THE RELATIONSHIP BETWEEN BANKING INNOVATIONS AND FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA

BY

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A RESEARCH PROJECT IN PARTIAL FULFILLMENT OF AWARD OF DEGREE OF MASTER OF BUSSINESS ADMINISTRATION, FACULTY OF BUSINESS AND MANAGEMENT STUDIES, UNIVERSITY OF NAIROBI

SEPTEMBER   2023

DECLARATION

This project is my original work that has not been given out for any award to in any, Institution or University.

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ACKNOWLEDGEMENT

I acknowledge my supervisor Professor Angela Kithinji for her professional guidance, critique and support. I acknowledge my dear parents for their moral support throughout my MBA programme. Lastly, I acknowledge my wife who offered me support especially when writing this project.

DEDICATION

I would gladly wish to dedicate this project to my dear wife who has supported me morally through the study period.

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ABBREVIATIONS AND ACRONYMS

ATM - Automated Teller Machines

CBA - Commercial Bank of Africa

CBK - Central Bank of Kenya

CRBs - Credit Reference Bureaus

GMM - Gaussian Mixture Modelling

ICT - Information Communication Technology

KCB - Kenyan Commercial Bank

MFI - Micro Finance Institutions

MFS - Mobile Financial Service

POS - Point of Sales

R&D - Research and Development

ROE - Return on Equity

ROA - Return on Asset

RTGS - Real Time Gross Settlements

ABSTRACT

The goal of the study was to ascertain how technology advancements affected the financial performance of commercial banks in Kenya. The following theories were used in the study: the diffusion of innovation theory, the Schumpeter theory of innovation, and the constraint-induced financial innovation theory. The population of the study, which used a descriptive research approach, included all 42 commercial banks that were registered and actively operating as of December 31, 2022.For the years 2015 through 2022, secondary data was gathered Data on net income, total assets, and capital adequacy ratio were taken from the annual reports of the various commercial banks. The CBK's annual survey report provided information on the quantity of transactions made using mobile devices, the dollar amount of bank transactions made using Internet devices throughout the year, and the dollar amount of transactions made using ATMs. The acquired data was subjected to diagnostic tests for normality, linearity, multicollinearity, and autocorrelation to determine its appropriateness for the creation of a linear regression model. For data analysis, the study used descriptive statistics such the median and mode. To determine the relationship between the explained and explanatory factors, inferential statistics were also applied in the study through the use of multiple regression models. According to correlation analysis, online banking showed a positive but insignificant link with the financial performance of commercial banks, whereas mobile banking and ATM banking had a favorable correlation with financial performance. On the other hand, regression analysis showed that there was a positive and significant correlation between the financial success of commercial banks and online, mobile, and ATM banking. The report advised commercial banks to use technological advancements like mobile banking, ATM banking, and internet banking more frequently. The report also advised the government, working through the Kenyan central bank, to create rules that would promote the use of ATM, internet, and mobile banking in all commercial banks.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Due to its ability to increase profitability within the banking industry, banking innovation is a crucial driver of bank performance as it directly affects consumers (Tahir et al., 2018).According to Tunay, Yüksel, and Tunay (2019), applying banking innovations improves bank productivity, customer satisfaction, and profitability. When compared to conventional banking processes, technological innovations have the potential to offer significant cost advantages that increase revenues while reducing risks (Akhisar Tunay & Tunay, 2015). Banking effectiveness lowers costs, which increases bank revenues. Technology, for example, ensures the banking industry cross-market both new and existing goods to potential clients, improving financial performance (Lawrence, 2010).

The study must be theoretically underpinned through the Schumpeter theory, diffusion of innovation theory, and constraint-induced innovation theory .Diffusion of innovation theory clarifies why some banks embrace new technologies more quickly than others and explains such policy-making processes that deploy optional innovations through authoritative, group-based, and accountable innovation decisions (Liu & Li, 2009.)The constraint-induced innovation theory (Silber, 1983) contends that the goal of financial innovation is to ensure that all financial organizations maximize their profits. Contextually, Kenyan financial institutions have embraced and adapted the idea of banking innovation to a significant extent. More than 10600 agents have been formed by Kenya's top ten banks, with Banking industry in Kenya leading the charge agencies other bank in the nation. Kenyan banks have consistently embraced various innovations to improve customer service. Internet banking, ATM card, debit card, and electronic financial transfers which are more than the banking innovations that have been embraced in Kenya. Customer satisfaction is increased by banking innovations that reduce the cost of banking transactions, provide convenience, and

guarantee the security of cash transfers (Musyoka, 2014).

1.1.1 Banking Innovations

According to Gardeva and Rhyne (2011), banking innovation refers to the process through which financial organizations take advantage of ICT's effectiveness to develop new products, services, and delivery methods for banking services. Banking innovation is defined as the emergence of new technologies in finance, financial markets, and financial instruments (Tufano, 2012). Banking innovation refers to the conceptualization, creation, and execution of pertinent financial instruments combined with originality and creativity to address pressing problems in the financial industry (Lawrence, 2010).

Chaarani and Abiad (2018) argue that banking innovations serve as a key instrument for connecting the banking industry and the economy. Financial institutions use banking innovations as instruments to make sure that services are provided to clients successfully. The goal of banking innovations within the banking sector is to speed up service delivery and increase market shares of specific financial institutions (Jack & Suri, 2010). Banking institutions have a specific competitive advantage that places them in a position to achieve higher-level financial performance, especially in a highly uncertain working environment, as demonstrated by successful innovations (Zu, Gu, & Bonsu, 2019).

