	4.64	.484
Average	**4.25**	**0.73**

Key: SD (1) = Strongly Disagree D (2) Disagree MA (3) = Moderately Agree A (4) = Agree SA (5) =Strongly Agree

Source: Field Data (2025)

Table 4.3 assessed the effect of internet banking usage on the performance of listed commercial banks in Kenya. A total of 77 responses were collected, and descriptive statistics, including percentages, mean scores, and standard deviations, were used to summarize the results.

The findings revealed strong agreement with most statements regarding internet banking's role in enhancing bank performance. A large majority, 23 (29.9%) agreed and 54 (70.1%) strongly agreed, that fund transfers via internet banking are processed in real time. This item recorded a very high mean of 4.70 and a low standard deviation of 0.461, reflecting near-universal approval. However, when asked whether internet banking systems incorporate two-factor authentication to prevent erroneous transactions, 13 (16.9%) strongly disagreed, 37 (48.1%) disagreed, and only a small proportion agreed or strongly agreed (14 [18.2%] and 8 [10.4%] respectively). This item registered a low mean of 2.57 and a relatively high standard deviation of 1.261, suggesting general concern and divergent views regarding transaction security.

Similarly, a large number of respondents, 30 (39.0%) agreed and 47 (61.0%) strongly agreed, that systems limit online fund transfers to reduce risk of theft and mismanagement. This generated a high mean of 4.61 with a low standard deviation of 0.491. In contrast, transparency of fund transfer fees received weaker support: 14 (18.2%) strongly disagreed, 36 (46.8%) disagreed, and only 17 (22.1%) agreed or strongly agreed. The mean was relatively low at 2.43 with a standard deviation of 1.105, reflecting dissatisfaction with fee clarity.

For the statement that users can track investment performance through online portfolio systems, 29 (37.7%) agreed and 41 (53.2%) strongly agreed, resulting in a favorable mean of 4.38 and a standard deviation of 0.859. However, when asked whether real-time stock updates are provided for decision-making, 50 (64.9%) disagreed and 11 (14.3%) strongly disagreed, with a low mean of 2.13 and standard deviation of 0.732. The claim that online portfolio systems

automatically generate and allow real-time withdrawal of dividends, bonuses, or stock splits was also poorly rated 30 (39.0%) strongly disagreed and 29 (37.7%) disagreed yielding a mean of 2.03 and standard deviation of 1.135.

Internet banking platforms were positively rated for their security: 48 (62.3%) agreed and 27 (35.1%) strongly agreed that these systems are secured from unauthorized access and fraud, with a mean of 4.30 and SD of 0.608. A similarly high level of agreement was observed on the use of PayPal for international transactions 39 (50.6%) agreed and 33 (42.9%) strongly agreed, producing a mean of 4.36 and SD of 0.605.

With regard to bill payments, 39 (50.6%) agreed and 38 (49.4%) strongly agreed that the online system allows scheduling to avoid late fees, which had a mean of 4.49 and SD of 0.503. Furthermore, 23 (29.9%) agreed and 54 (70.1%) strongly agreed that bill payments made online are secure and cost-effective, again generating a high mean of 4.70 and SD of 0.461. Finally, 28 (36.4%) agreed and 49 (63.6%) strongly agreed that online bill payment is convenient and less time-consuming, reflected by a mean of 4.64 and SD of 0.484. The average across all items was 4.25 with a standard deviation of 0.73, indicating strong positive perceptions overall.

These results indicate that internet banking is widely perceived to enhance banking performance, particularly in terms of efficiency, convenience, security, and digital integration. Features like real-time transfers, PayPal integration, and bill payments are highly valued, contributing positively to the digital transformation of banks. However, areas such as two-factor authentication, fee transparency, stock update systems, and auto-generated financial benefits still require improvement, as evidenced by the lower mean scores and higher variability.

The current findings align with those of Ajaya (2020), who reported that online banking significantly improved the financial performance of commercial banks in Kenya, particularly

through increased digital transactions and cost efficiencies. Similarly, Katutu (2019) noted that top-tier Kenyan banks experienced growth in profitability due to increased customer engagement via internet banking platforms. In contrast, studies by Islam et al. (2019) and Ndine et al. (2022) found that early internet banking adoption in Bangladesh and Kenya, respectively, led to lower returns due to high implementation costs and limited consumer uptake. These comparisons suggest that the success of internet banking depends heavily on the maturity of the system, user experience, and the strategic deployment of digital tools.

In the qualitative analysis exploring the influence of internet banking on efficiency, profitability, and customer satisfaction, participants from eleven major banks in Kenya including KCB, Equity, Cooperative Bank, NCBA, Stanbic Bank, T&M Bank, Standard Chartered Bank, Diamond Trust Bank Kenya Ltd, HF Group, Absa Bank, and National Bank of Kenya offered consistent and revealing insights into its transformative role within the sector.

Across the responses, internet banking was overwhelmingly credited with boosting operational efficiency. Many participants highlighted that automation of key services such as funds transfers, account inquiries, and statement generation has significantly reduced over-the-counter demand, manual processes, and administrative workload. One respondent noted, *"internet banking has minimized routine physical tasks, freeing up staff for high-value engagements."* These efficiency gains have streamlined workflows and improved turnaround times across departments.

Cost reduction emerged as another clear benefit, with respondents pointing to diminished reliance on physical branches, paperwork, and in-person services. A manager from Stanbic Bank remarked, *"the shift to online platforms has significantly lowered our operational overheads, especially in urban branches."*

Participants also emphasized enhanced customer satisfaction as a direct outcome of internet banking. The ability to access services 24/7, complete transactions in real time, and utilize user-friendly digital interfaces has reshaped customer experience. As one Equity Group staff member explained, *"our clients enjoy convenience, faster service, and better autonomy in managing their accounts."*

These improvements in efficiency and customer satisfaction have in turn contributed to increased profitability. Respondents observed that savings on service costs and greater digital transaction volumes have opened up new revenue streams. Several banks reported *"reduced cost per transaction"* and *"higher client retention rates due to satisfaction with internet-based services."*

Moreover, internet banking was praised for offering convenient and reliable service delivery, with users benefiting from reduced queues, self-service capabilities, and enhanced system stability, even during peak usage times. For many institutions, this has translated into broader digital reach especially among remote clients enhancing accessibility to financial services across diverse demographics.

Finally, a notable theme was the reduction in service turnaround time. With real-time updates and processing, customers experience quicker resolution of requests, fostering a more responsive banking environment.

In summary, participants across all eleven banks agreed that internet banking has become a cornerstone for modern banking strategy driving operational efficiency, lowering costs, improving customer experience, and contributing positively to profitability. However, a few respondents also hinted at the need for continuous improvement in system reliability and digital literacy support to maximize the full potential of internet banking for all customer segments.

The qualitative findings from this study resonate with the conclusions drawn by Ajaya (2020**)**, who established that the adoption of internet banking significantly enhanced the financial performance of Kenyan commercial banks. Ajaya's research revealed that online banking improved customer access, reduced operational costs, and increased digital transaction volumes, all of which contributed to stronger profitability paralleling participant observations in the current study regarding enhanced efficiency, customer satisfaction, and reduced service costs. This alignment reinforces the argument that internet banking, when strategically implemented, plays a pivotal role in transforming both operational dynamics and revenue models within the banking sector.

4.3.3 Artificial Intelligence and Bank Performance

The study employed a 5-point Likert scale to assess the influence of artificial intelligence (AI) integration on the performance of listed commercial banks in Kenya. Respondents were presented with a set of statements related to AI technologies and asked to indicate their level of agreement, reflecting their perceptions of AI's impact on various dimensions of bank performance.

Table 4.4 Influence of Artificial Intelligence Integration on the Performance of Listed Commercial Banks in Kenya

Statement	***Mean***	***Std***
AI-powered Chatbots and virtual assistants are being used to address customer inquiries and complaints	4.55	.640
AI has created personalized customer experiences that has made customers satisfied and happy	2.43	.979
AI provides customer support to clients both day and night irrespective of the time zone they operate in	4.49	.503
AI has helped banks automatically prioritize and assign customer issues	2.81	.918
AI evaluates fraud risk areas in transactions to detect and seal off vulnerable points	4.27	.599

AI fraud detection systems are less time-consuming	4.57	.802
AI adoption has improved transaction processing speed and accuracy	4.49	.641
AI has enabled conduction of due diligence on potential loan borrowers	4.48	.576
AI has reduced the time needed for data analysis through automation	2.39	1.226
AI has improved real-time data validation by identifying errors in datasets	4.43	.524
AI has helped identify hidden data patterns for decision-making	2.32	1.186
AI has enhanced operational efficiency through automation of repetitive tasks	4.58	.496
Average	**4.20**	**0.76**

Key: SD (1) = Strongly Disagree D (2) Disagree MA (3) = Moderately Agree A (4) = Agree SA (5) =Strongly Agree

Source: Field Data (2025)

Table 4.4 assessed the influence of Artificial Intelligence (AI) integration on the performance of listed commercial banks in Kenya revealing strong and varied perspectives from the 77 respondents surveyed. Using a 5-point Likert scale, participants rated their agreement with a series of AI-related statements, covering aspects such as customer service, fraud detection, data analysis, operational efficiency, and decision-making.

