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

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A RESEARCH PROJECT PRESENTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION, FACULTY OF BUSINESS AND MANAGEMENT SCIENCES, UNIVERSITY OF NAIROBI

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DECLARATION

I, the undersigned, declare that this is my original work and has not been presented to any institution or university other than the University of Nairobi for examination.

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This research project has been submitted for examination with my approval as the University Supervisor.

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DEDICATION

This research project is dedicated to my entire family for their moral support and encouragement during this research project. To my parents thank you for the sacrifice and commitment to ensure i excel in my studies. May God bless you abundantly.

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LIST OF ABBREVIATIONS

ANOVA   Analysis of Variance

ATM   Automated Teller Machine

CBK   Central Bank of Kenya

EFT   Electronic Funds Transfer

ICT   Information and Communication Technology

IT   Information Technology

KCB   Kenya Commercial Bank

NSE   Nairobi Securities Exchange

ROA   Return on Assets

ROE   Return on Equity

ROS   Return on Sales

SPSS   Statistical Package for Social Sciences

TAM   Technology Acceptance Model

VIF   Variance Inflation Factors

ABSTRACT

The use of financial innovations by the financial sector has increased drastically around the world. Bank processes including trading stocks, offering new products, handling the internet and electronic payments, and incurring costs have all benefited from the enhancement. Consequently, the quality of banking services given globally has improved. This research sought to bring out the effect of financial innovations on the financial performance among commercial banks in Kenya. The research established the effect of mobile banking, internet banking and agency banking on financial performance among banks in Kenya. Capital adequacy, asset quality and bank size were used as the control variables in the model. Descriptive research design was used. The target population was the banks in Kenya. There are 38 banks in Kenya as at 2020 but only 37 provided complete data set. Research variables data were derived from CBK and audited bank's annual financial statements from 2016 to 2020 for all 37 banks making 185 observations. Regression and correlation analysis were used to test the study hypotheses by establishing the relationship between financial innovations and ROA. The study found that mobile banking (β=0.113, p=0.000), internet banking (β=0.133, p=0.000), agency banking (β=0.106, p=0.008) and bank size (β=0.411, p=0.000) had a positive and significant relationship with ROA among banks in Kenya. Asset quality has a significant negative effect on ROA (β=-0.506, p=0.000) while capital adequacy was not statistically significant. The results also indicated R^2 of 0.447 which implied that the selected independent variables contributed 44.7% to variations in ROA. The study recommends the need for policy makers to provide a conducive environment for banks to undertake financial innovations as this enhances their financial performance. Managers and directors of commercial banks should also work on improving their financial innovations coverage in an attempt to enhance their performance and to remain competitive in the ever changing environment.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Financial innovations have significantly affected the operation of financial firms and created the foundation for banks to differentiate between their products and their competitors. Abdulkarim and Ali (2019) argue that financial innovation is essential for directing money to efficient purposes and allocation of risk to people who can utilize them, and this boosts financial performance. Financial innovation is anticipated to improve financial inclusion, resulting in improved bank financial results (Rasheed, Law, Chin & Habibullah, 2016). Neaime and Gaysset (2018) asserted that in general, innovations have a substantial influence in increasing monetary performance of firms.

This study drew support from innovation diffusion theory, the technology adoption model as well as the financial intermediation theory. Financial intermediation theory by Diamond (1984) was the anchor theory as it observes that through intermediation, financial institutions may create and provide customized financial solutions to meet the needs of each client. By doing so, the financial intermediaries enhance credit reach and enhance their performance. Diffusion of innovation by Rogers (1995) is about the mechanism via which a new thought is disseminated to a particular societal system relies on utilizing a specific preference channel. The Technology Acceptance Model (TAM) provides clarity on how customers incorporate and exploit an innovative concept (Davis, 1989). To learn how financial institutions in Kenya absorb new technologies, TAM was used in this research.

The research focus on Kenyan commercial banks. This is because the last decade has seen banks in Kenya embrace financial innovations. Financial innovation is available

in Kenya in a number of forms, inclusive of mobile phone apps, mobile money wallets, as well as payroll borrowing. The services often involve short-term, high-interest loans. Banks utilize client cell phone information including, social media, transaction history of mobile, short messages record and calls for the evaluation of credit scores and loan amounts (Mohamed, 2018). The most common financial innovation services being offered by banks include M-Shwari, KCB MPESA and Fuliza (CBK, 2019). The current study seeks to investigate how this influences the financial performance among commercial banks.

1.1.1 Financial Innovations

According to Sheleg and Kohali (2011), any technical advancement affecting the financial industry and its operations is referred to as financial innovation. Financial innovation can also refer to businesses that combine financial services with modern technology to provide user-friendly, automated, transparent, and efficient internet-based and application-oriented services (Triki & Faye, 2013). Financial innovation, according to Freytag and Fricke (2017), is innovative technology that enables financial services. Banks are anticipated in future to provide social network platforms, permitting customers to make use of their mobile phones to access investment options made possible by financial innovations (World Bank, 2017).

Financial innovations provide a range of technological options for comfort, faster reaction time and operating efficiencies (Klapper, 2016). Financial innovation has affected many financial industry players. As a result, services of asset management have improved by providing retailers wealth management services via streamlined systems, algorithm proposals to assist decision-making and managed portfolios artificially through robots. The banking sector has also been affected by monitoring tax

labiality, spending, credit, saving, bank service provision besides traditional banking, distribution leading technology allows for quicker transaction, mobile transfer, the usage of cryptocurrencies, and data analytics allows for cellular lending to individuals and small businesses (Yang & Liu, 2016).

In regard to operationalization, financial innovations are connection between the mobile phone and an employer's or company's bank account, as used nowadays in many financial transactions (Demirguc-Kunt et al., 2018). Financial innovations has been operationalized before in terms of mobile banking, internet banking, ATMs, agency banking among others. Internet banking provides financial services via a bank's website. Peer-to-peer financing is a kind of lending that allows people to lend to one another and also loan money which are not used as mediators by a bureaucratic bank. This study attempted to quantify the level of financial innovations usage, as defined by the total number of transactions carried out via agency banking, internet banking, and mobile banking.

1.1.2 Financial Performance

Alamro, Al-Soub and Almajali (2012) defines financial performance as a firm capability of realizing financial goals, for example, profitability. It displays how well financial goals have been met (Nzuve, 2016). Nasieku and Baba (2016) report that financial performance illustrates in what manner a firm utilizes assets to generate revenue, helping stakeholders take choices. Current study defines the financial performance as the capacity of a business in generating revenue from its assets.

Financial performance is vital to shareholders, investors, and, by extension, the entire economy. The return on investment is completely worthwhile to investors, and having a good firm can provide greater and long-term revenue to individuals who invest

(Fatihudin & Mochklas, 2018). Financial performance of a firm is crucial to its health as well as its existence. As per Karajeh and Ibrahim, (2017) ,a company's excellent performance demonstrates its efficiency and effectiveness in managing its assets while operating, investments, and financial transactions.

Various methods of evaluating financial performance are used and should be harmonized. Asset returns (ROA), size of company, equity returns (ROE) and sales return (ROS) are factors recognized as measures of financial performance. ROA and ROE are the most recognized ways of measuring financial performance. The ROA evaluates the company's profitability using its total assets, whereas the ROE examines the way a company is using shareholder's equity (Mwangi & Murigu, 2015). Baba and Nasieku (2016) posit that market based mROAics like earnings per share, dividend yield, market to book value of equity and market capitalization can too be employed in financial performance measure. The current research used ROA as a mROAic of financial performance as it is the most recognized measure (Fatihudin & Mochklas, 2018).

1.1.3 Financial Innovations and Financial Performance

The diffusion of innovation hypothesis says that every economically impactful change centers on entrepreneurship, market power and innovation. From this reasoning come theories about the Financial innovations revolution. Rogers (1995) believes that invention briefly establishes a monopoly, wherein imitators compete and remove monopolies. Therefore, if financial institutions utilize financial innovation and secure hedging other banks using new goods and services, they will certainly have an effect on financial growth.

With the number of financial innovations rise,households, borrowing and savings products are made easy for everyone (Mehotra & Yetman, 2015). Long-term financial performance of banks is one of the projected benefits of financial innovations (Rasheed, Law, Chin & Habibullah, 2016). As per system Zins and Weill, (2016) making sure people have simple accessibility to and are able to utilize these services is vital in fostering social growth and sustainable economic, decreasing destitution, and helping to stabilize the financial.

According to Lenka and Sharma (2017), having more financial access promotes job creation in rural areas since residents in these areas will have a greater disposable income, allowing them to save and increase their deposits, which increases overall economic growth due of the multiplier effect. The inability to secure financing as a result of poor financial innovations adoption has a dROAimental repercussion on performance of the bank. This is due to the belief that the poor's inability to save and invest in income-generating activities is due to a lack of finances. Financial innovation's ease access to funding, on the other hand, encourages businesses to invest more and take on more risk, boosting bank performance (Neaime & Gaysset, 2018).

