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

BY

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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, UNIVERSITY OF NAIROBI

2021

DECLARATION

I declare that this is my own work and has not been submitted for any award to any learning institution.

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D61/21834/2019

The research has been presented for examination with my approval as the University Supervisor.

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ACKNOWLEDGEMENT

DEDICATION

I dedicated to my entire family, friends and colleagues who have immensely offered

their moral and emotional support in this journey. Be blessed all.

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LIST OF ABBREVIATIONS

ATM	Automated Teller Machine
CBK	Central Bank of Kenya
EFT	Electronic Funds Transfer
ICT	Information and Communication Technology
IT	Information Technology
KDIC	Kenya Deposit Insurance Corporation
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

Monetary inventions are used by commercial banks so that they can compete in financial markets and therefore improves their performance and maintains their efficiency on market. Financial experts and academicians have focused on reviewing the relationship between financial inventions and banking performance but no consensus has been reached yet. Commercial banks in Kenya adopted financial innovations and therefore provide a good context to investigate this relationship. This research sought to bring out the effect of adopted financial innovations on the financial performance among commercial banks in Kenya. The research established the effect of agency banking, mobile banking, ATMs and internet banking on financial performance among banks in Kenya. Bank size, capital adequacy and credit risk and were used as the control variables in the model. Descriptive research design was used. The target population comprised of Kenyan banks. 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. Regression and correlation analysis were used to test the study hypotheses by establishing the relationship between adopted financial innovations and ROA. The results indicated R^2 of 0.448 which implied that the selected independent variables contributed 44.8% to variations in ROA. The study further found that agency banking (β=0.106, p=0.008), mobile banking (β=0.113, p=0.000), internet banking (β=0.133, p=0.000), and bank size (β=0.411, p=0.000) recorded a positively and substantial relationship with ROA among banks in Kenya. Credit risk recorded a substantial negative effect on ROA (β=-0.506, p=0.000) while ATMs and capital adequacy were not statistically significant. The study recommends the need for policy makers to provide a conducive environment for banks to undertake adopted financial innovations as this enhances their financial performance. Managers and directors of commercial banks should also work on improving their adopted financial innovations coverage in a bid to enhance their performance and to remain competitive in the ever changing environment.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

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 (Neaime & Gaysset, 2018). Boot and Thakor (2014) asserted that in general, invention have a substantial influence in increasing monetary performance of firms. Innovation efforts require monitoring, allocating and controlling, since they are vital and limited resources that are to be utilized in a wise manner. A perfect understanding of the nature of inventions might help organizations to prioritize their marketing, production and technology strategies followed by suitable consequent action plan.

There are various theories, which attempted to elaborate linkages between adopted financial innovation and the financial performance. "This study drew support from financial intermediation theory, technology adoption model and diffusion of innovation, Mises (1912) was the first to advance the financial intermediation theory, which claims that financial institutions must invest in financial intermediation which makes it convenient for clients to trade in order to maximize their performance. The mechanism via which a new thought is disseminated to a particular societal system relies on utilizing a specific preference channel (Rogers, 1995). 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 study.

In the presence of technology, monetary invention has radically revolutionized banking perspectives, which have since been modified owing to competition in the Kenyan

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banking business. The banking system's perplexing business climate has prompted increased innovation in the sectors of product, procedure, and market. In the banking and financial industries, IT has ushered in new revolutions in product design and delivery. Their major focus is on customer service and satisfaction. With the use of modern technology, the banking industry has developed projects aimed at offering improved customer service. Banking via the internet has emerged as a key resource for increasing efficiency, controlling operations, and lowering costs by substituting labor-intensive activities with automated ones, resulting in increased productivity and profitability (CBK, 2018)."

1.1.1 Financial Innovations

Tufano (2014) asserted that financial innovation involves establishing and making popular new financial tools in addition to new financial techniques and markets. Lawrence (2013) opined that financial invention consists of the plan, progress, and the execution of inventive monetary tools, procedures and the invention of resolutions to challenges in finance institutions. financial innovations, according to Freytag and Fricke (2017), are innovative technology that supports financial services. Banks are expected to offer social network platforms in the future, allowing clients to utilize their mobile devices to exploit financial innovations-enabled investing opportunities.

