THE EFFECT OF TECHNOLOGICAL INNOVATIONS ON FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA

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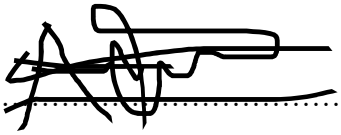
DECLARATION

This research project is my original work and has never been presented for any academic award in any other university or learning institution.

Signed…  ……. Date ..25/11/2023

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LIST OF ACRONYMS AND ABBREVIATIONS

ATM	Automated Teller Machine
CBK	Central Bank of Kenya
EFT	Electronic Funds Transfer
IDT	Innovation Diffusion Technology
IT	Information Technology
KAP	Knowledge-attitude Practice
NIM	Net Interest Margin
OECD	Organization for Economic Cooperation and Development
PEOU	Perceived ease of Use
PU	Perceived Use
ROA	Return on Asset
ROE	Return on Equity
ROI	Return on Investment
SMEs	Small and Medium Enterprises

ABSTRACT

The use of new technologies is causing substantial shifts in Kenya's banking and finance industry. The business is in the midst of enormous and notable developments that brought about in and will keep on perplexity the banking industry with a variety of customer-focused financial solutions. The desire to dominate the economy and surpass the cunning of their rivals is the driving force behind all or some of these changes. The institution has welcomed potential technological developments upheavals in order to boost its revenue margins and make sure that the changing market place is fully utilized. These modifications have forced commercial banks to resurrect its financially motivated philosophy within the face of an increasingly cutthroat international financial industry. This study's primary objective was to figure out how financial innovations affected the fiscal health of Kenya's commercial banks. The study adopted descriptive research design. A comprehensive census of all 43 commercial banks in Kenya was employed, obviating the need for sampling procedures. Secondary data was used for this Study. A data collection sheet was used to collect data and the records of the data collected was entered there before being subjected to a set of analytical tools. To gather data on the amount and frequency of alternative channels of banking transactions, the researcher made reference to Central Bank of Kenya annual supervisory reports, published reports, and other documents like the banking sector publications for the years 2018 to 2022.The findings of the study were that; From the regression analysis it was determined that: the beta value for mobile banking was 0.775 at a 0.00 degree of importance. The result was an indication that mobile banking was a positive and significant predictor of financial performance. The beta value for online banking was 0.172. This meant that if all other variables were held constant a rise in digital banking units led to a 0.172 improvement in the monetary outcomes. It also meant that online banking was a positive and significant predictor for financial performance. Size had the beta value of 1.327. This was an indication that a unit increase in size led to a 1.327 increase in financial performance. It also meant that size was also a positive and significant predictor of financial performance. Agency banking had a beta value of 0.611. This was an indication that agency banking was a positive and significant predictor of financial performance of the banks. Based on the findings, it was recommended that; commercial banks ought to employ fiscal creativity in order to improve business operations. For the purpose of improving financial success, it is advised that commercial banks keep establishing long-lasting business relationships and partnerships with web and mobile phone service providers. The analysis suggests that commercial banks should hire additional representatives who provide banking services in light of the investigation's outcomes. As a result, there would be more transactions, resulting in higher earnings on capital.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

The term "technological innovation," which has gained popularity over the past ten years, has its roots in Schumpeter, who is regarded as the term's originator (Drucker, 2014). Globally, other Scholars have been successful in reengineering the term innovation to suit their environment. Financial innovation has played a pivotal role in economic endeavors throughout history, as highlighted by Goetzmann (2009). An illustrative example can be traced back approximately 6,000 years ago to the prosperous Sumerian city of Uruk. During this period, the emergence of tradeable lending agreements appeared for allowing a varied range of intertemporal exchanges, thereby fostering enhanced specialization, innovation, and overall economic expansion (Goetzmann, 2009).

The banking industry in the twenty-first century has unquestionably been significantly impacted by technological advancement. Gaining new customers and improving an organization's performance are two major factors that drive economic growth (Urbancova, 2013). The world of today is at a fortunate crossroads, according to a 2015 World Bank report on financial innovation and competitiveness. A key point is that the World Bank Group advocates for equity and the reduction of poverty among low-income groups that make less than $1 per day. The majority of Kenyan commercial banks have invested in information technology, which has caused a diversification in their line of business. Since the emergence of online lenders, who are significantly harming the performance of Kenya's commercial banks, technological innovation has not been well received. This is a result of rival businesses operating against them in the small

market and other market forces. In addition to the M-Shwari loan platform provided by Safaricom through its M-pesa platform, there are over 100 online money lending apps without collateral, which have had a variety of effects on the commercial banking industry. Financial Innovation is largely responsible for the metamorphosis and transition behind everything that is happening in Kenya's banking sector (Njoroge, 2017). The value and volume of banking sector transactions increased thanks to Kenya's electronic payment and settlement system (Kinoti, 2015). With a high percentage of Kenyans owning smartphones, internet banking is dominating the commercial banking industry, saving customers from long bank lines and delayed transactions (Wanjohi, 2017).

1.1.1 Technological Innovation

As posited by Ignazio (2007), the act of creating novel financial products and devising innovative approaches to provide pre-existing services within banking establishments is commonly referred to as financial innovation. Financial innovation was defined by Noyer (2007) as the introduction of novel products to cater to the target consumers of the financial market. These two definitions show how technology can be used to enhance client interactions and the operations of financial institutions. Financial companies are required to innovate in order to maintain their competitiveness and to establish new and improved capacities at the same time as their equipment becomes more useful (Drucker, 1985). Financial innovation can come from the banking sector's institutional, product, and processes areas, according to Frame and White (2002). The banking sector is currently experiencing many of these types of financial innovation. The innovation of

choice may have a detrimental effect on traditional methods of doing things.

Drucke (2014) asserts that innovation significantly influences any institution's management approach. New categories of financial intermediaries being developed or the legal and regulatory environment changing are two institutional innovations that might have an impact on the financial sector. In order to expedite the commercial banking process, the OECD defined creation of products in 2005 as a result of relatively new goods and services. As per a report disseminated by the Organization for Economic Co-operation and Development (OECD) in 2005, the financial sector's innovation can be ascribed to a varied spectrum of factors. These factors encompass the product itself, customers, management, and the institution as a whole. Raising the institution's service quality was the shared objective of the involved parties. They believed that diversification could be significantly improved by combining new and old ideas and accepting change.

The institution, the process, and the product are the three main areas in which businesses innovate in the financial sector (Frame and White, 2002). The institution's innovation is based on novel business plans, enhanced working conditions, and new investor relationships. Institutional innovation affects how financial institutions function by collaborating with businesses that have goods or systems that would support their operations or by introducing agents. Innovation becomes an option where the government enacts minimum capital requirements and modifies the legal and regulatory system. Contrarily, the financial industry frequently introduces new products (OECD, 2005). In this type of financial innovation, new, improved products or services are created based on the needs and preferences of consumers.

Technology innovation has completely changed how the financial system operates in Kenya. If everything goes based on plan over the next ten years, technological progress was largely to blame for the performance of the banking sector. According to Njoroge (2017), financial institutions that adopt technology slowly run the risk of losing customers. According to the research conducted by Manoranjan, Bhusan, Kanta, and Suryakanta (2012), the financial system within Kenya is experiencing the implementation of several noteworthy financial innovations. These innovations encompass the utilization of automated teller machines, mobile banking services, internet banking platforms, and agency banking models. The significance of online banking in the contemporary world is undeniable. According to Manoranjan, Bhusan, Kanta, and Suryakanta (2012), internet banking has been instrumental in enhancing customer relationships, reducing operational, bankruptcy, and regulatory costs, as well as increasing transparency and profit margins. The Central Bank of Kenya (CBK), the regulatory authority in the financial sector in Kenya, has presented data that reveals an important surge across demand for automated teller machines (ATMs) since their inception in the early 1990s. Considering that the Central Bank of Kenya (CBK), as the financial regulatory authority, has been granted authorization to utilize and execute the Internet of Things (IoT) within the financial industry, encompassing the integration of Electronic Funds Transfer (Ignazio, 2017).

1.1.2 Financial Performance

Organizations utilize four primary performance metrics, specifically customer-focused execution, economic efficiency, labour efficiency, and organisational efficiency. These metrics serve as

pivotal indicators of an organization's comprehensive performance and achievement. According to the Farlex Financial Dictionary (2012), financial performance is among the quantitative indicators that reveal a company's profitability. Given its ability to showcase a bank's revenue generation, stability maintenance, and profit-making capability, financial performance holds utmost significance in the banking sector. The financial outcomes, particularly return on assets, of a bank exemplify its proficiency in generating returns from its fixed assets. This demonstrates the efficiency with which a bank can use its assets to produce revenue. According to Khrawish (2011), the return on assets ratio also demonstrates how bank executives can make money from their current assets.

The analysis of financial ratios enables the assessment of financial performance. This compilation encompasses a range of ratios, including after-tax profits, return on equity, return on assets, earnings per share, and additional market valuations. Historically, profit after tax has been a commonly used metric for evaluating the the state of banks' finances. Additional proportions which were recently employed tend to be the proportions of overall debts divided by cumulative investments, the monetary interconnectedness proportion, the composition of the bank's portfolio, the per capita Gross Domestic Product, sales and client happiness (Athanasoglou et al., 2008). External determinants of financial performance entails the internal elements which are obtained through the financial situation and complete earnings declarations, while the ethical and economic environment whereby banks function is utilised. The purpose of this investigation is to ascertain

how technological advancements and bank financial performance by examining the potential connection between these two variables.

1.1.3 Technological Innovations and Financial Performance

The commercial banking sector in Kenya, comprising of 40 banks, is classified into three main groups according to an established structure encompassing their net financial assets, customer inflow, capital and reserves, deposit share, and loan inventory. A bank meets the requirements to be considered a large group bank (tier 1 bank) if its composite weighted index is greater than 5%. In the realm of banking, small group banks, also known as tier 3 banks, are allocated weighted composite indices that fall below 1%. Conversely, medium group banks, or tier 2 banks, are assigned indices ranging from 1% to 5%. According to the most recent data released as a result of the CBK in 2021, the nation is host to eight financial institutions classified as tier 1, eleven financial institutions classified as tier 2, and twenty-one financial institutions classified as tier 3. Over the past few years, the commercial banking industry's market share segment has undergone an unheard-of transformation. The CBK (2021) report states that during the 2020–2021 fiscal year, the financial institutions in the tier one category saw an increase in their market share from 65–point 3 percent to 66–percent. The growth in market share was primarily brought on by the increased customer deposits, which are predicted to continue in this pattern through 2022. In the middle peer group, comparable trends were identified, with the proportion rising from 26% in December 2020 to 26% in December 2021. Conversely, the small peer group encountered an unforeseen decrease in market share by 1.5%, resulting in a decline from 9% to 7.5% compared to the previous fiscal year. This decline can be attributed to the merger of two tier three financial

institutions by tier one and tier two entities within the same fiscal year, leading to a substantial reduction in market dominance. According to the CBK, the institution was able to diversify its product offerings thanks to technological 1llllll network coverage up from 2,656 in 2016 to 2,825 in 2021. The fiscal year 2020-21 was deemed as the most prosperous year in the advancement of self-service banking technology in the past decade, notwithstanding the Covid pandemic. The financial leadership in the commercial banks made a well-thought out strategic- decision to ensure that they specifically devolved their services to economically disadvantaged areas, and this is important to note. The commercial banking sector has openly embraced innovation, as demonstrated by this. In summary, the rise of self-service banking is an excellent illustration of how financial institutions have embraced financial innovation.