1.1.4 Commercial Banks in Kenya

The CBK defines a bank as a business conducting or planning to carry out banking operations in Kenya. Commercial banking includes the activities of deposit acceptance, extending credit, processing financial transactions in addition to offering financial services in other areas. Specifically, the industry contributes significantly to the financial sector, with a special focus on the mobilization of saving and the provision of loans to businesses and consumers. The CBK is the regulating authority in the Kenyan banking industry. The banking sector has 1 mortgage finance company, 38 commercial

banks, and 13 microfinance companies in the industry. There are 11 of the 38 listed at the NSE (CBK, 2020).

Financial innovation continues to change and shape the banking sector in Kenya. The Kenyan banking sector has focused increasingly on financial innovations as a strategic instrument to achieve organization goal of reducing costs and maximizing revenues. KCB has been promoting KCB MPESA and adopted fuliza in 2019, Equity has been using Equitel and Eazzy banking app, NCBA bank has been offering Mshwari and recently Fuliza. Other banks also have some aspect of mobile lending through their digital platforms (CBK, 2020). The big question is whether the financial performance resulting from the use of financial innovations has improved.

Commercial banks have performed variably in terms of financial performance, with some seeing an increase in ROA while others have seen a decline. Over the past few years, we've seen certain banks, like Chase bank, fall due to lackluster performance, like National bank, and we've also seen more mergers among competing banks, all in an effort to maintain financial stability in the market (CBK, 2020). This clearly demonstrates the need to investigate whether financial innovations has an impact on financial performance and provide legislative suggestions that protect the financial risk borne by banks and the cash held by stakeholders.

1.2 Research Problem

The use of financial innovations by the financial sector has increased dramatically around the world. Bank processes including trading stocks, offering new products, handling the internet and electronic payments, and incurring costs have all benefited from the enhancement. As a result, the quality of services provided by banks around the world has improved (Babajide et al., 2015). In the growth process, finances are just

as essential as creativity (Kim, Yu & Hassan, 2018). According to evidence, innovation experts are consistently convinced that the financial innovations promotion will result in increased revenue for banks. Banks, on the other hand, are likely to miss out on the benefits of enhanced performance if access to financial innovations is restricted (Neaime & Gaysset, 2018).

Kenyan commercial banks have increased their digitization efforts, putting financial innovations at the forefront, to strengthen their network base, decrease staff expenses, operate competitively with staff and enhance profitability. However, as a result of all of this increased digitization, some banks have experienced a drop in profitability, others have been placed under statutory management, and still others have closed their doors. Apart from the competition for customers amongst Kenyan commercial banks, in the Kenyan market, they are also up against increasing competition from digital lenders for the same consumers (Koki, 2018).

Although there have been international studies in this field, they have mostly focused on certain elements of financial innovation and how they correlate to financial performance. Stoica, Mehdian, and Sargu (2015) investigated how internet banking affects Romanian bank performance and E-banking, according to the study, provides affordable and efficient services that help banks operate better. Wadhe and Saluja (2015) investigated how E-banking impacted the profitability of Indian banks from 2006 to 2014. The results showed that e-banking had a favorable relationship with profitability in both private and public sector banks. Hujud and Hashem (2017) examined the connection between Lebanon's financial innovations and profit statuses of commercial banks and found that financial innovations have a positive and

significant relation to profitability. All these investigations were conducted in a distinct setting thus, their results cannot be applied to the current situation.

Locally, Mutinda's (2018) study on effect of technology advancements upon the profitability of public commercial banks has found that mobile banking has a significant negative link to Kenya's profitability of public commercial banks. In contrast, Kariu (2017) studied the financial technology and profitable business banking in Kenya and concluded financial technology has a statistically substantial connection with commercial bank profitability. Kamande (2018) showed the statistically meaningful excellent outcomes of only agency banking with statistically irrelevant, positive financial performance connections among ATM, internet and mobile banking. There is a lack of consensus on how financial technology affects commercial bank profitability among prior empirical research which provides sufficient grounds for additional investigations. Further, most previous research has operationalized financial innovations in different ways, with the majority choosing for a restricted definition, which is the knowledge gap that the current research aimed to fill. This research answered the research question: What is the effect of financial innovations on financial performance of commercial banks in Kenya?

1.3 Research Objective

The study's objective was to determine the effect of financial innovations on financial performance of the commercial banks in Kenya.

1.4 Value of the Study

The conclusions will aid investors as well as practitioners understand the relationship between the two variables, that is important for ensuring strong management team with diverse viewpoints and competences streamlining operations as well as managing

financial innovation, as well as for building confidence among corporate stakeholders, which will ultimately optimize financial performance.

The research will too be of value to policymaking organizations like governments, the capital markets, central banks and economic bodies that formulate the various polices on financial innovation as well as financial performance. The policy making bodies may use the study recommendations to come with effective financial innovation strategies to enhance financial performance.

Finally, the review will add on to the available theoretical discussion on the financial intermediation theory, technology acceptance model and diffusion of innovation theory. In addition, study contributes to empirical studies on financial innovation and financial performance. Additional studies may also be carried out based on the recommendation and suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter introduces the study's theoretical foundation as well as summarizes existing research on financial innovations and financial performance. It includes a theoretical overview, empirical review, literature review summary, research gaps, and a conceptual framework that depicts the study variables' hypothesized relationships.

2.2 Theoretical Framework

This study examines various theories that attempts to explain how financial innovations is related to financial performance. Diffusion of innovation theory, technological acceptance model and financial intermediation theory are among the theoretical reviews presented.

2.2.1 Financial Intermediation Theory

This theory was proposed by Diamond (1984) and it serves as the anchor theory. The theory plays a central role in the financial intermediation process predominantly among banks to mitigate information asymmetry that lies between borrowers and lenders, hence their constant interaction assists lenders in producing credit worthy information to borrowers. Information that is provided gives creditors and loan officers a strong incentive in assessing and appraising credit to those that require it. Modern theories state that the business of financial intermediation is pegged on economic imperfections from 1970s with limited contributions (Jappelli & Pagano, 2006). The presence of the intermediaries is based on their capability to lower transaction and information costs from asymmetries (Tripe, 2003).

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The biggest criticism of the financial intermediation theory is its inability to give recognition to the role of lenders in the process of risk management (Levine et al., 2000). Scholtens and Van Wensveen (2000) stated that they do not recognize credit risk management as an important factor in the financial industry and emphasizing the participation costs concept. They suggested future developments in the financial intermediation theory to understand challenges in the financial sector.

The theory is relevant to the research since boosting the profitability of banks can be accomplished by implementing innovative financial innovation that enables simple and convenient banking activities for consumers. Financial intermediaries utilize mobile apps and other digital lending mechanisms that are useful in lowering transactional costs brought about by information asymmetry. They hence play a central role in effective functioning of financial markets. The theory is useful in understanding how financial innovations and performance relate.

2.2.2 Diffusion of Innovation Theory

The pioneer of this idea was Rogers (1962). An innovation is any newly introduced ideas, practices or item into a social structure whereas, on the contrary,, innovation dissemination is the way the new concept is transmitted over a period of time to the social system via a default route. In this regard, this theory attempts to outline how new innovations are accepted and utilized in a social system such as mobile banking and online banking (Clarke, 1995). Rogers (1995) broadened the idea by saying that the study on technological diffusion was insufficient, further explaining that the technology cluster had additional distinctive characteristics that were thought to be fully linked. That is why the advantages and repercussions of embracing or refusing to embrace innovation should be notified to people and societies at large. Rogers (2003) says

plainly that interpersonal connections are necessary because dissemination includes a social process.

Robinson (2009) criticizes the theory for taking a dramatically different view of other change theories. It is not about attempting to persuade people to change, though about making progress or re-inventing goods and character, so that they can better suit what the person wants or needs. In this idea, people do not change, but innovations have to adapt to the demands of the people. The invention process takes time, as per Sevcik (2004), and it does not happen immediately. He also believes that the spread of innovation and the opposition to changes has the greatest impact on the process of innovation because it delays it down.

Rogers (2003) argues that the perception of these characteristics by an organization affects the degree of breakthrough technology adoption. If an organization realizes the benefits arising from online banking, these innovations will be taken into account when additional technologies are available. Innovation is quicker adopted in companies having internet access as well as information technology than in those lacking. The hypothesis is based on the present research, which shows how innovations like financial innovations are taken up by banks.

2.2.3 Technology Acceptance Model

The technology acceptance model was first conceived by Davis (1989) and is known as Davis model in some citations. The model addresses customers' adoption behavior, which is utilized to select a system that is both beneficial and convenient to them. Moon and Kim (2015) explored the underlying essence of TAMs validity and found that TAMs core construction is not the determining factor of user acceptance—use of technology and other usability facets influence this. Technologies or computer system's

anticipated utility is defined by the theory that it will substantially improve work performance once it is put in place (Davis, 1989).

The simplicity with which a system may be used continues to be prioritized, it is a sign that the user has learned how to run it and employ the new technology. The model focuses on simple use as a means of predicting system utility (Gefen, Karahanna & Straub, 2013). When people believe electronic banking is effective, it's more likely to be used (Potaloglu & Ekin, 2015). Aspects such as perceived usability simplicity and perceived utility are seen as essential to the promotion of e-banking.

Theory of technology acceptance has changed how researchers do their work. Key aspects of the current investigation is to discover benefits and drawbacks of incorporating technology into commercial banks in Kenya and to look at how easy or difficult it is for electronic banking to be used within the commercial banking sector in Kenya.