The data showed that 2 (2.6%) respondents disagreed, 29 (37.7%) agreed, and 46 (59.7%) strongly agreed that AI-powered chatbots and virtual assistants are being used to handle customer inquiries and complaints. This item had a high mean score of 4.55 with a standard deviation of 0.640, indicating strong consensus. However, there was skepticism regarding AI's capacity to deliver personalized customer experiences: 7 (9.1%) strongly disagreed, 47 (61.0%) disagreed, 9 (11.7%) moderately agreed, 11 (14.3%) agreed, and 3 (3.9%) strongly agreed. This yielded a lower mean of 2.43 and standard deviation of 0.979. On 24/7 customer support via AI regardless of time zone, 39 (50.6%) agreed and 38 (49.4%) strongly agreed, with no disagreement, resulting in a high mean of 4.49 and SD of 0.503.

AI's role in automatically prioritizing and assigning customer issues received mixed responses: 9 (11.7%) strongly disagreed, 11 (14.3%) disagreed, 46 (59.7%) moderately agreed, 8 (10.4%) agreed, and 3 (3.9%) strongly agreed, producing a moderate mean of 2.81 and SD of 0.918. Fraud detection was one of the strongest areas, with 1 (1.3%) strongly disagreeing, 52 (67.5%) agreeing, and 24 (31.2%) strongly agreeing that AI evaluates risk areas and seals vulnerabilities. This had a mean of 4.27 and low SD of 0.599. On whether AI fraud detection systems save time, 2 (2.6%) strongly disagreed, 1 (1.3%) disagreed, 22 (28.6%) agreed, and 52 (67.5%) strongly agreed, giving a mean of 4.57 and SD of 0.802.

Transaction speed and accuracy also rated highly, with 1 (1.3%) strongly disagreeing, 35 (45.5%) agreeing, and 41 (53.2%) strongly agreeing, producing a mean of 4.49 and SD of 0.641. On whether AI enables effective due diligence on loan applicants, 1 (1.3%) disagreed, 37 (48.1%) agreed, and 39 (50.6%) strongly agreed, giving a high mean of 4.48 and low SD of 0.576. In contrast, for whether AI reduces time for data analysis through automation, 18 (23.4%) strongly disagreed, 34 (44.2%) disagreed, 9 (11.7%) moderately agreed, 9 (11.7%) agreed, and 7 (9.1%) strongly agreed, producing a low mean of 2.39 and high SD of 1.226.

On AI's capacity to validate real-time data and identify errors, 1 (1.3%) moderately agreed, 42 (54.5%) agreed, and 34 (44.2%) strongly agreed, yielding a strong mean of 4.43 and SD of 0.524. Regarding AI's ability to identify hidden patterns for decision-making, 19 (24.7%) strongly disagreed, 35 (45.5%) disagreed, 7 (9.1%) moderately agreed, 11 (14.3%) agreed, and 5 (6.5%) strongly agreed. This resulted in a low mean of 2.32 and SD of 1.186. Finally, 32 (41.6%) agreed and 45 (58.4%) strongly agreed that AI enhances operational efficiency through automation of repetitive tasks, producing a high mean of 4.58 and SD of 0.496.

Overall, the average mean score across all items was 4.20 with an overall standard deviation of 0.76, indicating strong agreement on AI's positive impact, although perceptions varied

significantly across specific functionalities. The results suggest that banks have effectively integrated AI to enhance performance in areas such as customer service, transaction processing, and fraud detection. However, limited support for AI's analytical and personalization capabilities indicates areas that may require more strategic investment, including algorithm refinement and staff training.

These findings align with the work of Al-Ababneh and Andrusiak (2023), who observed that AI implementation in Credit Agricole Bank in Ukraine significantly improved efficiency and reduced operational costs through automation. Similarly, Awosusi (2025) found that AI enhanced financial transactions, improved fraud detection, and increased productivity in Nigerian banks, contributing to improved financial outcomes. Together, these studies support the conclusion that when strategically integrated, AI can meaningfully boost bank performance though optimization and inclusive adoption remain critical.

In the qualitative analysis of how Artificial Intelligence (AI) has influenced bank performance in Kenya, participants from eleven banks including KCB, Equity, Cooperative Bank, NCBA, Stanbic Bank, T&M Bank, Standard Chartered Bank, Diamond Trust Bank Kenya Ltd, HF Group, Absa Bank, and National Bank of Kenya consistently identified AI as a transformative force enhancing efficiency, profitability, and customer satisfaction.

Respondents highlighted that AI has significantly improved operational efficiency by automating routine tasks, minimizing human intervention, and optimizing back-office processes. One participant noted, *"AI has taken over repetitive functions, allowing staff to focus on strategic duties."* This efficiency gain was further supported by a reduction in turnaround time for transactions and service delivery, resulting in quicker customer resolutions.

In terms of customer satisfaction, participants praised the use of AI-powered chatbots and personalized services that provide 24/7 support and quick responses. A manager from Equity

Bank mentioned, *"clients now get real-time responses to queries, which improves their overall experience and loyalty."*

Profitability was also reported to have improved due to cost savings from reduced staffing pressure and streamlined operations. Banks noted increased retention and revenue through personalized service recommendations and predictive analytics, with one NCBA respondent stating, *"AI helps us retain clients by anticipating their needs before they reach out."*

A cross-cutting theme was the enhanced decision-making and monitoring enabled by AI systems. Participants shared that AI tools provide smart data insights for forecasting, performance tracking, and resource planning. Additionally, fraud detection and risk control were widely acknowledged, with banks using AI to detect anomalies and prevent fraud in real time.

Lastly, respondents emphasized that AI has lowered staff workload, reduced burnout, and improved overall employee efficiency by reallocating human resources to more value-adding tasks.

Overall, while respondents unanimously recognized the benefits of AI adoption in boosting efficiency, profitability, and customer satisfaction, a few cautioned that its success depends on continuous system updates and adequate staff training to maximize its capabilities and address technical challenges effectively.

The qualitative findings on the influence of Artificial Intelligence (AI) on bank performance in Kenya align closely with the study by Al-Ababneh and Andrusiak (2023), which demonstrated that AI integration at Credit Agricole Bank in Ukraine significantly enhanced operational efficiency and reduced costs by automating tasks such as legal opinion drafting and customer service through voice bots. Similarly, Kenyan bank respondents cited AI's role in automating routine processes, reducing staff workload, improving decision-making, and boosting customer

satisfaction and profitability reinforcing the view that strategic AI deployment drives substantial improvements in banking performance.

4.3.4 Blockchain Technology and Bank Performance

The study employed a 5-point Likert scale to examine the role of blockchain technology adoption on the performance metrics of listed commercial banks in Kenya. Respondents were asked to rate their level of agreement with various statements relating to how blockchain influences different dimensions of bank performance.

Table 4.5 Role of Blockchain Technology Adoption on the Performance Metrics of Listed Commercial Banks in Kenya

Statement	***Mean***	***Std***
Blockchain technology has managed theft risk through provision of highly secured platforms	4.58	.496
Blockchain permits peer-to-peer financial transactions eliminating counterparty risks	4.38	.650
Blockchain's cryptographic nature prevents unauthorized disruption or data manipulation	4.45	.501
Kenyan banks use Blockchain for cross-border payments via local banks	4.38	.629
Cross-border payments are made in real-time	2.04	.733
Cross-border settlements are less costly and convenient	2.30	.974
Blockchain payment systems enable P2P and B2B payments across countries	4.36	.705
Blockchain enhances transparency and accountability in banks	2.13	1.043
Smart contracts self-execute transactions without third parties, saving time	4.34	.476
Smart contracts support immutable and transparent transactions	4.64	.484
Smart contracts verify and record transactions promptly	4.38	.488
Smart contracts cut intermediary costs, making cross-border payments economical	4.61	.491
Average	**4.18**	**0.64**

Key: SD (1) = Strongly Disagree D (2) Disagree MA (3) = Moderately Agree A (4) = Agree SA (5) =Strongly Agree

Source: Field Data (2025)

Table 4.5 presents insights into the role of blockchain technology adoption on the performance metrics of listed commercial banks in Kenya, based on responses from 77 participants. Using a 5-point Likert scale, respondents evaluated various statements regarding blockchain features such as transaction security, transparency, peer-to-peer capabilities, and operational efficiency.

The data reveals strong agreement that blockchain technology manages theft risk through secure platforms, with 32 respondents (41.6%) agreeing and 45 (58.4%) strongly agreeing, resulting in a high mean of 4.58 and a low standard deviation of 0.496. Similarly, for the statement that blockchain permits peer-to-peer financial transactions and eliminates counterparty risks, 1 (1.3%) strongly disagreed, 1 (1.3%) moderately agreed, 42 (54.5%) agreed, and 33 (42.9%) strongly agreed. This yielded a high mean of 4.38 and a standard deviation of 0.650.

Respondents also affirmed that blockchain's cryptographic nature prevents unauthorized disruption or data manipulation, with 42 (54.5%) agreeing and 35 (45.5%) strongly agreeing, producing a mean of 4.45 and a standard deviation of 0.501. On whether Kenyan banks use blockchain for cross-border payments via local banks, 1 (1.3%) strongly disagreed, 44 (57.1%) agreed, and 32 (41.6%) strongly agreed. This resulted in a mean of 4.38 and a standard deviation of 0.629.

In contrast, perceptions about the speed of cross-border payments were less favorable. Here, 16 (20.8%) strongly disagreed, 45 (58.4%) disagreed, 13 (16.9%) moderately agreed, and only 3 (3.9%) agreed. The mean was low at 2.04 with a standard deviation of 0.733, indicating dissatisfaction. Similarly, regarding the cost and convenience of cross-border settlements, 14

(18.2%) strongly disagreed, 37 (48.1%) disagreed, 18 (23.4%) moderately agreed, 5 (6.5%) agreed, and 3 (3.9%) strongly agreed. This statement recorded a mean of 2.30 and a standard deviation of 0.974, showing limited support for cost-efficiency claims.