The two most important banking developments in the financial sector continue to be mobile and ATM banking. The fundamental idea behind electronic banking is to make it simple for consumers to access their accounts online and to make sure they carry out specific activities by putting them through rigorous security checks (Essinger, 1999). Because they ensure that financial services are available to everyone, banking innovations benefit not only banks plus other financial institutions and countries. The application of ATMs, internet, and mobile banking were all included in the study to measure financial innovations in banking. The study operationalized internet banking using the amount of bank transactions made using

computers, mobile banking through the number of transaction through mobile device, and ATM banks through values of banking through the device and ATM banks through use of transactions ATMs.

1.1.2 Financial Performance

Financial performance is the use by financial metrics to assess the extent in which an aim is met, the input required to make available the necessary resources, and the assistance provided to banks in the form of investment opportunities (Heremans, 2007). According to Rutagi (1997), financial performance is a gauge of how well a corporation is doing overall. This translates to a measurement of how well a company generates and ensures value for shareholders (Ahmed, Raza, Amjad & Akram, 2011).

Several institutions, like commercial banks, use both indicators of finance plus metrics to track their financial success. Many studies on the financial health of banks literally concentrate entirely on raising profits and reducing various risks (Boot & Thakor, 2007). There exists a consistent primary link between risk and return that links higher returns to greater risks and lower returns to lower risks. It is necessary to develop new procedures to ensure banks maintain their competitiveness in the market due to the ongoing rise in competition within the banking industry.

We have several ways to evaluate an organization's performance. Return on equity return on assets and operational profit margin are frequently employed crucial financial ratios applied in analyzing profitability without neglecting net sales (Zenios, 1999). The Return on assets is a precise indicator of the return of the company's assets, as a result, the higher the value, the higher in terms of profitability, and the lower values, and lower profitability. To determine if a company makes a responsible return on the borrowed funds, the Return on equity is carefully studied in contrast to return on assets. Return on assets will be applied as the primary performance indicators in this study to operationalize financial performance.

1.1.3 Banking Innovation and Financial Performance

Technological products provide the banks with a lot of benefits. As an illustration, the bank will experience cost-related benefits, increased profitability, and reduced risk in comparison to the traditional products of banking (Tunay, Yüksel & Tunay, 2019). Therefore, it is encouraged for bank managers to implement new banking financial innovations that aim to reduce costs and, as a result, maximize profits (Nader, 2011). By adopting branchless banking methods, banks gain competitive advantages and improve performance (Mckay & Pickens, 2010). This fact is explained since branchless banking systems require less labor than traditional banking systems, making them less expensive to maintain. Gutu (2014), argues the ongoing use of banking innovations in the Romanian banking industry has greatly decreased expenses, resulting in an increase in bank revenue. By creating an environment where account holders can easily transact by self-service abilities, innovations tend to lessen the over reliance on human labor.

One innovation that lowers banking overhead costs is the use of ATMs, agency banking, and internet banking (Krawish & Al-Sadi, 2011). Therefore, innovations not only save costs but also increase bank profitability. The advantages of electronic banking include increased client satisfaction and decreased moral hazard. Customers can make rapid transactions and have access to their accounts thanks to online banking. Through online banking, banks may conduct transactions more quickly and easily, which has a favorable impact on their business.

1.1.4 Commercial Banks in Kenya

The Annual Report of CBK 2022, argues we had 42 commercial banks, involving 1 mortgage financing company, 13 microfinance institutions , 9 representatives of the foreign banks, 74 licensed foreign exchange bureaus, 19 remittance companies, and 3 CRBs in Kenya at the end of December 2022.The Kenya CBK Act (Cap. 491 of 1966), Companies' Act (Cap. 17 of 2015), and financial Act (Cap. 488 of 1989) are the laws that governing

Kenyan financial sector. Additionally, the Central Bank typically issues and directs several regulations and procedures. CBK controls all bank activities, including digitalized operations and mobile applications that permit transfers, deposits, and withdrawals. The Kenyan economy continues to be significantly influenced by the Kenyan commercial banking sector. Since the capital market is still developing and thus less well-known, the Kenyan banking sector makes up the majority of the country's whole financial sector.

Commercial banks' primary role in promoting economic growth through their funding mechanism necessitates a thorough understanding of their organizational structure (Nyathira, 2012). The Kenyan commercial banks have embraced financial technologies in a big way. Continued adoption of banking systems is unmistakable proof that the world is becoming more digital. A KCB report from 2022 states that the bank lent more than 212 billion using Mpesa network, accounts for more than 70% of all loans made by the commercial banks.

According to a report by equity published in 2022, Equitel mobile banking accounts for 77% of all transactions within the banking industry. Equitel remains as the first mobile operator (MVNO) to be launched in Kenya. According to the survey, mobile platforms presently account for more than 89% of all processed loans. Kenya has persisted in making significant investments in digital banking technologies and educating human resources with the requisite skills to manage relevant developments.

1.2 Research Problem

Use of banking innovation in the bank sector improves bank performance while requiring less work to give high-quality services (Chaarani & Abiad, 2018). Investment in banking innovation creates a new enabling environment that improves banks' performance (Tahir et al., 2018). Nevertheless, in the age of intense pressure, businesses deal with several difficulties brought on by liberalization, globalization, technological improvements, and

shifting consumer expectations (Abdullah, 2017).