1.1.4 Commercial banks in Kenya

The categorization of Kenya's commercial banking industry into three principal groups is achieved through the utilization of a pre-established composition of their net assets, customer flow, capital and reserves, percentage of deposits, and loan portfolio. In line with the established standards, banks are categorized as large group banks (tier 1 banks) if their composite weighted index is greater than 5%. Medium group banks, also known as tier 2 banks, are characterized by a weighted index ranging from 1% to 5%. On the other hand, small group banks, referred to as tier 3 banks, possess a weighted composite index below one percent. According to the Central Bank of Kenya (CBK, 2021), the current banking sector in Kenya consists of eight tier 1 financial

institutions, eleven tier 2 institutions, and twenty-one tier 3 institutions. The tier one category accounted for an astounding 81 percent of the gross total pre-tax profit, up 3 percent from the before accounting period, according to the CBK (2021) report.

The tax records pertaining to financial institutions classified under Tier 3 revealed a notable decrease of 3.5 percent. This decline can be attributed to substantial losses incurred by eight financial institutions, which marks an increase from the previous year's count of five. Furthermore, the proportion of gross pre-tax income associated with the middle peer group in Tier 2 has experienced a reduction of zero percentage points compared to the preceding fiscal year. The decrease in revenue was brought on by the loss of income, which increased to three institutions from the prior two. In the same time frame, the portfolio of customer deposits increased by a staggering 10.75 percent. The adoption of technological innovation to diversify the institution's product offerings led to an increase in daily transactions, which the CBK attributed to higher income.

Similar to the proliferation of ATMs in the self-service banking sector, the ATM system experienced a comparable expansion nationwide. In order to provide doorstep services for their customers, the institutions increased the coverage of their ATM network from 2,656 in 2019 to 2,825 in 2021. The years between 2010 and 2020 were regarded as the most productive for the development of self-service banking technology. To make sure that their services are specifically devolved to the economically underprivileged areas, the financial leadership must appear to have made a well-executed strategic decision. This offers a distinct benchmark for the commercial

banking industry's adoption of innovation. A good sign of how Kenyan financial institutions have embraced financial innovation is the rise in self-service banking locations.

1.2 Research Problem

Previous research has demonstrated a positive correlation between digital banking solutions and financial performance indicators, including profitability, efficiency, and customer acquisition (Kimutai & Mutai, 2019; Odera & Nyambura, 2018). However, it is essential to examine the how these solutions impact the financial performance of commercial banks in Kenya. Research has further shown that the adoption of ATMs and self-service channels leads to cost savings, improved operational efficiency, and enhanced customer experience, positively impacting financial performance (Kiprotich & Cheserek, 2017; Oketch & Ongarora, 2019). However, the specific influence of these technologies on the financial health of commercial banks in the Kenyan context requires further investigation. Several studies have provided evidence of a favorable correlation between the implementation of core banking systems, data analytics, and financial performance indicators, encompassing profitability, efficiency, and risk management (Muthoga & Thuo, 2018; Muriuki & Bwisa, 2020). Nevertheless, it is imperative to conduct a thorough examination of the specific influence exerted by these technologies on the financial well-being of commercial banks in Kenya. Although the employing of cryptocurrencies and Bitcoin technology in Kenya is still in its infancy, research has shown that these technologies may offer advantages like improved transaction security, lower transaction costs, and quicker cross-border transfers (Mokua and Chumo, 2020; Gikonyo et al. , 2019). However, further investigation is required to

gain a thorough comprehension regarding the specific impact of these technologies on the the commercial banks' economic achievements within Kenya. Numerous regional research was undertaken to analyze the implementation of bank inventions within the banking industry of Kenya. Mwangi (2013) specifically examined the influence impacting bank inventions on Kenya's commercial banks' bottom line results. The research primarily concentrated regarding the effects of bank innovations on bank income, asset returns, bank profitability, and customer deposits. It is worth noting that the study excluded agency banking, which is a significant component of contemporary bank innovations, and instead concentrated solely on online, ATM, and mobile phone banking. The utilization of information technology in Kenyan banks is explored by Nyangosi and Arora (2011), with a particular emphasis on services provided through Internet and mobile phone banking. Nyangosi and Arora have suggested that financial institutions have employed various electronic channels to meet customer demands, yet they have not thoroughly examined the overall impact on the performance of commercial banks. Research on financial innovation and financial performance has yielded inconsistent results. While Sewing et al (2014) discovered a positive correlation, Aker and Mbiti (2010) found a strong negative correlation connecting technological advances as well as the monetary fulfilment of commercial banks. These conflicting findings highlight its importance of additional research regarding what links with financial innovation also financial execution.

1.3 Research Objective

This study's primary goal intended figuring out how financial innovations affected the

fiscal health of Kenya's commercial banks.

1.4 Value of the Study

The results of this study fundamentally altered the way commercial banking institutions operate by educating them on the importance of innovation in fending off threats to their existence and maximizing asset returns. The findings of this study will additionally demonstrate the substantial contribution made by the government towards establishing regulations and a legal framework that foster technological progress and innovation within the finance sector. These regulations may be formulated with the aim of guaranteeing that both the macro and micro environments of financial institutions are conducive to promoting innovation in the realm of commercial banking, while simultaneously imposing severe penalties on individuals or entities found to be involved in activities that contradict the ethical principles of financial innovation.

The study's conclusions will give other academics a strong background and informational source as they work to unravel the puzzle of how financial institutions fit into the fourth industrial revolution, which is thought to be the financial market's future course.

Lastly, the study will serve as partial fulfillment of the requirement for the award of a master’s in Business Administration to the researcher from the University of Nairobi.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This literature review focuses on the effect of technological innovations on the financial performance of commercial banks in Kenya. It encompasses a wide range of technological innovations, including digital banking solutions, ATMs, core banking systems, and blockchain technology. In order to evaluate how technological innovations have affected the financial performance of commercial banks, the review takes important financial performance indicators like profitability, efficiency, liquidity, and asset quality into account. The review was structured as follows: The literature review explores the various technological innovations adopted by commercial banks in Kenya and their impact on financial performance, drawing on empirical studies and theoretical frameworks, then conceptual framework, providing definitions of technological innovations and financial performance, as well as establishing the link between the challenges and opportunities associated with technological innovations in the industry.

2.2 Theoretical Review

This review was predicated upon three theoretical frameworks, namely the resource-based view theory, the innovation diffusion theory, and the technology acceptance model.

2.2.1 Technology Acceptance Model

The acceptance of using information technology by a person or an organization is largely influenced by two factors, according to research by Davis (1989). The terms PU and PEOU denote perceived use and perceived ease of use, respectively. As per the given definition, perceived

usefulness pertains to the extent to which a company perceives that the implementation of a system will enhance productivity. This has found widespread application in the commercial banking industry, where management has experimented with new systems only to increase marginal profits. It serves as a gauge for how individuals view innovations and their effects on their companies (Davis,1989). Usefulness alone does not always indicate whether a practice is a technology or an innovation. Although technology may benefit the company and enhance performance, its users may find it difficult to use. This explains the necessity of developing innovations that the target market will find easy to use.

For the advancement of anticipated technological innovations, this theory serves as the framework. a novel product. It gives the commercial banker the necessary tools to ensure the necessary conditions are met before making any product available for utilization. The significance of this theory to the present study cannot be overstated. Specifically, it is imperative that self-banking technologies are designed in a manner that facilitates seamless connectivity for users across all institutions. In order to prevent the exclusion of illiterate and semi-literate individuals from the advancements in mobile banking, the developed applications must be user-friendly. In the event that basic devices are the only means of access for certain population groups, the commercial banking sector must ensure the availability of alternative procedures that are less complex.

Applying the TAM to commercial banks, Studies have shown that consumers' opinions of the value and simplicity of digital banking solutions, mobile banking, and internet banking have a

positive impact on their adoption and usage patterns. In Kenyan commercial banks, for instance, a study by Mutai (2019) discovered that customers' perceptions of the usefulness and simplicity of mobile banking significantly influenced their intention to use it. The TAM provides insights into how customers' acceptance and usage of technological innovations can drive banks' financial performance by increasing customer engagement, reducing costs, and expanding market reach.

2.2.2 Innovation Diffusion Theory

The theory of innovation diffusion can aid in enhancing our understanding of the adoption and dissemination of technological innovations within social systems. According to Rodgers (2003), the theory posits that several factors, including the attributes of the innovation, communication channels, the preparedness of the social system for change, and the perceptions of potential adopters, exert an influence on the pace at which innovations are adopted and diffused.

Relating to Kenyan commercial banks., the innovation diffusion theory helps explain how the adoption of technological innovations can impact banks' financial performance. The theory posits that early adopters of innovations can gain a competitive advantage and achieve better financial performance compared to late adopters. Early adopters can capture a larger market share, establish their reputation as technological leaders, and reap the benefits of being first movers (Demir, 2006).

Rogers was able to outline the various steps that a person or an organization can take to adopt an innovation in IDT. The innovation decision process, where customers or a targeted financial institution evaluate their own need for implementing the new idea or device to streamline their

operation, was one crucial stage he did highlight. Given that today's society's consumers, especially those who work in banking, are eager to fully understand any technology before deciding to use it, this idea is sound. This step is essential, and in the contemporary commercial banking industry, it might be used as a strategic management tool to ensure that the institution doesn't suffer losses in the future. By forming attitudes toward the innovation, which is a gradual process, the stage is finished (Demir, 2006). Demir backed Rodgers' proposal when he combined the notion of decision-making with an attitude of acceptance toward organizational changes.

