DIGITAL FINANCIAL INNOVATION AND FINANCIAL INCLUSION IN COMMERCIAL BANKS IN KENYA

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DECLARATION

I declare that, this thesis is my own original work and has not been presented for award of any degree in any University.

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ABSTRACT

This paper mainly aimed at examining the causal relationship between digital financial innovation and financial inclusion in the banking industry in Kenya. General objective of this research was to examine the relationship between digital financial innovation and financial inclusion in commercial banks in Kenya. The specific objectives were: To establish the effect of mobile banking solutions, digital payment, agent banking services on financial inclusion in commercial banks in Kenya and To assess the influence of digital credit on financial inclusion in commercial banks in Kenya. A number of theoretical frameworks such as Financial Innovation Theory, Financial Intermediation Theory, Technology Acceptance Model (TAM) and Rational Choice Theory were used as the foundation of the study. Samples were taken as 39 commercial banks in Kenya and a five-year period (2013 to 2024). The census strategy was taken. Secondary data on financial inclusion, mobile banking, digital payment, agent banking services and digital credit via CBK Bank Supervisory reports, annual bank reports and Audited Financial Statements of individual banks of the concerned period. Secondary data was collected through data extraction checklist. In this research, secondary data was quantitative. Quantitative data was coded and keyed into Eviews version 10 to analyse. Particularly, the quantitative data analysis was used to establish inferential and descriptive statistics. Descriptive statistics appear in form of frequency distributions, percentages, standard deviation and mean. There were also Normality test and Diagnostic tests. These tests are Shapiro-Wilk Normality Test, autocorrelation test, heteroscedasticity test, linear test, Stationarity Test and Hausman test. To investigate the impact of independent variable on the dependent variable, regression analysis was employed. The regression coefficients reflected positive relationships with financial inclusion were all statistically significant, suggesting that a strong direct impact on increasing access to financial services in the country. Mobile banking solutions (beta=0.73934, p-value =0.0053), Digital payments (beta=0.534400 p-value 0.0408, Agent banking services (beta= 0.978870, p-value=0.0000) and Digital credit (beta=0.828504, p-value=0.0000). Future studies should investigate the expected benefits and challenges of digital financial innovations across different geographical areas (urban, peri urban, and rural contexts). Future studies could include the demographic groups such as women, youth, older adults, and low income individuals to gain a better understanding of their needs, and how digital innovations can be further leveraged to support their continued and enhanced financial inclusion.

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DEDICATION

I wish to express my deep appreciation to my children Megan, Jasmine and Emmy, who played an instrumental role in ensuring its success.

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LIST OF ABBREVIATIONS AND ACRONYMS

ATM	Automatic Teller Machine
CBK	Central Bank of Kenya
DFI	Digital Financial Innovation
DFSA	Digital Financial Services Association
DLAK	Digital Lenders Association of Kenya
FSD	Financial Sector Deepening
GDP	Gross Domestic Product
IMF	International Monetary Fund
KCB	Kenya Commercial Bank
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KNBS	Kenya National Bureau of Statistics
MBT	Mobile Banking Technology
MSME's	Micro Small and Medium Enterprises
NACOSTI	National Commission for Science, Technology, and Innovation
NSE	Nairobi Security Exchange
OECD	Organization for Economic Cooperation and Development
POS	Point of Sale
SDG's	Sustainable Development Goals
SEPA	Single Europe Payments Area
SME's	Small and Medium Enterprise
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Theory
UTAUT	Unified Theory of Acceptance and Use of Technology
WBT	Web Banking Technology

OPERATIONAL DEFINITIONS OF TERMS

Agency Banking Service Agency banking is a financial service delivery model wherein licensed financial institutions collaborate with third-party agents (e.g., retail outlets, post offices, or mobile operators) to provide basic banking services such as cash deposits, withdrawals, fund transfers, and bill payments (World Bank, 2022).

Digital Credit Digital Credit refers to the provision of short-term, unsecured loans through digital platforms, such as mobile apps or online systems, which leverage algorithms and alternative data (e.g., mobile phone usage, transaction history, or social media activity) to assess creditworthiness and disburse funds rapidly (Ozili, 2022).

Digital Payment System refers to an electronic platform or infrastructure that enables the transfer of monetary value between parties using digital technologies, such as mobile devices, internet-based applications, or block-chain networks (Bank for International Settlements, 2022).

Emerging markets Emerging markets are economies characterized by rapid industrialization, progressive integration into the global financial system, and dynamic growth trajectories, often driven by structural reforms, technological adoption, and expanding middle-class populations (International Monetary Fund, 2023).

Financial ecosystem The financial ecosystem refers to a dynamic and interconnected network of traditional and modern financial institutions, markets, technologies, regulatory frameworks, and stakeholders that collectively facilitate economic activities, capital allocation, risk management, and value exchange (Bank for International Settlement, (2023).

Financial Inclusion Financial inclusion is defined as the equitable access for all individuals and businesses to a comprehensive suite of useful, affordable, and appropriate financial services—including payments, savings, credit, and insurance—delivered responsibly and sustainably through formal institutions (World Bank, 2021).

Financial Innovation Financial innovation refers to the creation and adoption of novel financial instruments, technologies, services, or processes that transform how financial systems operate, enhance efficiency, mitigate risks, or expand access to financial resources (Omarini, 2023).

Gross Domestic Product is defined as the total monetary value of all final goods and services produced within a country's geographic boundaries during a specified period, typically measured quarterly or annually (World Bank, 2023).

Mobile Banking Solutions Mobile banking solutions refer to digital platforms and services that enable consumers to conduct financial transactions and enjoy banking services through their mobile, say smartphones and tablets (Federal Reserve Board, (2022).

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter speaks to the background of the study, statement of the problem, research objectives, research questions, hypothesis, and significance of the study, scope and delimitation of the study, theory framework and conceptual framework.

1.1 Background of the Study

Globally, financial systems including financial institutions are critical drivers of economic growth and stability (Bozic & Bozic, 2025). Financial institutions help in mobilizing savings and channelling them into productive investments, which enable individuals and businesses to grow, innovate, and create jobs fostering overall economic development (Shah, 2025). People often benefit from credit that enable them to own home, education their family members thus enhancing personal financial security and well-being of the whole society. In addition, financial institutions offer risk management tools, such as insurance and diversified investment options, that offer protection to many households and businesses against unforeseen events (Wang, 2024), thereby stabilizing the economy. Efficient payment systems and liquidity provision further facilitate seamless trade and commerce, underpinning daily economic activities. Financial systems help in allocating resources efficiently, which in turn increases productivity, accelerate technological progress, and support government policies including monetary control.

Furthermore, financial systems play a transformative social function that foster participation and inclusion of citizens in economic development thus reducing inequality, (Hujo & Fuentes-Nieva, 2024). Access to microloans, savings accounts, and insurance empowers underserved groups, enable them to build assets and participate in economic development. For example, microfinance initiatives have lifted millions of people out of

poverty through microloans programmes that support small-scale entrepreneurship, (Dumbuya & Munu, 2024). During crises, financial institutions acted as conduits for relief funds, mitigating social hardship. Access to capital and commercial services is paramount as they build wealth equality, improves social mobility, and cultivate long-term stability. Ultimately, inclusive financial systems not only drive equitable growth but also reinforce social cohesion, highlighting their dual socio-economic significance.

1.1.1 Financial inclusion

Financial inclusion is the process of making sure that vulnerable groups, such low-income and weaker sectors, have cheap access to commercial services and appropriate credit when they need it (Durai & Stella, 2019). It is a multidimensional with a dynamic concept encompassing three key dimensions namely ‘access’, ‘usage’, and ‘quality’. "Access" is defined by Banerjee and Donato (2020) as the percentage of a population that has access to commercial services and the degree of financial system penetration. "Usage" quantifies how frequently and how much these services are used, whereas "quality" refers to the degree of financial knowledge and the calibre of the provided goods and services. Access to banking accounts, insurance, remittance and payment services, and financial advising services are all examples of financial inclusion (Singhania & Tanty, 2023). It offers them the chance to put money aside for stability in the future. A solid deposit base, chances to save money, invest, and obtain credit are all made possible by a high level of bank deposits (Durai & Stella, 2019).

Interrelated and multidimensional concepts are normally taken into consideration when it comes to financial inclusion. The broad definitions of financial inclusion provided by international institutions are the process of expanding access to and use of a complete package of accessible and quality financial products (Monye, 2021). All these are essential elements that make people and companies are fully included in the financial system. Access

means the accessibility and the ease to acquire cheap commercial services and products such as bank accounts, loans and insurance. However, mere access is not adequate; usage focus on the importance of regularly and actively utilizing financial services, indicating that consumers find them practical and beneficial in their daily lives. Quality makes the financial services accessible not only but also relevant, safe and tailored to the needs of various groups of consumers in a responsible and sustainable way. Together, these elements build a basis of a more inclusive financial system that helps grow the economy and minimize inequality (Inzali, (2024).

The concept of affordability is important since it would define how accessible commercial services are to individuals and smaller companies that have little or no access to financial solutions. Digital financial innovations, such as mobile banking, agent banking, and digital credit, eliminate prohibitive transaction costs and geographic barriers (Ononiwu et al., 2024).However, affordability is not solely about lowering costs; it also premised on the design of inclusive financial solutions that align with users' financial ability while addressing their needs. For instance, microloans with flexible repayment terms or pay-as-you-go models can enhance affordability, thereby enhancing inclusion. Similarly, hidden costs, such as data charges for mobile apps or stringent eligibility criteria, may inadvertently serve as barriers for vulnerable groups (Sikka & Bhayana, 2024). This ensures technological progress does not perpetuate existing socio-economic inequalities but instead empowers disadvantaged populations to participate actively in the formal financial system (Nanda & Yunus, 2024).

It is estimated around 1.4 billion adults globally remain unbanked, with over more than half of the unbanked (60%) residing in developing countries (World Bank's Global Findex database,2021; Agu et al., 2024). This excluded segment of the population primarily comprises of marginalized groups, including women, rural communities, and low-income households, who often have limited resources and opportunities needed to engage with

formal financial institutions. In most emerging markets, access to financial services indicate pronounced disparities. For example, in Sub-Saharan Africa, approximately 66% of adults do not have a bank account, with a higher proportion of the unbanked being women. According to a report by the International Finance Corporation (IFC), women residing in developing regions are 7% less likely than men to access financial services (Adedapo et al., 2023; Daramola et al., 2024; Komolafe et al., 2024; Olatunji et al., 2024).

Complex issues like service time and distance are resolved by digital financial inclusion, which also offers a route forward for the growth of the financial sector (Nizam & Rashidi, 2025). Liu, Wan and Chen (2024) argue that inclusive finance is therefore not only an innovation in financial service concepts but also an institutional arrangement to address the imbalance in social and economic development. Commercial banks should take the lead in creating inclusive digital finance, as they are crucial financial institutions in the growth of inclusive finance. Numerous measures, including as account ownership, credit availability, and the utilization of financial goods and services, may be used to quantify financial inclusion. Financial inclusion, describes the ease of access and effective use of formal services offered by recognized institutions including banking, credit, insurance and payment services (Wandeda et al., 2023).

The 2021 Global Findex report highlights that approximately 1.4 billion adults worldwide remain unbanked**,** with sub-Saharan Africa still disproportionately affected. Moreover, while financial inclusion has improved since 201, the region continues to lag, with 45% of adults lacking access to formal commercial services (Demirgüç-Kunt et al., 2022). The report highlights what mobile money has done in closing gaps especially in nations such as Kenya and Ghana though still there exist challenges in low income and rural locations. Both developmental and financial scholars have hinted that the provision of individuals who have access to the banking infrastructures and financial services is very

crucial towards improving their economic status and quality of life in general. Statistics from World Economic Forum (2020) showed approximately one billion people globally remain without access to essential banking services. Bridging this gap remains a critical challenge for governments, financial institutions, and technology providers striving to promote inclusive economic development.

The financial landscape in most advanced countries is often dominated by strong banking systems that foster financial inclusion. This is enhanced by easy access to banking, digital payments, and credit, (Tay et al., 2022) which is driven by financial regulations, financial literacy programs, and technology. The Single Euro Payments in European countries, and cashless economies like Sweden and Denmark is a testament of financial integration. Although the U.S. is a leading global economy, financial inclusion remains a challenge. Most of the low-income, minority and rural citizens cannot access the traditional banking services. In 2021, approximately 7% of U.S. households were unbanked, while nearly 20% depended on alternative financial options (William, 2024).

Developing countries, however, perceive financial inclusion as something new. Developing countries refers primarily to countries in Sub-Sahara Africa, Asia and Latin America often lacking robust banking systems to support financial integration and access banking service. World Bank (2021), revealed that 94% of the individuals in developed economies had a bank account, compared to developing countries: 51.4% in Latin America, the Caribbean, and Central Asia, 46.4% in South Asia, and only 43% in Africa. Africa lags even further in some aspects of financial inclusion. Africa's being home to nearly half of the 2 billion people with no access to financial services (International Monetary Fund, 2020). For instance, excluding South Africa, the region has an average of fewer than six ATMs per 100,000 people. In addition, just one out of every five people possesses a bank account, while in Latin America; only two out of every five people have access to one. Kenya has

significantly good financial access compared to other African and Asian nations (Isabwa, 2021).

A sizable section of the populace in the majority of developing nations lacks access to basic commercial services, making financial exclusion more noticeable. About 1.4 billion individuals worldwide do not have access to banking, with the majority of them living in low- and middle-income nations, (World Bank's Global Findex Database). Financial exclusion is worsened by topography, financial and social issues like poor formal banking infrastructure, financial literacy, and exposure to digital gadgets or internet in these regions.

Despite several innovations, significant challenges remain. In most developing nations, financial literacy is still low and traditional banking services are often confined to urban areas, leaving the rural unserved and especially conflict-affected regions. Moreover, a considerable gender gap exists, where women face additional obstacles to financial inclusion due to cultural norms, legal barriers, and lower financial literacy. Therefore, while several successes have been witnessed, further efforts are needed to replicate on the achievements of mobile money platforms and government initiatives to foster equitable access to financial services for everyone. Tram et al. (2021) observed that digital financial services serves as the foundation of financial inclusion in most developing countries, especially in those geographical jurisdictions isolated from financial inclusion.

A key obstacle to financial inclusion, despite digital advancement, lies in addressing structural and systemic barriers that disproportionately affect vulnerable populations. While digital tools reduce geographic and cost hurdles, their impact is limited by uneven infrastructure, digital divides, and low financial literacy (Okello, 2024). Most of rural and low-income groups lack access to reliable internet or affordable devices, and low financial literacy, especially among women, older adults, and the less educated further impedes usage of financial solutions. Regulatory fragmentation, including strict KYC rules, also hinders

individuals who are undocumented or without proper identification documents from financial access. Another major challenge involves the unintended consequences of digital finance. Cybersecurity breaches, such as data theft or fraudulent transactions, can disproportionately harm vulnerable people who lack recourse mechanism. Algorithmic bias in credit scoring often hinders inclusion, (Andrae, 2025), while hidden costs and opaque fees disproportionately burden low-income earners (Sikka & Bhayana, 2024). In regions like Sub-Saharan Africa, digital credit has contributed to rising over-indebtedness due to aggressive marketing and weak regulation (Ngandi, 2024).

These structural barriers underscore the importance for coordinated investments in infrastructure, financial education, and adaptive regulatory frameworks to ensure digital innovations do not inadvertently reinforce existing divides (Djatmiko, Sinaga & Pawirosumarto, 2025). The profit-driven motives of fintech firms and traditional banks often prioritize scalability over inclusivity, which tends to ignore complex needs of the individuals and businesses. As such, a holistic approach emphasizes the importance of centering ethical design, transparency, and user protection in digital transformations to protect marginalized populations from the exploitation (George & George, 2024). To address cyber security concerns, collaborative efforts, such as a robust cyber security framework, pool resources to build resilient infrastructures (Olaonipekun, 2023). Balancing innovation with safeguards remains pivotal to ensuring financial inclusion aligns with equitable socio-economic progress.

Due to poverty, the World Bank and the G-20 have been increasing their efforts to enhance financial inclusion in the developing countries since 2010 (Global Partnership for Financial Inclusion, 2016). Although the construct of financial inclusion has been identified as a very important policy agenda by the World Bank, the IMF, the Organization for Economic Cooperation and Development, financial regulators, and governments, the desired outcomes have not been achieved as yet. Globally, out of the 1.4 billion unbanked population,

developing countries account for about 44% of the population who do not have access to formal financial services (Anakpo et al., 2023). This statistic reflects significant financial inclusion gaps, with low-income groups, individuals in informal sector, and rural dwellers being the most affected. Besides, 57 percent of the basic account holders lack access to diversified investment and savings, affordable payment systems, necessary household and business insurance, and access to credit. In addition, 62 percent of all adult people in the world can access basic commercial services, have a bank account or a mobile money account essentially.

1.1.2 Digital Financial Innovation

Digital financial innovation basically entails leveraging advanced technologies, business models, and processes to increase the access, usage, and affordability of financial services. It comprises of technologies such as mobile banking, agent banking, and digital payment platforms that revolutionized traditional finance by reducing costs, increasing access, and enabling real-time transactions (Mhlanga, 2024). In Kenya, Digital financial innovation has driven financial inclusion through various transformations such as M-Pesa, agency banking, and digital credit, reducing barriers like geographical distance, high fees, and lack of collateral that disenfranchise underserved and rural populations from financial inclusion,(Kim, 2022). These financial technologies enable banks to offer cost effective and inclusive services (Iorgachova & Kovalova, 2025).

The emergence of digital banking and financial transformation has prompted banks to investigate ways to accelerate digital transformation, financial technology, and business model change. Adopting financial transformations like internet, mobile, and agency banking is part of this (Li, 2022). Providing commercial services via credit and debit cards connected to a reputable digital payment system, mobile devices, personal computers, the internet, or e-wallets is what digital finance comprises (Durai and Stella, 2019). Digital finance has the

potential to not only enhance financial inclusion but also provide affordable, convenient and secure banking service, and more so in developing countries and emerging economies, it helps reduce poverty levels (Ozili, 2018).

The rapidity with which mobile platforms are used to support and deliver banking products and services, and also make payments has transformed the dynamics, and it has some other advantages such as access expansion, cost reduction, and enhancing convenience of transactions. Regarding whether and how mobile banking influences financial inclusion in 17 countries, Akter et al. (2021) state that mobile banking has a positive effect on the countries which are subject of the study yet the change is not symmetrical. The study found that African countries improved their financial inclusion significantly more than other regions after introducing mobile banking. Mobile money is one of the major determinants attributable to the fast expansion of financial access among the world's poorest, especially in Sub-Saharan Africa (Demirguc-Kunt et al., 2022). Many success stories depict the contributions of mobile banking in bringing about the so called financial revolution, such as M-Pesa in Kenya, Celpay in Zambia, Wizzit in South Africa and DR in Congo. Asian countries boast similar revolution in the financial world through Smart Money and GCash in the Philippines and Little World in India. Consequently, mobile banking has come up as a major policy priority in the promotion of financial inclusion.

Digital payment systems provide innovative solutions that allow people to perform financial transactions electronically, hence enhancing accessibility and efficiency. Initially driven by private-sector initiatives, notable early digital payment systems include M-Pesa in Kenya, Venmo in the United States, AliPay and WeChat Pay in China, and MobiKwik and Paytm in India, each emerging to address needs of different consumer and merchants. Digital platforms play a vital role in driving financial inclusion, especially in emerging markets where traditional commercial banks often fail to reach underserved populations (Adebayo et

al., 2024; Efunniyi et al., 2024; Maha Kolawole & Abdul, 2024; Omomo Esiri & Olisakwe, 2024). Offering services such as mobile money, e-wallets, and payment gateways, digital payment platforms cater to different financial needs while increasing financial accessibility. Payments often serve as the initial entry point to financial services, paving the way for broader access to savings, credit, and insurance as financial systems develop and mature (Jain et al., 2014; Khera et al., 2022).

Digital payment systems have eliminated geographical and temporal barriers to banking services, enabling customers to conduct transactions or make payments from anywhere at any time (Nnaomah et al., 2024). Moreover, digital payments are efficient, they offer a transparent method of conducting financial transactions and they are a key driver of financial inclusion (Davico et al., 2021). Agency banking is a model in which banks provide commercial services through non-bank agents such as retail outlets, post offices, and pharmacies, allowing customers to access real-time banking services that are equivalent to those provided by the main branch and banks, particularly in areas where there are no formal bank branches (Nisha et al., 2020). Agent banking has significantly influenced deposit collecting, remittance inflow, and loan disbursement, particularly in rural regions, thereby matching with the demand for cost-effective alternatives to providing accessible and secure formal finance for agriculture and rural SMEs (Khanam, 2022).

The agent-banking is the probable and viable means of fostering the financial deepening in unbanked areas of Bangladesh, enhancing the accessibility of the financial services to rural poor, and generating growth (Nabila et al., 2020). Digital credit has in the past years assumed new shapes, and is making significant contributions towards a rise in credit. Digital credit can take the form of Fintech credit, which entails innovative business models that leverage current technology to digitize at least some aspects of the credit extension process. Another type of digital credit is provided by non-finance organizations

with a vital role in the supply chain, such as telecom and mobile payment providers like Safaricom (Bazarbash & Beaton, 2020).

Since the implementation of M-Shwari in 2012 which was a joint venture between the Commercial Bank of Africa and Safaricom, Kenya has witnessed significant development in digital lending. Kim and Duvendack (2024) assert that digital credit has demonstrated significant success in Kenya and is anticipated to offer options for persons marginalized from conventional loans due to their lower socioeconomic position. Digital credit has produced beneficial spillover effects on the financial inclusion of youth, as borrowers of digital loans have enhanced their access to financing, resulting in job creation, poverty alleviation, and increased financial independence among young individuals (Wathome, 2020).

Digital financial innovations have increased drastically in Kenya at the local level including services such as mobile money like M-Pesa, M-banking services, internet banking, agent banking which has enhanced access to commercial services (Tiony, 2024 and World Bank, 2020). The banking sector has been on the lead on driving such digital financial innovations in partnerships with other financial and non-financial companies, technology-related companies, innovators and intermediaries. The study tries to focus on the impacts of these digital financial innovations on financial inclusion in the Kenyan banking industry. Mobile banking is one of the digital innovations that has seen rapid growth, driven by the necessity to reach unbanked populations in remote areas (Wakaba and Wepukhulu, 2019).

1.1.3 Commercial Banks in Kenya

The financial sector is dominated by commercial banks that play an intermediary role that link savers and borrowers of funds. The Central Bank of Kenya (CBK) controls and monitors them. The country has 39 commercial banks which provide numerous financial services such as mobilization of deposits, provision of credits, foreign exchange transactions and financing of trade. The banks are categorized into three main tiers based on their asset

base and market share. Tier 1 banks comprise of large, well-capitalized banks which have a significant national and regional presence, like KCB and Equity Bank. Similarly, Tier 2 and Tier 3 banks are medium-sized and small banks respectively, serving niche markets with limited branch networks and smaller customer bases.

Over the years, the sector has experienced significant growth in terms of assets, customer base, and financial transformation. This is evident with Tier Banks (as Equity Bank and KCB Group) which have expanded into Eastern Africa region. The players also invested a lot in digital banking channels so that it might improve customer experience and operational efficiency. Such a transformation has played a decisive role in the advancement of financial inclusions, particularly the players of the SME sector and the formerly unbanked communities. Overall, Kenyan commercial banks are instrumental in fostering economic resilience, innovation, and inclusive growth.

1.2 Statement of the Problem

Financial inclusion is essential to the global goal for fostering fair economic growth and reducing poverty, particularly in poorer nations (Nnaomah et al., 2024). It ensures all underserved and unbanked population, have access to commercial services. Low-income individuals have long been excluded from accessing financial services by mainstream banks (Kamran & Uusitalo, 2024). It helps in reducing poverty and fostering sustainable development in different regions such as Africa (Djahini-Afawoubo et al., 2023). However, many people including smaller businesses in many emerging economies still cannot access commercial services owing to poor network coverage, fewer people own smartphones, high transaction costs, and limited user awareness, which hamper full financial inclusion ((Liu, et al., 2024). Moreover, in advanced countries, affordable financial options are also limited (Taylor, 2024). Cybersecurity concerns that consist of fraud and data breaches also pose challenge because they erode trust in these platforms (Sani et al., 2025).

Financial inclusion is social and economic instrument that can help to address structural inequalities. Furthermore, McKinsey Global Institute opined that enhanced access to digital financial services could increase the annual GDP of emerging economies by approximately 3.7 trillion by 2025 representing an increase of 6% over projected trends (Aboelenein, 2023).The growth would be catalyzed by greater financial inclusion, that boost productivity across different segments of the economy resulting to creation of millions of new jobs and bringing unbanked people into the formal financial system, (Ahmed & Alvi, 2024).

Various empirical studies have investigated the subject of financial inclusion. However, most of the research researches that have been conducted on the subject are out of Kenya and have not really examined the impacts of digital financial innovation on financial inclusion in Kenya. Against this background, this study tries to provide some knowledge in this field as it aims at analysing the impact of digital financial innovation on the financial inclusion to commercial banks in Kenya. Simiyu, Wanza and Githinji (2024) investigate how digital credit influences the financial inclusion 2018-2022. Using a mixed-method approach the study finds a strong positive association between digital credit adoption and financial inclusion. Ntahomvukiye and Kosgei (2021) in Burundi using secondary data revealed that while the number of distribution agents and the value of mobile transactions were not statistically significant in explaining financial inclusion; the number of transactions had a positive and significant impact. David and Sakanko (2019) in Niger State, Nigeria revealed that electronic payment systems have a significant positive effect on digital financial innovations.