2.3 Determinants of Financial Performance

It is possible to gauge an organization's financial health by considering a number of elements, both internal and external. Within a bank's spectrum of manipulation, internal elements differ from one bank to the next. The five characteristics of financial institutions are deposit liabilities, efficiency of management, quality of management, capital size and labor productivity. Political instability, robustness of monetary policy, inflation, Gross domestic product and the interest rate are the primary elements that influence a bank's overall performance (Athanasoglou et al. 2005).

2.3.1 Financial Innovations

Financial innovations are a broad term used to represent the use of technological advancements in financial services to provide comprehensive commodity solutions that

have traditionally been handled by banks (Arner 2015). In simple terms, financial innovations can be defined as an entirely new kind of money service trade that combines information technology with money services like asset management, transfer and payments (Lee & Kim, 2015). Financial innovations are often measured in terms of mobile, agency and internet banking (McAuley, 2015)

The increase in technological capability has resulted in better approaches to conducting enterprises in the current period (Stiroh, 2001). The research team of Ongori and Migiro (2010) found that the introduction of information and communications technology (ICT) has changed banking norms and the delivery of services to clients in the financial sector, according to the study. When launching a global expansion strategy, the aim is to improve the delivery of consumer services, reduce transaction costs, and use new technologies more broadly. Financial innovations have a role in spurring productivity and monetary progress at the company's scale (Brynjolfsson & Hitt, 1996).

2.3.2 Capital Adequacy

The ratio equity to total is often known as the ratio of bank capitalization. It illustrates the relationship between equity and total assets. It demonstrates a bank's capacity to stay viable through risk regulation. In a study, Berger and DeYoung (1997) demonstrated a negative link between capital sufficiency and performance. In imperfect financial markets, firms with adequate capital should limit borrowings to support a particular asset class and therefore minimize the expected bankruptcy cost.

A bank with enough capital indicates that a better performance is anticipated on the market. The findings of Athanasoglou et al. (2008) have shown that the capital stocks are favorably associated with bank profitability and indicate a solid financial position

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for Greek banks. Berger et al. (1987) also showed a positive causality of the contribution from capital and profitability.

2.3.3 Asset Quality

Asset quality poses a substantial challenge to the firm's solvency since it represents a risk to its existence (Sufi & Qaisar, 2015). It is normally measured as the ratio of NPL to total loans. Lenders provide loans knowing the borrowers would repay without any default, without falling into the non-performing category (Bhattarai, 2016). There will be disastrous consequences for the bank's profits if non-performing loans remain on the books. It is possible that banks have not implemented an effective measure to manage credit risk (Afriyie & Akotey, 2012).

In the banking industry, moral hazards and asymmROAic knowledge are associated with credit risk. When it comes to profits of the bank, credit risk has a large impact because a substantial part of a bank's revenue is from loans with interest. However, the threat posed to the financial sector by credit risk is undeniable. Credit risk must be addressed effectively (Bhattarai, 2016). Past research show that bank assets quality is a strong indicator of financial performance. Examples of credit risk indicators include non-performing loans, which might potentially destabilize the bank's general credit system and diminish its value (Afriyie & Akotey, 2012).

2.3.4 Bank Size

Bank size establishes by how much legal as well as financial elements affect a bank. As big businesses gather cheap capital and generate enormous incomes, the size of the bank is strongly related to enough capital (Amato & Burson, 2007). The book value of the entire assets of the bank typically determines its size. Additionally ROA is positively associated with bank size showing that large banks can accumulate

economies of scale hence reducing operational costs while increasing loan volumes (Amato & Burson, 2007). Bank size is related to capital rations, according to Magweva and Marime (2016), and profitability rises with size.

Burson and Amato (2007) said a company's size depends on the organization's assets. It can be argued that the more the assets owned by a bank the more the investments it can make which generate bigger returns compared to smaller firms with less assets. In addition, a bigger company may have more collateral that may be utilized as safety for more loan facilities than smaller companies (Njoroge, 2014). Lee (2009) argued that the assets being controlled by an entity impacts profitability level of the firm from one period to another.

2.4 Empirical Review

Researches have been done both internationally and locally to support the financial benefit of financial innovations, with varying outcomes.

2.4.1 Global Studies

The research by Wadhe and Saluja (2015) investigated the profitability of Indian banks from 2006 to 2014, focusing on electronic banking effects. Data pertaining to the commercial banks in India was utilized in the research. Multiple regression analysis was performed to determine how banking services and profitability are interconnected. E-banking was shown to be related to increased profitability for private as well as public sector banks. This research showed that increasing the number of ATMs increases profitability. While the connections were few, however, some might be established between the financial institutions' profit and the number of branches.

Khamis (2016) has investigated impact of agent banking techniques on customer services of commercial bank in Ghana. Services provided to clients have a significant

impact on such elements as decreased banking hall waits times, reduced service costs and personally tailored banking services, leading to the conclusion that the development of excellent financial services and customer service is closely related. In addition, the research showed that bank representatives substantially enhance the overall efficiency and quality of customer service in banks. As a consequence, the research deemed it essential for financial institutions to develop methods to guarantee their employees are properly motivated and to propose the usage of performance based incentives.

King'ang'ai et al. (2016) examined financial outcome of banks' performance via agents in the Rwandan country of East Africa utilizing four Rwandan commercial bank currently functional by 31 December 2015. The results from the research showed that the regulation of bank agencies, low transaction cost via banking agencies, access to banking-related services through bank agents and general development in the market had a favorable effect on performances in terms of financial position of commercial bank. Findings of linear regression model have created a favorable connection among agency banking effect and performances in terms of financial position of commercial bank.

Le, Ho and Mai (2019) focus on how financial innovations impacts income inequality in transitioning economies. The two-stage least squares model and two financial innovations indices are used in examining the impact that financial innovations has on income inequality in 22 transitioning economies from 2005 to 2015. The study results show that there exists a negative relation between the financial innovations index and the GINI coefficient. Among the suggestions put forward is that policy recommendations are needed to lower income inequality by the development of financial innovations.

Kim et al. (2019) examined fifty four scholarly papers on the relationship among development, integration and mobile service in order to identify the critical questions and gaps in their study. Findings indicate that most of the examined literature addressed three main areas: mobile services, delivery and the environment. In the early phases of the research, the regions examined shown a prejudice to individual and institutional circumstances in the mobile banking services are being implemented, compared to real users' supply and demand and their social effect. The research techniques were selected additionally showing minimal variety and depth. This analysis enhances the knowledge of current publications on mobile financial service in regards to inclusiveness among emerging regions and identifies needs for further investigations.

2.4.2 Local Studies

Using secondary data gathered between 2013 and 2017, Muli (2018) investigated how commercial banks efficiency is influenced by electronic banking. All 42 banks operating in Kenya were sampled. The variable predictor has been chosen as electronic banking based on the value of transactions performed by using ATMs, mobile banking, internet, and agency banking. Performance was utilized as a study response variable. The findings showed that the good and important effects of bank size, liquidity, capital adequacy, ATMs and mobile banking were achieved. Internet banking and agency banking have been identified as statistically negligible factors for efficiency in commercial banks.

The research interests of Wanalo (2018) were focused on investigating whether the usage of technical financial technology had substantial impact on performance financially, and to do so, examined the performances in terms of financial position of commercial bank. To do this project, the methodology involved in a descriptive

research was used. This study took into consideration all commercial banks. This research included a total sample size of 15 individuals and included banks from both the commercial and non-commercial sectors. Additional data was sourced from annual reports provided by commercial banks between 2012 and 2016, along with data gathered from the CBK and from the bank's website. The research utilized panel data analysis. The findings were found using the Prais Winstein regression model. Despite the increased use of ATMs and agency banking, they have little impact on a bank's overall financial health.

Sindani, Muturi and Ngumi (2019) examined the impact of financial channels of distribution evolution on financial inclusion in in Kenya over a duration of six years beginning from 2012 to 2017. Secondary data was gathered for subsequent analysis. For analysis of the data collected, frequency tables, percentages as well as means were utilized to demonstrate the conclusions of this study. Use of descriptive statistics in this study was meant to present the category sets formed by this research. The variance, mean as well as standard deviation on the dependent and independent variables function was to describe the variables used for the study. The conclusion from this study is that internet banking has had a beneficial effect on Kenya's financial industry in Kenya because it promotes productivity and efficiency. Also, ATM banking has enhanced financial inclusion in Kenya.

Ogweno (2019) focused on financial innovations effects on the financial performance of regulated MFI in Kenya. A total of 13 regulated microfinance institutions (MFIs) currently serve the people of the study's community. The data for the first five years of the project's life was gathered on a yearly basis throughout that time. The association between variables was evaluated using a multiple linear regression model, and the study

methodology used was a descriptive cross-sectional design, according to the findings. The findings of the research revealed that deposit, mortgage, and bank size all had a substantial impact on savings account balances and growth. There was no significant correlation found between agency banking, the number of ATMs, and the bank's financial performance.

Abdulkadir (2019) in Kenya performed an in-depth research on the effect of digital payments on the operation of commercial banks. The implementation of digital internet banking was attributed to the volume of transactions conducted through mobile and internet banking. All the data in this case comes from commercial banks. In order to account for the size of the bank, the research utilized financial institution and capital adequacy ratio variables. To gather data on all the commercial banks in Kenya, a descriptive research approach was utilized. The simple linear connection was created using Pearson correlation. The relationship's dynamics were uncovered by using a regression analysis. The research discovered that the financial innovations contributed to financial success.