Commercial banks in Kenya are consistently spending a lot of money on digital banking innovations and training staff members to handle relevant innovations (Korir, 2014). Kenyan banks have implemented various reforms, including the creation of CRBS, agency banks, and e-commerce in enhancing payment systems (Okiro & Ndungu, 2013). However, regardless the adopting e- banking innovations through Kenyan banks, the industry   still faces problems such as long lines, transaction errors, insecurity, and network problems (Cherotich et al., 2015). The key issue is still whether agency banks, internet banks, credit card use, and mobile banks improve the financial performance of commercial banks. Third-world nations like Kenya must continue to adopt new banking technologies, thus necessitates the need for research on the subject. (Joseph et al. 2003).

Only a small number of the studies within Kenya have narrowed down to effect of technological innovation on performance of banks applying performance as indicator, despite the fact that various studies have been carried out specifically on ensuring customer satisfaction and proper industrial services within banking industry within Kenya (Mugambi, 2006). The effect of banking innovations on performance is still a challenge for two major reasons, though being critical in   highlighting performance within the banking industry. The primary drivers of banking innovations are not well understood, and the impact of innovations on commercial banks' performance is currently being thoroughly examinedby (Mabrouk and Mamoghli, 2010). Numerous empirical research on the effect of banking innovation on bank performance has been carried out, but the findings have always been inconclusive.

Mwania and Muganda (2011) and Batiz-Lazo and Woldesenbet (2006) showed that innovations in banking industries is influenced by performance of commercial banks, leading to increase in banks' performance, Francesca and Claeys (2010) and Pooja and Singh (2009) established banking innovations showed an insignificant impact on performance of banks. Lerner and Tufano (2011) conducted research on the impact of banking innovation on performance of commercial bank, and the results revealed that current empirical evidence suggest more about banking innovations, we have still many unanswered questions regarding social welfares and impact of banking innovation on institutions, with majority of the studies being case studies.

In research carried out by Hendrickson and Nicholas (2011) to establish the impact of branchless banking on performance, it was found out that commercial banks were able to achieve a good performance through implementing innovation throughout the branches.

In order to have a comparison of the results from other researchers, regionally, locally and globally, these studies served as the basis for interesting study on related topics in the Kenyan banking industry, which has benefited from a steady increase in the use of banking innovations in recent years. This study tried to respond to the below question: What impact do banking innovation show on Kenya's commercial banks' financial performance? This study differs from past studies in that it contains multiple measures of financial innovation, includes control variables, and focuses on a more recent study period during which other financial innovations have already been established in the banking system by incorporating innovations into all the branches' performance.

1.3 Research Objective

To determine the effect of Banking innovations on financial performance of the commercial banks in Kenya.

1.4 Value of the Study

The research will have an impact on developing and improving policy. The consequence is advantageous to the policymakers as they create rules and policies governing banks as they adopt digital financial technologies. The study might be crucial in helping regulators create standards for commercial banks that want to adopt financial innovations. In order to provide guidance on risk minimization, particularly when dealing with banking innovations, the policy makers may require information for various applications.

Managers will gain from the study as well. By thoroughly comprehending the outcome of this research, commercial bank managers will be able to make managerial judgments on the deployment of banking innovations. Through this course, management will be better equipped to comprehend the issues with innovation and technology and how to solve them. Additionally, those interested in learning about numerous topics, including research methodologies and economics, will benefit from this study. Based on the study's suggestions, researchers will also conduct additional research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The research's guiding theory, the factors influencing financial performance, and many studies on study variables are all highlighted within the   chapter. This chapter also includes a conceptual gap   and a summary of the papers that were analyzed.

2.2 Theoretical Review

These theories will hence be relevant to the investigation: the Schumpeter innovation theory, the constraint-induced financial innovation theory and   diffusion of innovation theory. The main anchoring theory for this study is diffusion of innovation theory. According to notion regarding innovation diffusion, a high rate of dissemination results in a bigger impact and, as a result, a higher return to initial investment. (2006) (Akhavein, Frame, & White). This demonstrates how heavily banking innovations have affected the financial performance of banks around the world.

2.2.1 Diffusion of Innovation Theory

Rogers (1995) came up with and outlined the hypothesis. It is widely recognized as the hypothesis used in ICT study in   explaining the adoption of technology. Rogers (1995) argues that diffusion is hence a process that any innovations method gain before being given to a certain demographic integration. The outcome is therefore that people adopt and use the novel idea as a result of perception.

This theory's primary criticism is that it doesn't address whether it applies to various types of businesses (Lundblad & Jennifer, 2003). The hypothesis is also not concerned with whether the innovation traits are relevant to its adoption and whether or not the kind or scale of the sector has an impact. However, the theory is still valid since it identifies important factors

that influence how quickly some banks adopt new banking technologies. But the primary goal of the banks' use of technical superiority is to obtain a competitive edge over other banks who do not use it, which in turn results in financial advantage.

2.2.2 Constraint-Induced Financial Innovation Theory

The theory was proposed by Silber (1983). According to the notion, the primary driver of innovation in any financial institution is the desire to maximize profits. Silber (1983) argues that some restrictions, such as practices of leadership and organizational managing, hinder the effectiveness of financial institutions, which is why such institutions try to eliminate them. However, it emphasizes that innovation is focused on generating profit through addressing issues that institutions face. It also explains how banks come up with various ways to generate profits in the face of environmental change.

The theory emphasizes potential limitations both in and out of firm that enhance the organizations to come up with ways of being competitive and achieving financial performance in the marketplace. Nevertheless, the theory only focused on inventions from an economics perspective, hence unable to verify the idea of innovation out of liberal finance. However, it is applied to research since it explains how financial innovations influence profitability of business geared towards rising performance.

2.2.3 Schumpeterian Theory of Innovation

Joseph Schumpeter (1928–1939) created the Schumpeter innovation hypothesis. The thesis argues that innovations are ongoing processes of creative destruction that are crucial for fostering the growth of capital systems. According to Schumpeter's thesis, businesses draw new rivals as a result of profit potential, and thus starts the cycle of innovation. An investment wave results, which reduces total profitability (Chaarani & Abiad, 2018).