Throughout the development of this theory, Demir (2006) was able to ascertain that there are a number of stages that any organization must go through before adopting financial innovation. He recommended five crucial steps. He explained that when a person or organization is exposed to technology and how it affects his business, it enters the knowledge-based stage, which he named as one of the more notable stages. This theory section is critical to this study since it will demonstrate to the selected financial institution how important it is to recognize the significance of educating its clients whenever new financial innovations are introduced (Demir, 2006). In the contemporary landscape of financial technology competition, wherein institutions allocate substantial financial resources towards promoting their selected anticipated financial innovation, it is during this phase that an organization endeavors to generate awareness among its intended clientele, a crucial factor as emphasized by Rogers (2003).

Following awareness, Rodgers (2003) observed that creation is a crucial and audacious step in making sure that clients are convinced to support the financial institution's objectives. This is brought up only to combat the potential negative perception that customers may have of something new, either a product or an idea. Institutions must adopt strategies for changing the mindset of their clients and integrating them into their inner circle of operation after giving them careful thought (Rogers, 2003). The financial institution must lead by example by encouraging its customers to participate in the decision-making process after raising awareness of the issue. This is accomplished by selecting the scenario that offers the organization a variety of benefits. Adopting decision-making will play a crucial role in this study by outlining its importance to the top financial institutions when they decide to adopt financial technology (Rogers, 2003).

According to the Innovation Diffusion Theory, an innovation's characteristics determine how it is used, how it diffuses, and its nature. Thus, in order to effectively use financial innovations for better financial performance, commercial banks in Kenya must understand their characteristics. This theory is extremely helpful to the commercial banking industry because it suggests that the intended consumers of the financial instructions might not immediately purchase the new product. Customers can occasionally be reluctant, especially if they are unsure of how a new product will affect them. This warns the commercial banking sector that early product launches could take a long time and result in losses due to significant expenditures on marketing and information. This stage needs to be welcomed and treated seriously because it will determine in large part whether the innovative practice chosen was accepted.

2.2.3 The resource-based view theory

The Resource-Based View (RBV) theory posits that the resources and capabilities of a firm hold significant importance in attaining a competitive advantage and achieving superior financial performance (Wang et al., 2003). In the context of technological innovations in commercial banks, the RBV theory suggests that banks can leverage their unique resources, such as technological infrastructure, skilled workforce, and customer base, to achieve a competitive edge (Aduda & Kingoo, 2012).

The RBV theory posits that technological innovations can act as strategic resources that enable commercial banks to differentiate themselves from competitors. For instance, the adoption of digital banking solutions and advanced technology platforms can enhance banks' operational efficiency, customer experience, and service offerings (Aduda & Kingoo, 2012). By effectively leveraging these technological resources, commercial banks in Kenya can attract and retain customers, increase market share, and ultimately improve their financial performance.

To conclude, the Resource-Based View (RBV) theory, the Technology Acceptance Model (TAM), and the Innovation Diffusion Theory (IDT) offer significant conceptual frameworks for comprehending the dynamic correlation between technological advancements and the financial performance of commercial banks in Kenya. These theories emphasize how resources, consumer acceptance and adoption behavior, and the diffusion process shape how technological innovations affect banks' financial performance.

2.2.4 Silber's Theory of Financial Burden

This theory posits that financial institutions engage in product innovation as a strategic approach to overcome these constraints and maintain their competitive edge in the market. The fundamental premise of her theory is that financial innovation occurs within a microeconomic framework. As Silber (1975) put it, "Firms face certain financial constraints and try to eliminate or reduce their financial burden.".

Silber (1975) presents a comprehensive analysis of the factors that contribute to the emergence of financial innovations, categorizing them into instruments and practices. One key factor he identifies is the presence of an exogenous constraint, which can manifest in various forms. For instance, if a firm's utility decreases, it may be compelled to develop a new tool to restore its previous state of abnormally high utility, thereby achieving innovation success.

In terms of innovative approaches, Silber (1975) proposes three distinct ways in which a financial firm can exhibit innovation. Firstly, it can endogenize an exogenous item from the Statement of Financial Position, thereby incorporating external elements into its operations. Secondly, it can introduce existing financial assets from other nations or industries into its portfolio, expanding its range of offerings. Lastly, it can combine the aforementioned approaches by modifying an existing instrument, thereby creating a novel financial tool.

Building upon Silber's work, Silber (1983) further expands the understanding of financial innovation by identifying four distinct categories: institutional organization, innovation welfare, market structures, and microeconomic theory. These categories shed light on the diverse

dimensions of financial innovation and highlight the importance of considering the appropriateness of innovation in relation to sector profits. It is worth noting that businesses that exhibit lower sector profits may be inadequately innovative, and their declining profitability can be attributed to external factors such as competition from other firms or governmental regulations.

2.2.5 Kane's Theory of Regulatory Dialectic

In accordance with Kane's (1984) perspective, financial innovation can be understood as a response by institutions to the financial costs incurred due to technological advancements, market demands, and political influences, particularly laws and regulations. Kane characterizes the subsequent regulatory process that emerges from institutional innovation and avoidance as interactive and dialectical. Through his model, Kane provides a comprehensive explanation of the transformations that occurred in the United States during the 1960s and 1970s. This model primarily focuses on the regulatory dialectic between federal banking regulation and external market forces, such as technological advancements, the expansion of the banking sector, and growing concerns regarding the future trajectory of the financial system. It looks at innovation as a tool for arbitrage that tries to profit from regulatory inertia. Innovation often takes the form of product substitution with the goal of evading regulation by rearranging contracts or merely switching financial systems (Kane, 1997). Kane's contribution plays a pivotal role in comprehending the dialectical relationship between the Kenyan banking sector and exogenous factors.

2.2.6 Miller's regulation and taxation a theory of financial innovation

According to Miller (1986), the primary catalyst for nearly all noteworthy advancements in the past two decades can be attributed to modifications made to tax laws and regulations. Miller asserts that endeavors to modify the quantity and timing of taxable income have played a pivotal role in fostering the proliferation of numerous financial instruments. Furthermore, Miller highlights that the presence of regulatory barriers and financial institutions' endeavors to mitigate the impact of regulations have been instrumental in driving financial innovation. In light of this theory, investors should exhibit a heightened level of concern regarding the influence of regulatory procedures and taxation on the nature of securities issued by various entities. Consequently, investors should maintain a limited interest in any existing liabilities held by the issuing entity.

The importance of government regulation and taxation in promoting financial innovation is emphasized by Miller (1986). An innovation that fits this theory is the adjustable-rate mortgage (ARM). The Tax Reform Act of 1986, which eliminated the federal income tax deduction for consumer debt that was not a mortgage, significantly increased the number of home equity loans. One of the Modigliani-Miller propositions, according to which taxes and regulations are the only factors that should concern investors when it comes to the securities that companies issue, regardless of whether they are debt, equity, or other types of securities, lends support to the theory.

2.3 Determinants of Financial Performance

This part of review illustrates how external factors have an impact on firms' performance and how that affects the output of banks' customer service. The principal factors that exert an influence on the financial performance under investigation are financial technologies. Furthermore, other determinants that possess an impact on financial performance include capital adequacy, the size of the banking institution, the composition of the client base, Return on Equity (ROE), Return on Assets (ROA), Profit Earning Ratio (PER), and Management Efficiency.

2.3.1 The Type of Clients

The banking industry is comprised of two primary sectors, namely wholesale banking and retail banking. Wholesale banks primarily cater to the needs of businesses and governmental organizations, while retail banks serve individual customers. In order to diversify their investments, banks require a substantial asset base, which is typically obtained through wholesale banking activities. On the other hand, retail banking is associated with a higher operating cost to income ratio compared to wholesale banking. This elevated cost structure has a significant impact on the financial performance of retail banks, as evidenced by a study conducted by Hawaldar, Lokesh, and Biso in 2016.

2.3.2 Management Efficiency

The subjective aspects of administrative practises, rules, and procedures are covered in this section, together with the staff's ability, excellence, alongside authority, which ultimately impact a firm's utilization of available resources to optimize returns and achieve predetermined

objectives (Ikpefan, 2013). Anjichi (2014) asserts that the managing resources along with responsibilities has become very important influential factor in determining the performance of commercial banks. The effectiveness of management is evaluated by analyzing the operating costs of the bank, particularly the predetermined expenses the administration determines to pay, as well as the subsequent impact these expenses have on the financial performance of the bank, whether it be favorable or unfavorable (Ikpefan, 2013).

2.3.3 Capital Adequacy

The banking sector's capital adequacy is influenced by various factors, such as the loan-to-asset ratio, total assets, the ratio of non-interest revenue to the sum of capital, the ratio of overhead costs to overall capital, the total sum of cash on hand for loans, and the amount of money accessible to expanding the approach. Staikouras and Wood (2003) have established a correlation between the level of capital in European Union (EU) banks and the stability of their financial situation. Additionally, Abreu and Mendes (2001) have found that the amount of equity held by a commercial bank has a positive impact on its financial performance.

2.3.4 Macroeconomic Variables

The performance of banks is impacted by external factors (Olweny and Shipho, 2011). The financial performance of the banks is impacted by variables like interest rates, market concentration, industry size, and ownership, as well as variables like inflation, politics, government regulations, and government regulations.

2.3.5 Size of the Bank

A bank's size affects its financial performance, claim Hughes and Mester (2011). Banks can benefit from economies of scale by utilizing their size. Changing the product mix attracts more customers. Additionally, as a result of this, risks decline, which has a big effect on financial performance (Nzioka, 2013). Deals are easier to reach the bigger the bank is. By doing this, they are able to find more affordable sources of funding, which encourages growth and expansion. This has an effect on financial performance (Mathur and Kenyon 1998).

2.4 Empirical Review

Financial innovation has been the subject of extensive global research, yet limited investigation has been conducted on this matter in Kenya. Notably, Tufano's (1995, 2003) surveys on financial innovation have emerged as prominent studies, as they encompass a range of disciplines including finance, economics, history, law, and industrial organizations. Tufano defines financial innovation as the ongoing advancement of novel goods, services, and technologies for the provision of financial products and services. This innovation serves as a catalyst for the expansion of the financial services sector, as well as the reorganization of both financial and public institutions. In their respective theories, Silber (1975), Kane (1984), and Miller (1986) emphasize the significance of taxes and government regulations in promoting financial innovation. These authors highlight that the ultimate objective of financial innovation is to enhance the profitability and sustainability of financial institutions.

Miller (1992) and Finnerty (1992) discovered that banks attempt to shift risks, increase liquidity, or evade regulatory restrictions when conducting their studies on financial innovation. They argued that rather than the method of financing the assets, a firm's value was more based on the returns and risks of its assets (business risks).