Advancements in the banking industry have contributed to a rise in banks and the progress in level of complexity in new payment systems properties substitutes to keeping cash. Linked with the rapid development in financial sector as a result of monetary invention: credit cards, EFT, value capping, agent banking, cheques clearing in one day, retail financing, free consultancy services, execution of standing client's guidelines, paying of bills, internet financial transaction, mobile phone banking,

insurance and several other value-added services. financial innovation's main purpose is to make distinct quality services that will meet clients demand as well as making them convenient (Yang & Liu, 2016).

Financial innovations that are used nowadays in many financial transactions, according to Demirguc-Kunt et al. (2018), mobile banking also involves a connection to a business or employee bank account through a mobile phone. The growth of the Internet has allowed financial institutions to provide their services through the Internet, which they own. Peer-to-peer lending is a new form of lending in which individuals can get loans from others or loan money to others without the use of a bureaucracy bank as a middleman, a digital ledger and blockchain where all kinds of digital currency transactions are recorded openly and chronologically, as well as other technology services such as banking, credit cards, and ATMs. The 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, mobile banking and ATMs.

1.1.2 Financial Performance

Almajali, Alamro and Al-Soub (2012) describe financial performance as a company's capacity to meet a set of financial objectives, like profitability. Finanical performance is the degree to which a company's financial standards are fulfilled. It displays how well financial goals have been met (Nzuve, 2016). According to Baba and Nasieku (2016), concept of financial performance demonstrates how an organization utilizes assets available to generate income and hence guides stakeholders while coming up with decisions. Extant research describes financial position as the ability of the firm to earn revenue from its own 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 therefore is important to firm's health as well as existence. A company's excellent performance demonstrates its efficiency and effectiveness in managing available assets in the process of operations, financial transactions and investments (Karajeh & Ibrahim, 2017).

Different ways of measuring financial performance are employed, and they should be unified. Return on Assets (ROA), business size, Return on Sales (ROS) and Return on Equity (ROE) are among financial performance variables identified by Ngatia (2012). Carter (2010) used Tobin's Q and ROA to gauge financial success, but Wang and Clift (2009) employed ROE and ROA. ROE and ROA remain to be most recognized ways of measuring financing performance. The ROA is a metric of evaluating company's profitability relative to its total assets whereas ROE measures the net income achieved as a percentage of shareholders equity (Mwangi & Murigu, 2015). Baba and Nasieku (2016) posit that market-based metrics 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 metric of financial performance as it is the most recognized measure (Fatihudin & Mochklas, 2018).

1.1.3 Financial Innovation and Financial Performance

Monetary inventions are used by commercial banks so that they can compete in financial markets and therefore improves their performance and maintains their efficiency on market (Woldesenbet-Batiz- Lazo, 2006). Hence encourages the financial experts and academicians in reviewing the relationship between financial inventions

and banking performance. Cohen and Morrison (2007) argue that embracing specific invention type will influence firm performance positively. It further argued that organizations should add new information to the previous information acquired. Previous experience with a specific invention will further support the same application with information where they had success. Organization inclines towards implementing an invention because they retain information in that invention and thus assimilate new information and craft new prospects for them to be productive (Roberts & Amit, 2003).

The rising trend in financial innovations, borrowing and savings products are made easy for everyone (Mehotra & Yetman, 2014). Long-term financial performance of banks is one of the projected benefits of financial innovations (Rasheed, Law, Chin & Habibullah, 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 system (Zins & Weill, 2016).

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 detrimental 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

A bank is defined as an organization that plans or undertakes banking activities in Kenya, according to the CBK. Commercial banking includes the activities of providing other financial services, processing money transactions, extending credit and accepting client deposits. The sector plays a significant part in bolstering financial services, with a particular emphasis on supplying credit to economy and mobilization of savings. The Annual Report on Bank Supervision (2018), notes that the CBK is the regulatory body for the banking sector in the Czech Republic. There are also 1 mortgage finance company, 42 commercial banks, and 13 microfinance companies in the industry. A significant portion of the country's 42 commercial banks are held by residents, but a significant portion are controlled by international corporations. There are 11 of the 42 NSE-listed stocks on the exchange (CBK, 2020).