The idea (1928) contends that because capitalist technological breakthroughs are unexpected,

long-term and short-term growth rates are permanently fused. Schumpeter placed a significant amount of reliance on the organizational and social forces that took part in the several cycles of industrial transformation. Although Schumpeter placed a strong emphasis on the benefits of innovation in his writings, he never addressed the source of his creativity, which is one of the theory's main detractors. Porter (1992) parallels Schumpeter's thinking when he claims financial innovation is critical for the growth of a nation's competitive edge. Therefore, the nation should increase its financial sector's investment in innovations to gain a competitive edge and efficiently participate within global markets. The work of innovation which Schumpeter provided the groundwork for has been focused on firm-to-firm innovation up until this point. Therefore, the Schumpeter hypothesis is still applicable to this research since the application of new technology gives a replacement to the old ideas.

2.3 Determinants of the Financial Performance

This included banking innovation, bank size and capital adequacy.

2.3.1 Banking Innovations

As a technological standpoint, innovation can be as seen as a process involving science from theory, banking innovations should consequently result in increased profits by lowering the banking costs. Lyons, Chatman, and Joyce (2007) cite like in the one of Jack & Suri below. Hence, financial institutions are using banking innovations as tools to make sure that services are provided to customers properly. The goal of innovations in the banking sector is to speed up service delivery and increase the share market of specific aspects (Jack & Suri, 2010). Application of digital technologies is intended to make sure massive number of various transactions that commercial banks undertake go as quickly as feasible. replaces outdated technology, which is valuable since it adds value to the user for instance, users can access banking services anywhere with the help of mobile, internet, and ATM banking; this is

anticipated to increase bank profits because it cuts down on distribution expenses and transaction costs (Stavins, 2011).

2.3.2 Bank size

In order to determine the size of bank, available assets must be considered. However, prior research has produced contradictory findings, and there is still no clear understanding of how the bank size influences the Banking performance. When looked at standpoint of assets, bank size can influence profitability. The performance of commercial banks and bank size do not significantly correlate (Goddard, 2004). Commercial banks with substantial asset bases can expand their reach into less competitive regions with the primary objective of increasing customer deposits. Banks have a bigger lending capability since they have large customer deposits. As a result, banks can earn more money from the loans, which increases their profits.

2.3.3 Capital Adequacy

Capital adequacy could refer to the bare minimum of capital that banks must continually maintain. The protection of deposits and the promotion of global financial system stability are the two fundamental objectives of capital adequacy. The amount of finance that is always on hand to support any commercial bank's activities is known as capital. Commercial banks primarily require this capital to help them better manage risks including credit risks and operational hazards. Therefore, adequate capital refers to the bank's stability. The most important metric for capital adequacy is the capital adequacy ratio. According to Mulualem (2015), the higher the ratio, the greater chance the bank has of avoiding insolvency, whereas the lower the ratio, the higher the rate of insolvency for the bank.

2.4 Empirical Review

2.4.1 Global Studies

Bonsu (2019)and Zu, Gu, evaluated how banking innovation affected African banks' profitability between 2015 and 2018. The GMM estimation techniques were applied for analysis. The results revealed ATM use considerably and favorably impacted banks' financial results.

From 2010 to 2017, Chaarani and Abiad (2018) evaluated the impact of innovation banking on banking performance in Lebanon. As measures of performance, the study used ROA and ROE. mobile and Internet banking and ATMs, and software investments were among the banking innovation components taken into consideration. According to the survey, the performance of Lebanese banks was impacted by investments in ATMs and internet banking. Nevertheless, the survey also showed investments in banking had an insignificant impact on performance of banks in Lebanon.

Tahir et al. (2018) examined if innovation improves the financial performance of commercial banks in Pakistan. The research was conducted between 2007 and 2016, sand involved use of secondary data subjected to multiple regression. The study outlined those online transactions had significance effect on banking performance. However, the study never showed any correlation between mobile banking, Atm and the banking performance.

Abdullah (2017) looked at how technological advancements affected the functioning of commercial banks in Jordan. 11 banks were surveyed for primary data, analyzed by regression model. The research established commercial banks' performance increased when innovations were used. By making sure that financial services could be accessed by

customers, it has also been noted that banking innovations have had a considerable positive impact on customer service. Nevertheless, the study made use of primary information gathered through the use of questionnaires.

Research on the effect of electronic banking service on banking profitability of banks was conducted in 2015 by Akhisar Tunay and Tunay. Between 2005 and 2013, information was acquired from the banks in 23 countries, and analyzed by panel regression. The study showed profitability of banks increased with increase in ATMs quantity, but the internet banking contributed to a declining performance of banks. The research nevertheless narrowed down to digital banking as the origin of the banking innovations.

2.4.2 Local Studies

Oluoch (2016) and Kamau looked at the link among innovation and Kenyan performance of banks. The research applied correlation research design. Data of 41 banks were gathered between 2012 and 2015. Correlation analysis was used in the study to determine which factor had the biggest impact on how well commercial banks performed: ATM banking. As a result, several ATM were availed. The outcome of the analysis revealed a positive association among the financial performance of Kenyan commercial banks and ATMs use and other features of the banking innovations, such as internet banking.

Cherotich et al. (2015) tried to investigate how banking innovations affected the performance of Kenyan banks. The research included use of secondary data gathered from 44 Kenyan commercial banks and applied regression model to examine it. The outcome of study showed that performance was strongly impacted by banking advances. The study discovered that performance of Kenyan banking industry was positively affected through banking innovations.