Frame and White's (2004) study of financial innovation was categorized into three distinct classifications: new products and services, novel production techniques, and innovative organizational structures. They stated that a company faces a number of difficulties when attempting to create and implement novel technologies or novel products, the most important of which is securing adequate and long-term access to human capital, expertise, and knowledge. and add to investments made in the creation of new processes.

Ignazio (2007) asserts that financial innovation has resulted in the addition of new market players as well as new opportunities for sector participants. Innovation can result from the adoption of new technologies or processes because innovation was historically seen as a way to turn research findings into marketable products.

In 2007, Mwangi conducted a study entitled "Factors Influencing Financial Innovation of Nairobi Stock Exchange Listed Companies" with the aim of elucidating the macro-environmental and micro-environmental determinants that impact financial innovation within the Kenyan stock market. The study came to the conclusion that Kenya's investor protection laws were a significant factor affecting financial innovation. This outcome is consistent with what Frame and White (2002) discovered. A further finding of the study was that the primary factor affecting financial

innovation was unstable foreign exchange rates.

In his seminal study on the relationship regarding revenue growth and monetary growth in Levine (1997) posited that the presence of financial innovation is indeed imperative for the long-term sustenance of economic growth. According to his argument, the firm's assets, organizational procedures, firm characteristics, information, and knowledge collectively contribute to the firm's capacity to formulate and implement strategies aimed at enhancing efficiency and effectiveness.

During the evaluation of the consequences regarding innovation on business achievement, Gunday, Ulusoy, and Kilic and Alpkan (2011) conducted an examination of organisational, manage, goods, and promotional developments on various components of company efficiency, containing innovation, manufacturing, consumers, along with marketing. This empirical study was based in relation to the economic achievement of 184 Turkish production facilities. The findings of this study demonstrated the positive effects of innovation on the operational aspects of businesses in the manufacturing sector. In a similar vein, Lin and Chen (2007) conducted an empirical investigation on small and medium-sized enterprises in Taiwan. Their research revealed that the innovation capabilities of firms have a significant influence on their business performance, marketing performance, and ultimately, financial performance.

Furthermore, Tabasand & Beranova (2012) conducted an investigation into the financial performance of small and medium-sized enterprises (SMEs) in the Czech Republic. Their study specifically focused on the potential impact of product innovations on these enterprises. The authors' preliminary study, encompassing a statistical sample of 100 companies, revealed

compelling evidence that continuous innovation is imperative for these businesses. According to Atieno (2001), agency banking is a situation in which a financial institution hires a retail business owner to provide banking services. A retail business owner lets customers handle banking activities like saving money, checking account balances, making deposits and withdrawals of cash, and paying bills in place of having a bank teller on site. Today, the majority of bank agents in Kenya are wholesalers, pharmacies, M-pesa outlets, and supermarkets. The relevant bank is required to instruct its employees on how to provide its services to clients.

Agent banking was the topic of Gardner's (2010) research. The use of agents in banking, according to them, lowers operating costs. Agents combine all retail stores, allowing the bank to avoid investing in its own infrastructure and resulting in a reduction in fixed costs. Comparing retail banks to agents based on transaction costs reveals high variable costs. Thus, using agents in banking lowers the banking institution's variable costs. The current study is based on tier one banks, whereas the previous one was based solely on retail banks.

According to Kitaka (2011), the cost of setting up agents for a bank is 4% of the cost of paying a teller. Conclusion: Compared to the minimal cost incurred through the agent (11%) and the higher fixed amount (78%) that the teller costs the bank for the transaction. It was found to be cheap to find an agent to extend banking services. Customers made payments 70% less for transactions when making purchases online as opposed to in person. Performance is improved by the Internet's reduction in the weight and expense of handling paper.

A study was conducted by Acharya (2011) on how the financial success of microfinance institutions in India is impacted by financial innovation. Between 2001 and 2009 was the study's time frame. The study sampled 112 institutions, and descriptive statistics of financial performance were used to analyze the findings. Financial innovation was examined using secondary data. The study's conclusions suggest that financial innovation through agents has been crucial to the success of microfinance institutions in India. In comparison to institutions that did not adopt agency banking, those that did showed better performance indicators. While the current study will use Kenyan commercial banks, the previous one used microfinance organizations in India.

Identifying the factors that influence the use of agents in Kenyan banking was the goal of Kithuka (2012). All agencies of Equity Bank in operation for the period 2009 and 2011 made up the population. The research was descriptive in nature. 100 Equity Bank offices in Kwale District that conducted banking transactions comprised the sample size. Both qualitative and quantitative data were used. He discovered that banking through agents is increasingly popular and convenient for users, easy to use, affordable, and secure. As a result, it is growing quickly. According to Waithanji (2012), agency banking and commercial banking performance are positively correlated. Owing to the limited number of banks that have implemented agency transacting and the potential for a more pronounced effect once all banks have adopted this practice, the current literature lacks a conclusive analysis of the impact of agency banking on the operational outcomes of tier one banks in Kenya. To address this gap in knowledge, this study, initiated in 2017, endeavors to examine the ramifications of agency banking on the performance metrics of the aforementioned banks. The previous study utilized all commercial banks, whereas the current one

will only use tier one banks.

Onay, Ozsoz, and Helvacolu (2018) conducted research on the benefits of fourteen banks and the use of the Internet for cross-bank transactions in Turkey. Data from 1996 to 2015 were subjected to a panel analysis. On the basis of invested capital, investments, return on equity, and equity, financial performance was assessed. After a year, it was discovered that using the internet for banking increased return on equity and assets. But after two years of use, ROI and ROIC increased due to the introduction of the Internet in banking. The study measured financial performance using return on investment (ROI), whereas the current study used return on assets (ROA). The current study is based on Kenyan banks, whereas the previous study was based on Turkish banks.

Based on Internet usage and business performance between 1995 and 2004, Arnaboldi and Claeys (2008) compared various bank model implementations. This was done to banks in Finland, Italy, Spain, and the United Kingdom. A longitudinal design based on secondary data was employed. The results of a comparative analysis were presented in a table format. The results indicated that banking institutions that started utilizing the Internet in their banking operations had better financial results (ROA and ROE). Additionally, it was discovered that despite having little additional income, banking institutions spent less on their operations. The effect was governed by the interest rate, firm size inflation rate, and firm size. According to the findings, the correlation between online and offline deposits is negligible. It is preferred for banking products outside of the assortment to have added value. Customers continued to favor visiting retail establishments that required increased Internet productivity for maximum profitability, despite the positive

relationship between Internet use and firm performance. Furthermore, it was discovered that macro factors that can either favorably or unfavorably affect Internet banking have an impact on how well it functions. Similar to the present study, the previous one used ROA as a measure of financial performance. Hasan et al. (2010) used the mythology of descriptive research as the foundation for their analysis of innovative and traditional banking in Italy. The use of the internet for banking has been found to improve the return on equity and asset performance of banking institutions. Comparatively speaking, conventional banks have performed poorly. This was demonstrated by the average ROA of internet banks, which was 27.3 percent, compared to traditional banks, which had a ROA of 4.5 percent. As in the present study, ROA was utilized. The current study, however, will focus on Kenyan banks, whereas the previous one was done on Italian banks.

Information Technology and how it relates to firm value and profitability was studied by Daneshvar and Ramesh (2012). Between 1998 and 2009, research on Indian banks was done. To illustrate the relationship, the data were regressed and correlated. The data was shown in a tabular format. The correlation demonstrates that the uptake of online banking has resulted in higher levels of deposits in Indian banks. A correlation between internet usage and Indian bank profitability was discovered through regression analysis. Since the advent of the Internet, employee turnover has increased. Both the amount of non-performing assets and operating costs were decreased. The majority of companies use the Internet to reduce costs and boost their bottom line.

Baptista and Oleivera (2016) noted that a number of m-banking studies have been carried out in various parts of the world, with the majority concentrating on the uptake of this technology. Other studies have concentrated on adoption-promoting factors, their advantages, and consumer behavior. The effects of M-banking technological innovation on the banking sector are described in detail by Hoehle and Huff (2012). They mention that the technology provides cross-industry benefits, i.e., cross-selling and up-selling of sophisticated banking products and services. Additionally, they discovered that the m-banking platform makes a significant improvement to the customer experience, operational efficiency, and cost-savings for banks.

Aker and Mbiti (2010) looked at how sub-Saharan African regions' economic conditions were impacted by the use of mobile phones for banking. They discovered that businesses in Africa can offer their services to a larger customer base at a lower price due to the widespread use of mobile phones. For companies that have adopted the technology to cut costs and expand coverage, prices for services and goods sold through mobile phones have been found to be less expensive. The results revealed a direct correlation between mobile phone coverage and business performance. By offering a wider range of services and charging less, the rise in mobile phone usage has also improved businesses' competitiveness. The firms' financial performance as a result of this improved.

Rayhan et al. (2012) conducted research on the prevalence of mobile phone use in banking activities in Bangladesh. Due to the widespread use of mobile devices in the banking sector, they learned that banks could provide low-cost services to customers who did not use their phones for

transactions. Banks can provide a range of services to mobile users while spending less money. People can save more money by making purchases using their mobile phones because they can do so whenever, wherever, and for a low price. As a result, both the quantity of money deposited in banks and the volume of transactions increase. Advanced transactions can also be completed on mobile phones, including phone-based payments. In turn, this improves the financial performance of banks while lowering transaction costs for clients. Mobile phones are the most effective and efficient banking channel because they can access networks in remote, deep-rural locations.

149 SMEs in China were examined by Sewing (2014). He based his study of cutting-edge tactics and their effects on business performance on ROI. The study was based on the five years 2009–2013. Cross-sectional research, based on both primary and secondary data, was used by Sewing. Using panel king regression, the relationship was investigated. The innovation component of this study was measured by the volume of mobile transactions, whereas the component of performance was based on return on investment. Based on his research, it has been determined that the quantity of mobile transactions has had a positive influence on ROI. Nevertheless, the regression coefficients indicate that the effect was insignificant. This serves to demonstrate that the influence of mobile banking innovation on the financial well-being of small and medium-sized enterprises (SMEs) in China is negligible. While the current study's target population is commercial banks, the researcher's study was based on SMEs.

2.5 Conceptual Framework

A conceptual framework is a graphical representation of various components that portrays the interconnectedness differentiating components that are dependent and independent. The independent components examined throughout the aforementioned research are mobile banking services, agency banking investments, and online banking investments. The primary goal of such study is to look into the influence of these independent variables goes over the financial achievements of commercial banks in Kenya. To assess financial success, the researcher will utilize the return on assets metric. Figure 2.1 presents a conceptual framework that visually illustrates the interplay between the independent variables and the dependent variable.