Several empirical studies have explored financial inclusion from diverse perspectives across Africa and beyond. For example, Haule (2024) in Tanzania found that perceived usefulness significantly enhances digital financial inclusion among low-income groups, even

though perceived risks did not have a strong effect. In Kenya, Wachira, Kihara and Okech (2023) demonstrated that digital credit positively influences the financial health of youth borrowers in Kibera, highlighting the potential of digital innovation to improve welfare in marginalized communities. Similarly, Kipchoge and Mutuku (2024) reported that mobile banking adoption significantly boosts the financial performance of microfinance banks in Nairobi, confirming a strong institutional link between digital innovation and financial outcomes.

Other studies further highlight socio-economic and technological factors driving financial inclusion. Mose, Gitonga and Fumey (2024) found that demographic characteristics such as age, gender, education, and income significantly shape digital financial inclusion in Kenya. Muchiri (2023) also showed that M-Pesa and mobile banking transactions, alongside economic growth, play a crucial role in expanding financial inclusion, while internet and agency banking were less impactful. Collectively, these findings confirm that digital financial innovations support both institutional stability and individual well-being. However, despite the richness of this evidence, most research has not directly focused on the role of digital financial innovation within Kenyan commercial banks, underscoring the need for further inquiry into this specific context.

1.3. Objective of the Study

1.3.1 General Objective

The primary objective of this research was to examine the relationship between digital financial innovation and financial inclusion in commercial banks in Kenya.

1.3.2 Specific Objectives

The specific objectives were:

i. To establish the effect of mobile banking solutions on financial inclusion in commercial banks in Kenya.

ii. To investigate the influence of digital payment on financial inclusion in commercial banks in Kenya.

iii. To examine the effect of agent banking services on financial inclusion in commercial banks in Kenya.

iv. To assess the influence of digital credit on financial inclusion in commercial banks in Kenya.

1.4 Research Questions

i. What is the role of mobile banking solutions on enhancing financial inclusion in commercial banks in Kenya?

ii. What is the role of digital payments on enhancing financial inclusion in commercial banks in Kenya?

iii. What is the role of agent banking services on enhancing financial inclusion in commercial banks in Kenya?

iv. What is the role of digital credit on enhancing financial inclusion in commercial banks in Kenya?

1.5 Research Hypothesis

The research null hypotheses were:

i. $\mathbf{H_{01}}$: Mobile banking solutions have no significant role in enhancing financial inclusion in commercial banks in Kenya.

ii. $\mathbf{H_{02}}$: Digital payments have no significant influence on financial inclusion in commercial banks in Kenya.

iii. $\mathbf{H_{03}}$: Agent banking services have no significant effect on financial inclusion in commercial banks in Kenya.

iv. $\mathbf{H_{04}}$: Digital credit has no significant influence on financial inclusion in commercial banks in Kenya.

1.5 Significant of the Study

1.5.1. Academic Contribution

This study addresses the intersection of digital financial innovations (mobile banking, digital payments, agent banking, and digital credit) and financial inclusion in Kenya, a global leader in mobile finance (e.g., M-Pesa). It fills empirical gaps by analyzing how these technologies mitigate barriers (geographical, financial, socio-economic) to inclusion, offering insights for underdeveloped economies. It advances theories on financial inclusion and digital innovation, providing a holistic view of their aggregate impact on Kenya's banking sector complementing prior studies focused on single services.

1.5.2 Policy Makers

Policymakers can leverage findings to design inclusive regulations, incentivize fintech partnerships, and align strategies with Kenya's National Financial Inclusion Strategy (2023–2027). Despite M-Pesa's success, challenges persist in rural access and among women, youth, and SMEs. Addressing digital literacy, infrastructure gaps, and balancing transformation with cyber-security will enhance equity. This supports Kenya's Vision 2030 and SDG 10 (reduced inequalities) by fostering inclusive growth.

1.5.3 Financial Institutions

Financial institutions can develop tailored products (mobile platforms, digital wallets) for marginalized groups, while fintechs identify collaboration avenues with traditional banks. Digital innovations can bridge the unbanked with formal services, enhancing access to credit, savings, and insurance promoting poverty reduction, entrepreneurship, and economic resilience. A digitally inclusive ecosystem can align with SDGs 1 (No Poverty), 8 (Economic Growth), and 10 (World Bank, 2017).

1.6 Scope of the Study

The geographical scope of this study was on the commercial banks in Kenya and this was done to capture both urban and rural areas to give a wide scope on the experience on the digital financial service. The sample size that was used in the study included 39 commercial banks. It even examined regulatory processes that government and financial institutions have put in place to promote digital financial transformations and its impact on the financial inclusion.

Despite the fact that the introduction of financial technologies in the banking industry started at an earlier date, in 2010, the current analysis will be restricted to 2014-2023 because it will cover the most significant digital financial technologies, including mobile money and mobile banking, which have already been introduced in Kenya. The research is based on quantitative information, including the rates of user adoption, the statistics of financial access rates, and the volume of banking transactions.

In this paper, the author will be speaking in particular of the nature of financial inclusion and how the mobile banking technologies are being used in the Kenyan banking sector. This article is an analysis of how digital payments have contributed to inclusiveness of commercial banks in Kenya. This paper also discusses an understanding of how the agent banking services have affected financial inclusion in the banking industry in Kenya. Finally, it evaluates the impacts of digital credit on the financial inclusion of the banking sector in Kenya.

The key research purpose is to assess how digital financial innovation (DFI) affects financial inclusion in the Kenyan banking industry. This research paper is based on the use of mobile banking services, online payment websites, agency banking programs and online credit to help have better access to commercial services among underserved and unbanked individuals in Kenya. The research examines the roles that these innovations play in

promoting the development of financial inclusion including issues of access to financial products and services, their utilization, affordability, and quality..

This study was strictly undertaken within the banking systems in Kenya. The focus was laid specifically on the use of mobile banking, digital payments platforms, agency banking services and digital credit as digital financial innovations as far as they contribute in a manner that is considered as financial inclusion within the banking systems. Other digital financial transformations that are not contributing to the banking system were not considered as an objective. Specifically, the study investigated mobile banking, digital payments, Agent-banking and digital credit as independent variables. Financial inclusion was established as a dependent variable during the study.

1.7 Theoretical Framework

The purpose of this theoretical framework was to offer a structured ground to study by explaining key concepts, relationships, and theories that support the research. The section looks into Theory of Financial Inclusion, Technology Acceptance Model (TAM), and Rational Choice Theory (RCT) and Financial Intermediary Theory. The Theory of Financial Inclusion explains how accessible and affordable financial services can reach marginalized populations, focusing on how digital innovations facilitate access to financial solutions.

The Technology Acceptance Model (TAM), developed by Davis (1989), assesses user acceptance of new technology, analyzing how mobile banking and digital wallets like M-Pesa drive financial inclusion. Rational Choice Theory (RCT) posits that individuals make financial decisions based on cost-benefit analysis, helping to understand how banks and consumers adopt digital financial solutions for inclusion. Lastly, the Financial Intermediary Theory highlights the role of financial institutions in bridging gaps in financial access by leveraging technology to provide inclusive commercial services.

1.8 Conceptual Framework

Conceptual framework is a schematic depiction of interrelation amid the dependent variable and the independent variables. Figure 1 represents the hypothesized relationship between the variables of the research. In the study, independent variables will be mobile banking solutions, digital payment, agent-banking services, and digital credit, and dependent variable will be financial inclusion.

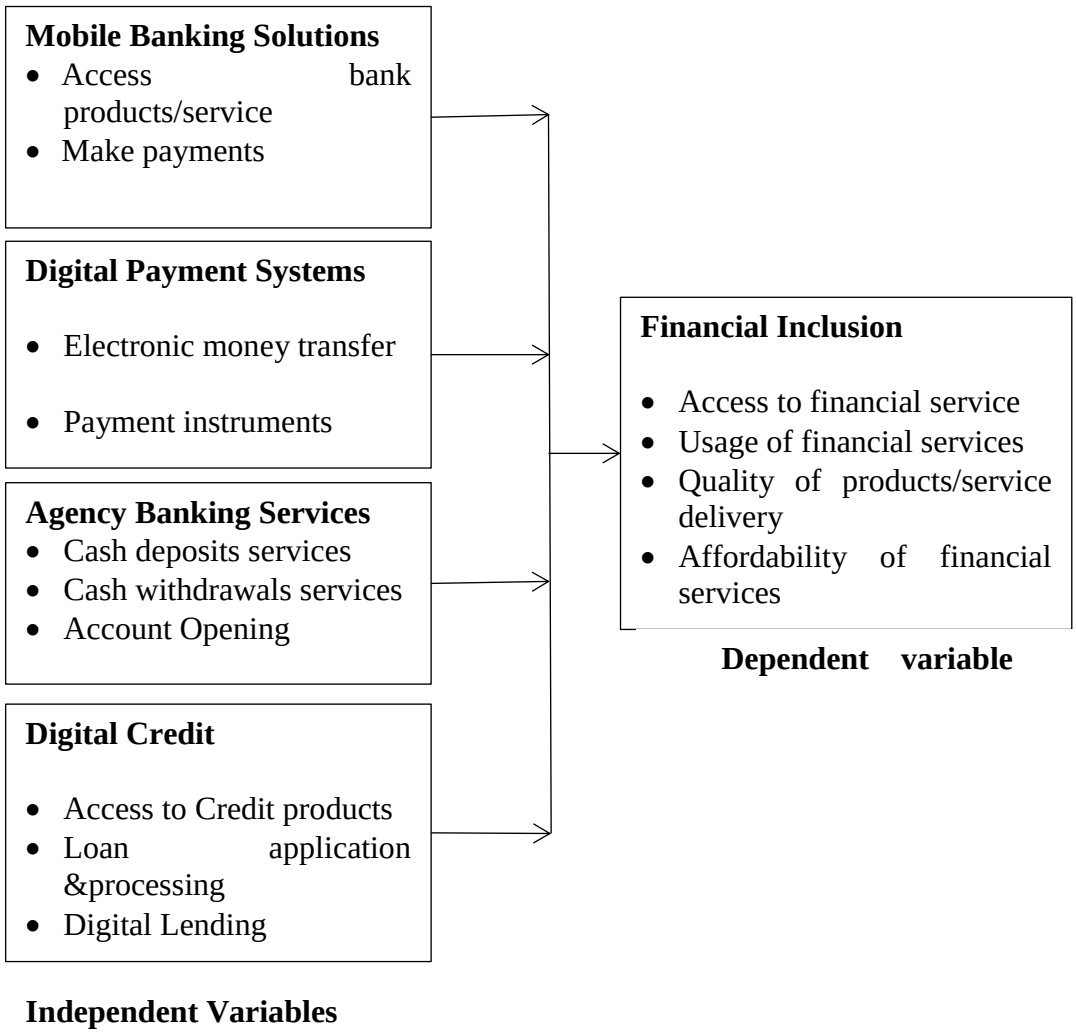


Figure 1.1: Conceptual Framework

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

In this chapter, a theoretical review of the study and critical analysis of theories are introduced. It also gives a review of the international, regional and local empirical research in relation to the study. At the end of the chapter, the author provides the knowledge gap of the empirical review.

2.1 Review of Theories

Some theories of financial transformation and financial inclusion adoption were examined in this paper. The study had its foundation on, the theory of financial innovation, the Technology Acceptance Model, Financial Intermediation Theory and the Rational Choice Theory. The topic of applicability of each of the theories and the description thereof is presented in the following sections.

2.1.1 Theory of Financial Innovation

William Silber initially introduced the theory of financial innovation in 1975, positing that new financial instruments or practices emerge to mitigate the financial constraints faced by banks (Silber, 1975). Merton H. Miller (1986), Miller, argued that derivatives and securitization enhance market completeness by allowing participants to hedge previously unmanageable risks. By enabling tailored risk-sharing (e.g., futures, options), these instruments improve resource allocation and stabilize cash flows for firms and investors. For instance, mortgage-backed securities (MBS) redistributed housing market risk from banks to global investors, theoretically enhancing systemic resilience. Miller posited that such transformations align with the Modigliani-Miller theorem, emphasizing that value creation stems from risk management rather than capital structure alone.

Robert and Merton (1992), Merton framed financial innovation as a catalyst for economic growth through dynamic capital allocation. He highlighted transformations like index funds and derivatives as tools that lower transaction costs and improve market participation. For example, derivatives enable firms to hedge currency risks, fostering cross-border investments. Merton also stressed the role of technology in expanding access to financial services, later exemplified by algorithmic trading and robo-advisors, which optimize portfolio diversification for retail investors.

Since then, the theory of financial transformation has garnered heightened interest, particularly following the 2008 financial crisis. Furthermore, market competition for financial transformation is experiencing significant transformations due to the advancements brought forth by Fintech start-ups, which leverage technology to disrupt traditional financial intermediation models and challenge regulatory frameworks (Thakor, 2020). Ogbeide and Obadeyi (2023) contend that financial innovation can enhance the efficiency of financial intermediation, thereby diminishing market frictions such as transaction costs, agency costs, and information asymmetry, while augmenting the availability of credit and other financial products. This, in turn, fosters increased investment, job creation, and economic advancement.

This theory will be used in the study that is going to be conducted to establish the impact of digital payment on financial inclusion in the banking industry in Kenya and also to establish the impact of digital credit on financial inclusion in the banking industry in Kenya.

2.1.2 Technology Acceptance Model

It is the concept that was developed by Davis in 1989. Technology Acceptance Model (TAM) considers the goals of behaviour as leading determinants of the use of systems in an individual. Shiau and Chau (2016) revealed that the perceived utility of a technology and the perceived usability of a technology have a significant impact on behavioural

intention. The perceived utility of system is the feeling that an individual has towards a system on how he or she has perceived the value that the system will add value to his or her performance at work. The perceived ease of use on the other hand is the level to which an individual thinks that he or she would find using a given technology easy. This model was founded on the basis of things that would dictate the probability of the user in acquiring the technology and the manner of adoption of the technology.

Building on this foundation, TAM2 (Venkatesh & Davis, 2000) expanded the original model by incorporating social influence processes (e.g., subjective norms) and cognitive instrumental processes (e.g., job relevance, output quality). Social influence factors, such as peer or managerial pressure, were shown to directly affect PU, especially in mandatory adoption contexts. Cognitive factors like job relevance (how well a technology aligns with a user's tasks) further explained why individuals perceive certain tools as useful. TAM2 highlighted the importance of contextual and organizational factors in shaping user acceptance, bridging gaps in the original model (Venkatesh & Davis, 2000). This model guides the study in examining the role of mobile banking solutions on financial inclusion in the banking industry in Kenya.

2.1.3 Financial Intermediation Theory

The Financial Intermediation Theory, developed by Gurley and Shaw (1960), Leland and Pyle (1977), Diamond and Dybvig (1983), Allen and Santomero (1996) and Scholtens and van Wensveen (2000), offers a theoretical lens for analyzing the role of intermediaries in the economic development (Bongomin et al., 2021). The theory asserts that financial intermediaries such as banks are vital in efficiently allocating funds within the economy. Financial intermediaries act as link between individual with excess saving (depositors) and individuals with deficit(borrowers,) thus driving investment and economic growth. These

intermediaries carry out essential functions such as converting short-term deposits into long-term loans, and offering liquidity and risk management services.

Cruzado et al. (2023), the theory is based on the idea of information asymmetry between borrowers and lenders, which intermediaries eliminate through conducting due diligence and credit evaluation processes. It also emphasizes risk diversification, where intermediaries pool funds from different savers and distribute them across different borrowers to reduce individual risks. Furthermore, the theory highlights economies of scale, particularly when financial intermediaries operate at a large scale, which allows them to gain cost advantages and enhance operational efficiency.

2.1.4 Rational Choice Theory

Rational Choice Theory was originally developed by Adam Smith in 1776. The theory believes that there is a link between social action and economic decision. Rational choice theory adopts three concepts of being a rational actor, self-interest, and the invisible hand. This implies that one will do a cost-benefit analysis before making an economic choice to determine the most efficient choice regardless of whether there are uncontrollable factors (Wittek, 2013). Becker extended RCT to non-market behaviors, including crime, education, and family dynamics. He argued that individuals weigh costs and benefits even in seemingly non-economic decisions (Becker, 1976).

The demand side of the side of financial inclusion that consists of the available financial services and the terms under which they are provided are all analyzed through the prism of the rational choice theory. The utility function is a mathematical utility that is used in the rational choice theory to assign a numerical value to all the possible alternatives that a person can pursue in a decision. The utility function is symbolized by features or quality of commercial services and the attributes of service providers where the demand side of financial inclusion lies (Burns & Roszkowska, 2016).

This theory supports the dependent variable, financial inclusion because it enhances rational thought process in decision making process during the need to demand a financial service. RCT is significant in affecting the financial inclusion in that they can characterize the inclusion of participation on the demand side and exclusion on the supply side and formulating policy. In this theory, the four identified variables are anchored in a bid to determine the role of mobile banking solution, the role of digital payment, the role of agent banking services and role of digital credit on financial inclusion in the Kenyan banking sector.

2.2 Criticism of the Theories

Admati and Hellwig (2013), criticized innovations like special-purpose vehicles (SPVs) and credit default swaps (CDS), which banks used to circumvent capital requirements. For instance, SPVs moved risky assets off-balance-sheet, artificially inflating capital ratios. Post-2008 reforms (e.g., Basel III) aimed to close these gaps, but shadow banking and crypto "stablecoins" continue to test regulatory frameworks. Systemic Risk: Hyman Minsky (1986), Minsky hypothesizes that a long period of stability contributes to a culture of complacency, the speculative bubble formation. He cautioned that such things as adjustable-rate mortgages (ARMs) promote excessive use of leverage. This subprime MBS fueled housing speculation was witnessed in the 2008 crisis and the failure of this led to contagion all over the world. The Ponzi finance system proposed by Minsky describes how the debt systems based on increasing asset prices are destined to fail, where sophisticated derivatives increase the magnitude of such an effect

Although financial innovation promises greater efficiency and market expansion, it also can generate new risks, especially when innovations are complex, less transparent, or subject to weak regulation. Post-2008 innovations such as algorithmic trading, decentralized finance (DeFi), and structured products have been found to amplify instability through leverage and

reflexivity, with regulation often lagging behind (Hassan, 2024). Further research shows that securitization and new derivatives may erode governance controls and incentivize excessive risk-taking (Knafo & Dutta, 2020). Additionally, systemic risk measurement methods remain institution-focused rather than system-wide, leaving regulators blind to network vulnerabilities (Silva et al., 2021).

Critics argue that TAM reduces technology acceptance to two primary constructs perceived usefulness (PU) and perceived ease of use (PEOU) while neglecting broader contextual factors. Bagozzi (2007) emphasizes that TAM overlooks affective elements, such as emotional responses (enjoyment, anxiety, or frustration), which significantly influence user decisions. For example, a user might avoid a useful tool due to anxiety about privacy, or adopt a less efficient platform because it is more enjoyable. By focusing narrowly on cognitive assessments, TAM fails to account for the complexity of human motivation and emotion in technology use.

Benbasat and Barki (2007) critique TAM for its individual-centric focus, which disregards organizational dynamics. Factors like leadership support, training quality, workplace culture, and team collaboration are critical to technology adoption but are excluded from TAM's framework. For instance, even if employees perceive a system as useful, poor training or resistance from management can derail implementation. This narrow scope limits TAM's applicability in organizational settings where collective behaviour and institutional policies play pivotal roles. Marangunić and Granić (2015) assert that the Technology Acceptance Model (TAM) aims to elucidate the factors affecting the adoption of mobile banking services, which may then be generalized to account for user behaviour across a broader range of end-user computing technologies and demographics.

TAM has been extended and tested widely in recent years, but its limitations are increasingly apparent. A study in Pakistan's tourism sector shows that compatibility, enjoyment, e-trust,

and expertise are critical drivers beyond perceived usefulness and ease of use (Ali et al., 2022). Research on Gen Z's online purchases also reveals that trust and social influence can outweigh the core TAM constructs in shaping intentions (Rizwan et al., 2023). Moreover, studies of fintech adoption in Sub-Saharan Africa show that regulatory frameworks and trust moderate both adoption and risk outcomes factors TAM alone cannot fully capture (Asongu et al., 2023).

Critics argue that financial markets can often bypass intermediaries, offering more efficient allocation of capital. Franklin Allen and Douglas Gale (2000) contrast bank-based and market-based systems, noting that markets provide superior risk-sharing and innovation mechanisms in advanced economies. They suggest that intermediaries may become redundant as markets evolve, challenging the theory's assumption of their indispensability. The 2008 crisis exposed systemic risks amplified by intermediaries. Anat, Admati and Martin Hellwig (2013) critique excessive bank leverage and inadequate equity buffers, arguing that the theory underestimates how intermediation can propagate crises. Hyman Minsky's financial instability hypothesis further underscores how intermediaries fuel speculative bubbles through pro-cyclical lending.

Financial intermediation theory emphasizes the efficiency role of banks in reducing transaction costs and information asymmetries, but recent work highlights the growing challenges of fintech and central bank digital currencies (CBDCs). IMF research finds that CBDCs can drive disintermediation, especially for poorer households with limited access to bank accounts (Kumhof & Noone, 2023). Editorials on AI and finance stress how fintech platforms and non-bank actors increasingly bypass traditional intermediaries, altering risk dynamics (Mhlanga, 2024). Furthermore, evidence from African banking shows that fintech-driven financial inclusion initially increases risk exposure before stabilizing, a pattern unexplained by classical theory (Asongu et al., 2023).

Herbert Simon challenged RCT's assumption of perfect rationality, arguing that humans face cognitive limitations and often "satisfice" (choose adequate options) rather than optimize. Simon's concept of bounded rationality highlights how decision-makers use heuristics due to incomplete information and mental constraints (Simon, 1955). Behavioral economists like Daniel Kahneman and Amos Tversky further demonstrated systematic biases (e.g., loss aversion) that deviate from RCT predictions (Kahneman & Tversky, 1979). Sociologists argue RCT overlooks how social structures shape decisions.

Rational Choice Theory assumes agents maximize utility with stable preferences and full information, but recent critiques highlight its shortcomings. Herfeld (2021) shows that even modern refinements fail to adequately account for bounded rationality, social context, and non-strategic motives. Other research argues that anomalous preferences and intentions undermine the normative plausibility of strict rational choice assumptions (Steinert-Threlkeld, 2021). In the digital finance domain, studies of decentralized finance reveal risks from governance tokens, smart contracts, and externalities that rational-choice models cannot capture effectively (Capponi et al., 2023).

2.3. Empirical Review

2.3.1 Mobile banking solutions and financial inclusion

The paper by Iwedi (2023) purposed to conduct an empirical investigation into the effect of the digital banking model on financial inclusion in Nigeria. In the quest to actualize the objective, financial time series method was employed to gather and study the quarterly data in the study. These figures were obtained under the premise of the Statistical Bulletin of Central Bank of Nigeria on a twelve (12) year trend (2009 - 2021). The independent variables of the study identified as the volume of transactions on the ATM, the volume of transactions on the POS, the volume of transactions on the web banking technology and the volume of transactions on the mobile banking technology were quite stated in the study whereas the

financial inclusion was quoted as a quotient of total deposits to the Gross Domestic Product (GDP).To determine the relationship among the independent variables, the study resorted to pairwise Granger causality test. The research results indicated that digital banking played a tremendous role in the inclusion of finances in Nigeria. These results demonstrate the promise of digital bank technologies in accessing more individuals to financial services in underserved communities and rural setting.

Saeed and Donkoh (2024) conducted a research to determine the determinants of the mobile banking services and evaluate their impacts on financial inclusion of customers of commercial banks in a developing economy. The study employed a structured questionnaire with the data collected by the study through the target population of 65 managers and supervisors in 13 commercial banks operating in Ghana. Purposive sampling method was used to select 13 commercial banks that formed part of the sample. In addition to that, the convenience sampling method contributed to gathering information among the managers and supervisors of the bank. The information was gathered by use of structured questionnaires. The outcome indicates that mobile banking transfer had a significant negative correlation with the financial inclusion on the one hand and mobile account management had a significant positive correlation with the financial inclusion on the other hand. Besides, the results also indicated that payment and financial inclusion with Mobile banking did not show any significant relationship.

Kipchoge and Mutuku (2024) aimed at examining the impacts of mobile banking on the finance performance of microfinance institutions in Kenya. This was an explanatory study design research. This study targeted 13 registered microfinance Banks that had their domicile in the Nairobi City County. The size of the population is small hence a census approach was applied. The mobile banking and financial performance (ROA) secondary data were obtained by extracting secondary data in the site b of CBK and financial statements, with the help of

data extraction checklist. The quantitative data extracted was run through STATA 14 and analysed in the form of panel data analysis. Various tests of diagnosis were carried out and the result was that there exists a positive and significant correlation between mobile banking and financial performance.