Many improvements have been made in the banking sector to increase efficiency and the way they operate. Increasing financial provision rivalry, technological innovation and banking consolidation are all examples of these developments. As a result, banks are being compelled to pay more focused emphasis on certain areas that improve performance, for example delivering better products and services and minimizing expenses in banking. With regard to the use of financial innovations by banks, it's being used to cut down on expenses in administration, operational efficiency, and competition (CBK, 2020). According to Abdulkadir (2019), financial innovations adoption is viewed as a tool that enhances the way financial transactions are conducted. This indicates that the financial functionality of this sector has improved because of the increasing adoption of financial innovations.

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 urge 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 Financial 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).

The banking sector has witnessed continuous increase in financial innovations in the past five years and there is a necessity in establishing the link amongst the developing financial innovations and financial institutions monetary performance in Kenya. Njoroge (2016) noted that there are a variety of banking and financial innovations that include emergence of mobile banking, EFT, telephone banking, RTGS, servicing of

utility bills and internet banking among others. The current study seeks to contribute knowledge on the effect of financial innovations on performance of commercial banks in Kenya.

Although there have been international studies in this field, they have primarily focused on certain components of financial innovations in relation to financial performance. Stoica, Mehdian, and Sargu (2015) investigated how internet banking affects Romanian bank performance and it has been shown that efficient and cost-effective services delivered through e-banking enhance banks financial performance. Ramesh and Daneshvar (2012) on influence of IT on profitableness and output of the Indian public financial institutions and proven that IT has donated towards improved amount of clients payments and ROA. **Wadhe and Saluja (2015)** investigated how banking electronically impacts financial performance of banks in India. Findings demonstrated that, in both private and public sector banks, electronic banking had a positive connection with financial performance. All these investigations were conducted in a distinct setting thus, their results cannot be applied to the current situation.

Locally, Mugodo (2016) investigated how electronic banking affects commercial bank performance in and found that it has a beneficial impact on the financial performance of Kenyan commercial banks. Chirah (2018) investigated how alternative banking channels affect bank operational efficiency in Kenya, concluding that online banking has no substantial impact on bank operational efficiency. Abdulkadir (2019) studied the financial performance of commercial banks in Kenya due to the use of financial innovations, concluding that technology in the financial sector has a favorable impact on performance. It is obvious from the preceding that, while there is similar local research in this area, their conclusions are inconsistent. Furthermore, most

previous research has operationalized financial innovations in different ways, with the majority choosing for a restricted definition, which was the knowledge gap that the current study aims to fill. "This research provided answer to: the effect of financial innovations on financial performance of commercial banks in Kenya?

1.3 Research Objective

This research determined the effect of financial innovations on financial performance of the commercial banks in Kenya.

1.4 Value of the Study

The outcomes of this research may help banks in realizing their growth by utilizing financial innovation in their processes. As a result, managers may accept essential financial innovations that bolsters financial enactment by banks. The research findings of the study will benefit the strategist and government by showing that financial invention have contributed to high bank performance therefore enable policy makers to straighten their strategies.

This research study will help Kenyan government to seek out leverage on technology to grow their monetary institution services, increase financial entree and inclusion. The major influence of revolution in Kenya is information technology and inventions. Through research finding, Kenyan government will know which extent of invention is needed to back the financial institutions either by renouncing taxes or other non-monetary enticements.

The research findings will make available resilient literature on the continuing discussions on the sustainable banks' performance during this current dynamic environment. The results may give evidence for the claim that financial innovation enhances financial performance by demonstrating that financial performance has a

substantial association with financial innovation. Future researchers interested in related topics might find and use some of the material from this study."