Independent Variables **Dependent Variable**

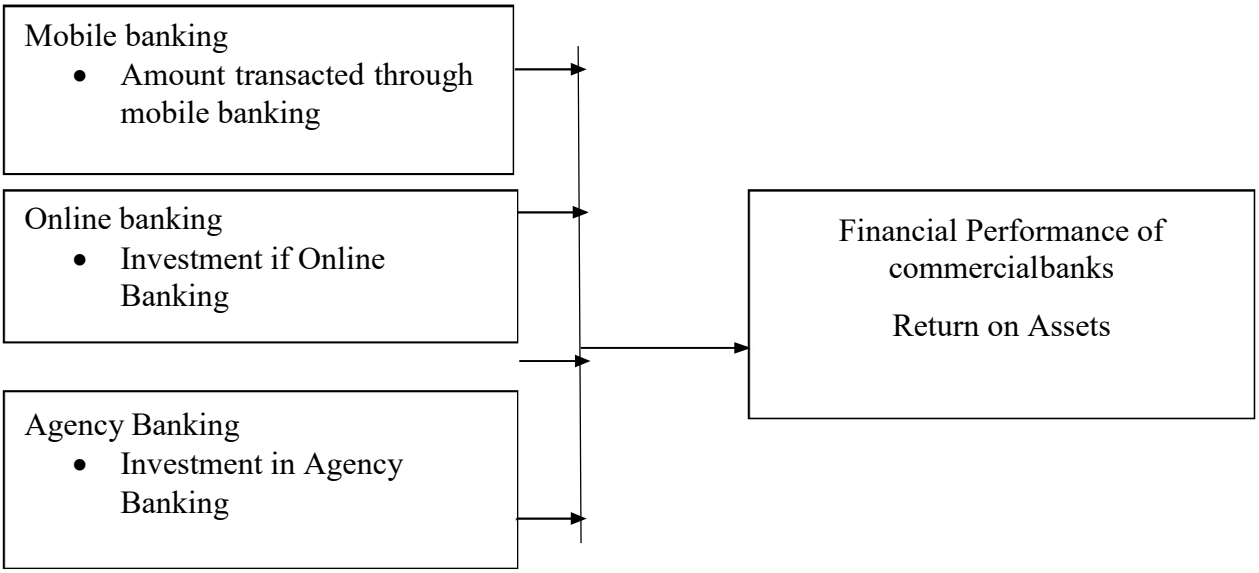

Figure 2.1: Conceptual Framework Source: (Author, 2023)

2.6 Summary of Literature Review

The exploration of innovation within the financial services industry is a nascent field of inquiry in business research. The review of the body of research on monetary services development serves as a means to identify potential areas for further investigation. One area of inquiry has centered regarding the current monetary operation legislative classification. Within this domain, certain studies have sought to apply conventional models for the achievement of emerging goods to the service environment, while also examining the distinctions involving the creation of brand-new amenities as well as emerging goods. Despite the existence of numerous studies on this topic in other regions of the world, particularly among tier-one banks, the impact of financial innovations on the financial performance of commercial banks in Kenya has yet to be explored.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents a comprehensive outline of the intended research methodology for the study. A range of methods and techniques was employed to collect and analyze data. The chapter was structured into four distinct sections, namely: target population, data collection and measurement, data analysis, and operationalization of variables.

3.2 Research Design

According to Creswell (2014), a research design consists of various specific steps, encompassing preparing reports, analysing information, and evidence gathering. In this study, an illustrative layout remained employed. During a study that is informative design, the researcher has the option to assume different roles, such as a full participant, a participant as an observer, or a complete observer. For example, a researcher may choose to observe and track customer shopping and selection patterns in a supermarket from a distance. A descriptive research design aims to address the questions of who, what, where, when, and how much (Cooper and Schindler, 2000). The primary objectives of this proposal are to offer proof in favour of the understudied issues and to ascertain another impact of financial advancement in Kenyan banking sector economic outcomes. A descriptive investigation design's objective is to gather information and provide an overview of a specific population at a particular moment in time. This design was employed because, by describing the important variables, it may help to clarify the research problem. The financial statements, official records, reports, and reputable archives serve as the secondary sources of data for the research proposal. To ascertain the validity and authenticity of the data, it was compared to regulatory reports from the central bank.

3.3 Population of the Study

A population, according to Mugenda & Mugenda (2003), is an assortment of person, objects, or occurrences that possess a discernible characteristic. Oso and Onnen (2008) define it as the complete count of subjects that the researcher intends to investigate. In the present study, the target population will encompass all 42 commercial banks operating within Kenya, as indicated by the Central Bank of Kenya (CBK, 2022). Consequently, a comprehensive census of all commercial banks in Kenya was employed, obviating the need for sampling procedures.

3.4 Data Collection

As stated by Kothari (2004), the researcher will gather information from secondary sources. Information that has already been gathered and examined by another party is known as secondary data. In this instance, a data collection sheet was used, and the records of the data collected was entered there before being subjected to a set of analytical tools. To gather data on the amount and frequency of alternative channels of banking transactions, the researcher will refer to Central Bank of Kenya annual supervisory reports, published reports, and other documents like the banking sector publications for the years 2018 to 2022.

3.5 Diagnostic Tests

To guarantee that the results are homogeneous, the data was put through diagnostic tests to determine whether the underlying assumptions are true or false. The subsequent diagnostic tests was performed.

3.5.1 Normality test

Data in a linear regression are presumed to be normally distributed. The error term displays the variables that should have been taken into account during the study but were instead taken for granted by the researcher when creating the model. There must be a normal distribution of the error in OLS. The Shapiro-Wilk test was utilized to establish whether the data are normal.

3.5.2 multi-collinearity

When using time series data, multi-collinearity is frequently a problem for researchers. Over time, the factors can either get bigger or smaller. The regression coefficient is uncertain due to multi-collinearity. Additionally, the standard errors become infinite due to multi-collinearity. Variance inflation factors (VIF) test was employed to look for the presence of multi-collinearity. When the VIF value is less than 10, there is no need to be concerned about multi-collinearity issues, whereas when the VIF value is greater than 10, multi-collinearity issues are found and must be fixed.

3.5.3 Heteroscedasticity

If the error term is consistent across observations, the heteroscedasticity test was used to determine this. To determine whether a variable's variation within sampling units in a regression model is continuous, Breusch-Pagan was used. Applying standard errors that have been corrected will remedy the situation.

3.5.4 Houseman Test

The model will undergo the Hausman Test, also referred to as the Hausman specification test. This test is utilized to detect endogenous regressors, or predictor variables, within a regression model. In order to investigate the presence of endogeneity in the data, the Durbin-Wu Hausman test was employed.

3.6 Data Analysis

The researcher employed several methods for data analysis, including descriptive statistics, correlation analysis, and panel data regression analysis, utilizing the software STATA 13. The Panel Data Regression Model was precisely defined by the researcher as follows:

$Yit=\alpha +\beta 1MBit+ \beta 2IBit+ \beta 3ABit + \varepsilon it$

Yit= Financial Performance as measured by ROA

α = Constant

MBit = Mobile banking

IBit = Online banking

ABit = Agency Banking

Bi's= the beta coefficients of the independent variables

ε it = Error term that capturing all relevant variables that will not be included in the model

3.7 Operationalization of Variables

Table 3.1: Operationalization of research variables

Variable	Indicator	Measurement
Technological Innovations	Mobile banking	Ratio of Amount transacted through Mobile
	Online banking	Ratio of Amount transacted through Internet
	Agency Banking	Ratio of Amount transacted through Bank Agents
Financial performance	ROA	Net Profit/Total Assets
Size	Loans and Advances	Loans and Advances

CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.0 Introduction

The data analysis, appearance, and evaluation of the study findings are the main topics of this section. Sections of the section are organised according to the notions of the objectives. The primary goal of the study was to investigate how technological developments affected Kenya's commercial banks' economic outcomes. The Central Bank of Kenya, which regulates the financial institutions, provided reports with secondary data that was analysed for this research. Since earnings from an investment is a particularly accurate metric for assessing financial success, it was used as the dependent variable. Agency, online, and mobile banking have been the autonomous factors. Explanations and interpretations are given in addition to the statistical representation. The analysis's five-year study period ran from 2018 to 2022. What follows acronyms, which are prevalent throughout the entire section and were utilised in the information evaluation, were employed in that order. Return on Assets (ROA), Mobile Banking (MB), Internet Banking (IB), and Agency Banking (AB)

4.1 Response Rate

Based on data from 2022, there currently exist forty-three licenced commercial banks in Kenya. The study was able to get information of all the banks for the period in research. This results in a 100% response rate, which is acceptable for analysing the information and drawing quantitative conclusions, according to Mugenda & Mugenda (2003), who state that a response rate beyond 60% is optimal.

4.3 Descriptive Statistics

Descriptive statistics offer a concise method for summarizing key features of a dataset in a meaningful manner. The study explored various descriptive statistics, including minimum, maximum, mean, standard deviation, skewness, and kurtosis. The minimum represents the smallest value in the dataset, while the maximum signifies the largest value. The mean serves as a measure of central tendency, describing the average of the dataset. Standard deviation measures the spread of the data, indicating how each dataset deviates from its mean. Skewness is a measure that quantifies the asymmetry of a distribution. Skewness was essential in that it helped identify the direction and degree of asymmetry in the dataset. Kurtosis is a measure of the "tailedness" of a distribution. It describes the shape of the distribution's tails in relation to the normal distribution. Table 4.1 shows the values for all the variables.

Table 4.1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Financial Performance	215	1.0641	7.3815	2.1218	.3407	.320	.293	1.763	.314
Mobile Banking	215	2.0602	23.4442	17.2150	14.0304	-.321	.293	1.841	.314
Online Banking	215	1.8719	22.1740	16.3337	13.2014	-.542	.293	2.437	.314
Size	215	2.2300	19.6842	14.0338	12.9646	.230	.293	1.560	.314
Agency Banking	215	4.7224	4.7283	20.1539	10.0611	-.124	.293	1.341	.314
Valid N (listwise)	215								

Source: Author, 2023

The dependent variable financial performance was measured by return on assets (ROA) of commercial banks. Findings from the study indicated that the highest value of ROA attained was 7.38 and the lowest value of ROA attained by the banks was 1.06. For the five year period the banks recorded an ROA mean value of 2.12 and standard deviation of 0.34. ROA data had a skewness of 0.32, indicating that the distribution was slightly positively skewed thus suggesting a slight inclination for observations to be centered more on the left side. ROA was also found to have a positive kurtosis value of 1.76 indicating that this distribution was slightly peaked compared to a normal distribution.