In their article, Ntahomvukiye and Kosgei, (2021) attempted to evaluate mobile money and financial inclusion in Burundi. A specific study was aimed at determining the impact of the distribution of mobile money, the mobile money transaction and value of the mobile money transactions to the financial inclusion in Burundi. The study also sampled three institutions which offered mobile banking services out of the 14 institutions which formed the study population. The secondary data was collected during year 2012 - 2019 in the study. The research outcome indicated that the quantity of mobile money distribution did not show any significant value and therefore not a predictor of the financial inclusion in Burundi. Moreover, it also indicated that the effects between financial inclusion and volume of the executed mobile money transactions were statistically significant. However, the value of mobile money transactions and the financial inclusion did not indicate any statistical significance between the two variables.

Haule (2024) investigated the influence of perceived mobile commercial services risk and usefulness on digital financial inclusion of low–income individuals in Tanzania. The research aimed to specifically look at the effect of perceived risks and perceived usefulness on digital financial inclusion among people with low-income, and the moderating role of perceived risks on digital financial inclusion. A pool of 283 clients of the micro finance banks in Arusha and Dar es Salaam was the target population of the research. In analysing the data, Partial Least Squares Structural Equation Modelling was used. These findings proved that perception of usefulness induced by Mobile Financial Services (MFS) was a crucial factor to digital financial inclusion because of time saver, cutting cost, and enhanced financial

management albeit having some degree of fear of transaction security as well as error. Nevertheless, perceived risks had no direct and moderating impact on financial inclusion. Further finding indicated that perceived usefulness had a positive and statistically significant effect on digital financial inclusion whereas perceived risks showed no direct influence nor moderating role in the perceived usefulness– digital financial inclusion relationship.

2.3.2 Digital Payment and Financial Inclusion

Wibawa and Kajeng (2023) sought to determine the effect of digital payments and financial literacy on MSME performance mediated by financial inclusion. The research is embraced quantitative research design. The study focused on MSMEs in Denpasar City in 2021, totalling 32,026 MSMEs. A purposive sample design coupled with the Slovin formula helped in identifying a sample size of 100 MSMEs. The technique used to analyze data was PLS-based SEM. The research findings revealed that the digital payments and financial literacy positively significantly affected financial inclusion. The more innovations and progress exist in the field of digital payments and the more financial literacy the actors of the business world have, the more the transformations in the sphere of the financial inclusion can occur. There is a big and positive influence of financial literacy and financial inclusion and digital payments on the performance of MSMEs. Business operators are more convenient since the digital payment systems and financial literacy are available, which ends up enhancing their performance.

Mustafa et al., (2023) examined the role of fintech payment instruments in improving financial inclusion. The research employed the fintech payments instruments in the changing ownership of accounts as one of the most important indicators of financial inclusion; to establish whether they perform better based on the varying income status of nations. In this research quantitative approach was used to provide response to research questions and testing hypothesis. The author uses a panel of twenty-two countries over the years 2010-2020 as the

sample of the study. The Global Findex; 2021 edition of World Bank is the source of the database. This international data has been tabulated in the form of a panel and the analysis of the same has been done on the basis of descriptive statistics and regression analysis. The results indicated that digital remittances, debit and credit cards; and macroeconomic variables had significant effect on financial inclusion in developed and middle-income countries implying that Fintech payment instruments enhanced financial inclusion at various levels due to the variation in technological advancements and the low rate of financial literacy. The study also depicted that the insignificant impact of the S&P indicator on the different income countries had, in fact, necessitated the increased focus on the Fintech and financial literacy as a way of fast-tracking the financial inclusion process.

Kambi and Onyiego (2022) discussed how digital financial inclusion impacted on financial development of the micro, small and medium sized enterprises in Kenya. The research has examined some of the digital elements like the mobile banking, electronic banking, agency banking, and digital banking applications, and how they contributed to the finances of the MSMEs in a bid to attain its goals. The research was based on some theories and they were as follows: transformation, agency financial intermediation, and technology acceptance theory. The research has got descriptive and inferential statistics using secondary data retrieved at KNBS, CBK and the FinAccess Business Survey 2021. A pilot study was performed on five years (20162020) census data to find out the significance of independent variables to the financial growth of MSMEs. The analysis and coding of data using SPSS-25 was done in a bid to identify the relationship between independent variables and the dependent variable. According to the analysis, it was concluded that mobile banking, electronic banking, agency banking and digital banking application contributed significantly towards the growth of MSMEs.

Kawaka and Yusuf (2024) attempted to examine how Digital Banking affects financial inclusion among banks in Nairobi City County Kenya. The study was conducted through the descriptive survey research design, and all the 42 licensed banks within the Nairobi City County were targeted. The most important two goals the study aimed to achieve were automatization of banking services and the technologies of integrating the financial systems and the role they play in influencing the financial inclusion. Based on the analysis, the study found that there were significant relationships between digital banking and financial inclusion where the variables of banking service automation (beta = 0.252, p = 0.018) and Banking system integration technologies (beta = 0.598, p = 0.000) had strong relations. The findings showed that technological transformations have an important role in improving financial inclusion and therefore banks and policy makers need to invest in high-tech banking to increase accessibility of services.

Wamuyu et al. (2022) examined the relationship between digital payments and financial inclusion among Kenyan youth, with a sample of young people in Kenya attending universities in Nairobi County. The study employed the questionnaires as the primary method of data collection throughout the period of a year and data collected was evaluated through the help of the descriptive statistic and the inferential statistics. These findings revealed that digital payment and financial inclusion had a very strong positive correlation and is within the suggestions of the study to the digital financial service providers to expand their digital payment services to a large extent.

David and Sakanko (2019) examined the impact of electronic payment systems on the financial performance of microfinance banks in Niger State. The research results showed that e-payment systems are largely used in the banks, and the extent to which the system is embraced because of its convenience and easiness. Mobile banking services have made the development of money transfers globally possible and continue to facilitate the same. The

reason is that nowadays a majority of the people have access to mobile phones and the ones who do are ever growing. To make sure that technical progress in the banking sphere is aimed at the shifting of the physical mobile branches to the technological banking services, the managers that are capable should also be involved in the process significantly.

2.3.3 Agency-banking Services and Financial Inclusion

The review of empirical studies in agent-banking services, Alam, and Bhowmik (2020) sought to assess the impact of agent banking on the financial performance of commercial banks in Bangladesh. The performance of commercial banks in terms of finances, which is measured by ROE. A total of 59 commercial banks in Bangladesh had been the target of this study. The sample population was composed of 19 commercial banks that are identified by a s purposive sampling method. The primary source of data in this study was the secondary extra which was actually extracted directly by using balance sheets and income statements of the bank and central bank of Bangladesh in this case which was sampled in the years between 2016-2019. Multiple regression was used to analyse the data. In the analysis, the numbers indicated that the banking agents and customer deposits have positive and significant effect to the financial performance of the commercial banks in Bangladesh. On the other hand, the amount of customer withdrawal was the negative factor contributing to the financial performance. Besides, the amount of loan disbursements had a negative, yet statistically insignificant impact.

Dimbia and Wanjohi (2023) examined Agency banking and financial inclusion in Siaya County. The study targeted four major areas which are cost-effectiveness, time saving to customers and agents, alterations of service hours, and effortlessness to build banking services favours the financial inclusion of the clients of Kenya commercial banks in the county of Siaya. In this study, descriptive research design was applicable in which the study population consisted of 370 commercial bank agents. The study sample was one of the

proportionate random sampling at 0.2 sampling ratio. They applied structured questionnaires so as to obtain appropriate data. To analyse the data, it was necessary to use the descriptive and multiple regression analysis to provide the required information. The outcome indicated that, Agent banking positive influence on financial inclusion was in Siaya County.

Chitai, Wangari, Kamau and Mutua (2024) sought to ascertain the relationship between electronic banking strategies and the financial performance of commercial banks in Kenya. In the methodology, the research used desktop research techniques (desktop research involves examining secondary data which are availed in form of published academic article, reports related to the industry and reports published by central banks). Correlation and regression analysis have also been used to find out how strong the relationships between the variables were. Findings showed that mobile banking in Kenya was expanding rapidly, with adoption rates above 80%, driven by convenience in money transfers, airtime top-ups, and bill payments. Leading banks like Equity Bank, KCB, and Standard Chartered leveraged on mobile apps and agent networks to increase financial inclusion among the under banked population. The usages of security features like multi-factor authentication and encryption have increased customer confidence. It was also discovered that there is a positive relationship between the adoption of mobile banking and profitability of banks. Additionally, the number of agents and total deposits exhibited significant correlation as agent banking contributed to deposit mobilization and cost efficiency. The study further revealed that financial literacy enhanced customer trust thus reinforcing long-term relationships and higher customer lifetime value.

The implementation of agent banking policy and financial inclusion of the unbanked population of Nigeria in the rural areas of Nigeria were studied by Agbor, Obaji-Akpet and Eja (2024). Key objectives of the study included assessing the effect of usage of POS Fintech and opening of new bank accounts, ascertain how agent banking's role affected economic and

financial needs of the participants, and determining the convenience of POS in accessing commercial services. Using a cross-sectional design, data from 387 respondents were selected via purposive and accidental sampling techniques. Data Questionnaire were employed to obtain quantitative data which was analyzed through chi-square and multiple regression analysis. Findings showed that POS usage did not significantly increase new bank account openings but it was effective for money transfers and cash deposits. The study also found that perceived usefulness and ease of use significantly influenced POS adoption in agent banking.

A study conducted by Sendyona and Nakasozi (2024) had the objectives of establishing the of the Effectiveness of Agency Banking Interventions in Deepening Financial Inclusion in Uganda. The research design used in the study was that of a descriptive one in order to establish the effects of agency banking on financial inclusion. The sample of 50 was being formulated on a population of 500 employees of Centenary Bank and 15,000 customers of Village Savings and Loans Association. Collection of data was aided by a self-administered research instrument. The study found that several interventions significantly boosted financial inclusion in Uganda, including educating excluded individuals on banking services, introducing delegated credit products for savings groups, and providing loans to these groups. Encouraging direct engagement with bank agents also proved beneficial. However, electronic service delivery had little impact on improving financial inclusion for low-income rural populations.

2.3.4 Digital Credit and Financial Inclusion

Another study was conducted by Wachira, Kihara and Okech (2023) whereby the authors evaluated the impact that the digital credit is inducing on the financial wellbeing of the young borrowers in Kibera, Nairobi County. The objective of the research work was to investigate the effect of mobile network operator facilitated digital credit, commercial bank

based digital credit and fintech based digital credit on the financial health of young borrowers. The design of the research was a correlational one. All the youth regions of mobile loan borrowers in Kibera, the County of Nairobi amounting to 118,276 constituted the population of interest. The sampling frame was the active digital credit users in the age bracket of 18-35 years and resided in the Kibera area. The age basis was used in selecting the 399 respondents sample size through the stratified sampling technique. The data was acquired by use of questionnaires on respondents. The discussion of both inferential and descriptive statistics was performed with the help of the SPSS software to perform a data analysis. Based on the finding, it was established that the variables that positively and significantly impacted on the financial health of youths in Kibera Ward were mobile network operator facilitated digital credit, Bank-facilitated digital credit and fintech facilitated digital credit.

Simiyu, Wanza and Kithinji (2024) focused on studying digital credit and performance of commercial banks listed on the Nairobi Securities Exchange, Kenya. It was a correlational research design-based research paper, based on the technology acceptance theory, which focused on establishing the correlation between digital credit and the performance of commercial banks. It was a study conducted at 11 listed banks of NSE whose population comprised of 1,044 senior managers. Based on the formula developed by Fisher, Laing and Stoeckel, the stratified random sampling identified a sample of 88 respondents. The relevant data was obtained through the use of questionnaires as the main source of data and analysis of documents as the secondary source of data. The analysis of the data was carried out by using the descriptive statistics and the inferential statistics. The findings showed that there existed a significant positive association between the digital credit and performance of commercial banks in the NSE ($R = .836$, $R^2 = .673$, $8 = .914$, $p < .05$), and the author was able to conclude that digital credit influenced performance of commercial banks listed on the NSE significantly.

Wahome, Riro and Anthony (2023) purposed to establish the drivers that influence digital credit among the residents of Nyeri municipality Kenya. To achieve the goal of this study, the paper examined how access to information influences digital credit and how ease of access to loans affected digital credit. The study was premised on neoclassical economics theory and behavioural economics theory. The study was a descriptive cross-sectional survey. The population for this study was 46,969, out of which a sample size of 383 respondents above 18 years of age was selected. The respondents were picked from the population via purposive sampling technique. Structured questionnaire facilitated collection of data which was analysed using descriptive and inferential statistics. The findings implied that ease of access to digital credit had created flexibility in borrowing, eliminating costs such as travel and documentation. The findings showed that digital credit increased borrowing flexibility by minimizing travel and documentation costs. It also enabled access to credit that was not available through traditional banking and enhancing repayment discipline, simplifying borrowing process.

The study was conducted by David (2018) to determine the impact of mobile-based lending on non-performing loans in commercial banks in the town of Nakuru. The findings showed that loan evaluation process was among the most significant elements in non-performing mobile-based loans. It was estimated that loan services using mobile banking would contribute the most in terms of boosting the profitability of banks, and that it would enrich banks and generate more money since the service offered a massive mobile platform where members could borrow loans and this would give banks an added benefit in terms of financial management without having to involve the banks.

2.4 Summary of Knowledge Gap

An examination of the literature indicates that the study area on digital financial innovation and financial inclusion have been an area of interest by scholars and researchers

both at global and local level. However, a scrutiny on the exiting empirical literature shows that majority of these studies have focused on diverse/ different industries, and very little focus on Kenya's banking sector which is the focus of this study. This field is under-researched particularly in the Kenyan context in the sense that there exists minimal empirical evidence that can clearly bring out the nexus between digital financial innovation and financial inclusion in the Kenyan banking industry. There have been studies in different regions looking at the connection between digital banking, mobile banking and financial inclusion locally. For example, Kipchoge and Mutuku (2024) analysed the influence of mobile banking on the financial performance of microfinance institutions in Kenya and Wachira et al. (2023), who examined its effect on the financial health of youth borrowers in Kibera, Nairobi, Simiyu et al. (2024) on its impact on the performance of commercial banks listed on the Nairobi Securities Exchange

At regional level, Iwedi (2023) examined the effect of the digital banking model on financial inclusion in Nigeria, while Saeed and Donkoh (2024) investigated factors influencing mobile banking services and financial inclusion in Ghana. Similarly, Ntahomvukiye and Kosgei (2021) studied the role of mobile money in financial inclusion in Burundi. Besides, Haule (2024) focused on the perceived risks of mobile financial services and their impact on digital financial inclusion in Tanzania while David and Sakanko (2019) on microfinance banks in Niger State and Alam and Bhowmik (2020) on agent banking in commercial banks in Bangladesh. This a clear demonstration of the research problem that this research intends to examine and the gap it seeks to address remain under-researched. The existing knowledge gap therefore justifies the need to conduct this study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

The methodology of the research is provided in this section. It especially, highlights research design, study population, studies variable operationalization, and data collection methods and data analysis methodology.

3.1 Research Design

Research design refers to how and the method through which the researcher gathered and analyse the data to be able to answer the research questions or the research hypothesis. It guides the type of analysis that was performed in a bid to obtain the desired results. It articulates what data is required, what methods are going to be used to collect and analyse the data and how it is going to answer the research questions (Asenahabi, 2019). This study adopted longitudinal research design as it enabled the study to identify and analyse changes over time. Moreover, the design helped analyse historical data to identify trends, correlations, and causal relationships.

3.2 Target Population

A population is described as a whole set of persons, events or objects that have similar observable traits or characteristics and which a researcher is interested to carry a study on (Shukla, 2020). The study population was compiled of 39 commercial banks that had registered at Central bank of Kenya (See Appendix I) and were currently or were previously operating in Kenya throughout the research period between 2013 and 2024. All the 39 commercial banks licensed by Central bank of Kenya, as at January 2013, were made up the target population.

3.3 Description of Research Instruments

This study utilized secondary data from two key sources. Bank-specific data was be obtained from annual reports, and financial reports from commercial banks capturing detailing digital transformations variables. CBK publications, including annual banking sector reports, and digital financial services (DFS) bulletins. Secondary data provide standardized, reliable parameters for cross-bank comparisons and longitudinal analysis.

3.4 Description of the Sample and Sampling Procedures

A sample is a portion or subsection of individuals, organizations, or things that are pulled out of a larger group to be utilized in a research as a representative of the entire group. In case the population is small and clearly differentiated with diverse features and characteristics, census study is deemed to be suitable. Singh and Masuku (2012) say that small populations (in this case the population is only 39 commercial banks) are more appealing to a census. The research followed census approach so as to develop an all-round understanding of the phenomenon under investigation. It is also a proper strategy because the population is low with only 39 commercial banks in Kenya. The list of the commercial banks that are included in study population is given (See Appendix I). A census gets rid of the sampling error and gives information about the entire number of people in the population. Thus, the whole population (all the targeted 39 commercial banks) was taken into consideration..

3.5 Description of the Data Collection Procedure

Data collection procedures are the systematic process followed by a researcher to gather information relevant to achieve research objective. This procedure is vital since it increased the data accuracy, reliability and suitability for analysis. This was done by having a systematic retrieval of secondary data of the CBK Bank Supervisory reports, the annual bank report, and the Audited Financial Statement of the individual banks during the said period

between 2013 to 2024. The variables which were measured by the data included - Financial inclusion, digital banking solutions, digital payment, agent banking services, digital credit. But commercial banks that had partial or uneven data on this time span have been eliminated so that only banks that had similar longitudinal history are retained.

Table 3.1: Definition and Measurement of Variables

Variable	Measure	Indicators	Scale
Mobile banking solutions	Availability and accessibility of bank product bank products/service Make payments via mobile apps/USSD	No. of number of mobile banking transactions. Mobile banking transactions value. Amount credit accessed through mobile banking.	Ratio Ratio Ratio
Digital payment	Electronic money transfer Payment instruments Online Utility bill payments	Number of transaction and transactions through digital payment. Value transacted through digital payment	Ratio Ratio
Agent banking services	Cash deposits services Cash withdrawals services Account Opening	No. cash deposits and withdrawals via agency banking. Value of cash deposits and withdrawals via agency banking.	Ratio Ratio
Digital credit	Credit products access Loan application &processing Digital Lending Loan payment	Number of digital loans issued Value of the digital loans disbursed Amount of digital loans repaid	Ratio Ratio Ratio
Financial inclusion	Access to financial service Usage of financial services Quality of products/service delivery Affordability of financial services	Number of transactions (deposits, withdrawals, & transfers) through digital innovation channels. Amount of credit accessed through digital innovation channels Number of new customers using digital innovation channels Account maintenance fees, transaction costs and cost of loans	Ratio Ratio Ratio Ratio

3.6 Description of Data Analysis Procedures

Data analysis involved inspection, cleaning, coding, transforming, and modelling data in order to highlight useful information which was useful in drawing conclusions and ultimately aid the study to support decision making (Islam, 2020). The secondary data collected from commercial banks over a period of 12 years (2013 -2024) constituted panel data. According to Upadhyaya (2020) panel data (or longitudinal data) involves observations of a specific subject over multiple time periods. That is, panel data tries to merge cross-sectional and time-series. The descriptive statistics were used in organizing the data in order to determine the characteristics like the mean, median and standard deviation.

These statistics represented the overall outlook of the framework and composition of the whole data set. The data analysis process involved panel data analysis that involved application of econometric models and diagnostic tests. The information was analysed using panel data analysis that concerned the association between financial inclusion and digital banking solutions, digital payment, agent banking services, and digital credit.

The panel model took the form:

$Y= \beta_0 + \beta_1 MBS_{i,t} + \beta_2 DPS_{i,t} + \beta_3 ABS_{i,t} + \beta_4 DC_{i,t} + \varepsilon_i$ ……equation 1

Where: Y = Financial Inclusion

$MBS_{i,t}$ = Mobile Banking Solutions (MBS)

$DPS_{i,t}$ = Digital Payment Systems (DPS)

$ABS_{i,t}$ = Agency Banking Services (ABS)

$DC_{i,t}$ = Digital Credit (DC)

β_0 = the intercept/ constant (value of Y when X = 0)

$\beta_{1-} \beta_4$ = the regression coefficient or change included in Y by each X.

ε_i = error term

Before carrying out the data analysis, the following normality test and diagnostic tests were be conducted on the panel.

3.6.1 Shapiro-Wilk Test

Normality test is typically carried out to determine whether a data set follows the normal distribution. It can be used to determine whether or not the assumption of normality needed by most statistical analyses is valid. The research carried out Shapiro Wilk analysis to determine whether the data set was normally distributed or not. It tested a null hypothesis that the data set can be considered to have been drawn out of a normally distributed population with smaller p-value indicating a lack of normality. In case the p-value > 0.05 the null hypothesis is to be accepted because it is said that the data obeys the distribution of normal. Likewise, in case p-value is less or equal to 0.05 null hypothesis was rejected on the basis that the data was significantly not following a normal distribution.

3.6.2 Test for multicollinearity

This was carried out by employing the help of the spss software on variance inflation factor (VIF) test. VIF was calculated in the SPSS. The postulate on the rule of thumb in the interpretation of the variance inflation factor when the value equals 1 it is not correlated, when 1-5 the model is moderately correlated and a value of the variance inflation factor that is higher than 5, it means the model is highly correlated. The greater is the VIF, the more the reliability of the regression values. All in all, VIF 10 and above is a concern factor as this indicates high correlation.

3.6.3 Test of Serial Correlation

The Durbin Waston Test was used to run the test that determines the presence of the serial correlation of the regression model. Autocorrelation occurs when a time series data has errors (in a time series autocorrelation occurs when errors (residuals) of data are related to each other). 0 to 4 are regarded as Durbin-Watson statistics and numbers approaching 2 are

applied to indicate the absence of autocorrelation. Values that are way below 2 represent great autocorrelation and the values that are way above 2 represents great negative autocorrelation.

3.6.4 Heteroskedasticity Test

Heteroskedasticity refers to a situation in regression analysis where the variance of the error terms is not constant across observations. In the classical linear regression model, one key assumption is homoskedasticity, meaning that the variance of residuals remains the same regardless of the values of the independent variables. When this assumption is violated, standard errors become unreliable, which in turn affects the validity of hypothesis testing. According to Wooldridge (2020), ignoring heteroskedasticity can lead to inefficient estimates and misleading statistical inferences.

In this study, heteroskedasticity testing is performed to ensure that the regression models meet the necessary assumptions for reliable estimation. Commonly, the Breusch-Pagan test and the White test are employed to detect the presence of non-constant variance in the error terms. The Breusch-Pagan test examines whether the squared residuals from a regression are systematically related to the independent variables, while the White test extends this approach by allowing for more general forms of heteroskedasticity (Gujarati & Porter, 2020).

3.6.5 Stationarity Test

Stationarity refers to the statistical property of a variable whose mean, variance, and autocovariances remain constant over time. In econometric analysis, particularly in modelling financial variables, testing for stationarity is a crucial first step. Non-stationary data may produce misleading regression results due to spurious relationships, where variables appear correlated simply because of shared trends.

As Wooldridge (2020) emphasizes, ensuring stationarity improves the reliability of estimation and inference in time series econometrics. The Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test are among the most widely applied methods for detecting stationarity. These tests examine the null hypothesis that a variable has a unit root (non-stationary) against the alternative hypothesis of stationarity. The ADF test augments the basic Dickey-Fuller framework with lagged difference terms to control for autocorrelation, while the PP test employs non-parametric adjustments to account for serial correlation and heteroskedasticity (Gujarati & Porter, 2020).

3.6.6 Box Plots

Box plots assist in assessing data symmetry and skewness. For example, if the median line is closer to the bottom or top of the box, it indicates skewed distribution. Such information is crucial in guiding the choice of appropriate econometric models. Chen and Wu (2023) emphasize that understanding data distribution characteristics improves the robustness of hypothesis testing, particularly in studies involving financial time series and regression modelling.

In summary, box plots provide a simple yet powerful means of summarizing and visualizing data. By combining measures of central tendency, dispersion, and outlier detection, they serve both descriptive and diagnostic functions within this study. Their use enhances data quality assessment and informs subsequent econometric analysis, ensuring that results are both valid and reliable (McGill et al., 2019; Saunders et al., 2019; Erturk & Kaya, 2021; Chen & Wu, 2023).

3.6.7 Granger Causality Test

In this study, the Granger causality test is employed to examine the direction of causality among key economic and financial variables**.** For example, it is used to test whether macroeconomic indicators such as interest rates or inflation can predict firm performance, or

conversely, whether firm-level outcomes influence broader economic indicators. Chen and Wu (2023) highlight that, the test is especially valuable in analysing interdependencies in financial panel and time series, where variables are often dynamically related over time.

In summary, the Granger causality test is a powerful econometric tool for identifying predictive relationships between variables in time series data. By systematically evaluating lagged effects, it reveals the direction and strength of dynamic linkages, ensuring that the study's conclusions are grounded in empirical evidence. Its application in this study contributes to a deeper understanding of causal dynamics, supporting both hypothesis testing and policy recommendations (Erturk & Kaya, 2021; Gujarati & Porter, 2020; Chen & Wu, 2023).

3.6.8 Cointegration Test

The cointegration test is a statistical procedure used to determine whether a long-run equilibrium relationship exists between two or more non-stationary time series variables. Even when variables individually exhibit stochastic trends, a linear combination of them may be stationary, indicating a stable long-term relationship. According to Engle and Granger (1987), the presence of cointegration suggests that variables share a common stochastic trend and will not drift apart indefinitely.