To establish the impact of banking innovation on the performance of Kenyan banks, Ngari and Muiruri (2014) engaged research. Questionnaires were utilized to gather data from a sample of sixteen banks, and the regression was applied to analyze the data. The analysis's findings showed that some Kenyan banks had consistently implemented new technologies including mobile and online banking. Further research revealed that Kenya's banking industry performance was significantly impacted by the innovations used.

Gichungu and Oloko (2015) looked at how banking innovations affected Kenyan commercial banks' performance. Online banking, agency and mobile banking, were applied as key variables for the research. The study applied a key descriptive research design and used the secondary data available . The analysis' outcome suggested that banking innovation had a beneficial and noticeable impact on Kenya's commercial banks' operations.

Monyoncho (2015) started a study to look into how financial technologies are affecting the financial performance of commercial banks in Kenya. The study's outcome showed that banks' profitability was considerably impacted by electronic banking. Customers can simply transfer money through e-banking and pay bills using a variety of accounts. Further research revealed that internet-related banking has a significant effect on Kenyan banks' profitability.

2.5 Summary of Literature Review

A thorough analysis of the empirical literally on banking innovations and performance was the focus of chapter two. Diffusion of innovation theory highlights that primary goal of the banks' application of technical superiority is to obtain a superior edge over other banks who do not use it, and as a result, to profit financially. According to the limited induced financial innovation hypothesis, financial innovations influence profitability of firms by increasing service quality of services they offer, which improves the banks' financial profitability. The theory holds that new technology applied tend to replace the old technology, that is valuable

as it tends to gain value from new technology.

The empirical research outcome on effect of banking innovations on profitability of banks is consistent. According to research by Akhisa and Tunay (2015), online banking showed negative effects on performance while ATM banking showed good effects on bank performance. The performance of Kenya's banks is however significantly impacted by banking financial innovations, according to studies by Chaarani and Abiad (2018), Abdullah (2017), Tahir et al (2018), Gichungu and Oloko (2015), Monyoncho (2015), Zu, Gu, and Bonsu (2019) Kamau and Oluoch (2016),

It is challenging to apply prior findings to the current Kenyan situation because the examined studies use a variety of research approaches and study contexts. The motivation for this study is still relevant and justifiable considering these discrepancies from the majority of studies conducted both locally and internationally.

2.6   Conceptual Framework

According to figure 2.1, the conceptual model for the study includes financial performance as explained variable and banking innovations as explanatory variable. The study also includes capital adequacy and bank size as control factors.