2.5 Conceptual Framework

The model that follows depicts the anticipated correlation between the variables. Financial innovations, as defined by agency banking, mobile banking, and internet banking, were the predictor variable. Capital adequacy, asset quality and bank size were the control variables. The dependent variable was financial performance as measured by ROA.

Figure 2.1: The Conceptual Model

Independent variables   **Dependent variable**

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┌─────────────────────────────┐
│ **Financial innovations**   │──────────────────────►
│                             │
│   • Mobile banking          │
│                             │
│   • Internet banking        │
│                             │
│   • Agency banking          │                          ┌──────────────────────────┐
│                             │                          │ **Financial performance** │
│        ──────────►          │                          │                          │
└─────────────────────────────┘                          │   • Return on assets     │
┌─────────────────────────────┐                          │                          │
│ **Control variables**       │                          └──────────────────────────┘
│                             │
│   • Capital adequacy        │──────────────────────►
│                             │
│   • Asset quality           │
│                             │
│   • Bank size               │
│                             │
│                             │
└─────────────────────────────┘
```
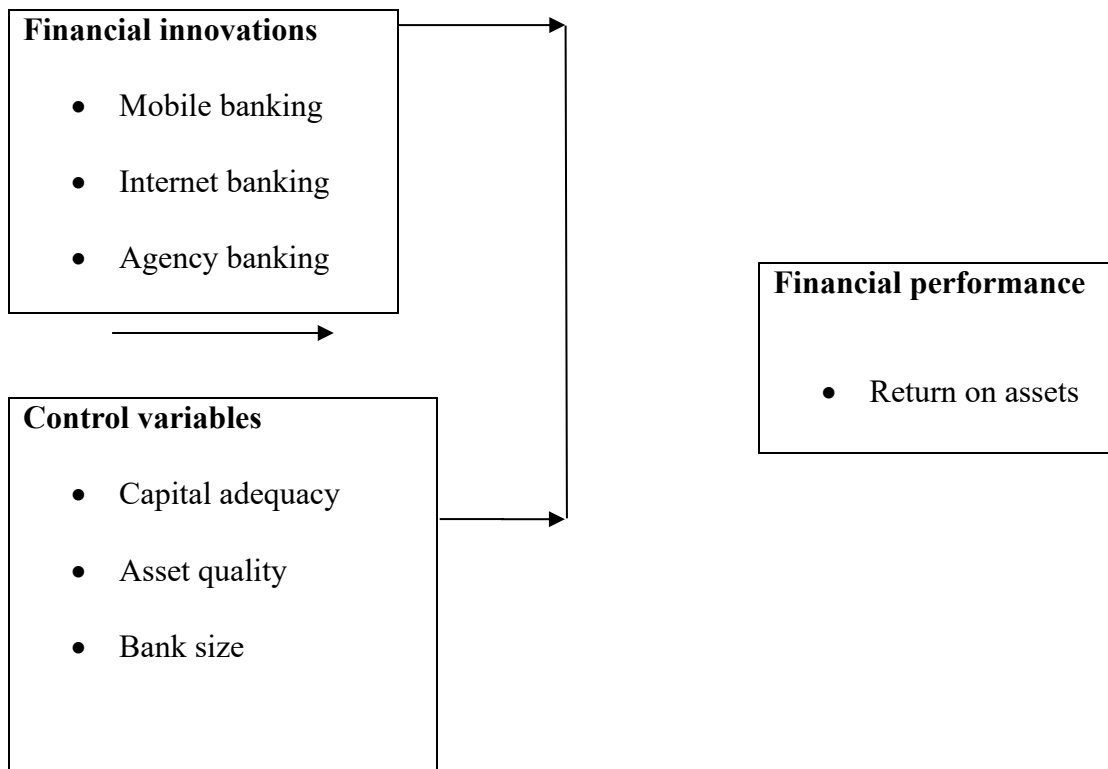
Source: Researcher (2021)

2.6 Summary of the Literature Review

Several theoretical frameworks have been proposed to describe the expected link between financial innovations and financial performance. The following theories are discussed in this review: Financial intermediation theory, technological adoption model, and diffusion of innovation theory are among the theories discussed in this paper. Some of the most important financial performance determinants have also been examined. Several domestic and international research on financial innovations and financial performance have been examined.

A good reason to undertake further study is the disagreement among worldwide and local research on the impact of financial innovations on commercial bank financial performance. Researchers must conduct comprehensive study on how financial innovations impacts commercial bank financial performance in the Kenyan environment in order to be considered valid. The conclusions should clearly

demonstrate how financial innovations influences commercial bank financial performance using valid methodology. This gap in knowledge was filled in this study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

For the purpose of determining the impact of financial innovations on financial performance, the research study should include a research methodology that outlines the procedure that was followed in conducting the research. Incorporating four sections, this chapter discusses the research design, the procedure for collecting data, the diagnostic tests and finally, the technique for interpreting the results.

3.2 Research Design

A descriptive design was adopted to determine how financial innovations and performance among commercial banks relate. This design was appropriate since the nature of the phenomena was of key interest to the researcher (Khan, 2008). It was also sufficient in defining the interrelationships of the phenomena. This design also validly and accurately represented the variables thereby giving sufficient responses to the study questions (Cooper & Schindler, 2008).

3.3 Population

The population of this research was made up of Kenya's 38 commercial banks as of December 31, 2020 (see appendix I). Since the population was relatively small, sampling was not carried out.

3.4 Data Collection

The information was gathered solely from a secondary source of information. The secondary data was gathered from the financial reports of commercial banks and the Central Bank of Kenya, as it is a necessity for commercial banks to give their reports to the controller. The data was collected on an annual basis for a period of five years from January 2016 to December 2020 (Appendix II).

3.5 Diagnostic Tests

To ascertain the model viability, a number of diagnostic tests were done, like normality, stationarity, Hausman test, multicolinearity, homogeneity and autocorrelation. The assumption of normality was that the dependent variable's residual was normally distributed and closer to the mean. This was accomplished by use of the Shapiro-wilk test or Kolmogorov-Smirnov test. In instances where one of the variables had no normal distribution, it was adjusted using the logarithmic adjustment methodology. Stationarity

test was utilized in determining if the statistical characteristics such as variance, mean, as well as autocorrelation change with the passage of time. This property was ascertained via the Levin-Lin Chu unit root test. In the event the data did not meet this property, the data was transformed using natural logarithm. Robust regression was also be used as it provides better regression coefficients than ordinary least square (Khan, 2008).

Autocorrelation is a measure of how similar one time series was when compared to its lagged value across successive timings. The measure of this test was done using the Wooldridge test and in the event that the presumption was breached the robust standard errors were used in the model. Multicollinearity exists when a perfect or near perfect linear relation exist between a number of independent variables. Variance Inflation Factors (VIF) as well as tolerance levels were utilized. Heteroskedasticity confirms if the errors variance in a regression lies among the independent variables. This was tested using the Breuch Pagan test and if data does not meet the homogeneity of variances assumption, robust regression analysis would be employed as it provides better regression coefficients when outliers exist in the data (Burns & Burns, 2008).

3.6 Data Analysis

After the various data sources have been surveyed, the data was organized to serve the goal of the study. The version 25 SPSS computer program was used for the analysis. Central tendency measurements (like mean and median) as well as measures of dispersion (like standard deviation) were calculated via descriptive statistics. Correlation and regression analysis are required in the context of inferential statistics. Regression analysis involves understanding the cause and effect between the variables whereas correlation analysis establishes the degree of connection among the studied

variables. A multivariate regression analysis was used in establishing the relationship between the dependent variable (financial performance) and independent factors: agency banking, mobile banking, internet banking, bank size, capital adequacy and asset quality.

3.6.1 Analytical Model

A multivariate regression model was used to assess the relative importance of each of the explanatory factors for financial performance in Kenya.

The study employed the following multivariate regression model;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon$$

Where:

Y   financial performance given by net income to total assets

β_0 regression constant (parameter of the function)

β_1, β_2, β_3, β_4, β_5 and β_6 are the coefficients of independent variables

X_1 mobile banking given by Log total value of mobile banking transactions

X_2 internet banking given by Log total value of internet banking transactions

X_3 agency banking given by Log total value of agency banking transactions

X_4 capital adequacy given by core capital to risk weighted assets

X_5 asset quality given by non-performing loans to total loans

X_7 bank size given by log of total assets

$\acute{\varepsilon}$ error term

3.6.2 Tests of Significance

In order to judge the overall model's relevance, as well as the statistical importance of each estimated item, paramROAic tests were conducted. To find out whether the

overall model was significant, the F-test was used, which was derived from the ANOVA, while to find out if any of the individual variables was significant, the t-test was used.

CHAPTER FOUR: DATA ANALYSIS RESULTS AND FINDINGS

4.1 Introduction