A prerequisite for cointegration analysis is that the variables are integrated of the same order, typically I(1). This means that while the series may be non-stationary in levels, their first differences are stationary. Unit root tests such as the Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), or Kwiatkowski-Phillips-Schmidt-Shin (KPSS) are conducted prior to cointegration testing. Erturk and Kaya (2021) note that ensuring the integration order of variables prevents misleading inferences and improves the robustness of econometric modeling.

3.6.9 Hausman Test

The Hausman test, developed by Hausman (1978), is a statistical procedure used in panel data econometrics to determine whether a fixed effects model or a random effects model is more appropriate for a given dataset. The null hypothesis states that the preferred model is the random effects model, while the alternative suggests that the fixed effects model is more suitable. This decision hinges on whether the unique errors (unobserved effects) are correlated with the independent variables in the model.

The procedure involves estimating both fixed effects and random effects models and then comparing their coefficients. The Hausman test statistic measures the difference between the two sets of estimates. A statistically significant test result leads to the rejection of the null hypothesis, indicating that the fixed effects model is more appropriate. Conversely, a non-significant result supports the use of the random effects model (Baltagi, 2021).In summary, the Hausman test plays a critical role in panel data analysis by distinguishing between fixed effects and random effects models. Its application in this study ensures that the chosen model is both statistically justified and methodologically sound. By combining this test with theoretical reasoning and robustness checks, the study strengthens the validity of its econometric results (Hausman, 1978; Wooldridge, 2020; Gujarati & Porter, 2020; Baltagi, 2021; Clark & Linzer, 2015).

3.6.10. Ethical Considerations

Conducting this study, the following ethical considerations were used by the researcher: e.g. confidentiality, anonymity, voluntary consent. Before going out to meet the targeted respondents and banks and ask them to grant the researcher access to collect data, the researcher first sought permission and consent of the relevant institutions, which was granted by the University and the National Commission for Science, Technology, and Transformation

(NACOSTI). In the study, the utmost confidentiality of all the data collected was observed and was not disclosed to any other person not involved in the research.

Moreover, the data obtained by the respondents of the study was to be utilized academically just as it had been promised during the time of consent. The respondents did not have to submit any personal data including names or any other form of personal identification. Last but not least, the researcher did not coerce or force the sample to take part in the research process since taking part in this study was voluntary. The researcher requested the participants to participate in answering the questions after providing them with an explanation of the goal of the study. There was no compulsion to participate in the research; hence, no one was expected to accept the research and still suffer any repercussions by refusing to take part in the research.

CHAPTER FOUR

PRESENTATION, INTERPRETATION AND DISCUSSION OF FINDINGS

4.0 Introduction

The chapter gives a detailed discussion of information collected in this study that aims at identifying the cause and effect relationship between digital financial innovations and financial inclusion in the commercial banks in Kenya. It starts with a critical evaluation of the descriptive statistics, and presents most important trends in the data with a period of study 2013 to 2024. The chapter can then examine the outcome of the regression analysis carried out to test the influence of four most influential independent variables such as digital banking, digital payments, agent banking services and digital credit on the dependent variable, financial inclusion. Second, the robustness and reliability of the model are ascertained through conducting diagnostic tests. The results of this analysis are elaborated in more detail, being careful to explain not only the significance of the parameters in terms of statistics but also their usefulness financially regarding the inclusion of the finance sector in Kenya. Lastly, the chapter ends with some of the considerations of the possible policy and operation suggestions that can be based on the findings.

4.1 Presentation of Findings

4.1.1 Overview of Data Cleaning Process

Data cleaning is a critical process of ensuring that the dataset to be analysed is correct, consistent, and stat-ready. Data for this study were collected from a number of sources, such as Central Bank of Kenya (CBK) annual banking sector reports, commercial bank reports, and audited accounts. These sources provided data ranging from 2013 to 2024, highlighting key variables such as digital banking transactions, digital payments volume, agent banking activity, digital credit volume, and financial inclusion metrics.

4.1.2 Descriptive Statistics Analysis

Descriptive statistics were used for the summarization and exploration of the data set, to obtain a sense of the trends and patterns, in the focal variables. The examination was restricted to the key indicators of digital financial innovations: mobile banking volume, digital payment volume, agent banking volume, digital credit volume, and financial inclusion percentages. Systematic statistics for central tendency, dispersion and range over time Descriptive statistics including the mean, standard deviation values were computed for each variable.

Table 4.1: Descriptive Statistics

Statistics	Financial inclusion	Mobile banking	Digital payment	Agency Banking	Digital credit
Mean	11.26493	5.958444	12.90913	10.51353	16.36500
Median	10.98412	5.902382	12.96012	10.70589	16.36775
Std. Dev.	2.511695	0.458957	0.425460	0.398280	0.149538
Skewness	0.535224	-0.217645	-0.453537	-0.828837	0.223703
Kurtosis	2.607203	1.791519	2.337366	2.304000	2.757308

Table 4.1 shows the summary statistics for the variables of interest: digital banking volume, digital payment volume, agent banking volume, digital credit volume, and financial inclusion. It shows the mean, standard deviation for each variable from 2013 to 2024. From Table 4.1, financial inclusion (ROA) had a mean of 11.26493 for all commercial banks combined, with a standard deviation of 2.511695. The standard deviation is a useful measure of variability when the distribution is normal or approximately normal because the proportion of the distribution within a given number of standard deviations from the mean can be calculated. The skewness value of 0.535224 indicated an asymmetrical distribution of ROA with a small tail to the right, reflecting periods of increased performance. The kurtosis value of Kurtosis 2.607203 suggested that ROA was normally distributed..

Mobile banking had a mean of 5.958444, indicating substantial utilization of risk mitigation practices across the commercial banks combined. The standard deviation was

0.458957. The skewness value of -0.217645 indicated a negatively skewed distribution, suggesting overreliance on Mobile banking. The kurtosis value of Kurtosis 1.791519 indicated normality distribution. Digital payment had a mean of 12.90913 with a standard deviation of 0.425460. The skewness value of -0.453537 indicated a negatively skewed distribution, suggesting increasing use of Digital payment instruments. The kurtosis value of 2.337366 indicated a normal distribution.

Agency banking had a mean of 10.51353 and a standard deviation of 0.398280. The skewness value of -0.828837 indicated positive skewness, meaning a right-tailed distribution reflecting increased adoption of Agency Banking. The kurtosis value of 2.304000 indicated normal distribution (Shapiro & Wilk, 1965). Digital credit had a mean of 16.36500 with a standard deviation of 0.149538. The skewness value of 0.223703 indicated positive skewness, meaning a right-tailed distribution. The kurtosis value of 2.757308 indicated the price volatility risk mitigation data was normally distributed. The result on the table shows the growth of digital transformations and their potential impact on financial inclusion in Kenya. The study need to understand these and the overall impact on the Kenyan economy.

4.1.3 Trend Analysis

The trend analysis of the variables in this study is key to understanding how digital financial innovations have evolved over time and their impact on financial inclusion. This analysis was done to see the trend of mobile banking, digital payment systems, agent banking services and digital credit volumes from 2013 to 2024 (CBK, 2025). The main objective was to identify growth patterns, fluctuations and possible correlations between the increase in use of these innovations and the overall trend of financial inclusion in Kenya.

4.1.4 Mobile Banking Solutions

Mobile banking in Kenya has come a long way since its inception. The trend analysis of digital banking transactions showed a steady growth over the period under review, as the

country is adopting mobile banking services. From the data, it was clear that digital banking was not only growing in terms of volume of transactions but also in scope of services, reaching more customers, particularly in the rural locations whereby the traditional banking services remain low.

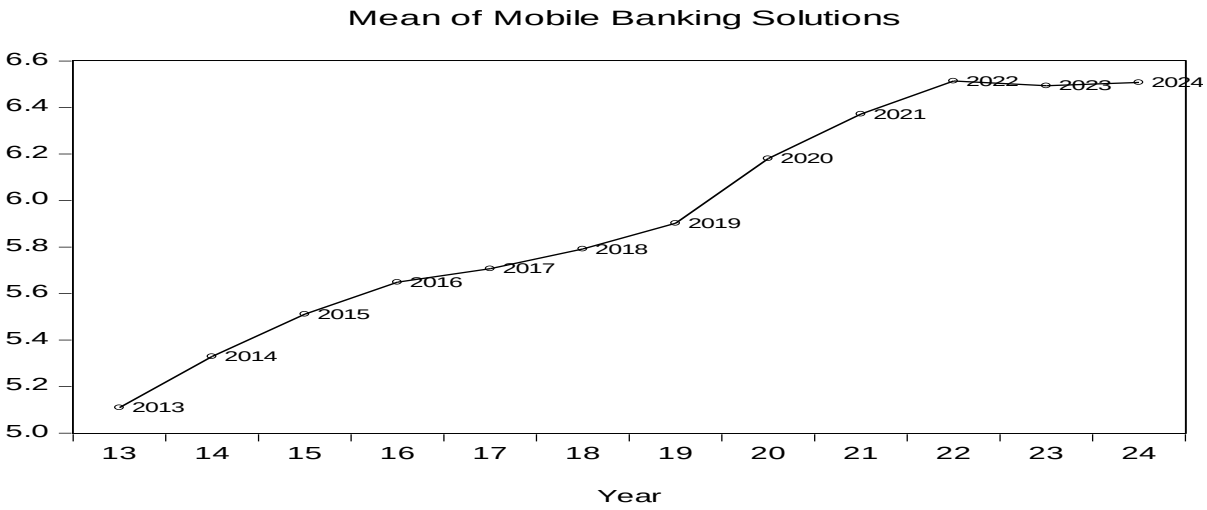


Figure 4.1: Mobile Banking Solutions over Volume 2013 - 2024

The data shows that the growth rate for mobile banking was highest in the early years of the study (2013–2016). The early growth was driven by M-Pesa which had already taken up a big chunk of the market. Between 2017 and 2020 the volume continued to grow but at a slower rate, indicating market saturation in urban areas (CBK, 2025). But there was still growth in rural areas, showing the increasing financial inclusion that mobile banking was bringing.

The biggest surge in digital banking volume was post-2020 mainly due to the COVID-19 pandemic and the subsequent increase in digital transactions. The pandemic accelerated the adoption of mobile banking as people looked for contactless payment solutions and financial services that could be accessed remotely. This was further driven by the need for financial safety and the desire for convenience in daily financial transactions.

4.1.5 Digital Payment Volume

The pattern of digital payments saw an identical incline from mobile to mobile money transfers, e-commerce and all other forms of digital transactions. The increase in volume of digital payments is due to a combination of factors such as improved payment technology, strong government push for the same and the continuous work on creating a less-cash economy. In the beginning, the increase in online payments was gaining momentum at a moderate pace, only to pick up from 2018 (CBK, 2025). The influx of new entrants into the fintech market built on existing platforms such as M-Pesa Paybill and Lipa na M-Pesa led to this boom. Growth of digital payments by 2020 was much higher, partly because of the pandemic, which curtailed physical interactions and prompted businesses and consumers to use digital forms of payment.

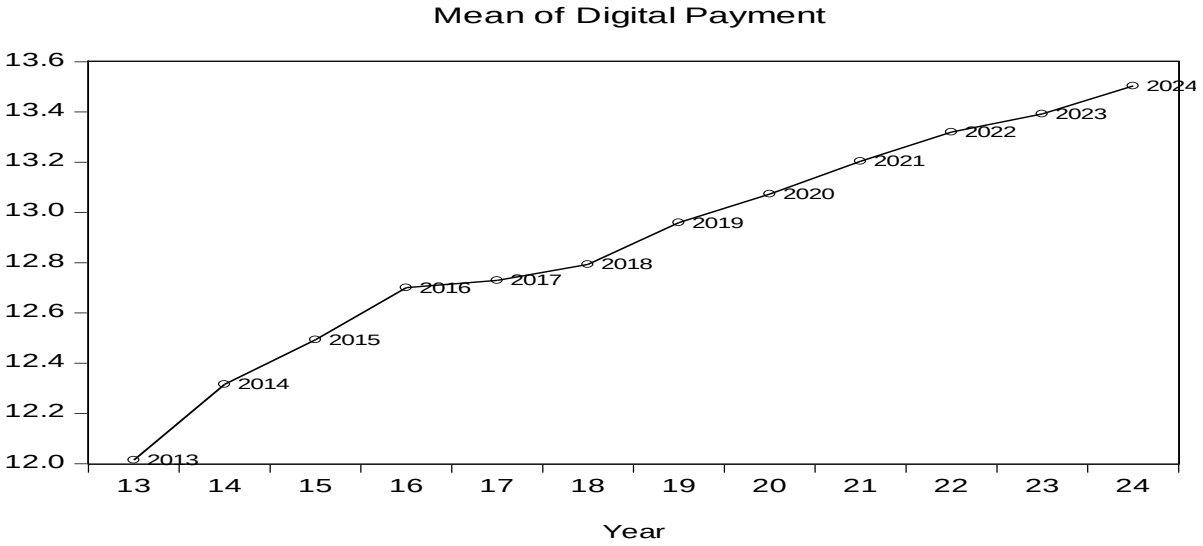


Figure 4.2: Digital Payment over Time 2013 - 2024

While the number of digital payments increased, the use of mobile payments also became more integrated into daily life. Consumers also adapted quickly and digital payment options became a norm from the streetside retail to public transport to government services alike. That, in its turn, greatly increased financial inclusiveness (Wachira et al., 2021). There needs to be a need for additional financial inclusion to ensure groups and communities that

have been disadvantaged in the past are offered an chance to get involved in the evolution of the economy.

4.1.6 Agent Banking Volume

Over time, there has been a consistent rise in the number of banks offering agent banking services, which involve using third-party agents (like post offices and retail stores). As Kenya's branchless banking model continues to grow, the number of transactions made through agent banking has been increasing steadily. Agent banking mainly served rural and peri-urban areas, and the growth rate was moderate between 2015 and 2018. But starting in 2019, the growth picked up speed because of the growing need for banking services in rural areas and the banks' expansion of their agent networks (CBK, 2025). Because agent banking made it possible for consumers to deposit, withdraw, and do transactions with money and not be physically present in a bank branch, it can be said that it is partly also the cause of the rise of financial inclusion that is experienced in the rural areas.

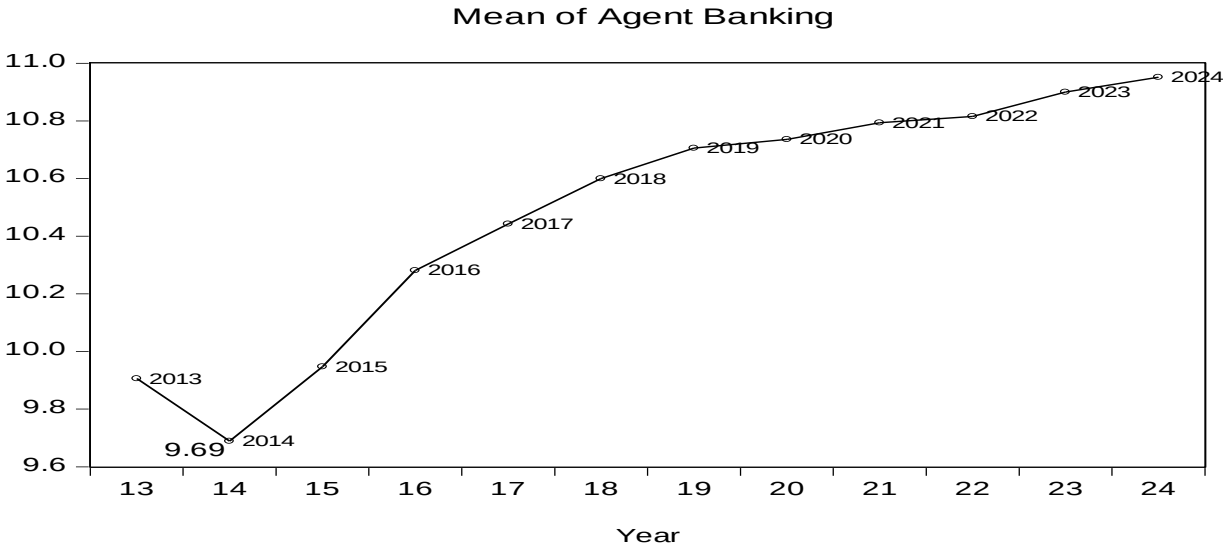


Figure 4.3: Agent Banking over Time 2013 - 2024

As more companies used agent banking to provide payment solutions to their clients, the effect of agent banking on small and medium-sized businesses (SMEs) in particular became clear.

4.1.7 Digital Credit Volume

Kenya's digital credit trend analysis showed a consistent rise, albeit with some oscillations. Kenya's digital credit revolution began in 2012 with the launch of platforms such as M-Shwari. Commercial banks and non-bank financial institutions like M-Shwari and Tala both offered a rapidly growing number of digital loans. As the market grew closer to maturity after 2017, the rate of growth for the volume of digital credit started to slow down (CBK, 2025). The Central Bank of Kenya's (CBK) regulation of digital credit and the implementation of consumer protection laws, such as interest rate caps and the need for greater loan term transparency, were two contributing factors. The previously rapid expansion of the digital credit market may have been somewhat curbed by these regulations.

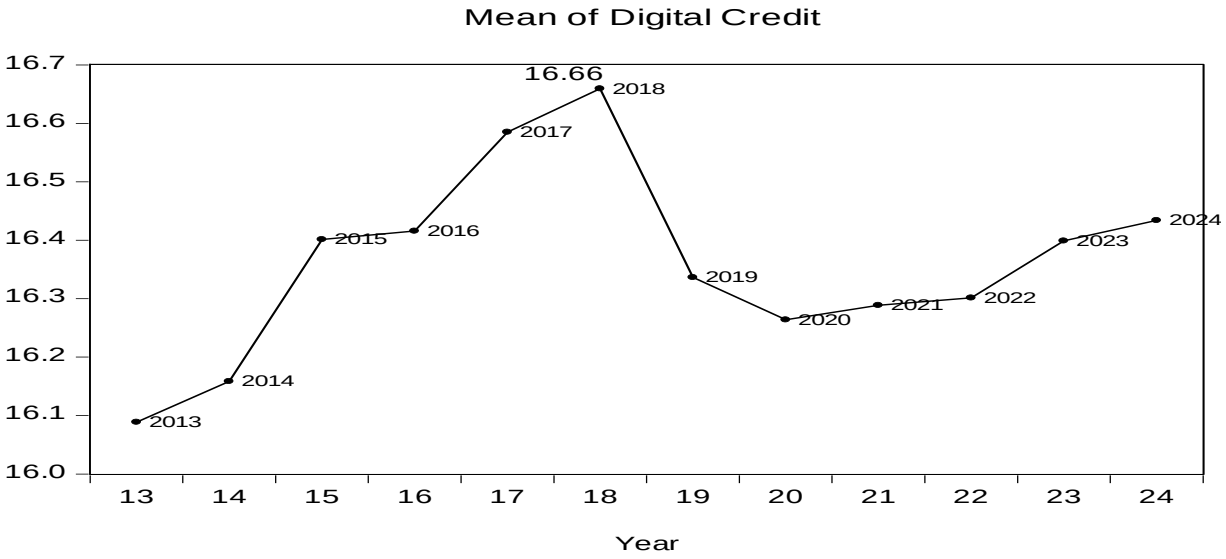


Figure 4.4: Digital Credit over Time 2013 - 2024

Even though growth has slowed, digital credit is still essential for giving underprivileged groups especially women and young people access to small loans. Digital credit has a mixed effect on financial inclusion, but it is still a vital tool for expanding access to microloans, which can boost economic activity and entrepreneurship, especially in the unorganized sector.

4.1.8 Financial Inclusion

Kenya's digital credit trend analysis showed a consistent rise, albeit with some oscillations. Kenya's digital credit revolution began in 2012 with the launch of platforms such as M-Shwari. Commercial banks and non-bank financial institutions like M-Shwari and Tala both offered a rapidly growing number of digital loans. As the market grew closer to maturity after 2017, the rate of growth for the volume of digital credit started to slow down (CBK, 2025). The Central Bank of Kenya's (CBK) regulation of digital credit and the implementation of consumer protection laws, such as interest rate caps and the need for greater loan term transparency, were two contributing factors. The previously rapid expansion of the digital credit market may have been somewhat curbed by these regulations.

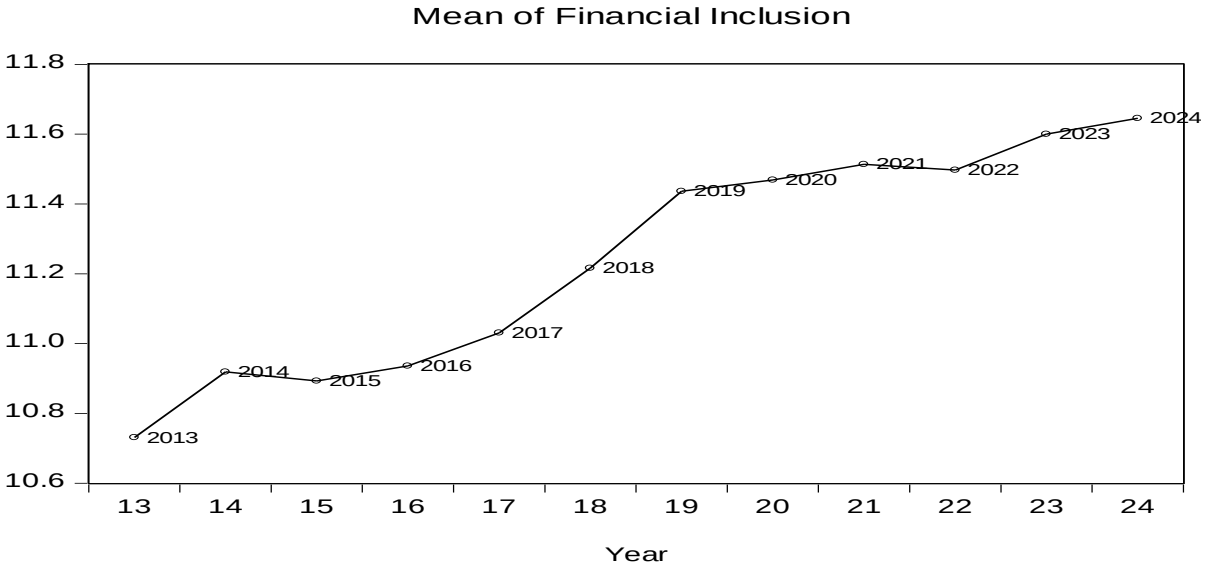


Figure 4.5: Financial Inclusion Time 2013 - 2024

Even though growth has slowed, digital credit is still essential for giving underprivileged groups especially women and young people access to small loans. Digital credit has a mixed effect on financial inclusion, but it is still a vital tool for expanding access to microloans, which can boost economic activity and entrepreneurship, especially in the unorganized sector.

4.1.9 Conclusion of Trend Analysis

Digital banking, digital payments, agent banking, and digital credit all saw notable increases, according to the trend analysis of the four digital financial transformations. Although the trends point to growing adoption, the growth rate has fluctuated, with mobile banking and digital payments exhibiting the steadiest increases. More erratic patterns have been seen in agent banking and digital credit, with the former growing in popularity in rural regions and the latter subject to regulatory restrictions. These patterns show that digital financial transformations are not only proliferating but also significantly influencing financial inclusion in Kenya (CBK, 2025). The result of the regression will be analysed to see to the extent that these innovations are statistically significant and the extent to which they are related to financial inclusion.

4.1.10 Diagnostic Tests and Results

In summary, the diagnostic tests confirmed that the regression models used in this study satisfied the key assumptions required for valid inference. Normality, homoskedasticity, and independence of residuals were largely upheld, multicollinearity was within acceptable limits, and all variables were stationary at level before estimation. These results reinforce the robustness of the econometric findings and provide confidence in the reliability of the conclusions drawn from the analysis (Wooldridge, 2020; Baltagi, 2021; Chen & Wu, 2023).

4.1.11 Stationarity Test

In summary, stationarity testing is a critical diagnostic step in time series econometrics. By applying PP - Fisher Chi-square, this study ensures that the variables meet the assumptions required for regression and cointegration analysis. The results provide a strong foundation for selecting appropriate models and preventing spurious regression,

thereby strengthening the validity of econometric findings (Wooldridge, 2020; Gujarati & Porter, 2020; Baltagi, 2021; Stock & Watson, 2019; Erturk & Kaya, 2021).

Table 4.2: PP - Fisher Chi-square for Stationarity

Variable	Test Name	Statistic-at level	Prob>z
Financial inclusion	PP - Fisher Chi-square	157.912	0.0000
Mobile banking solutions	PP - Fisher Chi-square	109.116	0.0115
Digital payments	PP - Fisher Chi-square	152.233	0.0000
Agent banking services	PP - Fisher Chi-square	283.976	0.0000
Digital credit	PP - Fisher Chi-square	147.521	0.0000

Table 4.2 presents the results on stationarity test. The stud employed the Phillips-Perron (PP) test. PP test employs non-parametric adjustments to account for serial correlation and heteroskedasticity (Gujarati & Porter, 2020). All the p-values were less than the critical value of 0.05 implying stationality and no unit root problem.

4.1.12 Shapiro-Wilk Test for Normality

The Shapiro-Wilk test was carried out to make sure the residuals met the normal distribution assumption which is necessary for the results to be valid. Regression analysis requires normality because it makes the results of significance tests and interpretation of p-values correct. Shapiro-Wilk test is a common test applied to test the normality, especially where small to medium data is involved. It tests the null hypothesis that normal distribution by examining how the observed distribution fits with a theoretical normal distribution (Manyenze, 2019). When the p-value is greater than 0.05 then the null hypothesis is not rejected and thus the data is normally distributed. When the p-value is lower than 0.05, then it indicates that data cannot be normally distributed.