On the ability of blockchain payment systems to facilitate peer-to-peer (P2P) and business-to-business (B2B) payments across countries, only 1 respondent (1.3%) each strongly disagreed, disagreed, and moderately agreed, while 40 (51.9%) agreed and 34 (44.2%) strongly agreed. This generated a high mean of 4.36 and a standard deviation of 0.705. However, perceptions about blockchain's role in enhancing transparency and accountability in banks were less favorable: 20 (26.0%) strongly disagreed, 41 (53.2%) disagreed, 5 (6.5%) moderately agreed, 8 (10.4%) agreed, and 3 (3.9%) strongly agreed. This produced a low mean of 2.13 and a standard deviation of 1.043.

Support for smart contracts was strong across several dimensions. For instance, all respondents either agreed (51 or 66.2%) or strongly agreed (26 or 33.8%) that smart contracts self-execute transactions without third parties, resulting in a mean of 4.34 and standard deviation of 0.476. Similarly, 28 (36.4%) agreed and 49 (63.6%) strongly agreed that smart contracts support immutable and transparent transactions, yielding a high mean of 4.64 and a standard deviation of 0.484. On the timely verification and recording of transactions by smart contracts, 48 (62.3%) agreed and 29 (37.7%) strongly agreed, with a mean of 4.38 and standard deviation of 0.488. Likewise, when asked whether smart contracts cut intermediary costs and make cross-border payments more economical, 30 (39.0%) agreed and 47 (61.0%) strongly agreed, generating a high mean of 4.61 and a low standard deviation of 0.491.

The average mean across all items was 4.18, with an overall standard deviation of 0.64, indicating a generally strong agreement with the performance-enhancing role of blockchain technology in the banking sector, despite a few areas particularly real-time cross-border payments and cost convenience receiving lower ratings.

The interpretation of these results suggests that blockchain technology is perceived as a key enabler of secure, efficient, and decentralized banking operations in Kenya. Features such as smart contracts, peer-to-peer payments, and encryption-based data protection have earned widespread approval from respondents, suggesting a strong belief in the technology's capacity to improve banking operations and customer experiences. However, limited agreement on blockchain's impact on cross-border payment costs and transparency in banks reveals gaps in implementation or awareness, indicating areas for improvement and policy alignment.

These findings align closely with Khadka (2020), who found that blockchain has simplified international transactions, enhanced financial performance, and eliminated third-party inefficiencies. This supports the current study's results that emphasize blockchain's positive role in facilitating cost-efficient, secure, and autonomous financial transactions. Additionally, the findings agree with Odukwu et al. (2023), whose study on Nigerian listed banks demonstrated that blockchain technology significantly improved financial performance. While their research used secondary financial data, this study enriches that perspective by offering direct feedback from bank staff, confirming blockchain's growing impact on operational security, payment efficiency, and cost reduction in Kenyan banks.

In the qualitative analysis examining the influence of blockchain technology on banking performance, participants from eleven major Kenyan banks KCB, Equity, Cooperative Bank, NCBA, Stanbic Bank, T&M Bank, Standard Chartered Bank, Diamond Trust Bank Kenya Ltd, HF Group, Absa Bank, and National Bank of Kenya consistently affirmed blockchain's growing impact on customer satisfaction, profitability, and operational efficiency.

A prominent theme across responses was enhanced security and transparency. Participants noted that blockchain's decentralized nature and encryption mechanisms have significantly reduced fraud and improved trust in digital transactions. As one respondent from Diamond Trust Bank observed, *"Blockchain has helped us tighten digital security and reassure*

customers that their transactions are traceable and safe." This transparency has also contributed to better regulatory compliance and accountability.

Operational efficiency was another clear benefit, especially in the context of faster transaction processing. Several banks highlighted how blockchain has reduced the time required for validating and completing transactions, particularly in cross-border transfers. A manager from NCBA mentioned, *"With blockchain, international payments are smoother and faster, which boosts our competitiveness globally."*

In terms of profitability, banks cited the reduction in operational costs due to diminished reliance on intermediaries and third-party verification systems. This has streamlined processes and cut fees, especially in international transactions. A respondent from Stanbic Bank stated, *"Blockchain has lowered transaction costs and helped us introduce innovative services with leaner structures."*

Participants also emphasized improved customer satisfaction, attributing it to the speed, reliability, and transparency of blockchain-enabled services. Customers have responded positively to the reduced waiting times and increased trust in the integrity of their transactions. One Equity Bank respondent noted, *"Customers value the transparency and real-time access blockchain offers they feel more in control."*

Additionally, many respondents viewed blockchain as a catalyst for digital banking innovation, helping to introduce advanced service models and new ecosystems for banking operations. This innovation has positioned several banks as leaders in digital transformation within the region.

Overall, while blockchain is still being gradually scaled across the sector, respondents widely acknowledged its substantial contribution to building secure, efficient, and customer-centric banking systems. However, a few emphasized the need for greater internal training and regulatory clarity to harness blockchain's full potential across all service areas.

These qualitative findings align closely with Khadka (2020), who examined the global implementation of blockchain technology and concluded that it significantly improved the effectiveness of financial institutions by simplifying due diligence, expediting international payments, and eliminating third-party inefficiencies. Similar to the perspectives shared by Kenyan bank respondents, Khadka found that blockchain enhances security, reduces operational costs, and improves financial performance primarily through increased transparency and automation. This literature reinforces the view that blockchain's decentralized and encrypted structure is instrumental in advancing profitability, efficiency, and customer satisfaction within banking systems.

4.3.5 Performance of the Listed Commercial Bank

The study employed a 5-point Likert scale to assess the performance of listed commercial banks in Kenya. Respondents were asked to rate their level of agreement with various statements reflecting key performance indicators, including profitability, operational efficiency, and service delivery, based on their experience and perceptions within the banking sector.

Table 4.6 Performance of Listed Commercial Banks in Kenya

Statement	*Mean*	*Std*
The return on assets have been improving consistently	4.55	.640
The bank has effectively used its assets to produce high profits	2.51	1.177
Operational costs have considerably reduced thus improving productivity and profitability	4.49	.503
The bank's technical efficiency has improved	2.58	1.341
Banking operations have been streamlined	4.34	.503
The bank has achieved positive customer experience	4.58	.496
The rate of customers stopping doing business has decreased due to increased satisfaction	1.58	.522
The bank's return on assets is higher than many competitors	3.64	1.327
The bank has reduced unnecessary delays in its operations	3.70	1.215
Customers' complaints are promptly handled and resolved	3.56	1.153
The bank makes effective use of its resources to minimize costs	3.48	1.294
Most customers express satisfaction with the quality of services offered	3.68	1.302
Average	**3.56**	**0.96**

Key: SD (1) = Strongly Disagree D (2) Disagree N (3) = Neutral A (4) = Agree SA (5) =Strongly Agree

Source: Field Data (2025)

Table 4.6 presents the descriptive statistics assessing the performance of listed commercial banks in Kenya based on responses from 77 participants. Using a 5-point Likert scale, the respondents rated various performance indicators such as profitability, operational efficiency, customer satisfaction, and competitive standing. The analysis includes all percentages, mean values, and standard deviations for each item, offering insight into how stakeholders perceive bank performance.

A substantial number of respondents, 29 (37.7%) agreed and 46 (59.7%) strongly agreed that the return on assets has been improving consistently, yielding a high mean of 4.55 and a low

standard deviation of 0.640. In contrast, when asked whether the bank has effectively used its assets to produce high profits, only 9 (11.7%) agreed and 8 (10.4%) strongly agreed, while 43 (55.8%) disagreed and 10 (13.0%) strongly disagreed. This resulted in a relatively low mean of 2.51 with a high standard deviation of 1.177, indicating disagreement and variability in perception. For the statement that operational costs have considerably reduced, improving productivity and profitability, 39 (50.6%) agreed and 38 (49.4%) strongly agreed, reflecting strong consensus with a mean of 4.49 and a low SD of 0.503.

The perception of technical efficiency was less positive. While 7 (9.1%) agreed and 12 (15.6%) strongly agreed, a significant proportion 16 (20.8%) strongly disagreed and 31 (40.3%) disagreed led to a low mean of 2.58 and a high SD of 1.341. A more favorable outcome was seen in the statement on streamlined banking operations, where 49 (63.6%) agreed and 27 (35.1%) strongly agreed, producing a high mean of 4.34 and a low SD of 0.503. Likewise, the statement that the bank has achieved positive customer experience received unanimous agreement, with 32 (41.6%) agreeing and 45 (58.4%) strongly agreeing (mean = 4.58, SD = 0.496).

A more negative response was found in the item assessing customer attrition. Here, 33 (42.9%) strongly disagreed and 43 (55.8%) disagreed that customer exits have decreased due to satisfaction. Only 1 (1.3%) moderately agreed, resulting in a very low mean of 1.58 and SD of 0.522, reflecting strong dissatisfaction. When asked whether the bank's return on assets is higher than competitors, 29 (37.7%) agreed and 23 (29.9%) strongly agreed, while 9 (11.7%) strongly disagreed, leading to a moderate mean of 3.64 and SD of 1.327.

The question of whether unnecessary delays have been reduced yielded a mean of 3.70 and SD of 1.215, with 27 (35.1%) agreeing and 23 (29.9%) strongly agreeing, although 13 (16.9%) disagreed. On the promptness in handling complaints, 27 (35.1%) agreed and 18 (23.4%)

strongly agreed, while 14 (18.2%) disagreed and 3 (3.9%) strongly disagreed, resulting in a mean of 3.56 and SD of 1.153. Concerning the effective use of resources to minimize costs, the responses were more mixed: 27 (35.1%) agreed and 19 (24.7%) strongly agreed, while 21 (27.3%) disagreed or strongly disagreed, yielding a mean of 3.48 and SD of 1.294.