This chapter focuses on data analysis. The objective of the research was to establish the correlation between financial innovations and ROA among banks in Kenya. Patterns were studied by descriptive and inferential analysis, that were then analyzed and conclusions drawn on them, in accordance with the specific objectives.

4.2 Descriptive Statistics

The research pursued to describe the data in terms of their mean and standard deviations. The descriptive analysis was necessary as it helps in understanding the characteristics of the collected data before conducting inferential analysis. The results are as shown in Table 4.1

Table 4.1: Descriptive Results

	N	Minimum	Maximum	Mean	Std. Deviation
ROA	185	-.244	.070	.00644	.038379
Mobile banking	185	4.323	5.588	5.09096	.319403
Internet banking	185	8.473	17.293	14.32992	1.605652
Agency banking	185	8.473	17.293	14.31379	1.647710
Capital adequacy	185	.0280	2.1258	.237358	.2113328
Asset Quality	185	.0008	38.5539	.355127	2.8284459
Bank size	185	14.7750	20.6163	17.725991	1.3648773
Valid N (listwise)	185				

Source: Field data (2021)

Table 4.1 depicts the descriptive analysis, with 185 observations for each variable based on the product of the number of cross-sectional units and the number of periods studied (37*5 =185). The dependent variable was ROA while the independent variable was financial innovations (mobile banking, internet banking and agency banking). Finally, the control variables were capital adequacy, asset quality and bank size.

4.3 Diagnostic Tests

To ascertain the model viability, a number of diagnostic tests being performed, like normality, stationarity, Multicollinearity test, homogeneity of variance and autocorrelation.

4.3.1 Normality Test

To test if the collected data assumed a normal distribution, normality test was conducted using the Kolmogorov-Smirnov test and the Shapiro-Wilk Test. The threshold was that, if the p value is above 0.05, then the data assumes a normally distribution.

Table 4.2: Test for Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
ROA	0.326	185	0.112	0.869	185	0.078
Mobile banking	0.408	185	0.207	0.918	185	0.102

Internet banking	0.272	185	0.063	0.881	185	0.094
Agency banking	0.124	185	0.057	0.874	185	0.091
Capital adequacy	0.176	185	0.061	0.892	185	0.101
Asset quality	0.567	185	0.365	0.923	185	0.120
Bank size	0.644	185	0.412	0.874	185	0.094
a. Lilliefors Significance Correction						

Source: Field data (2021)

The normality test results yielded a p- value above 0.05 thus the null hypothesis rejection and acceptance of the alternate hypothesis meaning the normality test revealing normal distribution in the data.

4.3.2 Multicollinearity Test

Multicollinearity exists when a perfect or near perfect linear relation exist between a number of independent variables. Variance Inflation Factors (VIF) as well as tolerance levels were utilized.

Table 4.3: Multicollinearity

	Collinearity Statistics	
Variable	**Tolerance**	**VIF**
Mobile banking	0.812	1.232
Internet banking	0.746	1.340
Agency banking	0.697	1.434
Capital adequacy	0.703	1.422
Asset quality	0.661	1.513
Bank size	0.634	1.577

Source: Field data (2021)

The outcomes in Table 4.3 specify that all the variables possessed a VIF values <10 as well as tolerance values >0.2 suggesting that Multicollinearity did not exist.

4.3.3 Heteroskedasticity test

To check for heteroskedasticity, the Breusch-Pagan test is used. The null hypothesis was that the variance of error terms is constant. Heteroskedasticity Test Results are shown in Table 4.4.

Table 4.4: Heteroskedasticity Results

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity		
Ho: Constant variance		
Variable: fitted values		
chi2(1)	=	0.8403
Prob > chi2	=	0.6612

Source: Field data (2021)

Homoskedastic error terms' null hypothesis is not rejected, according to the results in Table 4.4, which are supported by a 0.6612 p-value

4.3.4 Autocorrelation Test

Autocorrelation is a measure of how similar one time series was when compared to its lagged value across successive timings. The measure of this test was done using the Wooldridge test.

Table 4.5: Test of Autocorrelation

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F(1,   184) =   0.336
Prob> F =   0.5280

Source: Field data (2021)

From the results of Table 4.5, the null hypothesis of no serial correlation is not rejected provided the p-value is significant (p-value = 0.5280).

4.3.5 Stationarity Test

Stationarity test was utilized in determining if the statistical characteristics such as variance, mean, as well as autocorrelation change with the passage of time. Table 4.6 shows Levin-Lin Chu unit root test results.

Table 4.6: Levin-Lin Chu unit-root test

Levin-Lin Chu unit-root test			
Variable	**Hypothesis**	**p value**	**Verdict**
ROA	Ho: Panels contain unit roots	0.0000	Reject Ho
Mobile banking	Ho: Panels contain unit roots	0.0000	Reject Ho
Internet banking	Ho: Panels contain unit roots	0.0000	Reject Ho
Agency banking	Ho: Panels contain unit roots	0.0001	Reject Ho
Capital adequacy	Ho: Panels contain unit roots	0.0000	Reject Ho
Asset quality	Ho: Panels contain unit roots	0.0000	Reject Ho
Bank size	Ho: Panels contain unit roots	0.0000	Reject Ho

Source: Field data (2021)

The null hypotheses that: Panels contain unit roots were rejected for all variables since the p values were below 0.05, based on the results in Table 4.6. This meant that all of the variables' panel data were stationary.

4.4 Correlation Results

Correlation analysis was performed to establish the strength and direction of association between each predictor variable and the response variable. The results in Table 4.7 show the nature of link between the research variables in terms of magnitude and direction.

Table 4.7: Correlation Results

		ROA	Mobile banking	Internet banking	Agency banking	Capital adequacy	Asset quality	Bank size
ROA	Pearson Correlation Sig. (2-tailed)	1						
Mobile banking	Pearson Correlation	.188**	1					

	Sig. (2-tailed)	.001						
Internet banking	Pearson Correlation	.284**	.285**	1				
	Sig. (2-tailed)	.000	.000					
Agency banking	Pearson Correlation	.262**	.072	.017	1			
	Sig. (2-tailed)	.000	.135	.800				
Capital adequacy	Pearson Correlation	.085	.185**	.044	.017	1		
	Sig. (2-tailed)	.101	.000	.524	.803			
Asset quality	Pearson Correlation	-.479**	-.285**	-.064	-.104	.055	1	
	Sig. (2-tailed)	.062	.000	.347	.129	.425		
Bank size	Pearson Correlation	.495**	.335**	.104	.118	.051	.020	1
	Sig. (2-tailed)	.000	.000	.127	.084	.460	.775	

**. Correlation is significant at the 0.01 level (2-tailed).
b. Listwise N=185

Source: Field data (2021)

The outcomes in Table 4.8 reveal that mobile banking and ROA are positively as well as significantly correlated (r=0.188**) at 5 % significance level. This implies that mobile banking and ROA change in the same direction. In addition, the results show that internet banking and ROA are positively and significantly correlated (r=0.284**) at 5 % significance level. This implies that both internet banking and ROA change in the same direction. Further, results show that agency banking and ROA are positively and significantly correlated (r=0.262**) at 5 % significance level. This implies that both agency banking and ROA change in the same. For the control variables, capital adequacy did not have a significant link with ROA while asset quality had a significant negative link with ROA. Bank size exhibited a positive and substantial relationship with ROA.

4.5 Regression Results

Regression analysis was performed to determine the extent to which ROA is explained by the selected variables. The regression results were displayed presented in Table 4.8 to Table 4.10.

Table 4.8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.669[a]	.447	.429	.029011

a. Predictors: (Constant), Bank size, Capital adequacy, Internet banking, Mobile banking, Agency banking, Asset Quality

Source: Field data (2021)

From the findings as represented by the adjusted R^2, the independent variables that were studied explained variations of 44.7% in ROA among commercial banks in Kenya. This therefore means the six variables contributed 44.7% of the variations in ROA among commercial banks in Kenya whereas other aspects not examined in this research contribute 55.3%.

Table 4.9: ANOVA Analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	.121	6	.020	24.000	.000[b]
1	Residual	.150	178	.001		
	Total	.271	184			

a. Dependent Variable: ROA