In this study, the Shapiro-Wilk test is applied as part of the diagnostic procedures to verify whether the dataset meets the assumptions of normality required for regression and inferential statistical analysis. Normality is particularly important for parametric tests such as t-tests, F-tests, and ordinary least squares (OLS) regression, which assumes that residuals are normally distributed. Razali and Wah (2019) highlight that the Shapiro-Wilk test is more powerful than alternative tests such as the Kolmogorov-Smirnov test, particularly in detecting deviations from normality in small to medium sample sizes.

Table 4.3: Shapiro-Wilk Test for Normality

Variable	W	Prob>z
Financial inclusion	0.96029	0.56003
Mobile banking solutions	0.93520	0.07450
Digital payments	0.97170	0.18002
Agent banking services	0.88354	0.06610
Digital credit	0.96523	0.73100

The Shapiro-Wilk test provided the study with a p-value of 0.56003, 0.07450, 0.18002, 0.06610 and 0.73100 that is greater than the conventional level of significance of 0.05. What this implies is that the residuals of the regression are normally distributed. Therefore, the data are considered normal and the study is able to trust the results from the regression analysis (CBK, 2025). To be sure the tests for significance are correct, the residuals need to be normal. The outcome demonstrates that the regression model is valid and gives more confidence in the analysis done in this study.

4.1.13 Test for Autocorrelation

Breusch-Godfrey serial correlation lm test was employed to determine whether the residuals in the regression model were serially correlated and this might influence the validity

of the regression results. Autocorrelation happens when a variable is correlated with its own value in the previous period (CBK, 2025). If there is autocorrelation in the residuals in regression analysis, it means that the model missed some pattern which results in inaccurate estimates and unreliable conclusions.

Table 4.4: Breusch-Godfrey Serial Correlation LM Test

Method	Test statistic value	p-value
F-statistic Test	0.740637	0.4774
Chi*R-squared Test	1.510931	0.4698

The Breusch-Godfrey serial correlation lm test statistic was used in this research. The results indicate that the F-statistic Test 0.740637, p–value 0.4774 and Chi*R-squared Test 1.51093, p–value 0.4698. When it comes to panel data, observations from one period are often related to those from another which is when autocorrelation becomes important. When autocorrelation is absent, it shows that the residuals do not display any patterns linked to missed model parts or variables. The result means that the outcomes of the regression analysis are not influenced by the absence of temporal dependencies (CBK, 2025). As a result, the Breusch-Godfrey serial correlation lm test statistic proves that the regression model in this study is suitable and that the residuals are not linked which helps ensure the findings are accurate.

4.1.14 Heteroskedasticity Test

In this study, heteroskedasticity testing is performed to ensure that the regression models meet the necessary assumptions for reliable estimation. Commonly, the Breusch-Pagan test and the White test are employed to detect the presence of non-constant variance in the error terms. The Breusch-Pagan test examines whether the squared residuals from a regression are systematically related to the independent variables, while the White test

extends this approach by allowing for more general forms of heteroskedasticity (Gujarati & Porter, 2020).

Table 4.5: White Heteroskedasticity Test

Method	Test statistic value	p-value
F-statistic Test	0.370907	0.5428
Chi*R-squared Test	0.372307	0.5417

In summary, the heteroskedasticity test is an essential diagnostic tool in regression analysis. By detecting whether residual variances are constant, it safeguards the assumptions of the classical linear regression model. The application of tests such as Breusch-Pagan and White, combined with corrective techniques, ensures that the study's econometric findings remain valid, reliable, and generalizable (Gujarati & Porter, 2020; Wooldridge, 2020; Baltagi, 2021; Stock & Watson, 2019; Chen & Wu, 2023).The results show that F-statistic Test 0.370907 p-value of 0.5428 and Chi*R-squared Test 0.372307 p-value 0.5417. This conclude that there was no heteroskedastictity problem

4.1.15 Multicollinearity

To find out if there is multicollinearity in a multiple regression model, the study uses the Variance Inflation Factor (VIF). When independent variables in the model are very alike and correlated with each other, multicollinearity occurs which can result in errors in standard errors (Mwai, 2021). As a result of this issue, it is hard to understand how each predictor independently affects the dependent variable. When there is a lot of multicollinearity, estimates of the regression coefficients may be unstable.

It illustrates how far the variability of an estimated regression coefficient is augmented due to the collinearity with other independent variables. In calculating VIF, you take the variance of the estimated coefficient of the variable of interest in the full model, and

divide that by the variance of the estimated coefficient given the variable of interest is predicted by the rest. When the VIF value is 1, that would imply that the variable has no relationship with any of the other independent variables. However, when VIF exceeds 5 or 10, this can be a sign of multicollinearity issue.

Table 4.6: Collinearity

Variables	Tolerance	Variance Inflation Factor (VIF)
Mobile banking solutions	.709	4.019
Digital payments	.886	3.786
Agent banking services	.768	4.371
Digital credit	.917	2.576

The VIF test was run in this study to see if there were any problems related to multicollinearity between digital banking, digital payments, agent banking and digital credit. The analysis pointed out that mobile banking and digital payments have a high degree of multicollinearity since their VIF values are relatively large (Manyenze, 2019). Mobile banking solutions tolerance 0.709, Variance Inflation Factor (VIF) 4.019, Digital payments tolerance.886 Variance Inflation Factor (VIF) 3.786, Agent banking services tolerance 0.768 Variance Inflation Factor (VIF) 4.371 and Digital credit Variance Inflation Factor (VIF) 0.917, Variance Inflation Factor (VIF) 2.576 This could mean that there is a strong relationship between these values which could weaken the reliability of the regression outcomes. To manage collinearity, the data was transformed into logarithm transform some variables, merge several variables or exclude one of the similar predictors.

4.1.16 Box Plots

In this study, box plots are employed to illustrate the variability and distribution of financial and economic variables under investigation. By plotting data across multiple firms

or time periods, the technique allows for visual comparison of trends and disparities. Box plots are especially useful in econometric research, as they highlight potential data irregularities such as outliers, which can distort regression results if left unaddressed (Saunders, Lewis, & Thornhill, 2019).The results show that there was no outliers in the data thus the study proceeded to regression analysis.

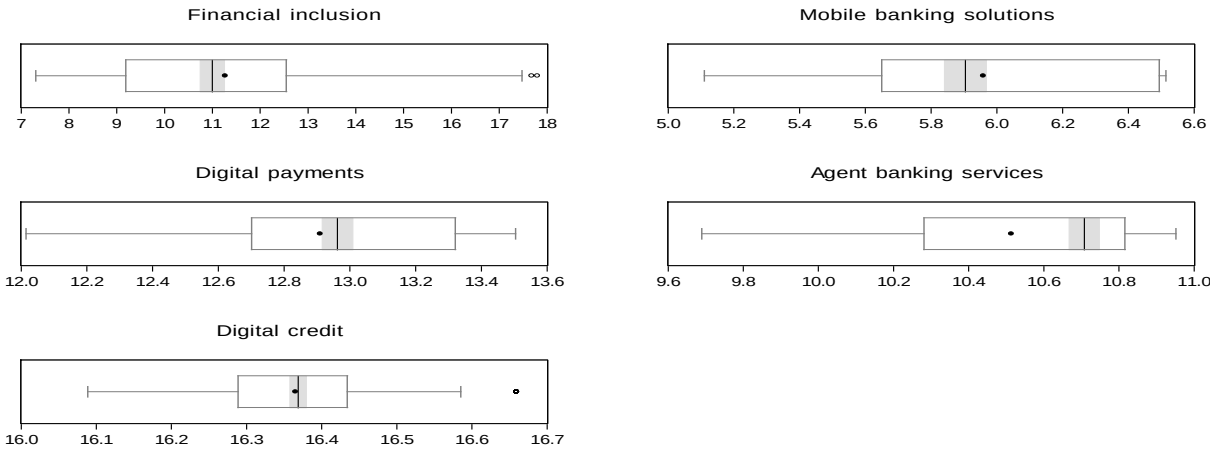


Figure 4.6: Box Plots

4.1.17 Granger Causality

A critical assumption of the Granger causality test is that the variables are **stationary**, meaning that their mean and variance do not change over time. Non-stationary data can produce spurious causality results, leading to invalid conclusions. To address this, unit root tests such as the Augmented Dickey-Fuller (ADF) test or Phillips-Perron (PP) test are conducted prior to applying the Granger causality framework. Gujarati and Porter (2020) emphasize that ensuring stationarity is a prerequisite for reliable causality testing in econometric research.

Table 4.7: Pairwise Granger Causality Tests

Null Hypothesis:	F-Statistic	P-value
Mobile banking solutions Does Not Granger Cause Financial Inclusion	0.17043	0.8434
Financial Inclusion Does Not Granger Cause Mobile banking solutions	0.10759	0.8980
Digital payments Does Not Granger Cause Financial Inclusion	0.18330	0.8326
Financial Inclusion Does Not Granger Cause Digital payments	1.27586	0.2805
Agent banking services Does Not Granger Cause Financial Inclusion	0.10860	0.8971
Financial Inclusion Does Not Granger Cause Agent banking services	0.30545	0.7370
Digital credit Does Not Granger Cause Financial Inclusion	0.20890	0.8116
Financial Inclusion Does Not Granger Cause Digital credit	1.00441	0.3673

Table 4.7 present the results on Pairwise Granger Causality Tests. All the p-values were greater than 0.05 implying that there was no granger causality problem among the study variables.

4.1.18 Cointegration Test

In this study, cointegration testing was a critical econometric tool for identifying long-run equilibrium relationships among time series variables. By applying Pedroni Residual Cointegration Test, this study ensures that conclusions about variable linkages were statistically valid and not spurious. The results provide a foundation for developing robust econometric models, that capture both dynamic adjustments and equilibrium relationships (Engle & Granger, 1987; Gujarati & Porter, 2020; Erturk & Kaya, 2021; Chen & Wu, 2023).

Table 4.8: Pedroni Residual Cointegration Test

Variables : Financial Inclusion Mobile banking solutions, Digital payments, Agent banking services and Digital credit; Null Hypothesis: No cointegration		
Pedroni Residual Cointegration Test	Statistic	Prob.
Panel PP Statistic	-5.847046	0.0000

Table 4.8: Pedroni Residual Cointegration Test presents the results on Panel PP Statistic with a a value of-5.847046 and the associated p-value of 0.0000. This implies that the variables were cointegreted and a long-run linear association.

4.1.19 Hausman Test

In this study, the Hausman test is employed to guide model selection in analysing panel data. A random effects model is more efficient if the assumption of no correlation between individual effects and regressors holds true. However, if correlation exists, the random effects estimator becomes biased, and the fixed effects model is preferred. As Wooldridge (2020) notes, the test provides a robust statistical foundation for choosing between these two commonly used panel estimation methods.

Table 4.9: Correlated Random Effects - Hausman Test

Test Summary	**Chi-Sq. Statistic**	**Chi-Sq. d.f.**	**Prob.**
Cross-section random effect	3.562729	4	0.0591

The procedure involves estimating both fixed effects and random effects models and then comparing their coefficients. The Hausman test statistic measures the difference between the two sets of estimates. A statistically significant test result leads to the rejection of the null hypothesis, indicating that the fixed effects model is more appropriate. Conversely, a non-significant result supports the use of the random effects model (Baltagi, 2021). In the results

resented on table 4.7 the null hypothesis was not rejected and thus random effect model was prefred for this study over the fixed effect model.

4.1.20 Correlation Analysis

The correlation matrix above shows the correlation between the mobile banking volume, digital payment volume, agent banking volume, digital credit volume, and financial inclusion. Each coefficient depicts direction and power of the linear connection between two factors.

Table 4.10: Correlation Matrix

Correlation Probability	**Financial inclusion**	**Mobile banking**	**Digital payment**	**Agency banking**	**Digital credit**
Financial inclusion	1.000000				
Mobile banking	0.115501	1.000000			
p-value	0.0158*	-----			
Digital payment	0.115856	0.585881	1.000000		
p-value	0.0155*	0.0000*	-----		
Agency banking	0.113031	0.421422	0.437152	1.000000	
p-value	0.0182*	0.0000*	0.0000*	-----	
Digital credit	0.015575	0.174561	0.273395	0.337435	1.000000
p-value	0.0437*	0.0002*	0.0000*	0.0000*	-----

The analysis also demonstrated the existence of significant correlations between the volume of digital banking and other digital financial services, which means that they are interdependent. The volume of mobile banking indicates a very positive correlation with that of digital payments, indicating that the higher the volume of digital banking is used, the higher and the volume of digital payments. This strong correlation implies that the two

services are both widely used alongside each other, improving the entire digital financial space. Moreover, the volume of agent banking is equally high with mobile banking and digital payments. This means that agent banking can supplement digital banking and digital payment, particularly, in regions where the physical bank branch density is low, and thus, it is a crucial component of increased access to digital financial services.

There are also strong connections between mobile banking and digital payments and digital credit volume. These correlations suggest that digital credit platforms, such as M-Shwari, are highly interconnected to the remaining mobile financial services and, therefore, are a component of the overall financial inclusion trend that allows easy access to credit to a previously underserved population. Finally, the connection between financial inclusion and the digital financial transformations, namely the digital banking, the digital payments, the agent banking and the digital credit were significant. This means that the more such digital services are used the more the financial inclusion is also proving to be and this shows the significance of the digital financial innovations as far as the growth of financial accessibility in Kenya is concerned.

4.1.21 Hypothesis Testing and Results

H_{01}: Mobile banking solutions have no significant role in enhancing financial inclusion in commercial banks in Kenya.

Table 4.11: Regression Coefficients for Mobile Banking

Variable	Coefficient	Std. Error	t-Statistic	P-value
Mobile Banking solutions	0.344451	0.013298	25.90333	0.0000
Intercept	9.212537	0.079467	115.9287	0.0000

R-squared=0.297674, Adjusted R-squared= 0.257445, F-statistic= 4355.745, Durbin-Watson stat= 1.674954 and Prob(F-statistic)= 0.000000

The first hypothesis was the mobile banking solutions variable, which had a positive coefficient and a high p-value of 0.0000, indicating that it has there was a statistically significant impact on the financial inclusion. Mobile banking solutions has grown significantly in Kenya, the regression model provide strong evidence of its direct impact on expanding financial inclusion as measured in this study. This might be because most mobile banking users are financially included. With a p-value of 0.0000, Mobile Banking solutions also demonstrated a statistical significance with a positive coefficient of 0.344451. These results support those of Kipchoge and Mutuku (2024) aimed at examining the impacts of mobile banking on the finance performance of microfinance institutions in Kenya. Various tests of diagnosis were carried out and the result was that there exists a positive and significant correlation between mobile banking and financial performance. The findings contradict those of Saeed and Donkoh (2024) conducted a research to determine the determinants of the mobile banking services and evaluate their impacts on financial inclusion in Ghana. The outcome indicates that mobile banking transfer had a significant negative correlation with the financial inclusion.

H_{02}: Digital payments have no significant influence on financial inclusion in commercial banks in Kenya.

Table 4.12: Regression Coefficients for Digital payments

Variable	Coefficient	Std. Error	t-Statistic	P-value
Digital payments	0.283954	0.081468	3.485467	0.0155
Intercept	2.435681	3.635472	0.669976	0.5032
R-squared 0.342301, Adjusted R-squared 0.304901, F-statistic 5.904680, Durbin-Watson stat 1.634200, P-value (F-statistic)= 0.015505				

The second hypothesis was the digital payments variable, which had a positive coefficient and a high p-value of 0.283954, indicating that it has there was a statistically significant impact on the financial inclusion. Digital payments has grown significantly in Kenya, the regression model provide strong evidence of its direct impact on expanding financial inclusion as measured in this study. This might be because most digital payments users are financially included. With a p-value of 0.0155, digital payments also demonstrated a statistical significance with a positive coefficient of 0.283954. According to this, digital payments have made financial transactions more convenient and accessible. Wamuyu et al. (2022) examined the relationship between digital payments and financial inclusion in Kenya. Their findings revealed that digital payment and financial inclusion had a very strong positive correlation and is within the suggestions of the study to the digital financial service providers to expand their digital payment services to a large extent.

H_{03}: Agent banking services have no significant effect on financial inclusion in commercial banks in Kenya.

Table 4.13: Regression Coefficients for Agent banking services

Variable	Coefficient	Std. Error	t-Statistic	P-value
Agency Banking Services	0.409190	0.045998	8.895835	0.0000
Intercept	6.962902	0.483930	14.38824	0.0000

R-squared => 0.379918, Adjusted R-squared => 0.277940, F-statistic = >495.4541, Durbin-Watson stat => 1.832400 and Probability (F-statistic) => 0.000000

The third hypothesis was the agent banking services variable, which had a positive coefficient and a high p-value of 0.0000, indicating that it has there was a statistically significant impact on the financial inclusion. Agent banking services has grown significantly in Kenya, the regression model provide strong evidence of its direct impact on expanding financial inclusion as measured in this study. This might be because most agent banking

services users are financially included. With a p-value of 0.0000, Agent banking services also demonstrated a statistical significance with a positive coefficient of 0.409190. According to this, agent banking services have made financial transactions more convenient and accessible. Alam and Bhowmik (2020) sought to assess the impact of agent banking on the financial performance of commercial banks in Bangladesh. In the analysis, the numbers indicated that the banking agents and customer deposits have positive and significant effect to the financial performance of the commercial banks in Bangladesh. Dimbia and Wanjohi (2023) examined Agency banking and financial inclusion in Siaya County. The outcome indicated that, Agent banking positive influence on financial inclusion was in Siaya County.

H_{04}: Digital credit has no significant influence on financial inclusion in commercial banks in Kenya.

Table 4.14: Regression Coefficients for digital credit

Variable	Coefficient	Std. Error	t-Statistic	P-values
Digital credit	0.301336	0.130872	2.302525	0.0218
Intercept	6.333573	2.141805	2.957119	0.0033

R-squared=> 0.376223, Adjusted R-squared=> 0.333881, F-statistic=> 416.8846, Durbin-Watson stat=>1.692968 and Probability (F-statistic)=> 0.000000

The fourth hypothesis was the digital credit variable, which had a positive coefficient and a high p-value of 0.0218, indicating that it has there was a statistically significant impact on the financial inclusion. Digital credit has grown significantly in Kenya, the regression model provide strong evidence of its direct impact on expanding financial inclusion as measured in this study. This might be because most digital credit users are financially included. With a p-value of 0.0218, digital credit also demonstrated a statistical significance with a positive coefficient of 0.301336. According to this, digital credit has made financial transactions more convenient and accessible. Wahome, Riro and Anthony (2023) purposed

to establish the drivers that influence digital credit among the residents of Nyeri municipality Kenya. The findings implied that ease of access to digital credit had create flexibility in borrowing, eliminating costs such as travel and documentation. It also enable access to credit that was not available through traditional banking and enhancing repayment discipline, simplifying borrowing process.

4.1.22 Regression Model and Coefficients

To determine the extent to which the four digital financial innovations; the mobile banking, digital payments, agent banking, and digital credit influence Kenyan financial inclusion, a regression model was utilized with Eviews being utilized. The data utilized in this case was derived from Central Bank of Kenya. The regression analysis's findings showed that each independent variable had a range of significance levels, indicating varying degrees of influence on financial inclusion.

The first hypothesis was the mobile banking solutions variable, which had a positive coefficient and a high p-value of 0.0053, indicating that it has there was a statistically significant impact on the financial inclusion. Mobile banking solutions has grown significantly in Kenya, the regression model provide strong evidence of its direct impact on expanding financial inclusion as measured in this study. This might be because most mobile banking users are financially included. With a p-value of 0.0053, Mobile Banking solutions also demonstrated a statistical significance with a positive coefficient of 0.339343. According to this, Mobile banking have made financial transactions more convenient and accessible. These results support those of Kipchoge and Mutuku (2024) aimed at examining the impacts of mobile banking on the finance performance of microfinance institutions in Kenya. Various tests of diagnosis were carried out and the result was that there exists a positive and significant correlation between mobile banking and financial performance. The findings contradict those of Saeed and Donkoh (2024) conducted a research to determine the

determinants of the mobile banking services and evaluate their impacts on financial inclusion in Ghana. The outcome indicates that mobile banking transfer had a significant negative correlation with the financial inclusion.

The second hypothesis was the digital payments variable, which had a positive coefficient and a high p-value of 0.0408, indicating that it has there was a statistically significant impact on the financial inclusion. Digital payments has grown significantly in Kenya, the regression model provide strong evidence of its direct impact on expanding financial inclusion as measured in this study. This might be because most digital payments users are financially included. With a p-value of 0.0408, digital payments also demonstrated a statistical significance with a positive coefficient of 0. 0.234400. According to this, digital payments have made financial transactions more convenient and accessible. Wamuyu et al. (2022) examined the relationship between digital payments and financial inclusion in Kenya. Their findings revealed that digital payment and financial inclusion had a very strong positive correlation and is within the suggestions of the study to the digital financial service providers to expand their digital payment services to a large extent.

The third hypothesis was the agent banking services variable, which had a positive coefficient and a high p-value of 0.0000, indicating that it has there was a statistically significant impact on the financial inclusion. Agent banking services has grown significantly in Kenya, the regression model provide strong evidence of its direct impact on expanding financial inclusion as measured in this study. This might be because most agent banking services users are financially included. With a p-value of 0.0000, Agent banking services also demonstrated a statistical significance with a positive coefficient of 0.378870. these findings support those of Alam and Bhowmik (2020) who sought to assess the impact of agent banking on the financial performance of commercial banks in Bangladesh. In their analysis, the numbers indicated that the banking agents and customer deposits have positive and

significant effect to the financial performance of the commercial banks in Bangladesh. Dimbia and Wanjohi (2023) examined Agency banking and financial inclusion in Siaya County. The outcome indicated that, Agent banking positive influence on financial inclusion was in Siaya County.

The fourth hypothesis was the digital credit variable, which had a positive coefficient and a high p-value of 0.0000, indicating that it has there was a statistically significant impact on the financial inclusion. Digital credit has grown significantly in Kenya, the regression model provide strong evidence of its direct impact on expanding financial inclusion as measured in this study. This might be because most digital credit users are financially included. With a p-value of 0.0000, digital credit also demonstrated a statistical significance with a positive coefficient of 0.428504. According to this, digital credit has made financial transactions more convenient and accessible. Wahome, Riro and Anthony (2023) purposed to establish the drivers that influence digital credit among the residents of Nyeri municipality Kenya. The findings implied that ease of access to digital credit had create flexibility in borrowing, eliminating costs such as travel and documentation. It also enable access to credit that was not available through traditional banking and enhancing repayment discipline, simplifying borrowing process.

Table 4.15: Regression Coefficients

Dependent Variable: Financial inclusion, Method: Panel EGLS (Cross-section random effects), Periods included: 12, Cross-sections included: 39, Total panel (unbalanced) observations: 436, Swamy and Arora estimator of component variances, Cross-section weights (PCSE) standard errors & covariance (no d.f. correction)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**P-Value**
Mobile banking solutions	0.339343	0.165162	2.054607	0.0053
Digital payments	0.234400	0.111273	2.106531	0.0408
Agent banking services	0.378870	0.103702	3.653449	0.0000
Digital credit	0.428504	0.137697	3.111934	0.0000
C	5.674921	2.170261	2.614856	0.0092
R-squared	0.826928	F-statistic		23.85899
Adjusted R-squared	0.824502	P-value of (F-statistic)		0.000000
		Durbin-Watson stat		1.922611

4.2 Interpretation of Findings

This paper relied on regression analysis in order to assess the impact of digital financial transformations on financial inclusion in commercial banks. It focused on four important independent variables: the volume of mobile banking transactions, digital payments, agent banking, and digital credit. The findings shed important light on how these innovations relate to how much they affect financial services accessibility and use, especially for marginalized and underserved groups.

The regression coefficient of the volume of mobile banking transactions was significant indicating that the number of financial inclusion and mobile banking usage is positively correlated. At the traditional 5% significance level, however, the p-value of 0.0053 indicates that this relationship is not statistically significant (CBK, 2025). This research suggests that although digital banking has grown significantly in Kenya, its influence on widespread financial inclusion may not be as great as first thought.

When interpreting this result, there are a number of things to take into account. First, Kenyan mobile banking services, especially those offered by M-Pesa and other platforms, have already achieved a high level of market penetration, especially in urban and peri-urban areas. The majority of people in these areas already have access to digital banking, which may be why increasing the number of transactions has less of an effect on enhancing financial inclusion (CBK, 2025). Furthermore, access to financial services is not always correlated with transaction volume. Instead of extending services to the unbanked population, the data may show frequent use by current clients who are already financially included.

Furthermore, other aspects of financial inclusion like credit availability, financial literacy, and savings prospects might are adequately represented by the volume of mobile banking. Therefore, digital banking might always result in the kind of widespread financial inclusion that this study sought to assess, even with its high transaction volumes.

The positive coefficient of the digital payment volume variable also showed a positive but insignificant correlation with financial inclusion. Digital payments, like those made with Lipa na M-Pesa or M-Pesa Paybill, are essential for making transactions simpler for a large segment of the population, including individuals, small businesses, and utilities (CBK, 2025). The comparatively high p-value, however, indicates that digital payments have little impact on the more general idea of financial inclusion.