Explanatory variable   **Explained Variable**

```
┌─────────────────────────────────┐            ┌───────────────────────────────┐
│ Technological innovations       │            │ Financial performance         │
│    •  Mobile banking            │            │    •  ROA                     │
│    •  Internet banking          │───────────▶│                               │
│    •  ATM banking               │         ↗  │                               │
│    •                            │        ╱   └───────────────────────────────┘
└─────────────────────────────────┘       ╱
┌─────────────────────────────────┐      ╱
│ Control Variables               │     ╱
│    •  Bank size                 │    ╱
│    •  Capital adequacy          │───╱
└─────────────────────────────────┘
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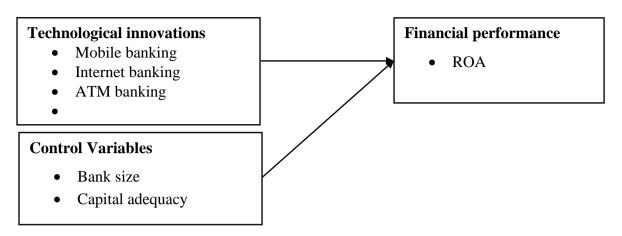
Figure 2.1: Conceptual Model
Source: Author (2023)

CHAPTER THREE:

RESEARCH METHODOLOGY

3.1 Introduction

This part involves data gathering methods, target clusters, study patterns, research designs, and data analysis methods. The term "methodology" refers to the overarching rule that directs anyone doing research on how to conduct a study (Dawson, 2009).

3.2 Research Design

The selection of any design in research is based on the   data type and adoption of analysis by any of the researcher (Cooper & Schindler, 2013). The study hence involves   application of descriptive research designs that   strives to make sure data is collected and ascertain and ensures of relationships within variables. The various reasons using descriptive design in collecting data and establishing the existing relationship between variables.

3.3 Target Population

Kothari (2004) argues that a population is totality of the elements having the comparable qualities from which conclusions can be drawn. The total 42 banks that were applied and actively in operation as of December 31, 2022, will make up the study population. Therefore, a census of Kenya's 42 registered banks will be conducted as part of the research.

3.4 Data Collection

In order to offer a panel of data for analysis, this study will use secondary data that will rely on information gathered utilizing data collection sheets. In addition to preparing the data for analysis, secondary data will be collected for   the years 2018 through 2022. This time period was selected because it was in tandem   with important advancements within the use of new technologies within financial banking sector.

The information will be gathered through the CBK's annual survey report, annual reports of financial statements, and various websites for Kenyan banks on the internet. Each commercial bank's return on assets value will be derived from the yearly CBK supervisory reports. The deployment of ATMs and information about agency banking locations will be gathered from the commercial banks 'website.

3. 5 Data Analysis

For data analysis, the research will use descriptive statistics like the median. To determine the relationship between the explained and explanatory factors, inferential statistics will be applied.

3.5.1 Diagnostic Tests

To find out the adequacy of research models, the testers will conduct several diagnostic tests. Shapiro Wilk tests on the residuals will be used to check for normality in the study. The study will use Wooldridge-tests of autocorrelation to check for autocorrelation; if the statistic is less than 0.05, first order serial correlation may exist. Additionally, the Variation of Inflation Factor (VIF) that must be used to do a test for multicollinearity within the study; a VIF of more than 10 will be multicollinearity. The study will next use the Breusch test, where the general guideline is the chi-square value must be lower than 0.05 for a particular data set, to test for homoscedasticity

3.6.1 Analytical Model

The model will be as shown below:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

Where,

Y =Financial Performances (Return on assets)

β_0 = is the constant

β_1 - β_5 = regressions coefficient

X_1 =Mobile banking.

X_2 = Internet bankings

X_3 = ATM backings

X_4 = Size of banks

X_5 = Capital adequacy

ε = Error terms.

3.6.2 Measurement of Variables

Table 3.1 Operationalization of the Study Variables

Variable	Proxy	Operational Definition	Measurements
Financial Performance	Y	Ability to mobilize resources, and manage them for better advantage	ROA = net income to total assets
Mobile banking	X1	The capability in applying mobile phone in enhancing banking operations	Value of transactions through mobile devices/total value number of transactions

Internet Banking	X2	Application of ATM to perform Banking operation	Transactions values via Internet devices within whole year/value of total annual transactions.
ATM Banking	X3	Adopting ATMs to perform banking operations	Value of transactions through ATMs/value of total transactions
Bank size	X4	The sum of total assets in a particular bank.	The Natural Log total value of assets held by a Bank
Capital adequacy	X5	Minimum reserve capital which a bank keeps	The capital Adequacy ratio as owners equity to total assets

3.6.3 Tests of Significance

To find out significance, the T- and F-test must be utilized. The F - test as well as variance analysis will be applied in assessing significance of the regression equations. T-test must be adopted to assess the statistical implications of regressions coefficients. The F and t-test will hence be carried out at 95% confidence level.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

Chapter four offered the findings from data analysis. First, it offered descriptive statistics that were applied to the data to generate a summary. The chapter then presented the results of the diagnostic tests that were taken into consideration to assess the assumptions made throughout the regression analysis. The findings of the analyses of correlation and regression analysis were then displayed.

4.2 Descriptive Statistics

The descriptive statistics that were reported included the minimum, maximum, mean, and standard deviation. To provide straightforward interpretations, the data were summarized using descriptive statistics. Table 4.1 summarizes the descriptive research findings.

Table 4.1: Descriptive Statistics

	Minimum	Maximum	Mean	Std. Deviation
ROA	-42.7117	4.8696	0.59037	0.378222
Mobile Banking	125826	230220	171847.8	3469.13
ATM Banking	35037	63912	44259.68	9710.568
Internet banking	627	1295	863.15	225.844
Capital Adequacy	-25.1	36.7	18.85526	11.80466
Total Assets	5250.61	621722.9	115362.2	14981.8

Source: Researcher, 2023

Table 4.1's data show that throughout the five-year period, the Return on Assets (ROA) recorded a low of -42.7117 and a maximum of 4.8696. With a standard deviation of 0.38, this

had an average of 0.59037. On the other hand, the total number of mobile banking transactions was 125826 minimum, 230220 maximum, with a mean of 171847.8, a deviation of 3669.3, and a range of 125826 to 230220. Additionally, the average for ATM banking was 44259.68, which was 9710.68 out from the norm. Likewise, the lowest and maximum ATM banking transactions were 35037 and 63912. Showing a mean of 863.15 and a standard deviation of 225.844, the number of transactions made through the internet ranged from 627 to 1295, with a low of 627 and a high of 1295. Furthermore, the capital adequacy ratio had a range of -25.1 to 36.7, showing an average of 18.85 and a standard deviation of 11.80. Last but not least, the bank size   as determined by assets ranged from 5250.61 to 621722.9, revealing   an average of 115362.2 and a standard deviation of 14981.8. The research also showed that internet, Atm and mobile   banking,