Finally, for the statement that most customers are satisfied with service quality, 28 (36.4%) agreed and 24 (31.2%) strongly agreed, with some variation from 8 (10.4%) who disagreed or strongly disagreed. The mean stood at 3.68 with a relatively high SD of 1.302. Overall, the average mean across all items was 3.56 with a standard deviation of 0.96, indicating moderate agreement among respondents about the overall performance of listed commercial banks, albeit with notable disparities in areas such as asset utilization, technical efficiency, and customer retention.

These findings suggest that while commercial banks in Kenya are perceived to be improving in areas like operational efficiency, customer experience, and timely service delivery, there are underlying challenges related to profitability, customer retention, and resource optimization. The positive ratings in return on assets, reduced delays, and customer satisfaction align with the view that digital transformations and strategic reforms may be positively impacting bank operations. However, concerns over poor asset productivity and technical inefficiency suggest a gap in translating available resources into high-yield performance.

This is consistent with the findings of Odukwu et al. (2023), who noted that blockchain and other digital technologies significantly improved financial performance in Nigerian listed banks, especially regarding operational speed and customer satisfaction. However, they also highlighted a lack of consistent customer retention and resource utilization strategies. Similarly, Susilo et al. (2024) found that improved operational efficiency driven by technological tools in Indonesian businesses enhanced performance but emphasized the

importance of addressing employee productivity and systemic gaps for holistic improvement. These perspectives reinforce the need for Kenyan banks to complement technological advancements with strategic human capital and performance management efforts.

4.4 Diagnostic Test Results

To ensure the validity and reliability of the linear regression model used in the current study, key diagnostic tests were conducted. These included tests for autocorrelation, normality, heteroscedasticity, and multicollinearity. Each test was used to verify whether the underlying statistical assumptions of the model were satisfied, thereby confirming the robustness of the regression results.

4.4.1 Auto correlation

In the current study, autocorrelation was tested to determine whether the residuals in the regression model were independent. The Durbin-Watson statistic was used for this purpose, as it is the standard measure for detecting autocorrelation in regression analysis. A value close to 2 indicates no autocorrelation, while values significantly below 2 suggest positive autocorrelation, and values above 2 indicate negative autocorrelation. The results of the Durbin-Watson test in this study confirmed that the residuals were independent, thereby satisfying the assumption of no autocorrelation in the regression model.

Table 4.7 Auto correlation Results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.543[a]	.295	.254	.290	1.945

a. Predictors: (Constant), Blockchain Technology, Mobile Banking, Internet Banking, Artificial Intelligence

b. Dependent Variable: Bank Performance

As shown in Table 4.7, the Durbin-Watson statistic was found to be 1.945, which is very close to the benchmark value of 2. This indicates that there is no, or minimal autocorrelation present in the regression model, suggesting that the residuals are independent. These results strengthen the validity of the regression model used to analyze the relationship between the predictors—Blockchain Technology, Mobile Banking, Internet Banking, and Artificial Intelligence—and Bank Performance among listed commercial banks in Kenya.

4.4.2 Normality Test

To ensure the validity of the findings, a normality test was conducted to assess whether the residuals of the regression model followed a normal distribution. This step is essential for maintaining the reliability and accuracy of the statistical analyses used in the current study.

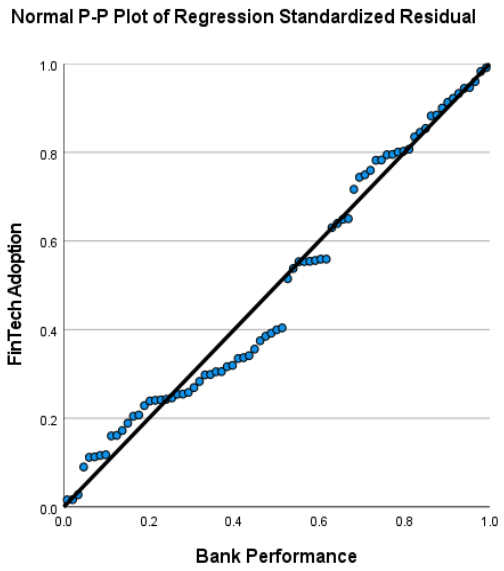


Figure 4.4 Normality Plot

Source: Field Data (2025)

The Normal P–P Plot of the regression standardized residuals (Figure 4.4) was utilized to assess whether the residuals of the regression model predicting Bank Performance based on FinTech Adoption were normally distributed a key assumption of linear regression. In the plot, the observed cumulative probabilities of the residuals (as indicated by the blue dots) closely follow the expected cumulative probabilities of a normal distribution, represented by the black diagonal line running from the bottom left (0.0, 0.0) to the top right (1.0, 1.0). Most of the points are tightly clustered along this diagonal, particularly in the mid-range between (0.2, 0.2) and (0.8, 0.8), which reflects a good approximation to normality. Although there are minor deviations at the lower end (around (0.0, 0.1)) and upper end (around (0.9, 1.0)), these deviations are minimal and within acceptable range for statistical analysis. The general linear trend of the data points confirms that the residuals are approximately normally distributed. Hence, the assumption of normality is satisfied, and the residuals do not show significant skewness or kurtosis. This supports the statistical reliability and validity of the regression model results, making it suitable for further interpretation and inference.

4.4.3 Heteroscedasticity Test

Heteroscedasticity refers to a situation in regression analysis where the variance of the residuals is not constant across all levels of the predicted values. This violates a key assumption of linear regression. It is commonly tested using graphical methods such as scatter plots of standardized residuals against fitted values. If the plot shows a funnel shape—where residuals spread out or narrow as fitted values increase it suggests the presence of heteroscedasticity. Conversely, a random and consistent spread of residuals indicates homoscedasticity, meaning the assumption is met and the regression results are reliable.

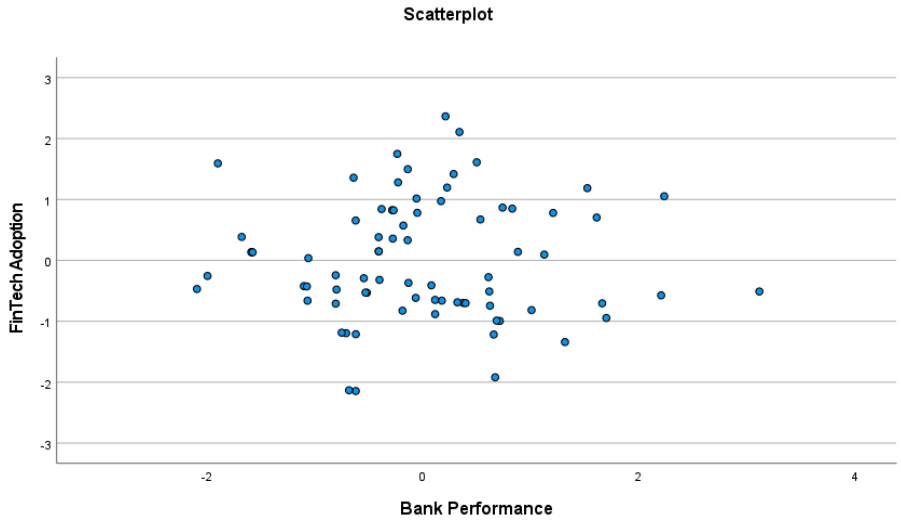


Figure 4.5 Heteroscedasticity

Source**:** Field Data (2025)

In Figure 4.5, the scatterplot of standardized residuals against predicted bank performance was used to assess the assumption of homoscedasticity that is, whether the residuals have constant variance across all levels of the predicted values. The plot displays data points scattered across the horizontal axis (bank performance) from approximately –2.5 to +4, and along the vertical axis (FinTech Adoption residuals) from about –3 to +3. The residuals are fairly evenly

distributed across the range of predicted values with no clear funnel shape or curvature that might indicate heteroscedasticity or non-linearity. Most of the residuals are clustered around the central values (between –1 and +1), with no systematic pattern or trend above or below the horizontal axis.

There are a few outliers visible beyond the ±2 range, but these are limited and do not form any directional structure. Therefore, based on this visual inspection, there is no strong evidence of heteroscedasticity. The residuals appear to have approximately constant variance, fulfilling the assumption of homoscedasticity. This supports the statistical appropriateness and reliability of the linear regression model used to explore the relationship between FinTech adoption and bank performance.

4.4.4 Multicollinearity Test

Multicollinearity arises when independent variables in a regression model are highly correlated, leading to inflated variances and unreliable coefficient estimates. The Variance Inflation Factor (VIF) is commonly used to detect multicollinearity, with values above 10 often indicating serious concern, though some researchers use a lower threshold of 5 (Lin et al., 2020).

Table 4.8 Multicollinearity

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Mobile Banking	.857	1.167
	Internet Banking	.913	1.095
	Artificial Intelligence	.882	1.134
	Blockchain Technology	.930	1.076

a. Dependent Variable: Bank Performance

Source: Field Data (2025)

Table 4.8 presents the multicollinearity diagnostics for the current study using Tolerance and Variance Inflation Factor (VIF) statistics for the independent variables—Mobile Banking, Internet Banking, Artificial Intelligence, and Blockchain Technology. The VIF values range from 1.076 to 1.167, which are well below the commonly accepted threshold of 10, and also below the more conservative benchmark of 5. These low VIF values indicate that there is no significant multicollinearity among the predictor variables.