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

2.2.1 Financial Intermediation Theory

Mises (1912) developed the theory of financial intermediation, which asserts that banks are key participants in financial intermediation. Banks mobilize clients' money and provide it to those who are short on funds at a rate known as interest. An arrangement like this allows the banks to give the financial system a condition of liquidity, since short-term client money is taken and used to provide longer-term money for their customers (Dewatripont, Tirole & Rochet, 2010). According to the Austrian economist Ludwig von Mises (1912), banks have a central function as debt negotiators, as they lend money borrowed from the public.

Borrowing and lending money are the two major roles played by banks when it comes to financial intermediation. According to Austrian economist Ludwig von Mises

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(1912), participation in financial intermediation by banks curtails their ability to create money while concurrently exposing them to the chance to do so. Critics such as Allen and Santomero (1997) say that the concept of participation costs has been front and center when it comes to risk management in the financial industry, and it posits risk management as an evolving concept. This idea is relevant to the research since boosting the financial performance of banks can be accomplished by implementing innovative financial innovations that enables simple and convenient banking activities for consumers.

2.2.2 Diffusion of Innovation Theory

This theory was initially put forth by Rogers E. M (1995). The two authors, Mahajan and Peterson (1985) assert that a new idea, action, or object that is welcomed into a societal system as soon as it emerges is called an innovation. It aims to explain how internet and mobile banking are embraced and applied within the boundaries of societal structure (Clarke, 1995). Adoption of innovation is not instantaneous, but occurs over time, as discussed by Sevcik (2004). He also claims that opposition to change slows down the speed of how innovation is adopted. These five attributes— complexity, compatibility, relative advantage, observability, and triability—influence how fast a company adopts new innovation (Rogers, 1995). To begin, Rogers contends that the manner in which a company understands its relative advantage, relative triability, complexity, compatibility, and observability will affect how much it adopts new innovation. Internet banking has been shown to be useful in Kenya, therefore once all of the necessary tools are in place, it will be used. Information technology departments and internet connectivity speed the rate of innovation adoption in enterprises. Innovations for instance, online banking, agency banking and mobile banking and are applied in enterprises when an executive has given the go-ahead.

2.2.3 Technology Acceptance Model

The technology acceptance model was first conceived by Davis (1989) and is also known as the Davis model (TAM). This model addresses customers' adoption behavior, which is utilized to select a system that is both beneficial and convenient to them. Moon and Kim (2001) 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). When the ease of use of an information system is maintained, 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, 2003).

When people believe electronic banking is effective, it's more likely to be used (Potaloglu & Ekin, 2001). Aspects like perceived simplicity of use and perceived usefulness are considered important in encouraging the adoption of e banking. Theory of Technology Acceptance has changed how researchers do their work. Key aspects of the current investigation is to identify the advantages and disadvantages 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 Determinant 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, 2006). 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 has a role in spurring productivity and monetary progress at the company's scale (Brynjolfsson & Hitt, 1996). Using technology, trading expenses are reduced, so making commodities more accessible and inexpensive for the banks (Bames, 2014).

2.3.2 Capital Adequacy

Athanasoglou et al. (2005) asserted that investment is identified as a crucial determinant of financial performance. The bank's capital consists of contributions that the bank's owner makes in support of the bank's operations, and that serve as a backup in case of undesirable occurrences. In imperfect capital markets, well-capitalized banks have to cut their borrowing in order to ensure that a particular asset index holds; consequently, they exhibit lower funding costs. It is often measured as the ratio of core capital to risk weighted assets.

The signaling impact of a well-capitalized bank is the one exceeding expectations should be anticipated. When Athanasoglou et al. (2005) factored in capital contributions, they found that they had a favorable possible adverse impact on the financial performance of banks in Greece, which confirms solid financial position. In addition, Baba and Nasieku (2016) discovered that a positive causation links both the amount of money a company puts into the economy and its financial performance.

2.3.3 Credit Risk

Credit risk refers to the likelihood that borrowers will not honor their obligations when they fall due. It 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 asymmetric 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 bank's general credit system and diminish its value (Afriyie & Akotey, 2012).