The independent variable mobile banking was measured as a log-normal distribution. Results from the five- year period pointed out that mobile banking had an average mean of 17.21 and standard deviation of 14.03. The variable was negatively skewed as indicated by the skew value -0.32. This skewness value implied that there was a slight tendency for observations to be concentrated more on the right side of the distribution, as indicated by the left side's tail being slightly longer than the right. Mobile banking was positively skewed as indicated by the kurtosis value of 1.84 which showed that the distribution may thin at the tail and elongated around the center.

The independent variable online banking was measured as a log-normal distribution. Findings from the study showed that the average value for the variable during the time for the study was 16.33 with a standard deviation of 13.20. The variable was negatively skewed as shown by the skew value of -0.54 which implied that observations are more concentrated on the right side of the

distribution. Online banking had a positive kurtosis shown by the value of 2.43, suggesting significantly thin tails than normal distributions and possibly the presence of outliers.

The independent variable size was measured as a log-normal distribution. The study established that for the period of the study size had a mean value of 14.03 and a standard deviation of 12.96. The variable distribution was somewhat positively skewed as indicated by the skewness of 0.23 which implied a slight tendency for observations to be more concentrated on the left side of the distribution, with the right side's tail being slightly longer than the left. The variable also had a positive kurtosis of 1.56, which also meant that it has tails that are comparatively thin than the normal distribution and more peaked.

The independent variable agency banking was measured as a log-normal distribution. The findings of the study determined for the period under study, the variable had a mean of 11.73 and standard deviation of 10.06. The variable also experienced a slight negative skew indicated by the skewness values of -0.12. The distribution of the variable experienced a positive kurtosis value as indicated by the kurtosis value of 1.34 which meant that the distribution was more peaked as compared to the normal distribution.

4.4 Correlation Analysis

Correlation analysis is employed to evaluate the linear association between two variables and the degree of that association. The numerical measure of correlation, denoted as the correlation

coefficient (r), ranges from -1 to 1. A positive correlation, with values greater than 0, signifies that as one variable increases, the other variable tends to increase as well. A correlation coefficient of 0 indicates no discernible correlation between the variables. Conversely, a negative correlation, indicated by a value less than 0, suggests that as one variable's value rises, the other variable tends to decrease.

Correlation coefficients between -0.3 and 0.3 typically indicate a weak correlation between variables. A moderate linear relationship is demonstrated by correlation coefficients ranging from -0.3 to -0.5 indicating moderate negative correlation or 0.3 to 0.5 indicating moderate positive correlation. A strong linear relationship is often indicated by correlation coefficients below -0.5 implying a strong negative correlation or above 0.5 indicating a strong positive correlation.

Table 4.2: Pearson Correlation

		Financial Performance	Mobile Banking	Online Banking	Size	Agency Banking
Financial Performance	Pearson Correlation	1	.649**	.754**	.531**	.892**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	215	215	215	215	215
Mobile Banking	Pearson Correlation	.649**	1	0.462**	.443**	.165**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	215	215	215	215	215
Online Banking	Pearson Correlation	.754**	.462**	1	.295**	.077**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	215	215	215	215	215
Size	Pearson Correlation	.531**	.443**	.295**	1	.001**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	215	215	215	215	215
Agency Banking	Pearson Correlation	.892**	.165**	.077**	.001**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	215	215	215	215	215

Mobile banking and financial performance had a strong positive correlation as indicated by the r value of 0.649. This implies that there is a tendency for mobile banking to increase along with an increase in Financial Performance, and vice versa. This relationship could be attributed to the ease of use and accessibility provided by mobile services. A rise in mobile usage may result in more engaged customers, speedier transactions, and even more effective financial processes.

Online banking and financial performance had a strongly positive correlation as shown by the r value of 0.754. This suggests that there is a strong tendency for online banking to increase in tandem with an increase in financial performance, and vice versa. The association may be explained by the efficiency and cost savings that come with doing business online. Online banking services frequently improve client satisfaction, saves on operating expenses, and streamlines procedures all of which have a favorable impact on overall financial success.

Size and financial performance had a strongly positive correlation as shown by the r value of 0.531. This implies that as size increases there is an increase in financial performance and vice versa. It is possible that the association could be related to economies of scale. Compared to smaller banks, larger banks typically exhibit greater financial success due to cost benefits, increased market share, and better bargaining strength.

Agency banking and financial performance had a strongly positive correlation as shown by the r value of 0.892. This indicates that as financial performance increases, there is a very strong tendency for agency banking to increase as well, and vice versa. The association may be attributed to the connection made by the growth of banking services through agency networks. Agency banking can expand the institution's consumer base, reach into new markets, and volume of

transactions all of which will improve its overall financial performance.

4.5 Diagnostic Tests

A linear regression analysis cannot be conducted unless certain presumptions made by the regression model are satisfied. To determine if all the information meets these requirements the study undertook several diagnostic test. These tests include test of normality and multicollinearity.

4.5.1 Normality Tests

To establish if data used for the study was normally distributed the study carried out two statistical tests. The Shapiro-Wilk test is a statistical test used to assess whether a sample comes from a normally distributed population. It is based on comparing actual sample data to expectations derived from a normal distribution. The test statistic generated by the Shapiro-Wilk test is sensitive to deviations from normality in various distributional regions. The population is normally distributed, which is the test's null hypothesis. The null hypothesis is rejected then the p-value is small, usually less than the selected significance level (e.g., 0.05), indicating a significant deviation of the data from a normal distribution.

The Kolmogorov-Smirnov test is another statistical test used to assess the normality of a sample. The sample data's cumulative distribution function (CDF) is compared to the expected cumulative distribution of a normal distribution. The maximum absolute difference between the observed and expected cumulative distributions serves as the basis for the test statistic. Similar to the Shapiro-Wilk test, the Kolmogorov-Smirnov test exhibits sensitivity to deviations from normalcy in various regions of the distribution. The assumption that the sample is taken from a normal distribution is the test's null hypothesis. The null hypothesis is rejected when the p-value is low, indicating that

the sample does not conform to a normal distribution. Findings from the study are as shown in the table below.

Table 4.3: Normality Test Table

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Mobile Banking	0.9991474	215	9.38E-03	0.01470095	215	9.82E-03
Online Banking	0.9987117	215	6.96E-03	0.01672844	215	9.42E-03
Size	0.9992163	215	9.60E-03	0.02158378	215	7.40E-03
Agency	0.9985273	215	5.73E-03	0.02331096	215	6.49E-03

a. Lilliefors Significance Correction

Source: Author, 2023.

Results from the study showed that for the Kolmogorov-Smirnov test, the p-values for Mobile Banking, Online Banking, Size, and Agency Banking are approximately 0.00938, 0.00696, 0.00960, and 0.00573, respectively. In the case of the Shapiro-Wilk test, the corresponding p-values are approximately 0.00982, 0.00942, 0.00740, and 0.00649 for the same variables. All the reported p-values are below 0.05, indicating evidence to reject the null hypothesis for normality in each tested variable. These results imply that the variables were picked from datasets that had a slight departure from the normal distribution.

Since commercial banks experience fluctuations in the economy over the course of their operations, the non-normality in the data set was anticipated. As a result, cyclical trends are frequently seen in economic data. Unusual fluctuations can be brought about by events like

business cycles, recessions, or economic booms.

4.5.2 Multi Collinearity Test

A multicollinearity test examines the extent whereby the variances of the independent variables are correlated. The study was able to test for multicollinearity through the application of the variance inflation factor (VIF). Values for the VIF range from 1 to 10. VIF values that are less than 4 suggest no multicollinearity, whereas values between 4 and 10 might suggest multicollinearity is present and needs more research. Any number greater than 10 indicates that the variables may be challenging to manipulate due to their strong interdependence. The findings of the study are as shown in the table 4.4 below.

Table 4.4: Multicollinearity Test Table

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Mobile Banking	.343	2.915
	Online Banking	.664	1.506
	Size	.961	1.041
	Agency Banking	.771	1.297

The study determined the VIF values for the variables as follows: 2.915 for Mobile Banking, 1.506 for Online Banking, 1.297 for Size, and 1.041 for Agency Banking. Notably, all VIF values are below 4, suggesting the absence of significant multicollinearity in the dataset under examination. This indicates that the variables exhibit relatively low levels of correlation with each other,

supporting the robustness of the study's regression analysis.

4.6 Regression Analysis

Regression analysis is a statistical method used to examine certain correlation involving one or several independent components as well as a dependent component. It is an effective instrument for comprehending and quantifying the nature of these relationships, making predictions, and identifying key factors influencing the outcome of interest. The study utilized regression analysis to assess if mobile banking, online banking, size and agency banking had an influence on financial performance of banks. The results of the study are shown by the model summary, Anova and coefficients tables. The model summary provides an overview of the regression model, including the R-squared value. R-squared represents the proportion of the variance in the dependent variable explained by the independent variables. ANOVA assesses the overall significance of the regression model. When comparing a model with independent variables to one without predictors, the ANOVA's F-statistic can be used to assess whether the independent variables in the model substantially improve the prediction. The coefficients table provides information on beta values and the p values. The beta values show the contribution of each independent variable to the dependent variable. The beta value also indicates the direction and strength of the relationship. The p-values assess the statistical significance of each predictor. Findings from the study are as shown in the tables below.

Table 4.5: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.771[a]	.594	.408	0.004092	2.079

The analysis of the model summary table revealed an R square value of 0.594. This signifies that approximately 59.4% of the variation in financial performance can be explained by the variables of mobile banking, online banking, size, and agency banking.

Table 4.6: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6315.608	4	1578.902	45.642	.000[b]
	Residual	7264.519	210	34.592		
	Total	13580.127	214			

The F statistic for the model was determined to be 45.642 at 0.000 level of significance. This implies that the regression model is a good fit for explaining the variation in financial performance, and the included predictors (mobile banking, online banking, size, and agency banking) collectively contribute significantly to the model.

Table 4.7: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.00808	.160		.506	.000
	Mobile Banking	.775	.4931	.361	1.572	.000
	Online Banking	.172	.189	.526	.922	.004
	Size	1.327	.968	1.299	1.382	.000
	Agency Banking	.611	.126	.584	2.7035	.004

Source: Author, 2023

The study determined the model fit from the data is

$Y= 0.00808 +0.775X_1 + 0.172X_2 + 1.327X_3+ 0.611X_5$

Where:

Where: Y = Financial performance

X_1 = Mobile Banking

X_2 = Online Banking

X_3= Size

X_4=Agency Banking

4.7 Discussion of Findings

Using the information acquired, the investigation created a linear regression model to ascertain how it impacts technological innovations on the monetary results of commercial banks in Kenya. From the regression analysis it was determined that: the beta value for mobile banking was 0.775 at a 0.00 degree of importance. The result was an indication that mobile banking was a positive and significant predictor of financial performance. It also meant that if all other factors were constant a unit increase in mobile banking led to a 0.775 increase in financial performance.