Additionally, the Tolerance values range from 0.857 to 0.930, which are well above the minimum acceptable threshold of 0.1. A Tolerance value below 0.1 would have indicated a high correlation with other predictors, raising concerns about multicollinearity. However, since all values are safely above this limit, it can be concluded that the independent variables are not excessively correlated with each other. Therefore, the results confirm that multicollinearity is not a concern in this regression model. The independent variables included in the analysis can be retained confidently, and the coefficients derived from the model are statistically reliable and interpretable for explaining the relationship with the dependent variable—Bank Performance.

4.5 Inferential Statistics

Inferential analysis was conducted in the current study to examine the relationship between the independent variables Mobile Banking, Internet Banking, Artificial Intelligence, and Blockchain Technology and the dependent variable, Bank Performance. Both correlation and regression analyses were employed to assess the strength, direction, and significance of the relationships among these variables. Correlation analysis was specifically used to determine the degree of association between each technological innovation and the performance of listed commercial banks in Kenya.

Table 4.9 Correlation Coefficient Results

		Mobile Banking	Internet Banking	Artificial Intelligence	Blockchain Technology	Bank Performance
Mobile Banking	Pearson Correlation	1	.420**	.462**	.398**	.521**
	Sig. (2-tailed)		.001	.000	.001	.000
	N	77	77	77	77	77
Internet Banking	Pearson Correlation	.420**	1	.377**	.331*	.496**
	Sig. (2-tailed)	.001		.001	.004	.000
	N	77	77	77	77	77
Artificial Intelligence	Pearson Correlation	.462**	.377**	1	.449**	.548**
	Sig. (2-tailed)	.000	.001		.000	.000
	N	77	77	77	77	77
Blockchain Technology	Pearson Correlation	.398**	.331*	.449**	1	.513**
	Sig. (2-tailed)	.001	.004	.000		.000

	N	77	77	77	77	77
Bank Performance	Pearson Correlation	.521**	.496**	.548**	.513**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	77	77	77	77	77

*. Correlation is significant at the 0.05 level (2-tailed).

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

The correlation results presented in Table 4.9 reveal significant positive relationships between all the independent variables Mobile Banking, Internet Banking, Artificial Intelligence, and Blockchain Technology and the dependent variable, Bank Performance, among listed commercial banks in Kenya. Specifically, the analysis shows that Mobile Banking has a strong and positive correlation with Bank Performance ($r = .521$, $p < 0.01$), suggesting that increased adoption of mobile banking services is associated with enhanced performance outcomes in the banking sector.

Similarly, Internet Banking is positively and significantly associated with Bank Performance ($r = .496$, $p < 0.01$), indicating that the expansion of online banking platforms contributes meaningfully to improved bank operations and service delivery. Artificial Intelligence demonstrates the strongest correlation with Bank Performance ($r = .548$, $p < 0.01$), highlighting the critical role that AI integration plays in boosting efficiency, customer service, and decision-making accuracy in the banking industry.

Blockchain Technology also shows a positive and significant relationship with Bank Performance ($r = .513$, $p < 0.01$), underscoring its value in enhancing transaction security, transparency, and cost-effectiveness. Additionally, the interrelationships among the independent variables are also statistically significant. For example, Mobile Banking is positively correlated with Internet Banking ($r = .420$, $p < 0.01$), Artificial Intelligence ($r = .462$,

p < 0.01), and Blockchain Technology (r = .398, p < 0.01), suggesting that these technological innovations are likely being deployed in complementary ways across banking systems.

Overall, the correlation analysis indicates that all four technological factors—Mobile Banking, Internet Banking, Artificial Intelligence, and Blockchain Technology—are significantly associated with better performance of listed commercial banks in Kenya. This supports the broader conclusion that strategic investment in financial technologies plays a key role in improving operational outcomes, customer satisfaction, and competitiveness in the sector.

4.5.1 Regression Analysis

This section analyzes data on the influence of the independent variable on the dependent variable. It looks at the model summary, ANOVA, and coefficient.

Table 4.10 Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.543[a]	.295	.254	.290	.295	7.56	4	72	.000

a. Predictors: (Constant), Blockchain Technology, Mobile Banking, Internet Banking, Artificial Intelligence

b. Dependent Variable: Bank Performance

The regression analysis summarized in Table 4.10 reveals a statistically significant but only moderately strong relationship between the independent variables Blockchain Technology, Mobile Banking, Internet Banking, and Artificial Intelligence and Bank Performance among listed commercial banks in Kenya.

The model produced an R value of 0.543, indicating a moderate positive correlation between the four digital banking technologies and overall bank performance. This suggests that improvements in these technologies are associated with improved outcomes, but the strength of the relationship is weaker than might be expected given the scale of investments in digital transformation. The R Square value of 0.295 shows that only 29.5% of the variation in bank performance can be explained by the combined effect of these FinTech variables. The Adjusted R Square was slightly lower at 0.254, indicating that after adjusting for sample size and predictors, the explanatory power of the model weakens further.

The relatively low explanatory power highlights that other organizational, macroeconomic, and regulatory factors also influence performance outcomes. This is consistent with past studies. For example, Katutu (2019) found that although e-payment and e-commerce boosted bank profitability in Ghana and Nigeria, FinTech adoption in Ethiopia was limited and did not translate into efficiency gains. Similarly, Chepkorir et al. (2022) observed that while FinTech adoption had a positive effect on financial inclusion, the effect on profitability was modest due to infrastructural and regulatory barriers.

The standard error of the estimate (0.290) suggests that the predictions were fairly close to the observed values, which strengthens confidence in the model's fit. Moreover, the F Change of 7.56 and the p-value of 0.000 confirm that the regression model is statistically significant, meaning the observed relationships are unlikely to have occurred by chance.

However, the results also align with the mixed findings in prior literature. Ndine et al. (2022) argued that the performance impact of FinTech is inconsistent across listed and non-listed banks, with some banks reporting higher customer outreach but stagnant returns on assets. Wangui (2023) further noted that digital transformation has not yet produced proportional

improvements in profitability for Kenyan banks due to high implementation costs and rising cyber risks.

Therefore, while this study affirms that Blockchain Technology, Mobile Banking, Internet Banking, and Artificial Intelligence positively influence performance, the relatively weak coefficient of determination suggests that FinTech adoption alone cannot guarantee robust performance gains. External factors such as credit risks, rising non-performing loans, and regulatory pressures (KPMG, 2024; Kenya Bankers Association, 2024) continue to constrain the banking sector's outcomes.

In conclusion, the findings emphasize that although digital technologies are important drivers of bank performance, their influence remains partial and must be complemented by strong governance, risk management, and supportive regulatory frameworks. This is consistent with the insights of Chepkorir et al. (2022), Katutu (2019), and Ndine et al. (2022), who all underline the need to situate FinTech adoption within a broader strategic and contextual framework.

Table 4.11 ***ANOVA***

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.812	4	.703	7.56	.000[b]
	Residual	6.700	72	.093		
	Total	9.512	76			

a. Dependent Variable: BankPerformance

b. Predictors: (Constant), Blockchain Technology, Mobile Banking, Internet Banking, Artificial Intelligence

Source: Field Data (2025)

The ANOVA results presented in Table 4.11 support the statistical significance of the overall regression model used in this study. The F-statistic value of 7.56 and a corresponding p-value of 0.000 (which is less than the conventional threshold of 0.05) indicate that the model provides a significantly better fit than a model without the predictors. This means that the combined influence of Blockchain Technology, Mobile Banking, Internet Banking, and Artificial Intelligence contributes meaningfully to predicting bank performance.

The regression sum of squares was 2.812, with 4 degrees of freedom, while the residual sum of squares was 6.700 with 72 degrees of freedom. The mean square for the regression was 0.703 compared to 0.093 for the residual, resulting in the F-ratio of 7.56. These results imply that the model explains a significant portion of the variance in the dependent variable (Bank Performance) and that the observed relationships between the predictors and the outcome are unlikely to have occurred by chance.

Thus, the ANOVA findings validate the use of the regression model and reinforce the conclusion that the integration of digital technologies, as specified, has a statistically significant impact on the performance of listed commercial banks in Kenya.

Table 4.12 Regression Coefficient

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.850	.610		3.033	.003		
	Mobile Banking	.320	.110	.162	2.909	.005	.857	1.167
	Internet Banking	.340	.125	.218	2.720	.008	.913	1.095
	Artificial Intelligence	.290	.115	.194	2.522	.014	.882	1.134
	Blockchain Technology	.370	.135	.159	2.741	.008	.930	1.076

a. Dependent Variable: Bank Performance

Source: Field Data (2025)

The coefficients results presented in Table 4.12 reveal that all four predictors—Mobile Banking, Internet Banking, Artificial Intelligence, and Blockchain Technology—have positive and statistically significant effects on the performance of listed commercial banks in Kenya. The unstandardized coefficients (B) indicate the expected increase in bank performance for each unit increase in the respective technology variable, assuming other variables remain constant. Specifically, Blockchain Technology (B = 0.370, p = .008) shows the strongest unstandardized effect on bank performance, followed by Internet Banking (B = 0.340, p = .008), Mobile Banking (B = 0.320, p = .005), and Artificial Intelligence (B = 0.290, p = .014).

The standardized Beta (β) coefficients provide insight into the relative contribution of each variable. Internet Banking recorded the highest standardized effect (β = 0.218), followed by Artificial Intelligence (β = 0.194), Mobile Banking (β = 0.162), and Blockchain Technology (β = 0.159). These β values confirm that, while all predictors have a statistically significant positive impact, Internet Banking has the most substantial standardized influence on bank performance when accounting for differences in measurement scales.