2.3.4 Bank Size

Bank size refers to the scope of operations and it is normally measured by value of total assets (Magweva & Marime, 2016). Legal and financial reasons have directly impacts on a bank's size. Capital adequacy is also influenced by the size of the bank. Bigger banks may obtain cheaper capital, which allows them to reap even larger profits. To get insight on the impact of size on asset return, bank size is related to return on assets; therefore, big banks possess economies of scale that help them save costs, resulting in improved financial performance (Amato & Burson, 2007). The size of the bank is associated with better capital ratios, and thus this conclusively supports the notion that increasing bank size improves financial performance (Magweva & Marime, 2016)

In order to be successful, an organization must have the resources to fuel its operations (Amato & Burson, 2007). In contrast to organizations with more assets, firms with significant financial resources can complete several large projects that yield larger returns. Other organizations have collateral that is sufficient for accessing loan facilities and credit that is more extensive than that of smaller organizations (Njoroge, 2014).

According to (Lee, 2009), a firm's overall assets have an impact on its recorded financial performance level every year.

2.3.5 Liquidity

Liquidity is used to denote the firms' capability to settle their credit commitments which are incurred within twelve months by the use of cash and short-lived assets that are rapidly convertible into cash. It hence occurs as a result of the ability to settle financial demands owed to creditors without liquefying their other assets. Liquidity is often measured using the current ratio (Adam & Buckle, 2013).

Liargovas and Skandalis (2008) argued sufficient proportions of liquid assets assist firms in their activity financing as well as investing in cases wherever they cannot obtain external funds. Firms with high liquidity can meet unforeseen liabilities and obligations that need to be settled. Almajali et al. (2012) argued firm liquidity can substantially affect the performance; thus, firms should hold more liquid assets and lower short term obligations (Jovanovic, 1982).

2.3.6 Management Efficiency

This is an important internal qualitative factor to consider when determining and measuring a company's operational effectiveness. "This quality can be measured in a variety of ways, including capacity of managements to efficiently employ resources, raise funding, and properly allocate that funding (Kusa & Ongore, 2013).

Management efficiency, as operational efficiency determinant, is a qualitative measure indicated by staff quality, the effectiveness of management systems and efficiency of internal controls (Athanasoglou, Sophocles & Matthaois, 2009). Quality of management impact operational expenses, which in turn has an impact on a business's

bottom line. As a result, management efficiency has a significant impact on firm efficiency (Kusa & Ongore, 2013).

2.4 Empirical Review

Extant researches locally and internationally support the financial benefit of financial innovations, with varying outcomes.

2.4.1 Global Studies

A research study was carried by Daneshvar and Ramesh (2012) **on** data from public financial institutions for the period of 1998 – 2009 to survey the impact of IT investment on profitableness in Indian public financial institutions. Major statistical tools that were used included regression and correlation analysis. The outcome showed that investment on IT lead to improved amount of clients' payment and ROA, turnover per workers as productivity gauge and reduction in staff cost and net non-performing assets ratio. The research exhibited that public financial institutions tried to embrace discount and assets worth approaches to compete in the Indian financial market. The study focused on two banks which might have affected the reliability of the outcomes. The current study will focus on 43 financial institutions in Kenya and also test the reliability of the monetary reports to ensure that the findings will be valid and reliable.

Abor (2013) in assessing the relationships between effect of innovative technology on Ghanian banks. The dependent variables were financial products and facilities including ATMs, Telephone lending, PC-Banking, and EFTPoS and the independent variable was the banks performance. The research was dedicated on clienteles with financial institutions that have at least one form of technological invention. The outcome of the research indicated that technological invention has contributed immensely to the facilitation of financial facilities and the development of the Ghanaian

financial institution. This study focused on effect of technological innovation on growth of the banking industry but did not reveal whether the innovations have an effect on performance of the banks. The current researchers therefore aims at assessing whether ATMs, Telephone banking, PC-Banking, and Electronic Funds Transfer have an effect on the return on assets of commercial banks.