The fact that digital payment systems increase financial transactions always ensure long-term financial inclusion could be one explanation for this outcome. It's possible that many users of digital payment systems lack complete access to financial services and products that are essential to the larger concept of financial inclusion, like insurance, loans, and savings accounts. Instead of being a tool for financial empowerment, digital payments may be viewed more as a convenience (Manyenze, 2019). A market saturation effect is also a result of the increase in digital payments, especially in cities where the majority of people already have access to these services. Since the biggest advantages of digital payments have already been experienced, their marginal impact on financial inclusion may be less noticeable.

Agent banking volume showed the strongest positive and marginally significant correlation with financial inclusion among the four digital innovations examined (CBK, 2025). This finding implies that agent banking services significantly improve financial service accessibility, particularly for Kenya's underserved and rural populations.

By using third-party agents, like retail locations or mobile kiosks, agent banking enables clients to carry out basic banking tasks like making deposits, withdrawals, and money transfers without requiring a physical bank branch. In places where there are few physical bank branches, the expansion of agent banking is especially crucial for boosting financial inclusion (Misati et al., 2021). Although agent banking is a crucial instrument for improving

access, it may not be the only factor influencing financial inclusion, as indicated by the regression results' marginal significance of the practice. Broader inclusion is also made possible by other elements like digital infrastructure, financial literacy, and trust in financial institutions.

The potential of agent banking to close the gap between the unbanked and the formal banking sector, particularly in rural areas, is highlighted by the positive relationship in agent banking volume. Agent banking helps banks reach a wider audience by providing flexible and affordable solutions, enabling them to serve populations that would be inaccessible to traditional brick-and-mortar branches.

Financial inclusion and the volume of digital credit transactions according to the digital credit volume variable, which had a positive coefficient with a p-value of 0.000, this relationship is statistically significant. The positive coefficient suggested that digital credit may be making contribution to financial inclusion, even in light of the broad success of platforms such as M-Shwari and Tala, which offer microloans to people who might not otherwise be eligible for traditional bank credit.

4.3 Discussion of Findings

Digital financial innovations have made a big difference in Kenya’s financial services sector and increased the number of people included in the financial system. In the last decade, Kenya has led the world in using mobile money and other digital payment methods (Wachira et al., 2022). The value of these innovations is that they open financial services to people who were not able to use them before. These inventions are not only about raising the number of transactions but about changing the way people and companies deal with money, credit and savings.

Due to the introduction of mobile banking, digital payment systems, agent banking and digital credit services, the capacity of people to utilize financial services has been

enhanced significantly. Thanks to M-Pesa and other digital banking solutions, many Kenyan citizens, mainly from rural areas, have been able to use their phones to access different financial services (CBK, 2025). Because of this, fewer people depend on banks with branches, as they are often not available in rural areas. Now, people can use their mobile devices to do activities like sending and receiving funds, paying their bills, checking their savings accounts and even taking out small loans.

They have also been important in helping more people get access to financial services. Thanks to M-Pesa Paybill and Lipa na M-Pesa, consumers and businesses can do transactions without using cash. It has made it faster to do transactions and safer to keep your money since you do not need to carry physical cash. In urban and nearby areas, the rise of digital payments has been very noticeable, since both businesses and consumers are using them more for daily shopping and services.

Through agent banking, customers in remote places can now use banking services. For micro, small and medium enterprises (MSMEs) and people without a bank account, this model has played a key role. Offering simple banking tasks through retailers or local shops has helped a lot more people get needed financial services.

Thanks to digital credit, individuals who do not have bank accounts can now receive small loans without having to show collateral, past credit history or go through lengthy paperwork. M-Shwari and Tala are digital credit platforms that offer micro-lending to people and businesses with low income. Through these platforms, borrowers can address short-term needs such as emergencies or starting businesses that they could not manage with banks.

All these transformations have increased the number of people from vulnerable groups such as women, youth and rural residents, who can use financial services. It has been found that providing digital financial services to people has reduced poverty, improved their financial security and encouraged entrepreneurship (CBK, 2025). Because a big section of the

population could not use traditional banks, digital financial tools have helped more people join the economy.

Still, digital financial technologies are extremely important, but there are challenges that must be acknowledged. To guarantee that these new technologies keep aiding growth for all, cybersecurity, data privacy and digital literacy problems must be tackled (Kivuitu et al., 2022). In addition, it is important to create policies that manage how much innovation is allowed in order to keep consumers from overspending on digital credit.

Digital credit has been a game-changing financial product in Kenya, offering an innovative solution to the age-old problem of limited access to credit, particularly for low-income individuals and small businesses. The impact of digital credit on financial inclusion is profound, as it offers customers access to small, short-term loans promptly and conveniently without having to go through traditional banking processes such as collateral requirements and lengthy paperwork (Kithinji, 2017). Services such as M-Shwari, Tala, Branch and Fuliza have become popular as they provide users with instant access to loans via mobile phones, extending financial services to the once excluded.

The largest effect of digital credit is to people who were earlier on ignored by formal financial institutions like the youth, women and rural dwellers. For the majority, these technologies have provided access to financial products that were not accessible to them in the past, mainly due to the fact that they had no access to credit history, insufficient collateral, or were located out of reach geographically (CBK, 2025). Due to digital credit, these clients can now access credit on the basis of non-traditional data such as cellphone activity, payment behavior, and social habits. This has also facilitated even the unbanked segment to enjoy credit facilities, allowing it to meet short-term financial needs, fund small and medium enterprises, and meet daily expenses.

Ease of accessing micro-loans from web-based platforms has also promoted entrepreneurship since it is simple for most small business owners to access the financing they need to start up or establish their businesses. For instance, digital credit has enabled farmers, retailers, and service providers to purchase necessary inputs or equipment to sustain and grow their activities. This has a multiplier effect in the broader economy, with small and medium-sized enterprises being a key driver of economic growth and job creation in Kenya.

Nevertheless, the growth of digital credit has not been unproblematic. Although digital credit platforms have made significant contributions to financial inclusion, over-indebtedness has been an issue of concern, particularly among those prone to over-borrowing more than they can repay (Agufa, 2016). Lack of financial education in the management of credit, coupled with the high interest charged by digital credit, creates a debt trap further aggravating financial vulnerability. Secondarily, the lack of regulatory check on the digital credit market has been viewed as raising issues of consumer protection, data privacy, and transparency of loan terms.

To manage such risks, the demand for stronger regulatory mechanisms to regulate digital credit so that consumers are protected and the products remain sustainable for borrowers increases. Stronger financial literacy and prudent lending are critical in making digital credit continue to be a catalyst of financial inclusion (CBK, 2025). Regulatory action, such as that of the Central Bank of Kenya (CBK), aims to balance digital credit's promise and consumer protection requirements so that the services are able to be positive socio-economic drivers without inducing financial exclusion or exploitation.

The chapter analysis was meant to examine the ways digital financial innovations advance financial inclusion in commercial banks in Kenya, with a focus on mobile banking, digital payments, agent banking, and digital credit. Results from the regression analysis and

diagnostic tests provided critical information concerning the impact and extent these innovations were making as well as their drawbacks.

The regression analysis showed that financial digital transformations of all four were positively correlated with financial inclusion, particularly in rural areas where access to traditional banking services is not available. The regression coefficients reflected positive relationships with financial inclusion were all statistically significant, suggesting that a strong direct impact on increasing access to financial services in the country.

Shapiro-Wilk test of normality, Durbin-Watson test of autocorrelation and Variance Inflation Factor (VIF) test of collinearity indicated that the regression model was reliable and valid. Normality test indicated that residuals were normally distributed and Durbin-Watson statistic indicated that the residuals had no autocorrelation. In extension, the VIF test indicated no collinearity. Digital financial innovations have contributed to financial incusion; the regression estimates show that their effects are than expected.

The chapter showed the outcome of the cause-and-effect regression analysis of the digital financial innovations and financial inclusion of banks in Kenya, including digital banking, digital payments, agent banking, and digital credit. The result portrayed significant details about how these transformations have contributed to expanded access to financial services. The research established that agent banking, digital banking, digital payments, agent banking, and digital credit all strongly positively influenced financial inclusion. Diagnostic tests verified the model's validity with normal residuals, no autocorrelation, and moderate collinearity between digital payments and digital banking. The results indicated that digital financial innovations all contributed to enhanced financial inclusion, the effects were all significant as anticipated. This stresses the importance of complementary strategies, such as enhancing financial literacy and implementing regulation mechanisms, to ensure some digital innovations are critical to ensuring sustainable financial inclusion.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.0 Introduction

The chapter focuses on the causal effect between the digital financial innovations and financial inclusion in commercial banks in Kenya. This chapter has taken an in-depth overview of the major conclusions that were obtained through the data analysis provided in Chapter 4. It describes the findings made on the basis of the results of the study, the potential impact on the banking sector, as well as on the financial inclusion environment in Kenya in general. On the basis of these findings, recommendations to policymakers, financial institutions, as well as other stakeholders are given practically. Moreover, the chapter provides recommendations on the future research to investigate the areas that were not covered in the present study. Lastly, the restrictions that were met in the course of the research are mentioned, which gives an accurate picture of the study boundaries and explanations of what could have affected the findings.

5.1 Summary of Findings

The study attempted to argue on the causality of the digital financial innovations and financial inclusion in the Kenyan banking industry. The research targeted four key digital innovation, which included mobile banking, digital payments, agent banking services, and digital credit, and the research method was quantitative, meaning that the researchers used secondary data, which had been collected by various authoritative sources, including the Central Bank of Kenya (CBK), annual reports of commercial banks, and audited financial reports, and the period considered was 2013 to 2024. The data analysis was conducted using SPSS software in which the effects of these transformations on financial inclusion were established using inferential statistical tests and descriptive statistical tests.

5.2.1 Mobile Banking

Mobile banking enables individuals to experience diverse banking services including money transfer, bill payments, saving, and credit facility all using mobile phones. The innovation has greatly minimized the impediments to financial access especially among the underserved and earlier unserved communities in rural locations (Maina, 2018). The research established that the amount of mobile banking activities in Kenya was on a gradual rise within the duration of study. This is credible due to the high prevalence of mobile phones in the nation even in the rural areas where the infrastructure of banks is usually scarce. The presence of mobile phones and in particular smartphones has enabled the mobile banking to expand exponentially, availing the financial services to the unbanked.

However, though the volumetric growth of transactions was extremely high, the regression analysis did show the significant impact of mobile banking on financial inclusion. Mobile banking systems such as M-Pesa have expanded the accessibility of financial services, particularly in the urban areas, they have made a massive difference in the financial inclusion of the unbanked. The result indicates that although mobile banking is highly used, its effect on increasing the extent of financial inclusion is very high in areas where the financial inclusion is already at a high level. This may be attributed to little impact of mobile banking in cities as too many people can already access conventional banking services (Hossain et al., 2021). At the locales the study is referring to, mobile banking is mainly a more convenient way of handling money, as opposed to providing new consumers with access to the financial system.

5.2.2 Digital Payments

During the study period, digital payment systems in Kenya have increased in volume tremendously, especially the M-Pesa Paybill, Lipa na M-Pesa, and other mobile payment systems. Digital payments offer people an effective and safe way to conduct financial

transactions including the transfer of funds, payment of bills, and buying of goods and services. These payment systems have also been found to be especially helpful to small businesses, consumers in the rural areas as well as utility services providers because they allow the elimination of physical cash and they allow the access to secure payment channels.

According to the research, the use of digital payments in Kenya has been on an upward trend, an indication that businesses and consumers have been embracing mobile payment systems. Various factors have contributed to this growth namely, government efforts to encourage cashless businesses and adoption of e-commerce, growth in penetration of mobile phones in the country. The volume of digital payments was rapidly growing, the result of regression analysis revealed that the association between digital payments and financial inclusion was positive and significant.

The ease and availability of digital payments cannot be denied. They enable people to pay fast, safely, and without using cash. Digital payment also brings a major benefit to small businesses which could make their business easy to conduct and access clients in the rural or remote areas. Yet, digital payments are mainly focused on the short-term transactional needs of consumers, and they are not useful to deliver the full range of financial tools that would achieve financial inclusion. In addition, although digital payments enhance access to payment systems, they do not ensure that there is access to other financial services which would lead to long-term financial empowerment.

5.2.3 Agent Banking Services

Particularly effective in enhancing financial inclusion in Kenya has been agent banking which is associated with collaborations involving commercial banks and third-party agents including retail outlets and post offices that provide basic banking services (Tay, 2022). The use of agent banking services enables basic banking services such as deposit of money, withdrawal of money, transfer of money amongst others, as well as opening of

accounts by the people without the need of visiting any physical bank office. The transformation has greatly narrowed the geographical distance gap in the access to financial services, especially in the rural and remote places.

The analysis has determined that the agent banking services in Kenya have been significantly positively correlated with the financial inclusion in a very strong manner. Regression analysis demonstrated that the volume of agent banking transactions was marginally significantly correlated to financial inclusion. This observation underscores that agent banking is a handy tool of accessing the underserved populations, especially in rural locations where the traditional banking infrastructure is unavailable. Agents banking has been found to be affordable, and reachable, way of availing banking services to people who are not otherwise in the formal financial system. Agent banking services can be provided cheaply by utilizing the existing retail infrastructure, and hence it is possible to offer the banking services to individuals in the remote areas. The upward trend of the agent banking volumes shows that it has the potential to widen the coverage of financial services and overall financial inclusion.

Nonetheless, agent banking services are also limited in some ways including the limited range of services provided by the agents. To ensure long-term success in agent banking, investment in training and support of the agents will be necessary as well as the establishment of measures which guarantee that agent services are of high-quality.

5.2.4 Digital Credit

Digital credit has been growing fast in Kenya, especially with the likes of M-Shwari, Tala, and Branch, all of which provide micro-loans to users on mobile phones. These sites have made small, short-term loans available to individuals that are not able to get traditional credit because they have no collateral or formal credit history. Digital credit has been touted as a remedy to fill the credit gap to the underserved where it was largely used in Kenya in the informal economy. The regression analysis however showed that the coefficient of digital

credit was negative and as such, though the digital credit is widely available, it might not have helped in enhancing financial inclusion in Kenya. The adverse effect can be explained by a number of reasons such as the fact that the interest rates imposed by most digital credit providers are high, the repayment rates are low, and borrowers lack financial literacy. These are some of the causes of over-indebtedness and thus, borrowers find it hard to repay their creditors hence, long-term financial inclusion is inhibited.

In as much as digital credit has increased access to credit to the people who may not be included in the formal financial system, its ability to achieve sustainable financial inclusion has been hampered by the adverse effects of the high-interest rates and predatory lending practices. Besides, insufficient consumer protection measures in the digital credit marketplace have caused predatory lending concerns, especially when there is no effective regulatory control. The results indicate that the accessibility of the credit provided by digital credit platforms has increased but at the same time, it has generated major problems that may compromise their role on financial inclusion. The unregulated market of digital credit, high costs and risk of borrowing has restricted the performance of digital credit to achieve long-term financial inclusion. Regulatory reforms and more consumer protection will be required in the future to guarantee that digital credit plays a positive role in financial inclusion.

5.2.5 Financial Inclusion

On balance, the research discovered that financial inclusion in Kenya has grown during the study time at the expense of mobile banking, digital payments, and agent banking provisions. Increased access to basic financial services to previously marginalized groups is the result of the growth of these digital financial transformations. However despite these positive dynamics, the research however indicated that the process of financial inclusion is not entirely complete in Kenya and notably when it comes to access to more advanced financial services such as credit, savings and insurance.

In Kenya, there is a persistent challenge of financial inclusion, yet the digital financial transformations are showing tremendous growth. In the quest to fully embrace financial inclusion, there is need to ensure that the barriers that are still limiting access to financial services are addressed. The obstacles are enhancing financial literacy, lowering transaction cost, and having stricter regulatory systems on digital financial services.

5.2 Conclusions

The causal role of digital financial innovations in financial inclusion in the Kenyan banking sector was the main aim of this research. To this end, the study examined 4 types of financial innovations, namely: mobile banking, digital payment, agent banking, and digital credit. The study looked into how these transformations were enabling financial inclusion in the banking sector, especially of the previously unbanked and poor populations (Jacolin et al., 2019). The study used qualitative and quantitative data obtained from secondary sources, which included secondary reports from Central Bank of Kenya (CBK), commercial banks and other financial institutions. The study collected data over a time frame of 2013-2024, then processed it and used inferential and descriptive statistical methods to analyses the relationship between the transformations and financial inclusion.

In accordance with the results provided in Chapter 4, some conclusions can be made as regards the effectiveness of digital financial innovations in facilitating financial inclusion in Kenya. The research determined that mobile banking, digital credit, digital payments and agent banking have been playing a positive role in enhancing the provision of access to financial services in Kenya. Thus, although the transformations are growing positively, their overall impact on overall financial inclusion has been mixed, with some innovations having greater impacts than others.

5.3.1 Mobile Banking

Mobile banking is without doubt one of the most revolutionary digital financial transformations in Kenya. Payment platforms such as M-Pesa have changed how people in Kenya access and use services in the financial sector, especially in rural and remote areas where banks do not exist or the banking infrastructure is flimsy (Tay, 2022). The explosion of mobile phone ownership has allowed millions of people to accessing banking services for the first-time as well. Mobile banking enables them to engage in several financial transactions, including transferring money, paying for goods and services, and applying for credit and savings products, just by using their mobile phones.

5.3.2 Digital Payments

Digital payments like M-Pesa Paybill and Lipa na M-Pesa have advanced accessibility and convenience for individuals and businesses in Kenya. More and more people are using digital payment and mobile payment systems which offer efficient, secure, and low-cost alternatives to cash and cards enabling people to complete transactions anywhere and anytime. Digital payments have advanced these services quicker than many expected, and for small businesses that have been able to accept payments remotely at lower costs without purchasing a point of sale (POS) terminal, it is clear that digital payments have accelerated progress.

This conclusion suggests that although digital payments are a necessary part of financial ecosystem one cannot rely on digital payments alone to drive deeper financial inclusion. Digital payments must be integrated with the other elements of financial services if the community is to see a measurable impact on improved financial access or other core tenets of financial inclusion could be realized. If financial service providers were to develop products and services that integrate digital payments more closely with savings products,

credit facilities and insurance, then a more holistic financial system could emerge. When combined, the financial ecosystems for all citizens would benefit at all levels of society.

5.3.3 Agent Banking

Agent banking services emerged as one of the finest methods of improving Kenya's financial penetration, particularly among groups and individuals in rural and remote areas. Through third-party agent relationships such as mobile kiosks, post offices, and retail outlets, commercial banks have been in a position to reach far larger geographical areas than the physical constraint of traditional bank branches. Agent banking has facilitated millions of people, particularly rural communities, to have access to core banking products such as deposits, withdrawals, money transfers, and account opening.

This finding underscores the relevance of agent banking in extending services to groups that have been remotely connected to formal banking systems (Jacolin et al., 2019). The ease and affordability of agent banking offer a viable option to individuals residing in rural areas who may not be able to access a local bank branch. Besides that, utilizing existing retail infrastructure for agent banking helps to reduce costs and provide a more sustainable method of offering financial products to poor communities.

5.3.4 Digital Credit

Digital credit platforms like M-Shwari, Tala, and Branch have become very popular in offering small, short-term loans to individuals who do not have access to traditional credit, because they do not have collateral, or a formal credit background to obtain loans. These digital credit platform application has led to an increase in access to some individuals who may not be able to obtain credit as previously used. It has stimulated outcomes for individuals and small businesses that were previously excluded from participating in the formal credit system.

Moreover, the digital credit marketplace, or intended disruption to lending has continued to remain light-touch regulated. Hence, very little protection for the borrower and little to no consumer protection. Borrowers using regulated lenders and apps are less accessible to predatory lending practices and barriers to financial exclusion (Tay, 2022). While there continues to remain concerns for consumer protection regulation, several groups in the marketplace enter are at risk for exploitation, including women and low-income earners to gain access to credit.

5.3 Recommendations For this study

From the findings of this study, it is evident that digital financial innovations can play a significant role in the financial inclusion in Kenya. It is their success that relies on how well the innovations are designed, regulated, integrated, and taken to the most poor and excluded populations of people. The following recommendations are offered to policymakers, financial institutions, regulators, and other stakeholders to ensure that the contribution of digital financial transformations to financial inclusion is maximized.

5.4.1 Promote Inclusive Mobile Banking Infrastructure in Rural Geographies

Although mobile banking access like M-Pesa has revolutionized financial services in Kenya, their urban saturation has limited their impact on expanding inclusion. Policymakers and providers need to head the agenda to expand mobile banking access to marginalized communities and rural areas where exclusion remains rampant. Investment in mobile network penetration, device availability, and infrastructure in remote areas needs to be accelerated. Collaborations between financial institutions and mobile network operators should also be encouraged to innovate and offer specific products for rural communities, e.g., products for smallholder farmers and informal workers.

5.4.2 Hybrid Digital Payments with Other Financial Services

Digital payments have provided more convenience and efficiency, but haven't fundamentally changed the transactional nature. If financial institutions are going to turn this usage into financial inclusion, then they need to think about how their digital payment systems can link to savings accounts, micro-insurance, pension funds, and affordable credit facilities. By providing users with basic payment services that links to other services over time, financial resilience and economic empowerment can be obtained.

5.4.3 Build Out Agent Networks and Service Offerings

Agent banking has already shown it could have definite and positive impacts on financial inclusion, especially in less developed areas. In order to fully leverage agent banking to its potential, banks should commit more to resourcing their agent networks with continued training, digital tools, and compensation improvement. In addition, agents can be supported by allowing agents to provide a greater number of services and even complex services such as lending processing, financial education, and insurance. There needs to be some regulatory support to ensure agents can operate with enough capital, security, and oversight to avoid cheating customers and to retain their trust.

5.4.4 Reform and Regulate the Digital Credit Ecosystem

Digital credit, while commonplace, has a negative relationship with financial inclusion which is therefore a problem that requires intervention. The Central Bank of Kenya and their regulatory partners need to reduce the risk the consumer encounters when using digital credit via consumer protection regulation related to interest rate caps, privacy of customer data, transparency of terms and conditions, and fairness on how collections are conducted. Financial institutions, and/or fintech firms, should also be required to assess credit worthiness and offer multiple repayment means as well as streamline credit reporting to protect borrowers from multiple simultaneous loans leading to them being over-indebted.

5.4.5 Invest in Financial Literacy Aficionado programs

The absence of financial literacy by users continues to be an ongoing limitation on digital finance innovations which reduced their potential to access services that are available to them. Thus, all levels of government, NGO's and private sector institutions need to mobilize and develop financial literacy campaigns with the goal of national penetration. Financial literacy campaigns seen in practice, should be culturally appropriate, in a diversity of languages, and delivered at the community level through schools, faith-based institutions and local cooperatives. On-going financial education in schools presses the basis of financially responsible citizens.

5.4 Suggestions for Further Research

While this study has contributed to understanding the effect of digital financial transformations on financial inclusion in Kenya, there are several areas that have not been addressed, or require further consideration. The following recommendation for further research suggests both gaps in the existing literature that need to be addressed and areas for more nuanced understandings of the factors influencing financial inclusion. This study has focused on national trends, yet the regional and demographic variations need research into the levels of adoption and effect of digital financial innovations. Future studies can investigate the expected benefits and challenges of digital financial services across different geographical areas (urban, peri urban, and rural contexts). Future studies could include the demographic groups such as women, youth, older adults, and low income individuals to gain a better understanding of their needs, and how digital innovations can be further leveraged to support their continued and enhanced financial inclusion.

Digital credit may have opened new avenues to microloans, but the long-term implications for financial inclusion remain uncertain. Future research should examine the sustainability of digital credit as a way to provide financial inclusion, in particular as it relates

to over-indebtedness, building a credit history, and strengthening financial resiliency. Longitudinal studies could track individuals who used digital credit services over time to assess whether these products helped enable an eventual transition to more formal financial services (e.g., access to larger loan amounts, savings accounts, or insurance).

Research could also be pursued about the role that financial literacy plays in the adoption and effective use of digital financial services. For example, future studies could examine the relationship between an individual's financial literacy level and the ability to effectively use mobile banking, digital payments, agent banking, and digital credit (Hossain et al., 2021). Further research could examine whether financial literacy programs are effective in increasing usage and improving outcomes of digital financial services, particularly with the unbanked, under-banked, and financially vulnerable populations.

5.5 Limitations of the Study

The study has provided a baseline analysis and assessment of Kenya's financial transformation and financial inclusion ecosystem but there are some limitations that should be noted which may impact the interpretation and generalizability of the results. Importantly, the study used secondary data from a range of sources, including reports from the Central Bank of Kenya, commercial banks and other financial institutions. While these are all generally accepted and trusted sources, there are consumer experiences, the informal financial services space, non-banking financial services and other areas of the digital financial service landscape which the study simply could not gather or analyze. Therefore the data may not have accounted for the full realm of financial inclusion, especially in informal and rural contexts.

Another limitation of the study is that while the analysis provided for examining the quantitative aspects of financial inclusion, the study did not provide for examining the qualitative aspects of the consumer experience of financial inclusion. For example, the study

tracked volume of transactions and the number of accounts but could not measure what motivates and influences consumer behaviour around those transactions and accounts, including consumers trust in digital platforms, financial literacy, access to online services, etc. Future studies may want to adopt a qualitative phase to collect richer data around consumer perceptions of financial innovation and digital financial services; this could potentially include interviews, or focus or discussion groups to gain a better understanding of the consumer experience and ultimately financial inclusion.