The beta value for online banking was 0.172. This meant that if all other variables were held constant a rise in digital banking units led to a 0.172 improvement in the monetary outcomes. It also meant that online banking was a positive and significant predictor for financial performance. Size had the beta value of 1.327. This was an indication that a unit increase in size led to a 1.327 increase in financial performance. It also meant that size was also a positive and significant predictor of financial performance.

Agency banking had a beta value of 0.611. This was an indication that agency banking was a positive and significant predictor of financial performance of the banks.

The results of the research provide credence to hypotheses like the invention diffusion theory, which postulates that, in an effort to improve profitability, technical innovations are dispersed among Kenya's commercial banks. The findings of the research corroborate the hypothesis put forth via a number of earlier research projects. Nyanga (2013) concurred that wireless currency enhanced SMEs' performance throughout Kenyan regions. Mobile financial services gives

businesses an edge over rivals that improves productivity across a range of businesses, according to Gitau (2011) and Kilonzi (2015).

The results of this investigation, however, are not supported by other empirical research. Recent research by De Young et. al (2015) shown that when the number of commerce at local financial institutions declined, so did the output from using the internet for exchanges. The effect of computerised banking on Jordanian the success of banks was ascertained by Mohammad & Saad (2011). They discovered that there was a bad correlation between economic achievement and computerised banking. They explain the connection by blaming internet banking for increasing risk exposure. In a related study, Cheruiyot (2010) failed to identify a meaningful connection between economic achievement and mobile banking.

This study is well-known because it makes the case that extensive investigation must be done to ascertain the degree of compliance with new technologies prior to the adoption of modern advancements. The expected value, usability, and danger of the idea all play a significant role when considering whether or not the demographic being targeted would embrace it.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

Main data results from its findings were presented and discussed in this section, along with conclusions drawn from the information and pertinent suggestions. The study's goals had been the main emphasis of the findings and suggestions that were made.

5.1 Summary of Findings

According to the study, the standard deviation of mobile banking was 14.03 and the mean was 17.21. The investigation showed where the average value of online banking was 16.33, with a standard deviation of 13.20. It was discovered that the size had a standard deviation of 12.96 and a mean value of 14.03. It was found that the mean and standard deviation of agency banking were 11.73 and 10.06, respectively.

The r value of 0.65 indicates a substantial positive link involving mobile banking and economic outcomes.. Online banking as well as the monetary outcomes possess some very strong positive correlation as evidenced by the r value of 0.75. There is a strong positive correlation (0.53) between size and financial performance. Financial performance and agency banking have a very strong positive correlation as indicated by the r value of 0.89.

The Kolmogorov-Smirnov test showed that the p-values for Mobile Banking, Online Banking, Size, and Agency Banking were approximately 0.00938, 0.00696, 0.00960, and 0.00573, respectively. In the case of the Shapiro-Wilk test, the corresponding p-values were approximately 0.00982, 0.00942, 0.00740, and 0.00649 for the same variables.

The VIF value for mobile banking, online banking, size and agency banking was revealed to be 2.915, 1.506, 1.297and 1.041 respectively. From regression analysis it was established that 59.4% of the variation in financial performance is accounted for by mobile banking, online banking, size and agency banking. Additionally, it was found that mobile banking had a beta value of 0.775, indicating that it was a significant and positive predictor of financial performance. For online banking, the beta value was 0. 172.It also implied that financial performance was positively and significantly predicted by online banking.

The beta value of size was 1.327. This indicated that financial performance was positively and significantly predicted by size as well. The beta value of agency banking was 0.611. This suggested that agency banking was a significant and positive predictor of the banks' financial performance.

5.2 Conclusions

The study concludes that size of the banks are a positive and significant predictor for financial performance. This provides evidence that an increase in the size of the banks is associated with a corresponding positive impact on financial performance. This suggests that larger banks, in terms of scale or assets, tend to exhibit enhanced financial performance.

The study concluded that agency banking is a significant and positive predictor of the banks' financial performance. This suggests that an active and effective implementation of agency banking services positively influences the financial performance of the banks. This finding underscores the strategic importance of agency banking in contributing to overall financial success.

According to the report, online banking favorably as well as considerably predicted monetary outcomes. Thus it implies that an emphasis on online banking services is linked to improved financial performance. This highlights the importance of digital channels and online banking platforms in contributing positively to the financial outcomes of the banks.

The study concludes that mobile banking serves as a significant and positive predictor of financial performance. Mobile banking activities are shown to have a considerable impact on financial performance, emphasizing the strategic relevance of mobile banking services in driving positive financial outcomes for the banks. This underscores the importance of embracing mobile banking trends in the ever-evolving landscape of the banking industry.

5.3 Recommendations

Given Kenya's rapid and ongoing adoption of financial innovation, the administration ought to offer advancement and research subsidies to experts who devote their resources and time to uncovering new financial innovations for the banking industry. To improve the way they operate, commercial banks ought to employ fiscal creativity. It is currently shown that the delivery of novel banking services is significantly influenced by mobile phones and the web. For the purpose of to

improve financial success, it is advised that commercial banks keep establishing long-lasting business relationships and partnerships with web and mobile phone service providers. The analysis suggests that commercial banks hire additional representatives who provide banking services in light of the investigation's outcomes. As a result, there would be more transactions, resulting in higher earnings on capital.

5.4 Limitations

The research's primary goal was actually accomplished, but there were a few difficulties along the way. To start, financial documents were in Indian, a foreign dialect, creating a linguistic barrier. Secondly, we discovered that certain the accounting records were dispersed, which is why we were unable to locate financial records for every year. Additionally, there was not much details available about online customer data, the overall amount paid out via mobile lending apps, and the total sum staked in banking software.

The study used a great deal of time as well as funds to gather information, verify its accuracy, and make sure the evaluation was done. Nevertheless, the investigator only had a brief period of time, thus the researcher had to rely on secondary data that was obtained through the internet pages of CBK and commercial banks.

Utilising additional data has restrictions as well because there is no certainty as to the knowledge's veracity. Annual reports on finances that were available on the web page of the bank served as the basis of the data. Thus, it stands to reason that there would have been inaccuracies in the data

regardless of blogging or financial statement preparation. The scholar lacked a means of verifying the authenticity and utilisation of the information.

Multiple linear regression was employed in the study's execution. This restricts the findings to the degree that a linear regression can be limited. The investigation's results and outcomes were constrained by the simulation's shortcomings as well. Finally, the study's conclusions apply to Kenyan commercial banks during the investigation period; however, we're unsure if these conclusions hold true for other countries.

5.5 Suggestions for Further Research

The report offers a number of recommendations for future research topics. Prior to comparing the findings of this investigation with those of another developing nation, a comparable study ought to be conducted elsewhere. It is possible to conduct an investigation in an advanced country and observe any variations in the outcomes. It's possible that commercial banks in rich countries have different difficulties than those in emerging economies. A study of this kind should be given sufficient time to gather primary and verified additional information. This would guarantee that the knowledge gathered is sufficiently genuine and that the suggestions made in the study won't be restricted in a way that would contradict the restrictions of this specific investigation.

A comparable subject need to be studied, but another approach is necessary for the computation of statistics, for instance the student t distribution model or the ordinal least square regression model. This would offer a comparison with the research's findings and lead to definitive

suggestions about technological advances and their effect on the financial health of commercial banks.

Additionally, the study suggests that comparable research be done as well as that a significant amount of time be set aside for the research. This would guarantee that all tests are conducted, information is collected in an efficient and authentic manner, and data is analysed using various models to see whether the conclusions and results are consistent. The study suggests that additional investigation should focus on the advantages of financial technology that commercial banks have embraced that are not related to banking.

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APPENDICES

Appendix 1: Data used for the analysis

ROA	Mobile Banking	Online Banking	Agency Banking	Size
5.5	7.363913501	4.96284463	4.96284463	12.68637308
7.7	8.878079256	5.38907173	5.38907173	12.38084075
4.7	7.682021511	4.9698133	4.9698133	12.34092691
5.8	7.031741259	4.672828834	4.672828834	12.24052238
6	4.919980926	4.060443011	4.060443011	12.30376181
4.1	4.394449155	3.091042453	3.091042453	12.04781521
4.9	4.9698133	3.258096538	3.258096538	11.645146
5.5	0	2.708050201	2.708050201	11.61110425
4.6	3.850147602	3.044522438	3.044522438	11.63440831
7	-0.693147181	0	0	11.17385185
3.6	8.636929873	2.890371758	2.890371758	11.73512457
4	7.158513997	3.713572067	3.713572067	10.68053921
4.8	3.091042453	2.944438979	2.944438979	10.85942199
1.9	6.188264123	3.555348061	3.555348061	11.43488824
-3.3	4.762173935	2.197224577	2.197224577	10.51615651
3.8	2.63905733	2.48490665	2.48490665	10.80893976
2	3.610917913	2.079441542	2.079441542	10.8720481

4.1	1.945910149	2.197224577	2.197224577	10.33270174
1.6	2.302585093	1.791759469	1.791759469	10.1518309
2.7	3.713572067	2.079441542	2.079441542	9.683713319
4.2	5.402677382	2.079441542	2.079441542	9.487896348
4.3	0	0.693147181	0.693147181	9.521055144
4.3	1.098612289	1.098612289	1.098612289	9.306468399
1.3	4.634728988	0	0	8.85509298
2.9	2.890371758	1.791759469	1.791759469	9.885272664
2.5	1.386294361	0.693147181	0.693147181	8.854664928
3	1.791759469	1.098612289	1.098612289	9.459931093
2.3	3.583518938	1.098612289	1.098612289	9.175541866
1.8	-0.223143551	0	0	9.653807502
1.8	3.433987204	3.784189634	3.784189634	9.333000385
1.2	0.693147181	2.197224577	2.197224577	8.990815266
1	2.079441542	0.693147181	0.693147181	8.896861744
1.4	-0.356674944	0	0	8.659733878
-7.5	1.098612289	-0.916290732	-0.916290732	8.218787156
-0.8	3.63758616	2.079441542	2.079441542	9.727883383
5.93	7.68294317	5.030437921	5.030437921	12.83991823
7.26	9.011645501	5.476463552	5.476463552	12.53219147