In summary, the regression coefficient analysis confirms that Mobile Banking, Internet Banking, Artificial Intelligence, and Blockchain Technology significantly and positively affect the performance of listed commercial banks in Kenya. While Blockchain Technology had the highest unstandardized effect, Internet Banking exhibited the most substantial standardized influence (β = 0.218) among the technological predictors.

The overall linear regression model for the current study can be summarized as follows:

Bank Performance = 1.850 + 0.320 (MB) + 0.340 (IB) + 0.290 (AI) + 0.370 (BT)

Where,

MB = Mobile Banking

IB = Internet Banking

AI = Artificial Intelligence

BT = Blockchain Technology

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER STUDIES

5.0 Introduction

This chapter presents the summary of key findings, conclusions drawn from the study, practical recommendations based on the results, and suggestions for further research. The study examined the influence of FinTech adoption specifically mobile banking, internet banking, artificial intelligence, and blockchain technology on the performance of listed commercial banks in Nairobi, Kenya. The chapter restates the purpose of the study, highlights how the research objectives were met, and outlines actionable insights for policymakers, banking institutions, and future researchers.

5.1 Summary of the Findings

5.1.1 Mobile Banking and Bank Performance

The findings revealed a consistent and positive influence of mobile banking on the performance of listed commercial banks in Kenya. Respondents affirmed that mobile banking significantly improves operational efficiency, enhances customer experience, and supports overall bank performance. Key benefits identified included easy access to account balances, real-time transaction updates, simplified retrieval of transaction details, and the ability to download and print statements for record-keeping.

Mobile banking was also credited with streamlining account opening processes and facilitating mobile loan services. Respondents noted that loan applications were user-friendly, approvals were fast, repayment processes were simple, and loan terms were clearly communicated. However, some advanced features such as updating security credentials, bill payments, funds

transfers, and budgeting tools were reported as less effective or underutilized, pointing to the need for further development in these areas.

Qualitative insights from key informants in major banks indicated that mobile banking has reduced operational costs, increased profitability, and improved internal accountability. Banks highlighted its role in expanding customer reach, enabling real-time engagement, reducing transaction errors, and fostering innovation in service delivery.

5.1.2 Internet Banking and Bank Performance

The study found that internet banking positively influences the performance of listed commercial banks in Kenya by enhancing efficiency, profitability, service quality, and customer satisfaction. Respondents reported that internet banking supports real-time fund transfers, facilitates bill payment scheduling, ensures cost-effective and secure payments, integrates with global payment systems, and allows customers to monitor investment portfolios with ease.

Internet banking was also recognized for its role in enhancing operational efficiency through reduced branch-based transactions, automation of routine services, cost savings, and broader outreach to clients in remote areas. However, challenges were noted in areas such as two-factor authentication, transparency in transaction fees, real-time stock price updates, and automated dividend or bonus generation in portfolio systems.

Qualitative feedback emphasized that internet banking strengthens customer autonomy, ensures service availability, and supports strategic transformation in banking operations. Banks, however, acknowledged the need to improve system stability, strengthen authentication measures, and enhance customer support to maximize the potential of these platforms.

5.1.3 Artificial Intelligence and Bank Performance

The findings revealed that Artificial Intelligence (AI) plays a strong and positive role in enhancing bank performance in Kenya. AI-powered tools such as chatbots were widely recognized for providing efficient customer service, handling inquiries effectively, and improving operational efficiency through automation. AI was also credited with enhancing fraud detection, improving real-time transaction monitoring, and supporting due diligence in loan processing. However, respondents noted limitations in AI's ability to deliver personalized services, speed up certain data analysis tasks, and identify hidden patterns in datasets, highlighting areas for further improvement.

Qualitative insights indicated that AI contributes to increased profitability, reduced staff workload, improved customer satisfaction, and more informed decision-making. Banks emphasized the importance of continuous system upgrades, better algorithms, and enhanced staff training to fully leverage AI's potential in strategic operations.

5.1.4 Blockchain and Bank Performance

The findings showed that blockchain technology significantly contributes to improving transaction security, reducing theft risk, and enhancing operational efficiency in Kenya's listed commercial banks. Respondents recognized its value in supporting peer-to-peer transactions, preventing unauthorized data manipulation, and facilitating cross-border payments.

Smart contracts were especially valued for enabling self-executing transactions, ensuring transparent and immutable records, verifying and recording transactions promptly, and reducing costs in international payments. Nonetheless, blockchain's effectiveness in enabling real-time, cost-effective cross-border transactions and enhancing transparency was viewed less favourably, indicating opportunities for further development.

Qualitative feedback confirmed blockchain's role in boosting security, speeding up transactions, reducing intermediary costs, and enhancing customer satisfaction. It was also seen as a driver of innovation and regulatory compliance. However, the need for increased internal training and clearer regulatory frameworks was emphasized to maximize its benefits.

5.1.5 Performance of Listed Commercial Banks

The study revealed that while listed commercial banks in Kenya demonstrate notable strengths in customer service, cost reduction, and profitability, certain operational and financial challenges persist. Respondents commended improvements in return on assets, reduced operational costs, streamlined operations, and positive customer experiences. However, concerns were raised about the effective utilization of assets, technical efficiency, and customer retention, with many reporting that customer attrition remains a critical challenge. Moderate performance was also observed in competitiveness, prompt complaint handling, and resource utilization.

Overall, the findings indicate that while banks are performing well in service delivery and operational cost control, they face ongoing challenges in sustaining customer loyalty, improving asset profitability, and enhancing technical efficiency. Strategic interventions in these areas could further strengthen performance outcomes.

5.2 Conclusions

This study explored the influence of Mobile Banking, Internet Banking, Artificial Intelligence, and Blockchain Technology on the performance of listed commercial banks in Kenya. The findings demonstrate that these FinTech components collectively exert a significant and positive impact on bank performance. By enhancing operational efficiency, improving customer experience, and supporting innovation in service delivery, these technologies

contribute to the competitive advantage and long-term sustainability of the banking sector. The following conclusions are drawn from these results:

5.2.1 Mobile Banking and Bank Performance

The study concludes that mobile banking is a significant driver of improved performance among listed commercial banks in Kenya. By enabling real-time customer interactions, expanding financial inclusion, and streamlining transactions, mobile banking has enhanced operational efficiency and reduced service delivery costs. Platforms such as USSD services, mobile apps, and loan disbursement tools have widened customer outreach and facilitated faster access to financial products. However, the full potential of mobile banking is yet to be realized, with opportunities remaining in strengthening security features, enhancing user interface design, and promoting financial literacy to ensure broader and more effective utilization.

5.2.2 Internet Banking and Bank Performance

Internet banking emerged as the most influential FinTech solution in enhancing bank performance. It provides seamless financial services, including online transfers, bill payments, investment monitoring, and efficient account management, thereby improving customer satisfaction and reducing operational bottlenecks. For Kenya's listed commercial banks, robust and secure internet banking platforms have become a strategic asset, not only offering convenience but also creating competitive differentiation. Continued investment in advanced web-based infrastructures, personalized customer dashboards, and secure authentication protocols will be essential to sustain these gains and further elevate service delivery standards.

5.2.3 Artificial Intelligence and Bank Performance

Artificial Intelligence has played a transformative role in banking operations, particularly in enhancing automation, fraud detection, and customer support. Its integration into services such

as chatbots, risk assessment models, and predictive analytics has improved operational accuracy and customer engagement. Despite these gains, the study found that personalization and algorithm sophistication can be further developed to maximize AI's strategic value. Strengthening AI capabilities through advanced machine learning tools, robust data systems, and staff capacity building will be vital for unlocking deeper insights, improving decision-making, and enhancing customer relationship management.

5.2.4 Blockchain Technology and Bank Performance

Blockchain technology has shown strong potential to transform banking operations through improved transaction security, transparency, and cost efficiency. Applications such as smart contracts and distributed ledgers have begun to reduce reliance on intermediaries, enhance trust, and promote faster settlement of transactions. However, adoption remains at an early stage, with infrastructural and regulatory challenges limiting its widespread use. The study emphasizes the importance of creating enabling environments through clear legislation, interbank collaboration, and technical capacity development to scale blockchain adoption and fully harness its benefits for performance improvement.

5.2.5 Overall Implications for Bank Performance

The study affirms that FinTech innovations namely mobile banking, internet banking, artificial intelligence, and blockchain technology are not merely supplementary tools but strategic enablers of organizational performance in Kenya's banking sector. Collectively, these technologies have enhanced efficiency, strengthened customer relationships, reduced costs, and supported innovation. Nonetheless, the findings suggest that technology adoption must be accompanied by investments in customer retention strategies, robust cyber-security measures, and adaptive organizational cultures to achieve sustained competitiveness. The future performance of Kenya's listed commercial banks will depend on how effectively they

transition from foundational adoption to fully integrated, intelligent, and customer-centered digital ecosystems.

5.3 Recommendations

Based on the findings of this study, which explored the influence of Mobile Banking, Internet Banking, Artificial Intelligence (AI), and Blockchain Technology on the performance of listed commercial banks in Kenya, the following recommendations are proposed. These are aligned with the study's theoretical foundations Resource-Based Theory, Financial Intermediation Theory, Technology-Mediated Learning Theory, and the Initial Trust Model.

5.3.1 Enhance Mobile Banking Platforms for Broader Impact on Bank Performance

Mobile banking has demonstrated a statistically significant yet moderate influence on bank performance, especially in improving operational efficiency, customer outreach, and service accessibility. However, performance in areas such as bill payments, account security, and mobile features integration remains suboptimal. To address these gaps, listed banks in Kenya should enhance mobile banking platforms by integrating real-time security updates, optimizing user interfaces, and promoting user education to increase adoption and digital literacy. This aligns with the Resource-Based Theory (Barney, 1991), which posits that banks can gain sustained competitive advantage by investing in unique digital resources like robust mobile platforms. As supported by findings from Loaba, S. (2022), upgrading mobile platforms increases convenience, encourages repeat usage, and ultimately boosts profitability. To improve user trust, banks should strengthen transparency in mobile transactions, which directly supports the Initial Trust Model (McKnight et al., 1998), emphasizing trust as a foundational element in technology adoption.