Furthermore, the study provides a representation of the rapidly changing financial system during the time frame of study participants from 2014-2023. However, it does not take into account the capacity of innovations and technologies to adapt, or the implications that international concerns, like that of the COVID-19 pandemic, had in the adoption of digital services. Future studies can expand the time frame or incorporate more recent data that may show more changes in digital finance. Lastly, while the study captured a national impact of digital financial transformations, there were regional and demographic differences that were not included, thus limiting the possible implications and generability for various populations in Kenya.

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APPENDICES

Appendix I: Data Collection Sheet

Bank name and year	Fin inclusion	Mobil banking	Digital payment	Agency banking	Digital credit
ABSA Bank Kenya Plc - 13	14.03031	5.109515	12.01476	9.905785	16.08864
ABSA Bank Kenya Plc - 14	14.13312	5.329530	12.31594	9.689242	16.15863
ABSA Bank Kenya Plc - 15	14.22259	5.511435	12.49322	9.947122	16.40124
ABSA Bank Kenya Plc - 16	14.30616	5.649168	12.70048	10.28086	16.41585
ABSA Bank Kenya Plc - 17	14.24162	5.706834	12.72987	10.44238	16.58511
ABSA Bank Kenya Plc - 18	14.30445	5.791986	12.79318	10.59971	16.65915
ABSA Bank Kenya Plc - 19	14.37507	5.902382	12.96012	10.70589	16.33656
ABSA Bank Kenya Plc - 20	14.42247	6.180462	13.07394	10.73564	16.26379
ABSA Bank Kenya Plc - 21	14.47893	6.372261	13.20367	10.79362	16.28857
ABSA Bank Kenya Plc - 22	14.52699	6.513927	13.32042	10.81549	16.30123
ABSA Bank Kenya Plc - 23	14.62018	6.493512	13.39210	10.90010	16.39893
ABSA Bank Kenya Plc - 24	14.69329	6.508054	13.50390	10.95151	16.43396
Access Bank (Kenya) PLC - 19	11.57391	5.902382	12.96012	10.70589	16.33656
Access Bank (Kenya) PLC - 20	11.58752	6.180462	13.07394	10.73564	16.26379
Access Bank (Kenya) PLC - 21	11.57512	6.372261	13.20367	10.79362	16.28857
Access Bank (Kenya) PLC - 22	11.36368	6.513927	13.32042	10.81549	16.30123
Access Bank (Kenya) PLC - 23	11.49451	6.493512	13.39210	10.90010	16.39893
Access Bank (Kenya) PLC - 24	11.49767	6.508054	13.50390	10.95151	16.43396
African Banking Corporation Ltd - 13	10.07264	5.109515	12.01476	9.905785	16.08864
African Banking Corporation Ltd - 14	10.35125	5.329530	12.31594	9.689242	16.15863
African Banking Corporation Ltd - 15	10.40071	5.511435	12.49322	9.947122	16.40124
African Banking Corporation Ltd - 16	10.48975	5.649168	12.70048	10.28086	16.41585
African Banking Corporation Ltd - 17	10.52331	5.706834	12.72987	10.44238	16.58511
African Banking Corporation Ltd - 18	10.55383	5.791986	12.79318	10.59971	16.65915
African Banking Corporation Ltd - 19	10.51905	5.902382	12.96012	10.70589	16.33656
African Banking Corporation Ltd - 20	10.48696	6.180462	13.07394	10.73564	16.26379
African Banking Corporation Ltd - 21	10.31877	6.372261	13.20367	10.79362	16.28857
African Banking Corporation Ltd - 22	10.25199	6.513927	13.32042	10.81549	16.30123
African Banking Corporation Ltd - 23	10.18957	6.493512	13.39210	10.90010	16.39893
African Banking Corporation Ltd - 24	10.17926	6.508054	13.50390	10.95151	16.43396
Bank of Africa Kenya Ltd - 13	10.70374	5.109515	12.01476	9.905785	16.08864
Bank of Africa Kenya Ltd - 14	10.92556	5.329530	12.31594	9.689242	16.15863

Bank of Africa Kenya Ltd - 15	11.32012	5.511435	12.49322	9.947122	16.40124
Bank of Africa Kenya Ltd - 16	11.59384	5.649168	12.70048	10.28086	16.41585
Bank of Africa Kenya Ltd - 17	11.69521	5.706834	12.72987	10.44238	16.58511
Bank of Africa Kenya Ltd - 18	11.57746	5.791986	12.79318	10.59971	16.65915
Bank of Africa Kenya Ltd - 19	11.56314	5.902382	12.96012	10.70589	16.33656
Bank of Africa Kenya Ltd - 20	11.43962	6.180462	13.07394	10.73564	16.26379
Bank of Africa Kenya Ltd - 21	11.27513	6.372261	13.20367	10.79362	16.28857
Bank of Africa Kenya Ltd - 22	11.12408	6.513927	13.32042	10.81549	16.30123
Bank of Africa Kenya Ltd - 23	11.02125	6.493512	13.39210	10.90010	16.39893
Bank of Africa Kenya Ltd - 24	10.98232	6.508054	13.50390	10.95151	16.43396
Bank of Baroda Ltd - 13	10.62230	5.109515	12.01476	9.905785	16.08864
Bank of Baroda Ltd - 14	10.69001	5.329530	12.31594	9.689242	16.15863
Bank of Baroda Ltd - 15	10.67964	5.511435	12.49322	9.947122	16.40124
Bank of Baroda Ltd - 16	10.73326	5.649168	12.70048	10.28086	16.41585
Bank of Baroda Ltd - 17	10.76134	5.706834	12.72987	10.44238	16.58511
Bank of Baroda Ltd - 18	10.80247	5.791986	12.79318	10.59971	16.65915
Bank of Baroda Ltd - 19	10.84085	5.902382	12.96012	10.70589	16.33656
Bank of Baroda Ltd - 20	10.89683	6.180462	13.07394	10.73564	16.26379
Bank of Baroda Ltd - 21	10.95817	6.372261	13.20367	10.79362	16.28857
Bank of Baroda Ltd - 22	11.05804	6.513927	13.32042	10.81549	16.30123
Bank of Baroda Ltd - 23	11.12492	6.493512	13.39210	10.90010	16.39893
Bank of Baroda Ltd - 24	11.16294	6.508054	13.50390	10.95151	16.43396
Bank of India - 13	9.628393	5.109515	12.01476	9.905785	16.08864
Bank of India - 14	9.694000	5.329530	12.31594	9.689242	16.15863
Bank of India - 15	9.703450	5.511435	12.49322	9.947122	16.40124
Bank of India - 16	9.638023	5.649168	12.70048	10.28086	16.41585
Bank of India - 17	9.666499	5.706834	12.72987	10.44238	16.58511
Bank of India - 18	9.683464	5.791986	12.79318	10.59971	16.65915
Bank of India - 19	9.691284	5.902382	12.96012	10.70589	16.33656
Bank of India - 20	9.666055	6.180462	13.07394	10.73564	16.26379
Bank of India - 21	9.606361	6.372261	13.20367	10.79362	16.28857
Bank of India - 22	9.534161	6.513927	13.32042	10.81549	16.30123
Bank of India - 23	9.472705	6.493512	13.39210	10.90010	16.39893
Bank of India - 24	9.433884	6.508054	13.50390	10.95151	16.43396
Citibank N.A. Kenya - 13	7.567346	5.109515	12.01476	9.905785	16.08864
Citibank N.A. Kenya - 14	8.391857	5.329530	12.31594	9.689242	16.15863
Citibank N.A. Kenya - 15	7.618251	5.511435	12.49322	9.947122	16.40124
Citibank N.A. Kenya - 16	7.616284	5.649168	12.70048	10.28086	16.41585
Citibank N.A. Kenya - 17	7.587311	5.706834	12.72987	10.44238	16.58511
Citibank N.A. Kenya - 18	7.593374	5.791986	12.79318	10.59971	16.65915
Citibank N.A. Kenya - 19	7.570443	5.902382	12.96012	10.70589	16.33656
Citibank N.A. Kenya - 20	7.651596	6.180462	13.07394	10.73564	16.26379
Citibank N.A. Kenya - 21	7.589336	6.372261	13.20367	10.79362	16.28857
Citibank N.A. Kenya - 22	7.639642	6.513927	13.32042	10.81549	16.30123
Citibank N.A. Kenya - 23	7.718685	6.493512	13.39210	10.90010	16.39893
Citibank N.A. Kenya - 24	7.748460	6.508054	13.50390	10.95151	16.43396
Commercial Bank of Africa Ltd - 17	15.54778	5.706834	12.72987	10.44238	16.58511
Commercial Bank of Africa Ltd - 18	16.05094	5.791986	12.79318	10.59971	16.65915

Commercial Bank of Africa Ltd - 19	16.37537	5.902382	12.96012	10.70589	16.33656
Commercial Bank of Africa Ltd - 20	16.67782	6.180462	13.07394	10.73564	16.26379
Commercial Bank of Africa Ltd - 21	16.88296	6.372261	13.20367	10.79362	16.28857
Commercial Bank of Africa Ltd - 22	17.08147	6.513927	13.32042	10.81549	16.30123
Commercial Bank of Africa Ltd - 23	17.08147	6.493512	13.39210	10.90010	16.39893
Commercial Bank of Africa Ltd - 24	17.08147	6.508054	13.50390	10.95151	16.43396
Consolidated Bank of Kenya Ltd - 13	10.71996	5.109515	12.01476	9.905785	16.08864
Consolidated Bank of Kenya Ltd - 14	10.78841	5.329530	12.31594	9.689242	16.15863
Consolidated Bank of Kenya Ltd - 15	10.80157	5.511435	12.49322	9.947122	16.40124
Consolidated Bank of Kenya Ltd - 16	10.78201	5.649168	12.70048	10.28086	16.41585
Consolidated Bank of Kenya Ltd - 17	10.85594	5.706834	12.72987	10.44238	16.58511
Consolidated Bank of Kenya Ltd - 18	10.75933	5.791986	12.79318	10.59971	16.65915
Consolidated Bank of Kenya Ltd - 19	10.76486	5.902382	12.96012	10.70589	16.33656
Consolidated Bank of Kenya Ltd - 20	10.71639	6.180462	13.07394	10.73564	16.26379
Consolidated Bank of Kenya Ltd - 21	10.71890	6.372261	13.20367	10.79362	16.28857
Consolidated Bank of Kenya Ltd - 22	10.72736	6.513927	13.32042	10.81549	16.30123
Consolidated Bank of Kenya Ltd - 23	10.73169	6.493512	13.39210	10.90010	16.39893
Consolidated Bank of Kenya Ltd - 24	10.74432	6.508054	13.50390	10.95151	16.43396
Co-operative Bank of Kenya Ltd - 13	14.65418	5.109515	12.01476	9.905785	16.08864
Co-operative Bank of Kenya Ltd - 14	14.76147	5.329530	12.31594	9.689242	16.15863
Co-operative Bank of Kenya Ltd - 15	14.86254	5.511435	12.49322	9.947122	16.40124
Co-operative Bank of Kenya Ltd - 16	14.89346	5.649168	12.70048	10.28086	16.41585
Co-operative Bank of Kenya Ltd - 17	14.98548	5.706834	12.72987	10.44238	16.58511
Co-operative Bank of Kenya Ltd - 18	15.05800	5.791986	12.79318	10.59971	16.65915
Co-operative Bank of Kenya Ltd - 19	15.07986	5.902382	12.96012	10.70589	16.33656
Co-operative Bank of Kenya Ltd - 20	15.10267	6.180462	13.07394	10.73564	16.26379
Co-operative Bank of Kenya Ltd - 21	15.13292	6.372261	13.20367	10.79362	16.28857
Co-operative Bank of Kenya Ltd - 22	15.16943	6.513927	13.32042	10.81549	16.30123
Co-operative Bank of Kenya Ltd - 23	15.24897	6.493512	13.39210	10.90010	16.39893
Co-operative Bank of Kenya Ltd - 24	15.16926	6.508054	13.50390	10.95151	16.43396
Credit Bank Ltd - 13	9.216720	5.109515	12.01476	9.905785	16.08864
Credit Bank Ltd - 14	9.460943	5.329530	12.31594	9.689242	16.15863
Credit Bank Ltd - 15	9.730146	5.511435	12.49322	9.947122	16.40124

Credit Bank Ltd - 16	10.09897	5.649168	12.70048	10.28086	16.41585
Credit Bank Ltd - 17	10.31281	5.706834	12.72987	10.44238	16.58511
Credit Bank Ltd - 18	10.42682	5.791986	12.79318	10.59971	16.65915
Credit Bank Ltd - 19	10.57799	5.902382	12.96012	10.70589	16.33656
Credit Bank Ltd - 20	10.65181	6.180462	13.07394	10.73564	16.26379
Credit Bank Ltd - 21	10.65046	6.372261	13.20367	10.79362	16.28857
Credit Bank Ltd - 22	10.66632	6.513927	13.32042	10.81549	16.30123
Credit Bank Ltd - 23	10.67950	6.493512	13.39210	10.90010	16.39893
Credit Bank Ltd - 24	10.70486	6.508054	13.50390	10.95151	16.43396
Development Bank of Kenya Ltd - 13	7.519150	5.109515	12.01476	9.905785	16.08864
Development Bank of Kenya Ltd - 14	7.589336	5.329530	12.31594	9.689242	16.15863
Development Bank of Kenya Ltd - 15	7.551712	5.511435	12.49322	9.947122	16.40124
Development Bank of Kenya Ltd - 16	7.430707	5.649168	12.70048	10.28086	16.41585
Development Bank of Kenya Ltd - 17	7.558517	5.706834	12.72987	10.44238	16.58511
Development Bank of Kenya Ltd - 18	7.388946	5.791986	12.79318	10.59971	16.65915
Development Bank of Kenya Ltd - 19	7.375882	5.902382	12.96012	10.70589	16.33656
Development Bank of Kenya Ltd - 20	7.471932	6.180462	13.07394	10.73564	16.26379
Development Bank of Kenya Ltd - 21	7.526718	6.372261	13.20367	10.79362	16.28857
Development Bank of Kenya Ltd - 22	7.490529	6.513927	13.32042	10.81549	16.30123
Development Bank of Kenya Ltd - 23	7.499423	6.493512	13.39210	10.90010	16.39893
Development Bank of Kenya Ltd - 24	7.616284	6.508054	13.50390	10.95151	16.43396
Diamond Trust Bank (K) Ltd - 13	12.04442	5.109515	12.01476	9.905785	16.08864
Diamond Trust Bank (K) Ltd - 14	13.27504	5.329530	12.31594	9.689242	16.15863
Diamond Trust Bank (K) Ltd - 15	13.39322	5.511435	12.49322	9.947122	16.40124
Diamond Trust Bank (K) Ltd - 16	13.58447	5.649168	12.70048	10.28086	16.41585
Diamond Trust Bank (K) Ltd - 17	13.64592	5.706834	12.72987	10.44238	16.58511
Diamond Trust Bank (K) Ltd - 18	13.22102	5.791986	12.79318	10.59971	16.65915
Diamond Trust Bank (K) Ltd - 19	13.14016	5.902382	12.96012	10.70589	16.33656
Diamond Trust Bank (K) Ltd - 20	13.17177	6.180462	13.07394	10.73564	16.26379
Diamond Trust Bank (K) Ltd - 21	13.21189	6.372261	13.20367	10.79362	16.28857
Diamond Trust Bank (K) Ltd - 22	13.34860	6.513927	13.32042	10.81549	16.30123
Diamond Trust Bank (K) Ltd - 23	13.57470	6.493512	13.39210	10.90010	16.39893
Diamond Trust Bank (K) Ltd - 24	13.25766	6.508054	13.50390	10.95151	16.43396
DIB Bank Kenya Ltd - 15	8.846353	5.511435	12.49322	9.947122	16.40124
DIB Bank Kenya Ltd - 16	8.859789	5.649168	12.70048	10.28086	16.41585
DIB Bank Kenya Ltd - 17	7.304516	5.706834	12.72987	10.44238	16.58511
DIB Bank Kenya Ltd - 18	7.999343	5.791986	12.79318	10.59971	16.65915
DIB Bank Kenya Ltd - 19	8.092239	5.902382	12.96012	10.70589	16.33656
DIB Bank Kenya Ltd - 20	8.264621	6.180462	13.07394	10.73564	16.26379
DIB Bank Kenya Ltd - 21	8.323123	6.372261	13.20367	10.79362	16.28857

DIB Bank Kenya Ltd - 22	8.545975	6.513927	13.32042	10.81549	16.30123
DIB Bank Kenya Ltd - 23	8.761863	6.493512	13.39210	10.90010	16.39893
DIB Bank Kenya Ltd - 24	8.957124	6.508054	13.50390	10.95151	16.43396
Ecobank Kenya Ltd - 13	11.73777	5.109515	12.01476	9.905785	16.08864
Ecobank Kenya Ltd - 14	10.88650	5.329530	12.31594	9.689242	16.15863
Ecobank Kenya Ltd - 15	10.58101	5.511435	12.49322	9.947122	16.40124
Ecobank Kenya Ltd - 16	10.98592	5.649168	12.70048	10.28086	16.41585
Ecobank Kenya Ltd - 17	10.90430	5.706834	12.72987	10.44238	16.58511
Ecobank Kenya Ltd - 18	11.92222	5.791986	12.79318	10.59971	16.65915
Ecobank Kenya Ltd - 19	12.06116	5.902382	12.96012	10.70589	16.33656
Ecobank Kenya Ltd - 20	12.11573	6.180462	13.07394	10.73564	16.26379
Ecobank Kenya Ltd - 21	12.11148	6.372261	13.20367	10.79362	16.28857
Ecobank Kenya Ltd - 22	12.13493	6.513927	13.32042	10.81549	16.30123
Ecobank Kenya Ltd - 23	12.66789	6.493512	13.39210	10.90010	16.39893
Ecobank Kenya Ltd - 24	12.60793	6.508054	13.50390	10.95151	16.43396
Equity Bank Kenya Ltd - 13	15.81597	5.109515	12.01476	9.905785	16.08864
Equity Bank Kenya Ltd - 14	15.94814	5.329530	12.31594	9.689242	16.15863
Equity Bank Kenya Ltd - 15	15.98800	5.511435	12.49322	9.947122	16.40124
Equity Bank Kenya Ltd - 16	16.04728	5.649168	12.70048	10.28086	16.41585
Equity Bank Kenya Ltd - 17	16.13218	5.706834	12.72987	10.44238	16.58511
Equity Bank Kenya Ltd - 18	16.20613	5.791986	12.79318	10.59971	16.65915
Equity Bank Kenya Ltd - 19	16.23879	5.902382	12.96012	10.70589	16.33656
Equity Bank Kenya Ltd - 20	16.18879	6.180462	13.07394	10.73564	16.26379
Equity Bank Kenya Ltd - 21	16.29750	6.372261	13.20367	10.79362	16.28857
Equity Bank Kenya Ltd - 22	16.32398	6.513927	13.32042	10.81549	16.30123
Equity Bank Kenya Ltd - 23	16.37284	6.493512	13.39210	10.90010	16.39893
Equity Bank Kenya Ltd - 24	16.48301	6.508054	13.50390	10.95151	16.43396
Family Bank Ltd - 13	14.09798	5.109515	12.01476	9.905785	16.08864
Family Bank Ltd - 14	14.24598	5.329530	12.31594	9.689242	16.15863
Family Bank Ltd - 15	14.39977	5.511435	12.49322	9.947122	16.40124
Family Bank Ltd - 16	14.51207	5.649168	12.70048	10.28086	16.41585
Family Bank Ltd - 17	14.56359	5.706834	12.72987	10.44238	16.58511
Family Bank Ltd - 18	14.61493	5.791986	12.79318	10.59971	16.65915
Family Bank Ltd - 19	14.62647	5.902382	12.96012	10.70589	16.33656
Family Bank Ltd - 20	14.66586	6.180462	13.07394	10.73564	16.26379
Family Bank Ltd - 21	14.71671	6.372261	13.20367	10.79362	16.28857
Family Bank Ltd - 22	13.90211	6.513927	13.32042	10.81549	16.30123
Family Bank Ltd - 23	14.87352	6.493512	13.39210	10.90010	16.39893
Family Bank Ltd - 24	14.88908	6.508054	13.50390	10.95151	16.43396
First Community Bank Ltd - 13	11.23185	5.109515	12.01476	9.905785	16.08864
First Community Bank Ltd - 14	11.55406	5.329530	12.31594	9.689242	16.15863
First Community Bank Ltd - 15	11.72450	5.511435	12.49322	9.947122	16.40124
First Community Bank Ltd - 16	11.88349	5.649168	12.70048	10.28086	16.41585
First Community Bank Ltd - 17	12.27593	5.706834	12.72987	10.44238	16.58511
First Community Bank Ltd - 18	11.60243	5.791986	12.79318	10.59971	16.65915
First Community Bank Ltd - 19	11.35550	5.902382	12.96012	10.70589	16.33656
First Community Bank Ltd - 20	11.32006	6.180462	13.07394	10.73564	16.26379
First Community Bank Ltd - 21	11.26977	6.372261	13.20367	10.79362	16.28857

First Community Bank Ltd - 22	11.23924	6.513927	13.32042	10.81549	16.30123
First Community Bank Ltd - 23	11.35550	6.493512	13.39210	10.90010	16.39893
First Community Bank Ltd - 24	11.32006	6.508054	13.50390	10.95151	16.43396
Guaranty Trust Bank (Kenya) Ltd - 13	9.736961	5.109515	12.01476	9.905785	16.08864
Guaranty Trust Bank (Kenya) Ltd - 14	9.761866	5.329530	12.31594	9.689242	16.15863
Guaranty Trust Bank (Kenya) Ltd - 15	9.766464	5.511435	12.49322	9.947122	16.40124
Guaranty Trust Bank (Kenya) Ltd - 16	9.782562	5.649168	12.70048	10.28086	16.41585
Guaranty Trust Bank (Kenya) Ltd - 17	9.662116	5.706834	12.72987	10.44238	16.58511
Guaranty Trust Bank (Kenya) Ltd - 18	9.703267	5.791986	12.79318	10.59971	16.65915
Guaranty Trust Bank (Kenya) Ltd - 19	9.747418	5.902382	12.96012	10.70589	16.33656
Guaranty Trust Bank (Kenya) Ltd - 20	9.853351	6.180462	13.07394	10.73564	16.26379
Guaranty Trust Bank (Kenya) Ltd - 21	9.950991	6.372261	13.20367	10.79362	16.28857
Guaranty Trust Bank (Kenya) Ltd - 22	10.01570	6.513927	13.32042	10.81549	16.30123
Guaranty Trust Bank (Kenya) Ltd - 23	10.05724	6.493512	13.39210	10.90010	16.39893
Guaranty Trust Bank (Kenya) Ltd - 24	10.06190	6.508054	13.50390	10.95151	16.43396
Guardian Bank Limited - 13	9.099185	5.109515	12.01476	9.905785	16.08864
Guardian Bank Limited - 14	9.165029	5.329530	12.31594	9.689242	16.15863
Guardian Bank Limited - 15	9.255505	5.511435	12.49322	9.947122	16.40124
Guardian Bank Limited - 16	9.380505	5.649168	12.70048	10.28086	16.41585
Guardian Bank Limited - 17	9.263881	5.706834	12.72987	10.44238	16.58511
Guardian Bank Limited - 18	9.186355	5.791986	12.79318	10.59971	16.65915
Guardian Bank Limited - 19	9.133459	5.902382	12.96012	10.70589	16.33656
Guardian Bank Limited - 20	9.154193	6.180462	13.07394	10.73564	16.26379
Guardian Bank Limited - 21	9.177404	6.372261	13.20367	10.79362	16.28857
Guardian Bank Limited - 22	9.181323	6.513927	13.32042	10.81549	16.30123
Guardian Bank Limited - 23	9.280053	6.493512	13.39210	10.90010	16.39893
Guardian Bank Limited - 24	9.284055	6.508054	13.50390	10.95151	16.43396
Gulf African Bank Ltd - 13	10.79249	5.109515	12.01476	9.905785	16.08864
Gulf African Bank Ltd - 14	10.99329	5.329530	12.31594	9.689242	16.15863
Gulf African Bank Ltd - 15	11.13947	5.511435	12.49322	9.947122	16.40124
Gulf African Bank Ltd - 16	11.26427	5.649168	12.70048	10.28086	16.41585
Gulf African Bank Ltd - 17	11.38181	5.706834	12.72987	10.44238	16.58511
Gulf African Bank Ltd - 18	11.49087	5.791986	12.79318	10.59971	16.65915
Gulf African Bank Ltd - 19	11.55628	5.902382	12.96012	10.70589	16.33656
Gulf African Bank Ltd - 20	11.56345	6.180462	13.07394	10.73564	16.26379
Gulf African Bank Ltd - 21	11.52051	6.372261	13.20367	10.79362	16.28857
Gulf African Bank Ltd - 22	11.37151	6.513927	13.32042	10.81549	16.30123
Gulf African Bank Ltd - 23	11.39106	6.493512	13.39210	10.90010	16.39893
Gulf African Bank Ltd - 24	11.42684	6.508054	13.50390	10.95151	16.43396
Habib Bank A.G. Zurich - 13	8.776321	5.109515	12.01476	9.905785	16.08864