4.3 Diagnostic Tests

Among the diagnostic techniques used were the normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test. Prior to using inferential statistics, linear regression was performed to make sure the assumptions were upheld.

4.3.1 Normality Test

A normality test is used to assess if the data is normally distributed or not.. Shapiro Wilk and Kolmogorov-Smirnova tests were applied to check for normalcy.

Table 4.2: Normality Test

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
ROA	0.363	37	0.080	0.443	37	0.070

Mobile Banking	0.149	37	0.078	0.901	37	0.053
ATM Banking	0.262	37	0.054	0.789	37	0.074
Internet Banking	0.194	37	0.601	0.865	37	0.060
Capital Adequacy	0.165	37	0.072	0.881	37	0.081
Bank Size	0.118	37	0.200	0.939	37	0.064

Source: Researcher, 2023

The outcome of the study showed that the significance level for the shapiro wilk and the Kolmogorov Smirnov were all greater than 0.05 indicating a normal distribution of the data.

4.3.2 Multicollinearity Test

Multicollinearity examines relationships between variables under investigation. Utilizing the Variance Inflation Factor (VIF), multicollinearity was examined. Multicollinearity would be present if the VIF was more than 10. The results were displayed in Table 4.3.

Table 4.3: Multicollinearity Test

Variable	VIF
Mobile Banking	6.134
ATM Banking	7.016
internet Banking	3.049
Bank Size	7.56
Capital Adequacy	1.206

There was no multicollinearity among the variables, as shown by the fact that none of the in-question variables had a VIF value more than 10.

4.3.3 Autocorrelation Test

Durbin-Watson was used in examining autocorrelation. Table 4.4 gives the results of the study. Range of the Durbin Watson statistic: 0 to 4. Positive autocorrelation is denoted by values under 1.5, whilst negative autocorrelation is denoted by values over 2.5.

Table 4.4: Autocorrelation Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.459 a	0.211	0.083	8.414635	2.277

Source: Researcher, 2023

For autocorrelation test, a value ranging between 1.5 and 2.5 indicates lack of autocorrelation. Therefore, the data did show any signs of autocorrelation since the value was 2.277.

4.3.4 Heteroscedasticity Test

Heteroscedasticity was tested using Breusch-Pagan test and findings presented in Table 4.5. Homoscedasticity is used to test if the residuals would increase with increase in dependent variable. A significance level greater than 0.05 indicates lack of heteroscedasticity.

Table 4.5: Heteroscedasticity Test

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	318823.3	5	63764.67	1.38	.259b

		Residual	1432821	31	46220.03

Residual	1432821	31	46220.03
Total	1751644	36	

The data did not exhibit heteroscedasticity, as indicated by the significance level of 0.259>0.05, and were thus suitable for inferential statistics.

4.4. Correlation

A correlation analysis was applied to focus on the direction of the nexus between the independent components and the dependent variable. The study's outcome is presented in Table 4.6.

Table 4.6: Correlation Matrix

		ROA	**Mobile Banking**	**ATM Banking**	**internet Banking**	**Capital Adequacy**	**Bank Size**
ROA	Pearson Correlation						
	Sig. (2-tailed)						
Mobile Banking	Pearson Correlation	.309*					
	Sig. (2-tailed)	0.049					
ATM Banking	Pearson Correlation	.313*	.822**				
	Sig. (2-tailed)	0.046	0.00				
internet Banking	Pearson Correlation	0.125	.645**	.807**			

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	Sig. (2-tailed)	0.437	0.000	0.000		
Capital Adequacy	Pearson Correlation	-0.087	0.07	-0.047	-0.056	
	Sig. (2-tailed)	0.605	0.675	0.78	0.739	
Bank Size	Pearson Correlation	.396*	.892**	.865**	.674**	-0.132
	Sig. (2-tailed)	0.015	0.000	0.000	0.000	0.437

As per the outcome in Table 4.6, there was a substantial and positive link among financial success and mobile banking (rho=0.309, p=0.049). The study also established a positive link among ATM banking and ROA (rho=0.313, p=0.046).This agreed with Kamau and Oluoch's (2016) finding of a nexus between ATM use and banking industry in Kenya. On the other hand, there was a slight but positive association between ROA and internet banking (rho=1.25, p=0.437). However, capital sufficiency showed a weak and unremarkable connection with ROA (rho=-0.087, p=0.605). Finally, there was a substantial and positive association between bank size and ROA (rho=0.396, p=0.015). This implied that while an increase in online banking would only have a little impact on financial performance, an increase in mobile banking and ATM usage would have a far larger impact.

4.5 Regression Analysis

Regression analysis was applied in the research to find out the connections among

financial performance and online, mobile, and ATM banking.

Table 4.7: Model Fitness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.459a	0.211	0.083	8.414635

Table 4.7's data showed that mobile banking, online banking, and ATM banking each accounted for 21.1% of return on assets. The R square value for this data was 0. 211.The model explained 21.1% of the study variables.

Table 4.8: ANOVA

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	585.77	5	117.154	211.655	0.005
Residual	2194.988	31	70.806		
Total	2780.758	36			

According to the ANOVA results, there is a substantial (P=0.005) association between technological advancements and financial performance, which is what the study was trying to investigate.

Table 4.9: Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
				2.03	0.97
(Constant)	-6.878	198.778		5	3
Mobile Banking	19.332	38.355	0.199	3.50	0.01

				4	8
				3.81	0.04
ATM Banking	33.719	41.243	0.346	8	2
					0.02
Internet banking	28.813	21.828	0.368	2.32	6
Capital				3.13	0.00
Adequacy	0.017	0.131	0.023	2	6
				2.18	0.04
Bank Size	7.526	6.354	0.52	4	5

Source: Researcher, 2023

The coefficients among mobile banking and financial performance showed a strong and favorable relationship (=19.332, p=0.018). Chaarani and Abiad's (2018) findings, on the other hand, showed that mobile banking showed a negative impact on banks' performance. Additionally, the results showed a positive and significant relationship between ATM banking and financial performance (=33.719, p=0.042). The outcomes, however, did not match those of Tahir et al. (2018), who discovered that ATM banking had a negative effect on performance of banking industry. This agreed with the research by Zu, Gu, and Bonsu (2019), who established ATMs had significant effect on commercial banks' financial results. Financial success and internet banking showed positive and significant linkage (r=28.813, p=0.026). The findings supported those made by Tahir et al. (2018), who found a strong correlation among the internet banking and the performance of banking industry. Financial performance and the control variables capital sufficiency and bank size had a significant and positive relationship. (=0.017, p=0.006, and (7.526, p=0.045) correspondingly.

The model was therefore confirmed as;