5.3.2 Strengthen Internet Banking Infrastructure for Secure and Transparent Service Delivery

Internet banking was found to strongly influence bank performance, particularly in enhancing service delivery, reducing operational costs, and expanding the reach of financial services. However, gaps still exist in areas such as fee transparency, user navigation, and the depth of investment features offered. In line with the Financial Intermediation Theory (Scholtens & van Wensveen, 2003), banks should leverage internet banking as a cost-efficient intermediary platform to deepen financial access and optimize banking operations. Drawing from Mao et al. (2023) and Ndine et al. (2022) the study recommends that listed commercial banks enhance the customization of user dashboards, strengthen online transaction security, and provide proactive customer support to mitigate service delays. Additionally, regular audits of internet banking services can identify weak points and guide upgrades, aligning with the Technology-Mediated Learning Theory by ensuring user engagement through ease of learning and usage.

5.3.3 Leverage Artificial Intelligence for Strategic Decision Support and Personalization

The study revealed that AI has a meaningful influence on bank performance through automation, customer support (e.g., chatbots), and fraud detection. However, AI was underutilized in areas such as personalized banking, predictive analytics, and advanced decision support. In line with the Resource-Based Theory, banks should invest in AI as a strategic capability to transform internal operations and gain market advantage. As Yang, (2022) suggest, AI enables better customer segmentation and experience, which in turn drives performance. Banks are encouraged to scale AI deployments by refining algorithms, upskilling personnel, and integrating machine learning into decision-making frameworks. This is also consistent with the Technology-Mediated Learning Theory, which promotes the intelligent

structuring of information systems for higher learning, user interaction, and task automation. Enhancing explainability and transparency in AI models will also improve trust and align with the Initial Trust Model, facilitating broader user adoption.

5.3.4 Expand Blockchain Adoption for Secure, Scalable, and Cost-Efficient Operations

Blockchain technology had a positive but comparatively weaker influence on bank performance due to low adoption, regulatory uncertainty, and infrastructural challenges. Despite its strength in securing transactions and enabling smart contracts, it underperformed in real-time international payments and interoperability. To improve its effectiveness, listed banks in Kenya should invest in blockchain pilot projects that address specific pain points, such as secure cross-border transfers and digital identity verification. According to Tseng et al. (2023), such targeted implementation can demonstrate tangible value and attract regulatory support. The Financial Intermediation Theory further supports blockchain's role in disintermediating and securing transactions, thereby enhancing efficiency in financial flows. Moreover, banks should collaborate with regulators and FinTech innovators to establish industry standards and address legal ambiguities. Building trust around blockchain technology is crucial, and as the Initial Trust Model suggests, increasing user awareness and regulatory assurance will accelerate adoption and enhance institutional credibility.

5.3.5 Policy Recommendations

To support effective adoption and sustainability of digital banking technologies in Kenya, regulators and policymakers must establish clear national frameworks for FinTech governance, including data privacy, cybersecurity, and digital identity management. Adequate investments in infrastructure especially in rural and underserved areas are critical to expand digital financial inclusion. Regulatory sandboxes should be encouraged to test emerging innovations such as AI-based underwriting or blockchain-enabled remittances. Furthermore, commercial banks

should receive incentives for adopting secure and innovative digital platforms that align with national financial inclusion goals. Training programs at national and institutional levels should focus on both employees and customers to close the digital literacy gap. Collaborations between public and private stakeholders, guided by frameworks such as the Financial Intermediation Theory and Resource-Based Theory, will ensure that FinTech adoption not only enhances individual bank performance but also strengthens the broader financial ecosystem.

By implementing these recommendations, listed commercial banks in Kenya can deepen their integration of FinTech innovations, strengthen institutional trust, enhance operational efficiency, and position themselves for sustained performance in an increasingly digital economy.

5.4 Suggestions for Further Studies

The current study found that Mobile Banking, Internet Banking, Artificial Intelligence, and Blockchain Technology explain only 29.5% of the variance in the performance of listed commercial banks in Kenya, leaving 70.5% unaccounted for. This suggests that several other factors may significantly influence bank performance. Future research should therefore explore areas such as regulatory compliance, workforce digital skills, macroeconomic conditions (e.g., inflation and interest rates), and cybersecurity readiness all of which can shape how effectively banks implement and benefit from FinTech innovations.

Additionally, organizational and customer-related variables warrant further investigation. These include leadership styles, change management strategies, innovation culture, and the alignment of digital technologies with institutional goals. Customer satisfaction, loyalty, and the ease of using digital services may also mediate the relationship between FinTech adoption and performance. A broader, more integrated approach to future studies will help capture the complex factors driving performance in digitally transforming banking environments.

Moreover, future studies should consider examining moderating variables such as employee demographics (e.g., age, gender, digital literacy, years of service), customer profiles, and banks' digital maturity levels to understand differential impacts of FinTech adoption. Comparative research across diverse financial institutions including microfinance banks, SACCOs, Islamic banks, and digital-only nonbanks as well as between public and private, or local and multinational commercial banks, could reveal how institutional structure influences performance outcomes and enhance the generalizability of findings.

Expanding the geographic scope to include other East African countries like Uganda, Tanzania, and Rwanda would allow for regional benchmarking and cross-country comparisons in similar regulatory and economic contexts. Furthermore, longitudinal studies are encouraged to evaluate the long-term effects of FinTech integration on key metrics such as profitability, customer retention, staff productivity, and sustainability. Such research would deepen understanding of the evolving digital landscape and support informed policy-making and strategic investment across the region's banking sector.

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APPENDICES

APPENDIX A: QUESTIONNAIRE

FOR CHIEF FINANCE OFFICERS, DIRECTORS OF DIGITAL BANKING, HEADS OF INFORMATION TECHNOLOGY, HEADS OF DIGITAL CHANNELS, OPERATIONS MANAGERS, CUSTOMER SERVICE MANAGES AND IT SUPPORT MANAGER**.**

INTRODUCTION

My name is Janet Peris Mulama, a Master's candidate at The Catholic University of Eastern Africa (CUEA), Nairobi, Kenya. I am conducting a study titled:

"FinTech Adoption on Performance of Listed Commercial Banks in Kenya."

This research is undertaken purely for academic purposes, and all responses provided will be treated with the utmost confidentiality and used exclusively for scholarly analysis.

You are kindly requested to complete the attached questionnaire, which comprises Likert-scale items and a few open-ended questions. For the Likert-scale items, please indicate your level of agreement with each statement using the scale provided. For the open-ended questions, brief but reflective responses are encouraged.

Participation in this research is voluntary, and your responses will be treated with the highest level of confidentiality. You are free to withdraw from participation at any point without any consequences.

By proceeding with the questionnaire, you acknowledge that you have read and understood the purpose of the research and consent to participate in the study.

I confirm that I am willing to participate in the study.

Signature:_____
Date: _____

SECTION A: DEMOGRAPHIC INFORMATION

1. Name of the Bank …….

2. Job Title…….

3. Years of Working with the Bank? 1-2 ☐ 3-5 7- 10 ☐

above ☐

4. Management Level: ☐ Top-Level ☐ Middle-Level ☐ Lower-Level

Section B: Mobile Banking

To what extent do you agree with the statements below (Rating scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Moderately Agree, 4 = Agree, 5 = Strongly Agree).

No.	Mobile Banking	1	2	3	4	5
1.	Mobile statement update has made it easy to access information on customers' bank balance.					
2.	Mobile statement updates are real time for every activity.					
3.	Transaction details are easily accessible from the mobile platform					
4.	Mobile statement can be downloaded as pdf files and printed for record keeping or for the purpose of presenting evidence.					
5.	Account management has made it simple and quick to open accounts on the mobile app					

6.	Account management has allowed simple updates of security pins and passwords					
7.	Account management has allowed users to pay bills digitally, view transaction history, transfer funds and check account balances.					
8.	Account management tool is a reliable tracker of the users' expenses, budget and savings performance.					
9.	The mobile loan application process is easy and user-friendly					
10.	Mobile loan approval time is fast					
11.	The loan terms (e.g., interest rate, repayment period) are clear					
12.	Repayment through mobile banking is simple and efficient					

In your view, how has mobile banking influenced the overall performance of your bank in terms of profitability, efficiency and customer satisfaction?

_____

_____

Section C: Internet Banking

To what extent do you agree with the statements below (Rating scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Moderately Agree, 4 = Agree, 5 = Strongly Agree).

No.	**Internet Banking**	**1**	**2**	**3**	**4**	**5**
1.	Fund transfer through internet banking is real-time.					

2.	Fund transfer has a two-factor authentication to protect users from making wrong transactions.					
3.	Internet banking systems limits the amount that can be transferred online in order to curb theft risk and mismanagement of funds.					
4.	The online fund transfer system fees are transparent					
5.	Users can track the performance of their investments via online portfolio management systems.					
6.	Online portfolio management provides real time updates on stock prices for effective decision making.					
7.	Online portfolio systems auto-generates bonuses, stock dividends and splits for the user's portfolio which can be withdrawn in real-time.					
8.	Online portfolio management systems are secured from unauthorized access and fraud risks.					
9.	Internet banking system is using Paypal services for clients to pay for international services or receive payments.					
10.	Online bills payment system permits scheduled payments for the purpose of avoiding late fees.					
11.	Online bills payment is highly secured and cost effective.					
12.	Bills payment through internet banking is convenient and less time consuming.					