Habib Bank A.G. Zurich - 14	8.692658	5.329530	12.31594	9.689242	16.15863
Habib Bank A.G. Zurich - 15	8.629092	5.511435	12.49322	9.947122	16.40124
Habib Bank A.G. Zurich - 16	8.603921	5.649168	12.70048	10.28086	16.41585
Habib Bank A.G. Zurich - 17	8.537388	5.706834	12.72987	10.44238	16.58511
Habib Bank A.G. Zurich - 18	8.525360	5.791986	12.79318	10.59971	16.65915
Habib Bank A.G. Zurich - 19	8.514389	5.902382	12.96012	10.70589	16.33656
Habib Bank A.G. Zurich - 20	8.522976	6.180462	13.07394	10.73564	16.26379
Habib Bank A.G. Zurich - 21	8.551401	6.372261	13.20367	10.79362	16.28857
Habib Bank A.G. Zurich - 22	8.606851	6.513927	13.32042	10.81549	16.30123
Habib Bank A.G. Zurich - 23	8.707979	6.493512	13.39210	10.90010	16.39893
Habib Bank A.G. Zurich - 24	8.750841	6.508054	13.50390	10.95151	16.43396
HFC Limited - 13	11.01751	5.109515	12.01476	9.905785	16.08864
HFC Limited - 14	11.13121	5.329530	12.31594	9.689242	16.15863
HFC Limited - 15	11.21733	5.511435	12.49322	9.947122	16.40124
HFC Limited - 16	11.58693	5.649168	12.70048	10.28086	16.41585
HFC Limited - 17	11.35750	5.706834	12.72987	10.44238	16.58511
HFC Limited - 18	12.12915	5.791986	12.79318	10.59971	16.65915
HFC Limited - 19	12.49618	5.902382	12.96012	10.70589	16.33656
HFC Limited - 20	12.53078	6.180462	13.07394	10.73564	16.26379
HFC Limited - 21	12.93347	6.372261	13.20367	10.79362	16.28857
HFC Limited - 22	12.55650	6.513927	13.32042	10.81549	16.30123
HFC Limited - 23	12.52709	6.493512	13.39210	10.90010	16.39893
HFC Limited - 24	12.43003	6.508054	13.50390	10.95151	16.43396
I & M Bank Ltd - 13	9.673445	5.109515	12.01476	9.905785	16.08864
I & M Bank Ltd - 14	11.31120	5.329530	12.31594	9.689242	16.15863
I & M Bank Ltd - 15	11.50205	5.511435	12.49322	9.947122	16.40124
I & M Bank Ltd - 16	11.63116	5.649168	12.70048	10.28086	16.41585
I & M Bank Ltd - 17	11.78677	5.706834	12.72987	10.44238	16.58511
I & M Bank Ltd - 18	11.92272	5.791986	12.79318	10.59971	16.65915
I & M Bank Ltd - 19	11.98933	5.902382	12.96012	10.70589	16.33656
I & M Bank Ltd - 20	12.07790	6.180462	13.07394	10.73564	16.26379
I & M Bank Ltd - 21	12.16008	6.372261	13.20367	10.79362	16.28857
I & M Bank Ltd - 22	12.22454	6.513927	13.32042	10.81549	16.30123
I & M Bank Ltd - 23	12.40381	6.493512	13.39210	10.90010	16.39893
I & M Bank Ltd - 24	12.73532	6.508054	13.50390	10.95151	16.43396
KCB Bank Kenya Ltd - 13	14.35830	5.109515	12.01476	9.905785	16.08864
KCB Bank Kenya Ltd - 14	14.65881	5.329530	12.31594	9.689242	16.15863
KCB Bank Kenya Ltd - 15	15.14908	5.511435	12.49322	9.947122	16.40124
KCB Bank Kenya Ltd - 16	15.34020	5.649168	12.70048	10.28086	16.41585
KCB Bank Kenya Ltd - 17	15.53576	5.706834	12.72987	10.44238	16.58511
KCB Bank Kenya Ltd - 18	15.78541	5.791986	12.79318	10.59971	16.65915
KCB Bank Kenya Ltd - 19	15.92786	5.902382	12.96012	10.70589	16.33656
KCB Bank Kenya Ltd - 20	16.00800	6.180462	13.07394	10.73564	16.26379
KCB Bank Kenya Ltd - 21	16.09821	6.372261	13.20367	10.79362	16.28857
KCB Bank Kenya Ltd - 22	16.24746	6.513927	13.32042	10.81549	16.30123
KCB Bank Kenya Ltd - 23	17.67726	6.493512	13.39210	10.90010	16.39893
KCB Bank Kenya Ltd - 24	17.79871	6.508054	13.50390	10.95151	16.43396
Kingdom Bank Limited - 19	11.97969	5.902382	12.96012	10.70589	16.33656

Kingdom Bank Limited - 20	12.03511	6.180462	13.07394	10.73564	16.26379
Kingdom Bank Limited - 21	12.22136	6.372261	13.20367	10.79362	16.28857
Kingdom Bank Limited - 22	12.08569	6.513927	13.32042	10.81549	16.30123
Kingdom Bank Limited - 23	12.15209	6.493512	13.39210	10.90010	16.39893
Kingdom Bank Limited - 24	12.51230	6.508054	13.50390	10.95151	16.43396
Middle East Bank (K) Ltd - 13	7.495542	5.109515	12.01476	9.905785	16.08864
Middle East Bank (K) Ltd - 14	7.601402	5.329530	12.31594	9.689242	16.15863
Middle East Bank (K) Ltd - 15	7.497207	5.511435	12.49322	9.947122	16.40124
Middle East Bank (K) Ltd - 16	7.536897	5.649168	12.70048	10.28086	16.41585
Middle East Bank (K) Ltd - 17	7.512071	5.706834	12.72987	10.44238	16.58511
Middle East Bank (K) Ltd - 18	7.586296	5.791986	12.79318	10.59971	16.65915
Middle East Bank (K) Ltd - 19	7.741099	5.902382	12.96012	10.70589	16.33656
Middle East Bank (K) Ltd - 20	8.004366	6.180462	13.07394	10.73564	16.26379
Middle East Bank (K) Ltd - 21	8.087025	6.372261	13.20367	10.79362	16.28857
Middle East Bank (K) Ltd - 22	8.112528	6.513927	13.32042	10.81549	16.30123
Middle East Bank (K) Ltd - 23	8.251403	6.493512	13.39210	10.90010	16.39893
Middle East Bank (K) Ltd - 24	8.458716	6.508054	13.50390	10.95151	16.43396
M-Oriental Bank Kenya Ltd - 13	8.670944	5.109515	12.01476	9.905785	16.08864
M-Oriental Bank Kenya Ltd - 14	8.565602	5.329530	12.31594	9.689242	16.15863
M-Oriental Bank Kenya Ltd - 15	8.485083	5.511435	12.49322	9.947122	16.40124
M-Oriental Bank Kenya Ltd - 16	8.366370	5.649168	12.70048	10.28086	16.41585
M-Oriental Bank Kenya Ltd - 17	8.362642	5.706834	12.72987	10.44238	16.58511
M-Oriental Bank Kenya Ltd - 18	8.367765	5.791986	12.79318	10.59971	16.65915
M-Oriental Bank Kenya Ltd - 19	8.378621	5.902382	12.96012	10.70589	16.33656
M-Oriental Bank Kenya Ltd - 20	8.350902	6.180462	13.07394	10.73564	16.26379
M-Oriental Bank Kenya Ltd - 21	8.295299	6.372261	13.20367	10.79362	16.28857
M-Oriental Bank Kenya Ltd - 22	8.314587	6.513927	13.32042	10.81549	16.30123
M-Oriental Bank Kenya Ltd - 23	8.383433	6.493512	13.39210	10.90010	16.39893
M-Oriental Bank Kenya Ltd - 24	8.524963	6.508054	13.50390	10.95151	16.43396
National Bank of Kenya Ltd - 13	13.16566	5.109515	12.01476	9.905785	16.08864
National Bank of Kenya Ltd - 14	13.25695	5.329530	12.31594	9.689242	16.15863
National Bank of Kenya Ltd - 15	13.45223	5.511435	12.49322	9.947122	16.40124
National Bank of Kenya Ltd - 16	13.16177	5.649168	12.70048	10.28086	16.41585
National Bank of Kenya Ltd - 17	13.30076	5.706834	12.72987	10.44238	16.58511
National Bank of Kenya Ltd - 18	13.45605	5.791986	12.79318	10.59971	16.65915
National Bank of Kenya Ltd - 19	13.45902	5.902382	12.96012	10.70589	16.33656
National Bank of Kenya Ltd - 20	13.56348	6.180462	13.07394	10.73564	16.26379
National Bank of Kenya Ltd - 21	13.61612	6.372261	13.20367	10.79362	16.28857
National Bank of Kenya Ltd - 22	13.63716	6.513927	13.32042	10.81549	16.30123
National Bank of Kenya Ltd - 23	13.17988	6.493512	13.39210	10.90010	16.39893
National Bank of Kenya Ltd - 24	13.14563	6.508054	13.50390	10.95151	16.43396
NCBA Bank Kenya Ltd - 19	17.27219	5.902382	12.96012	10.70589	16.33656
NCBA Bank Kenya Ltd - 20	17.47216	6.180462	13.07394	10.73564	16.26379
NCBA Bank Kenya Ltd - 21	17.29559	6.372261	13.20367	10.79362	16.28857
NCBA Bank Kenya Ltd - 22	17.19911	6.513927	13.32042	10.81549	16.30123
NCBA Bank Kenya Ltd - 23	17.23114	6.493512	13.39210	10.90010	16.39893
NCBA Bank Kenya Ltd - 24	17.31467	6.508054	13.50390	10.95151	16.43396
Paramount Bank Ltd - 13	9.271153	5.109515	12.01476	9.905785	16.08864

Paramount Bank Ltd - 14	8.848653	5.329530	12.31594	9.689242	16.15863
Paramount Bank Ltd - 15	9.054855	5.511435	12.49322	9.947122	16.40124
Paramount Bank Ltd - 16	9.176887	5.649168	12.70048	10.28086	16.41585
Paramount Bank Ltd - 17	8.996776	5.706834	12.72987	10.44238	16.58511
Paramount Bank Ltd - 18	8.929700	5.791986	12.79318	10.59971	16.65915
Paramount Bank Ltd - 19	8.935245	5.902382	12.96012	10.70589	16.33656
Paramount Bank Ltd - 20	8.950403	6.180462	13.07394	10.73564	16.26379
Paramount Bank Ltd - 21	9.014204	6.372261	13.20367	10.79362	16.28857
Paramount Bank Ltd - 22	8.761237	6.513927	13.32042	10.81549	16.30123
Paramount Bank Ltd - 23	8.776784	6.493512	13.39210	10.90010	16.39893
Paramount Bank Ltd - 24	8.846785	6.508054	13.50390	10.95151	16.43396
Prime Bank Ltd - 13	10.17023	5.109515	12.01476	9.905785	16.08864
Prime Bank Ltd - 14	10.04186	5.329530	12.31594	9.689242	16.15863
Prime Bank Ltd - 15	10.09811	5.511435	12.49322	9.947122	16.40124
Prime Bank Ltd - 16	10.28175	5.649168	12.70048	10.28086	16.41585
Prime Bank Ltd - 17	10.32203	5.706834	12.72987	10.44238	16.58511
Prime Bank Ltd - 18	10.38087	5.791986	12.79318	10.59971	16.65915
Prime Bank Ltd - 19	10.47681	5.902382	12.96012	10.70589	16.33656
Prime Bank Ltd - 20	10.57106	6.180462	13.07394	10.73564	16.26379
Prime Bank Ltd - 21	10.60115	6.372261	13.20367	10.79362	16.28857
Prime Bank Ltd - 22	10.67851	6.513927	13.32042	10.81549	16.30123
Prime Bank Ltd - 23	10.78639	6.493512	13.39210	10.90010	16.39893
Prime Bank Ltd - 24	10.84626	6.508054	13.50390	10.95151	16.43396
SBM Bank (Kenya) Ltd - 17	8.810460	5.706834	12.72987	10.44238	16.58511
SBM Bank (Kenya) Ltd - 18	12.66511	5.791986	12.79318	10.59971	16.65915
SBM Bank (Kenya) Ltd - 19	12.27279	5.902382	12.96012	10.70589	16.33656
SBM Bank (Kenya) Ltd - 20	12.21289	6.180462	13.07394	10.73564	16.26379
SBM Bank (Kenya) Ltd - 21	12.23721	6.372261	13.20367	10.79362	16.28857
SBM Bank (Kenya) Ltd - 22	12.07460	6.513927	13.32042	10.81549	16.30123
SBM Bank (Kenya) Ltd - 23	11.77044	6.493512	13.39210	10.90010	16.39893
SBM Bank (Kenya) Ltd - 24	11.81515	6.508054	13.50390	10.95151	16.43396
Sidian Bank Limited - 13	12.34591	5.109515	12.01476	9.905785	16.08864
Sidian Bank Limited - 14	12.74441	5.329530	12.31594	9.689242	16.15863
Sidian Bank Limited - 15	12.40780	5.511435	12.49322	9.947122	16.40124
Sidian Bank Limited - 16	12.45511	5.649168	12.70048	10.28086	16.41585
Sidian Bank Limited - 17	12.45219	5.706834	12.72987	10.44238	16.58511
Sidian Bank Limited - 18	12.39044	5.791986	12.79318	10.59971	16.65915
Sidian Bank Limited - 19	12.42161	5.902382	12.96012	10.70589	16.33656
Sidian Bank Limited - 20	12.17717	6.180462	13.07394	10.73564	16.26379
Sidian Bank Limited - 21	12.09716	6.372261	13.20367	10.79362	16.28857
Sidian Bank Limited - 22	12.04514	6.513927	13.32042	10.81549	16.30123
Sidian Bank Limited - 23	12.00780	6.493512	13.39210	10.90010	16.39893
Sidian Bank Limited - 24	12.05692	6.508054	13.50390	10.95151	16.43396
Spire Bank Limited - 15	9.938130	5.511435	12.49322	9.947122	16.40124
Spire Bank Limited - 16	10.05225	5.649168	12.70048	10.28086	16.41585
Spire Bank Limited - 17	10.06790	5.706834	12.72987	10.44238	16.58511
Spire Bank Limited - 18	10.05737	5.791986	12.79318	10.59971	16.65915
Spire Bank Limited - 19	10.05372	5.902382	12.96012	10.70589	16.33656

Spire Bank Limited - 20	10.03530	6.180462	13.07394	10.73564	16.26379
Spire Bank Limited - 21	9.995474	6.372261	13.20367	10.79362	16.28857
Spire Bank Limited - 22	9.716857	6.513927	13.32042	10.81549	16.30123
Spire Bank Limited - 23	9.716857	6.493512	13.39210	10.90010	16.39893
Spire Bank Limited - 24	9.716857	6.508054	13.50390	10.95151	16.43396
Stanbic Bank Ltd - 15	11.80784	5.511435	12.49322	9.947122	16.40124
Stanbic Bank Ltd - 16	11.83905	5.649168	12.70048	10.28086	16.41585
Stanbic Bank Ltd - 17	11.97859	5.706834	12.72987	10.44238	16.58511
Stanbic Bank Ltd - 18	12.13576	5.791986	12.79318	10.59971	16.65915
Stanbic Bank Ltd - 19	12.22371	5.902382	12.96012	10.70589	16.33656
Stanbic Bank Ltd - 20	12.26179	6.180462	13.07394	10.73564	16.26379
Stanbic Bank Ltd - 21	12.39063	6.372261	13.20367	10.79362	16.28857
Stanbic Bank Ltd - 22	12.50059	6.513927	13.32042	10.81549	16.30123
Stanbic Bank Ltd - 23	12.59096	6.493512	13.39210	10.90010	16.39893
Stanbic Bank Ltd - 24	12.68201	6.508054	13.50390	10.95151	16.43396
Standard Chartered Bank (K) Ltd - 13	12.18399	5.109515	12.01476	9.905785	16.08864
Standard Chartered Bank (K) Ltd - 14	12.27885	5.329530	12.31594	9.689242	16.15863
Standard Chartered Bank (K) Ltd - 15	12.29148	5.511435	12.49322	9.947122	16.40124
Standard Chartered Bank (K) Ltd - 16	12.30294	5.649168	12.70048	10.28086	16.41585
Standard Chartered Bank (K) Ltd - 17	12.23156	5.706834	12.72987	10.44238	16.58511
Standard Chartered Bank (K) Ltd - 18	12.14704	5.791986	12.79318	10.59971	16.65915
Standard Chartered Bank (K) Ltd - 19	12.34799	5.902382	12.96012	10.70589	16.33656
Standard Chartered Bank (K) Ltd - 20	12.37419	6.180462	13.07394	10.73564	16.26379
Standard Chartered Bank (K) Ltd - 21	12.51551	6.372261	13.20367	10.79362	16.28857
Standard Chartered Bank (K) Ltd - 22	12.59270	6.513927	13.32042	10.81549	16.30123
Standard Chartered Bank (K) Ltd - 23	12.64637	6.493512	13.39210	10.90010	16.39893
Standard Chartered Bank (K) Ltd - 24	12.66970	6.508054	13.50390	10.95151	16.43396
UBA Bank Kenya Ltd - 13	8.144679	5.109515	12.01476	9.905785	16.08864
UBA Bank Kenya Ltd - 14	8.587652	5.329530	12.31594	9.689242	16.15863
UBA Bank Kenya Ltd - 15	8.629271	5.511435	12.49322	9.947122	16.40124
UBA Bank Kenya Ltd - 16	7.336937	5.649168	12.70048	10.28086	16.41585
UBA Bank Kenya Ltd - 17	8.589142	5.706834	12.72987	10.44238	16.58511
UBA Bank Kenya Ltd - 18	8.681011	5.791986	12.79318	10.59971	16.65915
UBA Bank Kenya Ltd - 19	8.743532	5.902382	12.96012	10.70589	16.33656
UBA Bank Kenya Ltd - 20	8.485496	6.180462	13.07394	10.73564	16.26379
UBA Bank Kenya Ltd - 21	8.989070	6.372261	13.20367	10.79362	16.28857
UBA Bank Kenya Ltd - 22	9.578242	6.513927	13.32042	10.81549	16.30123
UBA Bank Kenya Ltd - 23	9.533003	6.493512	13.39210	10.90010	16.39893
UBA Bank Kenya Ltd - 24	9.547527	6.508054	13.50390	10.95151	16.43396
Victoria Commercial Bank Ltd - 13	8.099554	5.109515	12.01476	9.905785	16.08864

Victoria Commercial Bank Ltd - 14	8.140024	5.329530	12.31594	9.689242	16.15863
Victoria Commercial Bank Ltd - 15	8.207947	5.511435	12.49322	9.947122	16.40124
Victoria Commercial Bank Ltd - 16	8.262301	5.649168	12.70048	10.28086	16.41585
Victoria Commercial Bank Ltd - 17	8.397508	5.706834	12.72987	10.44238	16.58511
Victoria Commercial Bank Ltd - 18	8.481773	5.791986	12.79318	10.59971	16.65915
Victoria Commercial Bank Ltd - 19	8.526549	5.902382	12.96012	10.70589	16.33656
Victoria Commercial Bank Ltd - 20	8.582981	6.180462	13.07394	10.73564	16.26379
Victoria Commercial Bank Ltd - 21	8.636220	6.372261	13.20367	10.79362	16.28857
Victoria Commercial Bank Ltd - 22	8.760610	6.513927	13.32042	10.81549	16.30123
Victoria Commercial Bank Ltd - 23	8.847072	6.493512	13.39210	10.90010	16.39893
Victoria Commercial Bank Ltd - 24	9.017968	6.508054	13.50390	10.95151	16.43396

Appendix II: Data Collection Letter

THE CATHOLIC UNIVERSITY OF EASTERN AFRICA
A.M.E.C.E.A
SCHOOL OF BUSINESS & ECONOMICS
Department of Graduate Business Studies
P.O. BOX 62157 00200 Nairobi – KEN
Tel: 020-2525811-5, 8890023-4,
Email: dbs@cuea.edu or bsdgbs@cuea.edu
Website: www.cuea.edu

Our Ref: CUEA/SoBE/GBS/JM/mba.rec/376/2025

20th May 2025

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: SALOME WANGARI – REG NO: 1061996

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 (Finance Option).

As part of the MBA degree requirements, the University expects the student to write a research thesis. Salome 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 ***"Digital Financial Innovation and Inclusion in the Commercial Banks in Kenya".***

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

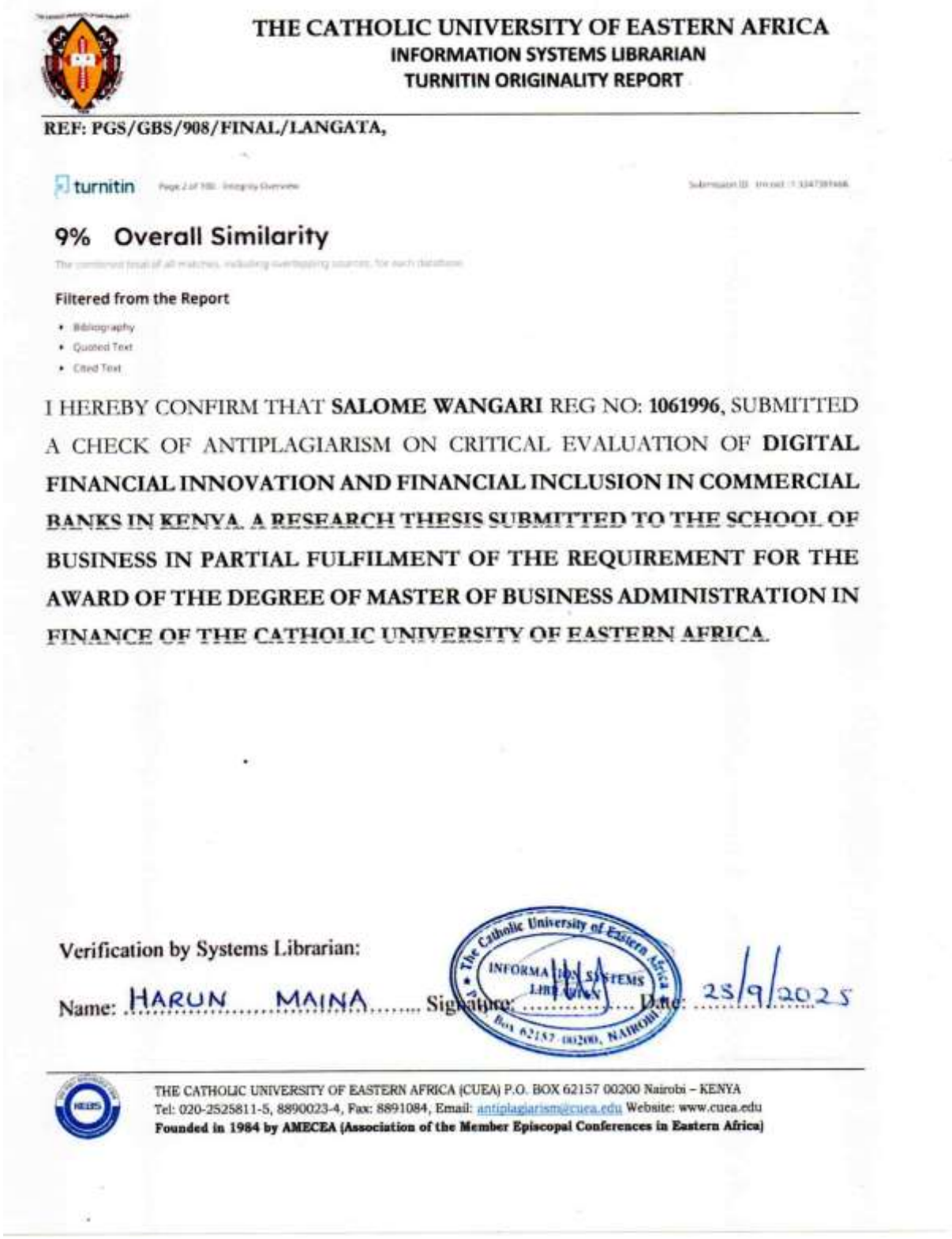
Thank you.

THE CATHOLIC UNIVERSITY OF EASTERN AFRICA
H.O.D.
20 MAY 2025
GRADUATE BUSINESS SCHOOL
P.O. BOX 62157 - 00200, NAIROBI

Yours faithfully,

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

Appendix III: Plagiarism Certificate



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I HEREBY CONFIRM THAT **SALOME WANGARI** REG NO: **1061996**, SUBMITTED A CHECK OF ANTIPLAGIARISM ON CRITICAL EVALUATION OF **DIGITAL FINANCIAL INNOVATION AND FINANCIAL INCLUSION IN COMMERCIAL BANKS IN KENYA. A RESEARCH THESIS SUBMITTED TO THE SCHOOL OF BUSINESS IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION IN FINANCE OF THE CATHOLIC UNIVERSITY OF EASTERN AFRICA.**

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Appendix IV: NACOSTI Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR
SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **711470**

Date of Issue: **17/July/2025**

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This is to Certify that Ms.. SALOME WANGARI 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: DIGITAL FINANCIAL INNOVATION AND FINANCIAL INCLUSION IN THE BANKING INDUSTRY IN KENYA for the period ending : 17/July/2026.

License No: **NACOSTI/P/25/4177001**

711470

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