4.43	7.790282381	5.068904202	5.068904202	12.55210263
5.44	7.145984468	4.65396035	4.65396035	12.32848053
6.42	5.030437921	4.143134726	4.143134726	12.31329343
4.31	4.521788577	3.091042453	3.091042453	12.05144602
4.47	6.317164687	3.36729583	3.36729583	11.85776262
5.64	3.951243719	3.36729583	3.36729583	11.82991631
4.44	4.043051268	3.091042453	3.091042453	11.82837104
5.22	1.098612289	0	0	11.28222846
2.57	9.141097469	2.995732274	2.995732274	12.07715346
4.24	7.306531399	3.871201011	3.871201011	11.03186898
4.35	3.135494216	3.044522438	3.044522438	11.03400217
1.9	6.284134161	3.583518938	3.583518938	11.71884147
-1.09	3.784189634	2.197224577	2.197224577	10.73498263
4.18	2.302585093	2.564949357	2.564949357	10.91359644
0.33	3.850147602	2.197224577	2.197224577	11.03830319
3.74	1.945910149	2.197224577	2.197224577	10.44493937
2.08	2.48490665	1.791759469	1.791759469	10.40402039
3.11	3.912023005	2.197224577	2.197224577	9.891111281
4.61	5.811140993	2.079441542	2.079441542	9.667701926
3.68	0	0.693147181	0.693147181	9.755219536

5.29	1.098612289	1.098612289	1.098612289	9.404837505
0.73	4.248495242	0.693147181	0.693147181	9.481740612
1.49	3.258096538	1.609437912	1.609437912	9.972966972
1.07	1.386294361	0.693147181	0.693147181	8.9692874
2.59	1.945910149	1.098612289	1.098612289	9.586788531
1.86	3.761200116	1.098612289	1.098612289	9.234056899
1.88	-0.105360516	0	0	9.738259073
0.67	4.477336814	2.772588722	2.772588722	9.634169164
1.32	0.693147181	1.609437912	1.609437912	9.249753374
-1.02	2.302585093	1.098612289	1.098612289	9.089866219
1.28	-0.105360516	0	0	8.688959234
-6.97	1.609437912	-0.916290732	-0.916290732	8.467162258
-1.82	3.737669618	1.791759469	1.791759469	9.620925683
5.01	8.195057691	5.141663557	5.141663557	13.05567
6.56	9.049702026	5.575949103	5.575949103	12.7406021
4.14	7.891330758	5.164785974	5.164785974	12.73537649
5.01	7.239214974	4.691347882	4.691347882	12.39318687
3.83	5.056245805	4.110873864	4.110873864	12.36363607
3.56	4.691347882	3.258096538	3.258096538	12.19893725
3.69	6.424869024	3.663561646	3.663561646	12.15975642

5.66	4.17438727	3.526360525	3.526360525	11.90392647
3.99	4.189654742	3.17805383	3.17805383	11.96248401
6.33	-0.510825624	0	0	11.38676115
3.14	9.46583494	3.135494216	3.135494216	12.19846377
3.55	7.454141078	4.204692619	4.204692619	11.30454737
3.65	3.044522438	3.135494216	3.135494216	11.12987721
-1.34	6.473890696	3.850147602	3.850147602	11.73842624
0.18	3.433987204	2.197224577	2.197224577	10.867177
3.99	2.397895273	2.564949357	2.564949357	11.08215793
-2.07	4.290459441	2.197224577	2.197224577	11.14591154
1.86	2.079441542	2.079441542	2.079441542	10.64929834
1.86	2.48490665	1.609437912	1.609437912	10.28786521
4.42	4.060443011	2.397895273	2.397895273	10.11512516
2.72	5.476463552	1.609437912	1.609437912	9.857810039
3.38	0	0.693147181	0.693147181	9.904487053
3.53	1.098612289	1.098612289	1.098612289	9.577757412
0.22	4.770684624	1.386294361	1.386294361	9.728062162
1.61	3.33220451	1.609437912	1.609437912	10.00143063
0.49	1.098612289	0	0	9.047350743
2.25	1.945910149	1.098612289	1.098612289	9.589393056

2.39	3.951243719	1.098612289	1.098612289	9.262268465
1.05	-0.105360516	0	0	9.737610048
0.07	4.584967479	3.218875825	3.218875825	9.589666822
1.6	0.693147181	1.945910149	1.945910149	9.261603666
-1.74	2.63905733	0.693147181	0.693147181	9.238636241
0.75	-0.223143551	0	0	8.644354337
-3.91	1.609437912	-0.916290732	-0.916290732	8.959440144
0.35	3.761200116	1.791759469	1.791759469	9.556480014
5.64	8.38822281	5.288267031	5.288267031	13.13187401
6	9.107421318	5.686975356	5.686975356	12.84726579
5.15	7.917536354	5.267858159	5.267858159	12.76568272
4.02	7.329749689	4.691347882	4.691347882	12.46650427
5.1	5.043425117	4.189654742	4.189654742	12.4303116
3.37	4.700480366	3.33220451	3.33220451	12.23025293
3.64	6.616065185	3.850147602	3.850147602	12.40543157
5.27	4.33073334	3.610917913	3.610917913	12.00832877
3.66	4.262679877	3.401197382	3.401197382	11.99440672
5.84	-0.510825624	0	0	11.54562496
3.6	9.767725102	3.713572067	3.713572067	12.25903505

0.91	7.572502985	4.143134726	4.143134726	11.14810314
4.67	3.044522438	3.218875825	3.218875825	11.32547478
0.14	6.180016654	3.610917913	3.610917913	11.65367822
-6.13	3.871201011	2.397895273	2.397895273	10.7605377
3.57	2.772588722	2.564949357	2.564949357	11.08732908
-0.03	4.59511985	2.197224577	2.197224577	10.93303554
4.57	1.945910149	2.079441542	2.079441542	10.77509468
2.23	2.48490665	1.609437912	1.609437912	10.29617133
2.78	4.189654742	2.48490665	2.48490665	10.2093533
0.3	5.513428746	2.197224577	2.197224577	9.94630755
3.55	0	1.098612289	1.098612289	10.01695016
3.65	1.098612289	1.098612289	1.098612289	9.742907918
-3.12	4.8978398	1.098612289	1.098612289	9.662943487
0.99	3.433987204	1.609437912	1.609437912	10.0177979
0.36	1.098612289	0	0	9.2023082
2.05	1.945910149	1.609437912	1.609437912	9.595942851
1.53	4.158883083	1.386294361	1.386294361	9.255791635
0.58	-0.223143551	-0.105360516	-0.105360516	9.706133573
-0.28	4.189654742	4.369447852	4.369447852	9.613268932
1.11	0	2.079441542	2.079441542	9.151333191

1.3	3.091042453	1.098612289	1.098612289	9.409355152
-1.93	0	-0.105360516	-0.105360516	8.562931083
0.89	0	-2.302585093	-2.302585093	8.630700432
-1.99	3.761200116	1.609437912	1.609437912	9.540938245
4.94	8.588024372	5.38907173	5.38907173	13.22785788
5.68	9.193092479	5.743003188	5.743003188	12.9150981
4.31	8.009363077	5.356586275	5.356586275	12.85534631
3.68	7.261225092	4.672828834	4.672828834	12.51238754
3.34	4.94875989	4.158883083	4.158883083	12.56068296
2.34	4.844187086	3.465735903	3.465735903	12.38592449
3.05	6.673297968	3.970291914	3.970291914	12.5064809
4.09	4.477336814	3.761200116	3.761200116	12.12243557
2.94	4.406719247	3.496507561	3.496507561	12.16949683
6.49	-0.510825624	0	0	11.49508731
3.13	9.971426536	4.394449155	4.394449155	12.34376724
-1.99	7.609366538	4.564348191	4.564348191	11.14260064
5.26	3.044522438	3.258096538	3.258096538	11.47347753
0.67	6.324358962	3.688879454	3.688879454	11.60770823
-2.68	3.850147602	2.079441542	2.079441542	10.88661416
2.59	2.772588722	2.63905733	2.63905733	11.24423523

0.06	4.709530201	2.197224577	2.197224577	10.90027012
4.72	1.945910149	2.197224577	2.197224577	10.94431182
0.87	2.302585093	1.609437912	1.609437912	10.22658503
0.81	4.304065093	2.564949357	9.971426536	10.35188443
-3.28	5.513428746	1.945910149	7.609366538	9.867963996
3.27	0	1.098612289	3.044522438	10.16527473
2.19	0.693147181	1.098612289	6.324358962	9.836706519
-5.93	4.852030264	0.693147181	3.850147602	9.461176908
0.82	3.465735903	1.609437912	2.772588722	10.11876021
1.1	1.098612289	0	4.709530201	9.266437111

APPENDIX II: COMMERCIAL BANKS IN KENYA

1. African Banking Corporation Ltd.
2. Chase Bank (K) Ltd
3. Commercial Bank of Africa Ltd
4. Consolidated Bank of Kenya Ltd
5. Co-operative Bank of Kenya Ltd
6. Credit Bank Ltd
7. Development Bank of Kenya Ltd
8. Diamond Trust Bank Kenya Ltd
9. Equatorial Commercial Bank Ltd
10. Equity Bank Ltd
11. Family Bank Limited
12. Fidelity Commercial Bank Ltd
13. Fina Bank Ltd
14. First community Bank Limited
15. Giro Commercial Bank Ltd
16. Guardian Bank Ltd
17. I & M Bank Ltd
18. Jamii Bora Bank Limited
19. Kenya Commercial Bank Ltd
20. K-Rep Bank Ltd
21. National Bank of Kenya Ltd
22. NIC Bank Ltd
23. Oriental Commercial Bank Ltd
24. Paramount Universal Bank Ltd
25. Prime Bank Ltd
26. Victoria Commercial Bank Ltd
27. Trans-National Bank Ltd
28. Imperial Bank Ltd
29. Bank of Africa Kenya Ltd
30. Bank of Baroda (K) Ltd
31. Bank of India
32. Barclays Bank of Kenya Ltd
33. CFC Stanbic Bank Ltd
34. Charter House bank Ltd (Under Statutory Management)
35. Citibank N.A Kenya
36. Dubai Bank Kenya Ltd
37. Ecobank Kenya Ltd
38. Gulf African Bank Limited
39. Habib Bank A.G Zurich
40. Habib Bank Ltd
41. Middle East Bank (K) Ltd
42. Standard Chartered Bank Kenya Ltd
43. UBA Kenya Bank Limited

Source: Central Bank of Kenya (2022)

Appendix III: Data Collection Sheet

Year	Return on Assets	Amount transacted through Mobile banking	Amount transacted through Internet banking	Amount transacted through Agency banking
	%	Shs.	Shs.	Shs.
2018				
2019				
2020				
2021				
2022				