$Y = -6.878 + 19.332X_1 + 33.719X_2 + 28.813X_3 + 0.017X_4 + 7.526X_5$

Where,

Y =FP (Return on assets)

β_0 = is the regression constant

β_1 - β_5 = regression coefficients

X_1 = Mobile backings.

X_2 = Internet bankings

X_3 = ATM bankings.

X_4 = Capital adequacy

X_5 = Size of bank

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The outcome covered in the earlier chapter are summarized in the chapter. The outcome of the study which are anchored on the chapter's results and suggestions for policy and practice, are also made. The chapter concludes with recommendations for additional study.

5.2 Summary of Findings

The goal of the study was to ascertain how technology advancements affected Kenya's commercial banks' financial performance. The intervening variables capital sufficiency and bank size were specifically used in the research to analyze the impact of mobile banking, online banking, and ATM banking on performance. The results of the research showed that the number of transactions varied depending on the technological developments that the banks had adopted, with mobile banking ,ATM banking and online banking having the fewest transactions. Analysis of correlations found a substantial and positive association between financial performance and mobile banking. This meant that a rise in mobile banking results in an increase in financial performance, unit for unit. The results also showed a positive and significant association between ATM banking and financial performance, indicating that an increase in ATM banking would correspond to an increase in financial performance. This was consistent with Akhisar Tunay and Tunay's (2015) study, which found that the number of ATMs enhanced bank profitability. The relationship between financial performance and online banking, however, showed a positive but negligible association, suggesting that a little increase in internet banking would have little impact on financial success.This was in line with the outcome of Monyoncho (2015), who established that internet banking improved bank performance. The results, however, were at odds with

those of Akhisar Tunay and Tunay (2015), who demonstrated that internet banking negatively impacted bank performance. Capital adequacy and bank size, the intervening factors, showed, respectively, a negative and positive connection.

Regression research demonstrated a substantial correlation between the performance.

of Kenya's banking industry and internet, ATM, and mobile banking. Moreover. Financial performance exhibited a strong and favorable association with capital sufficiency and bank size.

5.3 Conclusion

The study concluded that technology advancements significantly and favorably affect the financial performance of commercial banks. Increased use of the internet, ATM, and mobile banking would boost commercial banks' financial performance. This agreed with Abdullah's (2017) finding that commercial banks' performance improved with the introduction of innovations. Ngari and Muiruri (2014), Gichungu and Oloko (2015) and Cherotich et al. (2015) all came to the same conclusion that technical advancements had a major impact on performance. Gutu (2014), argues that ongoing use of technology breakthroughs in the banking industry lowers expenses significantly, increasing bank revenue.

5.4 Recommendations

The report advises commercial banks to use technological advancements like mobile banking, ATM banking, and internet banking more frequently. Commercial bank management needs to develop internal rules and procedures that will help the adoption of new technologies go effectively and efficiently. They should also make sure that customers can easily do banking activities via their mobile devices, the internet, and ATMs.

The research also suggests that the government create rules through Kenya's central bank to promote the use of ATMs, internet banking, and mobile banking in all commercial banks.

The government could also assist commercial banks by providing them with training and funding to increase their adoption of technological developments in the banks.

Investments in technology focusing on ATM (Automated Teller Machine) and mobile banking typically encompass a range of initiatives and developments aimed at improving and expanding these banking channels such as investment in deploying additional ATMs at strategic locations to improve accessibility for customers and ongoing maintenance and upgrades to ensure the reliability and security of ATM machines.

5.5 Limitations of the Study

One of the limitations of the study was in availability of accurate and up-to-date data on banking innovations and financial performance. Some data on banking innovations was not publicly accessible, leading to potential data gaps or reliance on self-reported data from banks.

The study could also not avoid external factors, such as changes in government policies, economic conditions, or global events, influenced financial performance. Isolating the impact of banking innovations from these external factors can be difficult. The findings of the study may be specific to the Kenyan context and may not be applicable to other countries or regions.

The study relied solely on quantitative data which limited the understanding of the nuances of banking innovations. Qualitative data, such as interviews or surveys, could have provided deeper insights. Finally The study's timeframe did not capture long-term effects of banking innovations. Short-term impacts could differ from those observed over several years

5.6 Areas for Further Research

This study looked at Kenyan commercial banks' financial performance and technical

advancements. Future academics who seek to study technical advancements might think about doing so in other industries, such as manufacturing, which plays a crucial role in the country's economic success. Other research might consider utilizing other technical breakthroughs, including online lending.

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APPENDICES

Appendix I: List of Licensed Commercial Banks

1) African Banking Corporation (K)

2) Guarant Trust Bank(K)

3) Bank of Baroda(K)

4) Guardian Bank(K)

5) .Bank of India

6) Gulf African Bank

7) Absa Bank.

8) Habib Bank A.G. Zurich

9) Bank of Africa Kenya

10) Habib Bank

11) Charter House Bank.

12) Imperial Bank (K)

13) Standard Bank of Mauritius

14) I & M Bank

15) Citibank N.A Kenya.

16) Commercial Bank of Africa

17) Jamii Bora Bank

18) Consolidated Bank of Kenya.

19) Cooperative Bank of Kenya

20) KCB Bank Kenya

21) Credit Bank.

22) Middle East Bank(K)

23) Development Bank of Kenya

24) National Bank of Kenya

25) Diamond Trust Bank

26) NCBA Bank

27) DIB Bank

28) M-oriental Bank

29) Ecobank Kenya

30) Paramount Bank

31) Spire Bank.

32) Prime Bank

33) Equity Bank Kenya

34) Sidian Bank

35) Family Bank.

36) Stanbic Bank

37) Fidelity commercial Bank

38) Standard Chartered Bank Kenya

39) First Community Bank

40) Trans National Bank

41) UBA Kenya bank

42) Victoria Commercial Bank.

Appendix II:
Secondary Data Collection Sheet

Year	ROA	ATM banking(No. of ATMs per bank)	Mobile banking (No. of transactions through mobile devices per bank)	Internet banking (Value of banking transaction through the internet devices)	Bank size (Total value of assets held by a Bank)
2015					
2016					
2017					
2018					
2019 2020 2021 2022					