b. Predictors: (Constant), Bank size, Capital adequacy, Internet banking, Mobile banking, Agency banking, Asset Quality

Source: Field data (2021)

ANOVA statistics in Table 4.9 depict that the data had a 0.000 level of significance hence this indicates that the data is perfect for drawing conclusions on the variables.

Table 4.10: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.544	.033		-7.423	.000
	Mobile banking	.113	.011	.108	4.178	.000
	Internet banking	.133	.078	121	4.704	.000
	Agency banking	.106	.004	.126	3.362	.008
	Capital adequacy	.002	.001	.104	1.830	.069
	Asset Quality	-.506	.001	-.421	-7.304	.000
	Bank size	.411	.002	.395	6.823	.000
a. Dependent Variable: ROA						

Source: Field data (2021)

The coefficient of regression model was as below;

$Y = -0.544 + 0.113X_1 + 0.133X_2 + 0.106X_3 - 0.506X_4 + 0.411X_5$

Where:

Y = ROA; X_1 = Mobile banking; X_2 = Internet banking; X_3 = Agency banking; X_4 = Asset quality; X_5= Bank size

4.6 Discussion of Research Findings

The objective of this research was to determine the effect of financial innovations on ROA. The study utilized a descriptive design while population was the 38 banks in Kenya. Data was collected from 37 banks, resulting in a response rate of 97.4%, which was deemed sufficient. The research made use of secondary data that was gotten from CBK and individual banks annual reports. The specific attributes of financial innovations considered were; mobile banking, internet banking and agency banking. The control variables were capital adequacy, bank size and asset quality. Data was analyzed via descriptive as well as inferential statistics. This section discusses the findings.

Regression results revealed that mobile banking was positively as well as significantly linked with ROA of banks in Kenya ($\beta=0.113$, $p=0.000$). These findings agree with those of Muli (2018) who found positive and significant impact of mobile banking on efficiency. However, these findings were inconsistent with those of Kamande (2018) who found that mobile banking does not significantly influence ROA.

In addition, results reveal that internet banking was positive as well as significantly linked with ROA of banks in Kenya ($\beta=0.133$, $p=0.000$). These outcomes concur with those of Kim et al. (2019) who indicated that internet banking affects the performance of banks. These findings were however inconsistent with those of Ogweno (2019) who found that there was no significant link between internet banking and ROA of MFIs.

The outcomes further show that agency banking was positively and significantly related with ROA of banks ($\beta=0.106$, $p=0.008$). These conclusions concur with those of Abdulkadir (2019) who found a positive connection between agency banking and ROA. These conclusions are also concurring with those of King'ang'ai et al. (2016) who studied the impact of agency banking on performance of banks in Kenay and established a positive and significant effect.

For the control variables, capital adequacy exhibited a not significant positive effect, bank size exhibited a significant positive effect while asset quality exhibited a significant negative effect. The R squared was 0.447. This infers that the chosen predictor variables contributed 44.7% to variations in ROA. This research discovered that agency banking has a significant effect on ROA and this supports the study by Kariu (2017).

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the findings from the preceding chapter, as well as the conclusions and limitations discovered during the research. Additionally, it provides recommendation for policy makers and offers suggestions on areas requiring further research.

5.2 Summary of Findings

The objective of this research was to assess how financial innovations influence ROA of banks in Kenya. The selected variables for investigation included mobile banking, internet banking, agency banking, asset quality, capital adequacy and bank size. To

finish the study, a descriptive research design was chosen. CBK provided secondary data, which was obtained and analyzed using SPSS. Annual data for 37 banks for five years from 2016 to 2020 was gotten from their annual reports.

The research first objective was to determine the effect of mobile banking on ROA among commercial banks in Kenya. The correlation results at 5 % significance level show that mobile banking possessed a positive link with ROA. This implies that improving mobile banking would lead to increase in ROA. Regression results (β=0.113, p=0.000) show that there was a positive as well as significant effect of mobile banking on ROA among banks in Kenya.

The second objective was to assess internet banking effect on ROA among banks in Kenya. The correlation results at 5 % significance level show that internet banking possessed a positive link with ROA. Implying that improving internet banking would lead to increase in ROA. Regression results β=0.133, p=0.000) show that there was a positive as well as significant effect of internet banking on ROA among banks in Kenya.

The third objective was to examine agency banking effect on ROA among banks in Kenya. The correlation results at 5 % significance level show that agency banking possessed a positive association with ROA. Thus implying improved agency banking would lead to increase in ROA. Regression results (β=0.106, p=0.008) show that there was a positive and significant effect of agency banking on ROA among banks in Kenya.

The fourth objective was to examine the effect of capital adequacy on ROA among banks in Kenya. The correlation results at 5 % significance level show that capital adequacy had a positive but not significant correlation with ROA. This infers a rise in capital adequacy might not yield to a significant change in ROA. Regression results

(β=0.002, p=0.069) show that there was a positive but not significant capital adequacy impact on ROA among banks in Kenya.

The fifth objective was to assess asset quality effect on ROA among banks in Kenya. The correlation results at 5 % significance level show that asset quality had a negative link with ROA. The correlation was too statistically substantial. Regression results (β=-0.506, p=0.000) show that there was a negative and significant effect of asset quality on ROA among banks in Kenya.

The sixth objective was to study bank size effect on ROA among banks in Kenya. The correlation results at 5 % significance level show that bank size possessed a positive link with ROA. This implies improving bank size would lead to increase in ROA. Regression results (β=0.411, p=0.000) show that there was a positive as well as significant effect of bank size on ROA among banks in Kenya.

5.3 Conclusions

The study intention of the research was to establish the association between financial innovations and ROA. The conclusions designated that mobile banking had a positive as well as significant effect on ROA. This may imply that banks which have adopted mobile banking in a large scale are likely to record a high level of ROA compared with banks with less mobile banking adoption.

The study results further indicated that internet banking possessed a positive as well as significant effect on ROA. This may imply that banks which have adopted internet banking in a large scale are likely to record a high level of ROA compared with banks with less agency banking adoption. The study concludes that internet banking enhances ROA among banks in Kenya.

The study results showed that agency banking possessed a positive as well as significant effect on ROA. This may imply that banks which have adopted agency banking in a large scale are likely to record a high level of ROA compared with banks with less agency banking adoption. The study concludes that agency banking enhances ROA among banks in Kenya.

In addition, the outcomes revealed that asset quality has a significant negative effect on ROA. This implies that banks with high levels of NPLs in their books end up having a lower ROA. Further, the study revealed that bank size has a significant positive effect on ROA. This might be explained by availability of better governance mechanisms in large banks as compared to small banks.

5.4 Recommendations for Policy and Practice