In your experience, how has internet banking influenced efficiency, profitability and customer satisfaction in your bank?

_____

_____

Section D: Artificial Intelligence (AI)

To what extent do you agree with the statements below (Rating scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Moderately Agree, 4 = Agree, 5 = Strongly Agree).

No.	Artificial Intelligence (AI)	1	2	3	4	5
1.	AI powered Chatbots and virtual assistants are being used to address customer inquiries and complaints.					
2.	AI has created personalized customer experiences that has made customers satisfied and happy.					
3.	AI provides customer support to clients both day and night irrespective of the time zone they operate in.					
4.	AI has helped banks to automatically identify and assign customer issues in the order of priority that needed to be sorted out.					
5.	AI evaluates fraud risk areas in financial transactions to detect and seal off areas vulnerable to fraud.					
6.	AI fraud detection systems are less time consuming.					

7.	AI adoption has improved transaction processing speed and accuracy					
8.	AI has enabled conduction of due diligence on potential loan borrowers.					
9.	AI has reduced the time needed for data analysis by automating data cleaning and data transformation.					
10.	AI has improved data validation by identifying errors in datasets in real time.					
11.	AI has assisted to identify hidden trends or patterns in data that was insightful for decision making.					
12.	AI has enhanced operational efficiency through automation repetitive and time-consuming tasks.					

In your view, how has the adoption of Artificial Intelligence (AI) influenced the performance of your bank in terms of efficiency, profitability and customer satisfaction?

_____

_____

Section E: Blockchain Technology

To what extent do you agree with the statements below (Rating scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Moderately Agree, 4 = Agree, 5 = Strongly Agree).

No.	**Blockchain Technology**	**1**	**2**	**3**	**4**	**5**

1.	Blockchain technology has managed theft risk through provision of highly secured platforms for conducting financial transactions.					
2.	Blockchain technology permits direct peer-to-peer financial transactions thus eliminating counterparty risks.					
3.	Blockchain technology's cryptographic nature has made it difficult for unauthorized parties to disrupt transactions or manipulate data.					
4.	Banks in Kenya are adopting Blockchain technology for people in Kenya to be able to make cross border payments through their local banks.					
5.	Cross border payments are made in real-time.					
6.	Cross border payment settlements are less costly and convenient.					
7.	Cross border payment system is flexible since it has enabled both Person-to-Person and Business-to-Business payments from one country to another.					
8.	Cross border payment system has strengthened transparency and accountability in banks thus making it to be highly reliable.					
9.	Smart contract has self-executed financial transactions with no need of third party oversight or manual intervention thus minimizing time wastage.					
10.	Smart contracts have led to immutable and transparent transactions.					
11.	Smart contract has enabled prompt verification of transactions and recording.					

12.	Smart contract has eliminated intermediary costs thus making cross-border payments economical.					

How has the use of blockchain technology influenced customer satisfaction, profitability, and operational efficiency in your bank?

_____

_____

Section F: Bank Performance

To what extent do you agree with the statements below (Rating scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Moderately Agree, 4 = Agree, 5 = Strongly Agree).

No.	**Bank Performance**	**1**	**2**	**3**	**4**	**5**
1.	The return on assets have been improving consistently.					
2.	The bank has effectively used its assets to produce high profits.					
3.	Operational costs and time wastage have considerably reduced thus improving the productivity and profitability of banks.					
4.	The bank's technical efficiency has improved.					
5.	Banking operations have been streamlined.					
6.	The bank has achieved positive customer experience.					
7.	The rate of customers stopping doing business with the bank has gone down due to increased satisfaction.					
8.	The bank's return on assets is higher than that of many competitors.					

9.	The bank has reduced unnecessary delays in its operations					
10.	Customers' complaints are promptly handled and resolved					
11.	The bank makes effective use of its resources to minimize costs					
12.	Most customers express satisfaction with the quality of services offered					

Thank You for Your Participation.

Appendix B: NACOSTI Research License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **709268**

Date of Issue: **12/August/2025**

RESEARCH LICENSE



This is to Certify that Ms.. Janet Mulama Peris of Catholic University of Eastern Africa, 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: FinTech Adoption in Performance of Listed Commercial Banks in Kenya" for the period ending : 12/August/2026.

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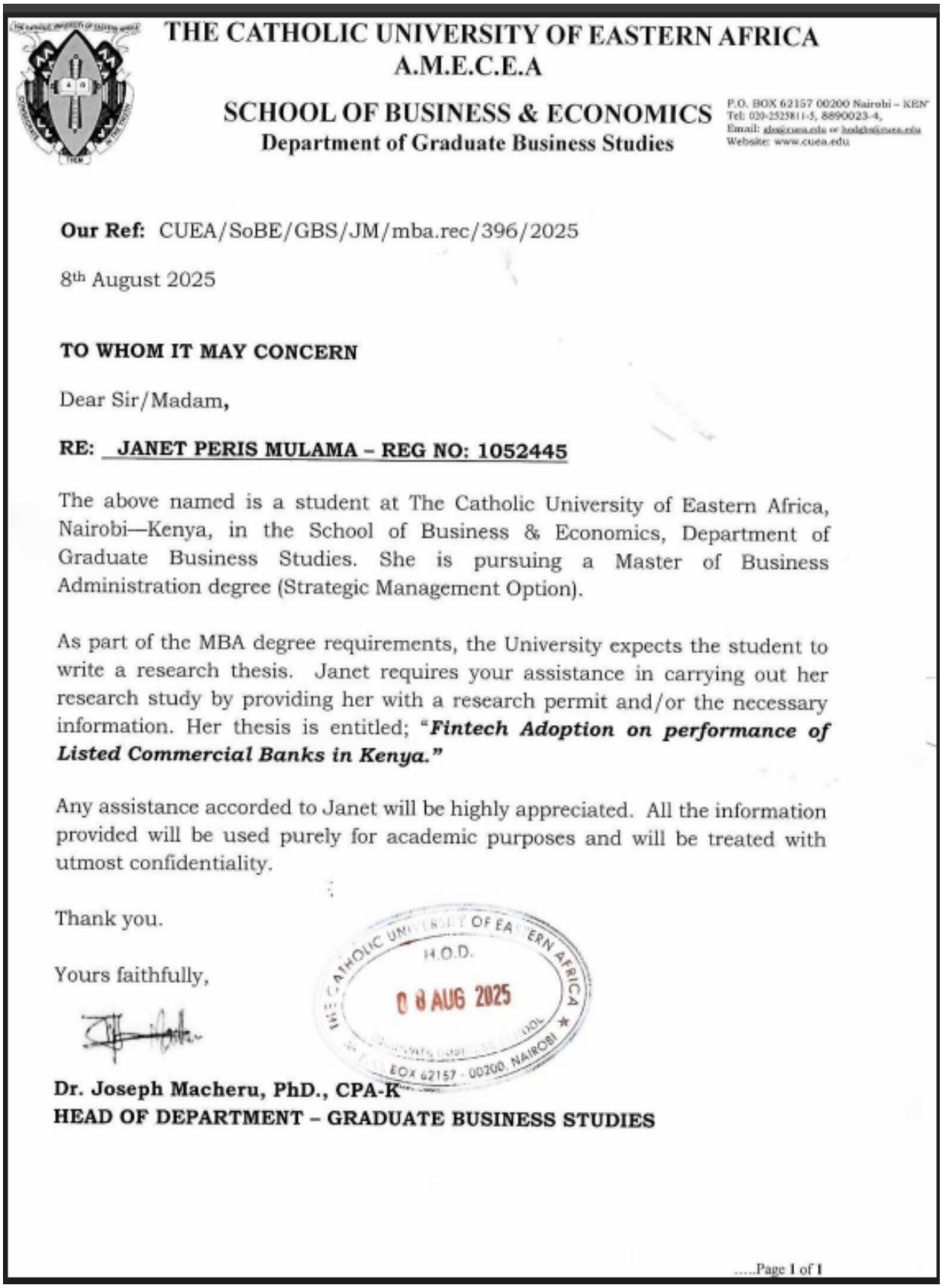
The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was the established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality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

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to.
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
    viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. Neither the license nor any rights thereunder are transferable.
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
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10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
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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.

National Commission for Science, Technology and Innovation(NACOSTI),
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Appendix C: University Data Collection Letter



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA
A.M.E.C.E.A

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Our Ref: CUEA/SoBE/GBS/JM/mba.rec/396/2025

8th August 2025

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: JANET PERIS MULAMA – REG NO: 1052445

The above named is a student at The Catholic University of Eastern Africa, Nairobi—Kenya, in the School of Business & Economics, Department of Graduate Business Studies. She is pursuing a Master of Business Administration degree (Strategic Management Option).

As part of the MBA degree requirements, the University expects the student to write a research thesis. Janet requires your assistance in carrying out her research study by providing her with a research permit and/or the necessary information. Her thesis is entitled; ***"Fintech Adoption on performance of Listed Commercial Banks in Kenya."***

Any assistance accorded to Janet will be highly appreciated. All the information provided will be used purely for academic purposes and will be treated with utmost confidentiality.

Thank you.

Yours faithfully,

THE CATHOLIC UNIVERSITY OF EASTERN AFRICA
H.O.D.
08 AUG 2025
P.O. BOX 62157 - 00200, NAIROBI

Dr. Joseph Macheru, PhD., CPA-K
HEAD OF DEPARTMENT – GRADUATE BUSINESS STUDIES

.....Page 1 of 1