The research findings reveal that mobile banking had a positive as well as significant impact on ROA. The study therefore recommends that the management of banks in Kenya should work on increasing their scale of mobile banking as this will contribute to enhancement of ROA. The policy makers such as the CBK should create a conducive environment for banks to conduct mobile banking activities.

Further, internet banking was found to have a significant and positive impact on ROA. The research thus recommending that managers and directors of commercial banks in Kenya should ensure that clients are able to transact through internet banking without security risks as this will lead to higher levels of ROA. The government should work on enhancing internet coverage to make this a reality.

From the research conclusions, agency banking had a significant impact on ROA. Therefore, the study recommends that the CBK which is the regulator should come with policy guidelines on how banks should adopt agency banking. They should also create

a conducive environment making it easy for banks to adopt agency banking. Furthermore, management and directors of banks in Kenya should work on ensuring they have agency banking outlets in the different parts of the country.

5.5 Limitations of the Study

The focus was on various elements thought to affect the ROA of Kenyan banks. In precisely, the research focused on six explanatory variables. Nevertheless, other factors likely to influence a firm's ROA. Some are controlled by the bank, such as management efficiency and corporate governance, while others are not.

The research used secondary quantitative data. The study also ignored qualitative data that might describe other factors which effect the relationship between financial innovations and banks' ROA. Qualitative methods like focus groups, open-ended surveys, and interviews can aid in the development of more definite outcomes.

The research focus being a five-year duration (2016 to 2020). It's unclear whether the results will last for a longer period of time. It is too uncertain if similar results will be achieved after 2020. In order to account for key economic events, the research ought to have been conducted over a longer period of time.

The researchers utilized an ordinary least square regression model to analyze the data. Because of the limitations of employing regression models, such as erroneous as well as misleading results that cause the variable value to change, it was impossible to generalize the conclusions of the research with correctness. Furthermore, if more data was included in the regression, the outcome could be different. As a result, the model is a drawback.

5.6 Suggestions for Further Research

The study findings revealed an R square of 44.7%. This implying presence of other factors that affect ROA among the banks in Kenya that were not addressed by the research. Other researches ought thus to focus on other factors for example; management efficiency, liquidity, board composition in terms of expertise, audit committee, among other corporate governance aspects that affect ROA among the banks.

The research was restricted to Kenyan commercial banks. Additional research on other Kenyan financial institutions should be conducted, according to the study's suggestions. Future research should look into how financial innovations affect other factors besides the ROA, such as bank value, efficiency, and growth, to name a few.

Because of the readily available data, the focus of this research was drawn to the last five years. Past studies may span a longer time period, such as ten or twenty years, and might have a significant impact on this study by either complementing or contradicting its conclusions. A longer study has the benefit of permitting the researcher to catch the effects of business cycles like booms as well as recessions.

Lastly, this research relied on a regression model, that possess its own set of confines, like errors and deceptive results when a variable is changed. Impending study ought to concentrate on models such as the Vector Error Correction Model (VECM) in order to investigate the numerous relationships between financial innovations and the ROA.

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APPENDICES

Appendix I: List of Commercial Banks in Kenya

1	ABSA Bank Kenya	1916
2	Access Bank Kenya	8th January 1985
3	African Banking Corporation Limited	8th December 1994
4	Bank of Africa Kenya Limited	30th April 2004
5	Bank of Baroda (K) Limited	1st July 1953
6	Bank of India	5th June 1953
7	Citibank N.A Kenya	1st July 1974
8	Consolidated Bank of Kenya Limited	18th December 1989
9	Co-operative Bank of Kenya Limited	1st July 1968
10	Credit Bank Limited	30th November 1994
11	Development Bank of Kenya Limited	20th September 1996
12	Diamond Trust Bank Kenya Limited	15th November 1994
13	DIB Bank Kenya Limited	13th April 2017
14	Ecobank Kenya Limited	16th June 2008
15	Equity Bank Kenya Limited	28th December 2004
16	Family Bank Limited	1st May 2007
17	First Community Bank Limited	29th April 2008
18	Guaranty Trust Bank (K) Ltd	13th January 1995
19	Guardian Bank Limited	20th December 1995
20	Gulf African Bank Limited	1st November 2007
21	Habib Bank A.G Zurich	1st July 1978
22	I&M Bank Limited	27th March 1996
23	Kingdom Bank Limited	2nd March 2010

24	KCB Bank Kenya Limited	1st January 1896
25	Mayfair CIB Bank Limited	20th June 2017
26	Middle East Bank (K) Limited	28th November 1980
27	M-Oriental Bank Limited	8th February 1991
28	National Bank of Kenya Limited	1st January 1968
29	NCBA Bank Kenya PLC	5th November 2019
30	Paramount Bank Limited	5th July 1995
31	Prime Bank Limited	3rd September 1992
32	SBM Bank Kenya Limited	1st April 1996
33	Sidian Bank Limited	23rd March 1999
34	Spire Bank Ltd	23rd June 1995
35	Stanbic Bank Kenya Limited	1st June 2008
36	Standard Chartered Bank Kenya Limited	1910
37	UBA Kenya Bank Limited	25th September 2009
38	Victoria Commercial Bank Limited	11th January 1996

Source: CBK (2020)

Appendix II: Research Data

Bank	Year	ROA	Mobile banking	Internet banking	Agency banking	Capital adequacy	Asset Quality	Bank size
1	2016	0.008	5.350	13.449	9.653	0.1645	0.1426	16.9342
	2017	0.003	5.338	14.595	11.265	0.1528	0.1566	16.9451
	2018	0.006	5.446	14.645	10.369	0.1560	0.1829	17.0576
	2019	0.000	5.365	14.883	9.626	0.1844	0.1989	17.1451
	2020	0.002	5.439	15.079	13.454	0.1538	0.1490	17.1964
2	2016	-0.015	5.429	14.605	13.449	0.1639	0.2325	18.0537
	2017	0.000	5.476	15.989	14.595	0.1616	0.2606	17.8408
	2018	0.001	5.514	15.922	14.645	0.1578	0.2816	17.8080
	2019	0.004	5.511	15.858	14.883	0.1602	0.3383	17.7090
	2020	-0.046	5.544	15.785	15.079	0.1083	0.4139	17.5996
3	2016	0.030	5.465	13.760	14.605	1.9617	0.0754	18.0376
	2017	0.036	5.588	14.577	15.989	0.3053	0.0846	18.2332
	2018	0.041	5.184	14.940	15.922	0.3229	0.0586	18.3812
	2019	0.032	5.152	14.722	15.858	0.3466	0.0882	18.6278
	2020	0.029	5.261	15.115	15.785	0.3274	0.0828	18.7805
4	2016	0.035	5.229	15.332	13.760	0.1840	0.0420	19.2998
	2017	0.028	5.289	13.573	14.577	0.1786	0.0521	19.3751
	2018	0.026	5.247	14.286	14.940	0.1803	0.0556	19.4197
	2019	0.023	5.303	14.465	14.722	0.1638	0.0610	19.6003
	2020	0.020	5.331	14.998	15.115	0.1667	0.0560	19.7397
5	2016	0.026	5.330	11.145	15.332	0.4230	0.0202	17.5571

Bank	Year	ROA	Mobile banking	Internet banking	Agency banking	Capital adequacy	Asset Quality	Bank size
	2017	0.034	5.348	12.798	13.573	0.4574	0.0139	17.6829
	2018	0.037	5.314	12.500	14.286	0.5397	0.0207	17.8521
	2019	0.031	5.419	12.966	14.465	0.4392	0.0713	17.9537
	2020	0.037	4.960	14.089	14.998	0.4842	0.0936	17.9514
6	2016	0.039	5.092	13.254	11.145	0.2832	0.0580	18.2945
	2017	0.033	5.125	14.251	12.798	0.2637	0.0192	18.4534
	2018	0.040	5.110	13.175	12.500	0.2555	0.0368	18.4028
	2019	0.037	5.166	14.129	12.966	0.2764	0.0162	18.2656
	2020	0.030	5.166	12.968	14.089	0.2715	0.0257	18.3858
7	2016	0.017	5.207	15.661	13.254	0.1792	0.1059	19.1891
	2017	0.029	4.737	16.210	14.251	0.1845	0.0745	19.2507
	2018	0.023	4.760	15.935	13.175	0.1732	0.0831	19.3199
	2019	0.023	4.837	16.061	14.129	0.1573	0.0797	19.3172
8	2020	0.003	4.765	16.087	12.968	0.0939	0.0553	16.4642
	2016	-0.015	4.855	13.912	15.661	0.0790	0.1176	16.4487
	2017	-0.025	4.820	13.143	16.210	0.0509	0.1527	16.4149
	2018	-0.042	4.862	13.890	15.935	0.0280	0.1533	16.3718
	2019	-0.045	4.878	14.067	16.061	0.1352	0.2568	16.2888
9	2020	-0.006	4.873	14.072	16.087	0.1551	0.0638	16.1464
	2016	0.009	4.925	13.029	13.912	0.2285	0.0722	16.3200
	2017	0.009	4.934	13.022	13.143	0.1477	0.0754	16.4904
	2018	0.014	5.012	13.254	13.890	0.1451	0.0724	16.7006
	2019	0.010	4.771	13.502	14.067	0.1496	0.0870	16.8910

Bank	Year	ROA	Mobile banking	Internet banking	Agency banking	Capital adequacy	Asset Quality	Bank size
10	2020	0.034	4.721	13.758	14.072	2.1258	0.0342	19.6518
	2016	0.036	4.692	15.034	13.029	0.2277	0.0390	19.6787
	2017	0.029	4.688	15.011	13.022	0.2268	0.0620	19.7736
	2018	0.031	4.677	15.578	13.254	0.1618	0.1009	19.8406
	2019	0.031	4.602	16.112	13.502	0.1505	0.0979	19.9402
11	2020	0.004	4.529	16.133	13.758	0.2508	0.2601	16.6135
	2016	0.002	4.547	14.321	15.034	0.2355	0.2098	16.6072
	2017	0.007	4.455	14.378	15.011	0.2323	0.2981	16.5449
	2018	0.070	4.489	14.636	15.578	0.3147	0.3695	16.5472
12	2019	0.024	4.335	14.473	16.112	0.1463	0.0241	19.4199
	2020	0.024	4.323	14.276	16.133	0.1850	0.0325	19.6087
	2016	0.019	5.350	14.288	14.321	0.1901	0.0666	19.7107
	2017	0.019	5.338	15.268	14.378	0.2111	0.0629	19.7497
	2018	0.019	5.446	15.616	14.636	0.2091	0.0683	19.7719
13	2019	-0.230	5.365	16.384	14.473	0.7005	38.5539	14.7750
	2020	-0.119	5.439	16.312	14.276	0.2990	0.0037	15.4739
	2016	-0.064	5.429	8.654	14.288	0.1486	0.0095	16.0114
14	2017	0.002	5.476	8.473	15.268	0.2496	0.0622	17.7749
	2018	-0.043	5.514	8.765	15.616	0.1944	0.1628	17.6683
	2019	-0.021	5.511	8.937	16.384	0.1599	0.3770	17.7944
	2020	0.004	5.544	8.982	16.312	0.1659	0.1735	17.8130
	2016	0.002	5.229	14.510	8.654	0.1622	0.1448	18.1380
15	2017	0.040	5.289	14.426	8.473	0.2017	0.0272	19.8748

Bank	Year	ROA	Mobile banking	Internet banking	Agency banking	Capital adequacy	Asset Quality	Bank size
	2018	0.035	5.247	15.198	8.765	0.1966	0.0628	19.9761
	2019	0.036	5.303	15.635	8.937	0.2041	0.0553	20.0779
	2020	0.035	5.331	14.631	8.982	0.1593	0.0710	20.1671
	2016	0.036	5.330	15.810	14.510	0.1979	0.0873	20.3283
16	2017	0.024	5.348	15.807	14.426	0.1441	0.0367	18.2134
	2018	0.005	5.314	16.632	15.198	0.2078	0.1197	18.0567
	2019	-0.014	5.419	16.553	15.635	0.1986	0.1923	18.0516
	2020	0.004	4.960	16.488	14.631	0.1952	0.1618	18.0204
	2016	0.012	4.950	13.903	15.810	0.1869	0.1409	18.1831
17	2017	-0.001	4.901	14.147	15.807	0.1145	0.2346	16.4941
	2018	-0.004	4.960	15.608	16.632	0.1399	0.3195	16.5210
	2019	0.009	5.067	15.939	16.553	0.1534	0.4078	16.6697
	2020	-0.012	5.027	15.781	16.488	0.0911	0.4882	16.6992
	2016	0.010	5.092	14.201	13.903	0.0810	0.4145	16.7474
18	2017	0.009	5.125	14.758	14.147	0.2649	0.0916	17.5282
	2018	0.013	5.110	15.067	15.608	0.2547	0.1108	17.2864
	2019	0.007	5.166	15.193	15.939	0.2387	0.1088	17.2774
	2020	0.002	5.166	15.299	15.781	0.2597	0.1467	17.4516
	2016	0.020	5.207	14.735	14.201	0.2428	0.1090	17.1856
19	2017	0.016	4.737	14.401	14.758	0.1763	0.0304	16.4972
	2018	0.016	4.760	14.583	15.067	0.1904	0.0169	16.5037
	2019	0.010	4.837	14.620	15.193	0.2022	0.0453	16.5757
	2020	0.014	4.765	14.876	15.299	0.2275	0.0757	16.5997

Bank	Year	ROA	Mobile banking	Internet banking	Agency banking	Capital adequacy	Asset Quality	Bank size
	2016	0.011	4.855	11.683	14.735	0.2220	0.0689	16.6120
20	2017	0.029	4.820	12.546	14.401	0.1577	0.0842	17.0226
	2018	0.018	4.862	11.930	14.583	0.1872	0.0923	17.1171
	2019	0.005	4.878	12.984	14.620	0.1620	0.0929	17.2596
	2020	0.004	4.873	13.008	14.876	0.1866	0.1064	17.3218
	2016	0.005	4.925	13.706	11.683	0.1711	0.1534	17.3744
21	2017	0.029	4.934	14.077	12.546	0.3213	0.0792	16.1408
	2018	0.024	5.012	14.217	11.930	0.3911	0.1871	16.3419
	2019	0.011	4.771	14.403	12.984	0.2463	0.0745	16.8845
	2020	0.010	4.721	13.678	13.008	0.2729	0.0922	17.0273
22	2016	0.017	4.692	12.438	13.706	0.1813	0.0437	18.0874
	2017	0.013	4.688	12.652	14.077	0.1769	0.0692	18.0912
	2018	0.002	4.677	13.478	14.217	0.1700	0.1081	18.0282
	2019	-0.010	4.602	12.387	14.403	0.1534	0.2494	17.9190
	2020	-0.002	4.529	13.474	13.678	0.1456	0.2356	17.8490
23	2016	0.037	4.547	14.836	12.438	0.2020	0.0248	19.0716
	2017	0.037	4.455	14.657	12.652	0.1815	0.0289	19.1652
	2018	0.030	4.489	15.143	13.478	0.1858	0.0870	19.2966
	2019	0.026	4.335	15.496	12.387	0.1792	0.1079	19.3315
	2020	0.033	4.323	16.198	13.474	0.2156	0.0979	19.4287
24	2016	0.001	5.350	13.923	14.836	0.1625	0.0517	16.6358
	2017	-0.011	5.338	14.970	14.657	0.2008	0.1720	16.5742
	2018	-0.037	5.446	15.174	15.143	0.1933	0.1331	16.3714

Bank	Year	ROA	Mobile banking	Internet banking	Agency banking	Capital adequacy	Asset Quality	Bank size
25	2016	0.035	5.365	16.404	15.496	0.1536	0.0446	20.1400
	2017	0.033	5.439	16.372	16.198	0.1801	0.0705	20.2045
	2018	0.030	5.429	13.149	13.923	0.1663	0.0766	20.2873
	2019	0.034	5.476	13.172	14.970	0.1955	0.0627	20.3868
	2020	0.028	5.514	14.291	15.174	0.1903	0.1016	20.6163
26	2016	-0.013	5.511	13.916	16.404	0.3933	0.1590	15.4706
	2017	-0.005	5.544	13.792	16.372	0.5708	0.1807	15.4489
	2018	0.000	5.465	15.999	13.149	0.4494	0.3825	15.4946
	2019	0.000	5.588	16.552	13.172	0.3119	0.1374	15.9516
27	2016	0.003	5.184	17.119	14.291	0.3869	0.0821	16.1101
	2017	0.009	5.152	17.293	13.916	0.3316	0.0718	16.1741
	2018	0.008	5.261	17.168	13.792	0.3093	0.0940	16.1683
	2019	-0.002	5.229	13.112	15.999	0.3442	0.1931	16.3327
28	2016	-0.009	5.289	13.473	16.552	0.1399	0.1116	18.6473
	2017	0.001	5.247	13.262	17.119	0.0715	0.1749	18.5348
	2018	0.007	5.303	13.123	17.293	0.0542	0.3001	18.5148
	2019	-0.001	5.331	13.795	17.168	0.0370	0.3913	18.5591
	2020	-0.008	5.330	13.178	13.112	0.1150	0.3564	18.5343
29	2017	0.027	5.348	13.273	13.473	0.2059	0.0912	18.9262
	2018	0.026	5.314	13.209	13.262	0.2304	0.1126	18.9481
	2019	0.020	5.419	13.166	13.123	0.2227	0.1089	19.1442
	2020	0.020	4.960	13.466	13.795	0.1869	0.1224	19.1550
30	2016	0.015	4.950	15.871	13.178	0.2412	0.0519	16.1693

Bank	Year	ROA	Mobile banking	Internet banking	Agency banking	Capital adequacy	Asset Quality	Bank size
	2017	0.011	4.901	15.840	13.273	0.2741	0.0828	16.0592
	2018	0.012	4.960	16.080	13.209	0.2946	0.1056	16.0711
	2019	0.024	5.067	16.570	13.166	0.2853	0.1318	16.1067
	2020	0.009	5.027	16.744	13.466	0.2450	0.1211	16.1615
31	2016	0.031	5.092	14.117	15.871	0.1729	0.0170	17.9899
	2017	0.029	5.125	16.162	15.840	0.2216	0.0362	17.9950
	2018	0.029	5.110	16.371	16.080	0.2248	0.0486	18.1721
	2019	0.023	5.166	16.383	16.570	0.3729	0.0606	18.4220
	2020	0.024	5.166	16.476	16.744	0.4136	0.1018	18.5049
32	2016	-0.005	5.207	12.591	14.117	0.1509	0.1025	18.7977
	2017	-0.192	4.737	12.628	16.162	0.1281	0.8832	16.0873
	2018	-0.029	4.760	13.081	16.371	0.1644	0.7290	16.2608
	2019	0.019	4.837	13.343	16.383	0.2425	1.2528	18.0733
	2020	0.012	4.765	13.520	16.476	0.2312	0.8521	18.0994
33	2016	0.019	4.855	13.042	12.591	0.2468	0.1284	16.7655
	2017	0.001	4.820	13.456	12.628	0.2325	0.2383	16.8541
	2018	-0.022	4.862	14.169	13.081	0.1646	0.2780	16.7757
	2019	-0.015	4.878	14.455	13.343	0.1440	0.2035	17.0467
	2020	0.004	4.873	14.617	13.520	0.1793	0.1968	17.0908
34	2016	0.024	4.925	13.562	13.042	0.1870	0.0411	19.1552
	2017	0.021	4.934	14.290	13.456	0.1812	0.0505	19.1847
	2018	0.017	5.012	14.979	14.169	0.1684	0.0666	19.3319
	2019	0.022	4.771	14.970	14.455	0.1740	0.0945	19.4537

Bank	Year	ROA	Mobile banking	Internet banking	Agency banking	Capital adequacy	Asset Quality	Bank size
	2020	0.021	4.721	14.799	14.617	0.1834	0.0998	19.4947
35	2016	0.027	4.692	14.378	13.562	0.2116	0.1015	19.2707
	2017	0.036	4.688	14.704	14.290	0.2091	0.0829	19.3389
	2018	0.024	4.677	14.957	14.979	0.1852	0.0896	19.4705
	2019	0.028	4.602	14.831	14.970	0.1947	0.1169	19.4694
	2020	0.027	4.529	14.540	14.799	0.1773	0.0953	19.5264
36	2016	-0.034	5.350	16.000	14.378	0.1745	0.3332	16.4876
	2017	-0.054	5.338	16.274	14.704	0.1627	0.1677	16.4404
	2018	-0.101	5.446	16.135	14.957	0.1265	0.4271	16.2268
	2019	-0.244	5.365	16.242	14.831	0.2201	0.5598	16.0372
	2020	-0.069	5.439	16.445	14.540	0.2060	0.7111	15.7413
37	2016	0.016	5.429	14.742	16.000	0.2164	0.1103	16.1624
	2017	0.011	5.476	14.835	16.274	0.2230	0.1156	16.1547
	2018	0.004	5.514	14.036	16.135	0.2908	0.2416	16.1419
	2019	-0.007	5.511	14.621	16.242	0.2111	0.2211	16.1414
	2020	-0.009	5.544	14.727	16.445	0.2015	0.2857	16.0475
38	2016	-0.034	5.465	13.179	14.742	0.2379	0.0180	15.8672
	2017	0.004	5.588	13.505	14.835	0.3868	0.0186	15.5385
	2018	0.003	5.184	13.509	14.036	0.3878	0.0436	15.6880
	2019	0.003	5.152	14.283	14.621	0.3316	0.1276	16.5455
	2020	0.004	5.261	14.396	14.727	0.2537	0.2432	16.5936
39	2016	0.036	5.229	10.741	13.179	0.1930	0.0329	16.8122
	2017	0.026	5.289	10.802	13.505	0.2545	0.0255	16.9247

Bank	Year	ROA	Mobile banking	Internet banking	Agency banking	Capital adequacy	Asset Quality	Bank size
	2018	0.024	5.247	10.946	13.509	0.2274	0.0008	17.0730
	2019	0.014	5.303	11.867	14.283	0.2109	0.0308	17.2917
	2020	0.015	5.331	12.995	14.396	0.2015	0.0506	17.4010