Agboola (2006) on ICT among Nigerian banks checking on level of implementation in inventive technology, level of exploitation of the technologies identified and effect of the implementing ICT among banks, established that that technology was the sole driving force of competition in the banking industry. During this study he witnessed increased uptake of EFT, ATMs, electronic home and office lending, telephone lending and smart cards. It further indicates that uptake of ICT improves the banks' image and leads to extensive, quicker and more effective market. He affirms that it is imperious for financial institutions management to maximize investment in ICT gadgets to bolster speed, convenience, and accuracy in services, or else may lose to their rivals. This research majorly focused on effect of inventions on competition which created gaps on effect of monetary inventions on performance."

De Young et al. (2015) conducted research in Oslo, Norway, as far as the effect of internet goes on local banks' output and productivity. The population of interest in this research was 29 financial institutions, and it took place between 2006 and 2019. Using a descriptive research methodology, the researchers found. Primary data (i.e., data that has been gathered directly from the sources) was used to gather information for the online questionnaire, and secondary data (i.e., information that has been compiled from annual financial reports) was utilized to collect that information. The outcome demonstrated that conventional lacal-based banks that do not adopt internet banking do

not do as well as those that have, because their profits are significantly lower due to their total revenue and deposits and their operating costs are also more expensive. Furthermore, the study found that even if financial performance disparities are covered in a short amount of time due to economies of scale, economic gaps are hard to narrow quickly

The study by Wadhe and Saluja (2015) investigated the profitability of Indian banks from 2006 to 2014, focusing on impact of electronic banking. Data pertaining to commercial banks in India was used in the study. 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 both public and private banks. This study 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.

Dawood et al. (2019) studied the influence of mobile lending on alleviation of household poverty in Indonesia. Utilizing the Binary Logistic model and data from 300.000 families from the 2017 Indonesian Survey, the study found that mobile lending decreases absolute poverty amongst households. Additionally, mobile lending can be a compensation for limited assets, reduced non-agricultural occupations in rural areas, and little education for family heads. Additionally, it will reduce incentives for poor, to reduce rural-urban migration for low-skilled rural people who seek non-agricultural job opportunities.

2.4.2 Local Studies

The research interests of Wanalo (2018) were focused on investigating whether the use of technical financial innovations (TFT) had a significant impact on financial

performance, and to do so, examined the banks' performance in Kenya. The three theories used were innovation diffusion, financial intermediation and Silber's financial innovations limitations. 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.

Chirah (2018) attempted to identify how different banking networks affect efficiency in operations among Kenyan banks. "A set of all banks in Kenya that have 42 locations was utilized. In this study, the independent variable was alternative banking channels, which included transactions carried out using the internet, a smartphone, automated teller machines, and agency banking. The ratio of operating expenses to total revenue assessed operational efficiency. Additional data has been collected on an annual basis since January 2013 up to December 2017 for a period of five years. In this investigation, liquidity demonstrated a positive and considerable value. Studying the connection between ATM, agency banking, mobile banking, internet banking, and firm size and capital structure, it was discovered that ATMs, mobile banking, agency banking, firm size and internet banking were insignificant factors in determining operational efficiency in commercial banks.

Sindani, Muturi and Ngumi (2019) examined the impact of financial channels of distribution evolution on financial inclusion in in Kenya over a period of six years beginning from 2012 to 2017. The specific objectives guiding this study include; examine how internet banking affects financial inclusion in Kenya and to examine how ATM banking affect financial inclusion in Kenya. Secondary data was collected for subsequent analysis. For analysis of the data collected, frequency tables, percentages and means were used to demonstrate the findings of this study. Use of descriptive statistics in this study was meant to present the category sets formed by this research. The mean, variance and std dev. on 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 link between variables was evaluated using a multiple linear regression, 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 study of 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 used. 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 technologies contributed to financial success.

2.5 Conceptual Framework

The model that follows depicts the probable link existing between variables. financial innovations, as defined by ATMs, mobile, internet, agency banking, were the predictor variable. Bank size, capital sufficiency, and credit risk were the control variables. financial performance, as assessed by ROA, was the dependent variable.

Figure 2.1: The Conceptual Model
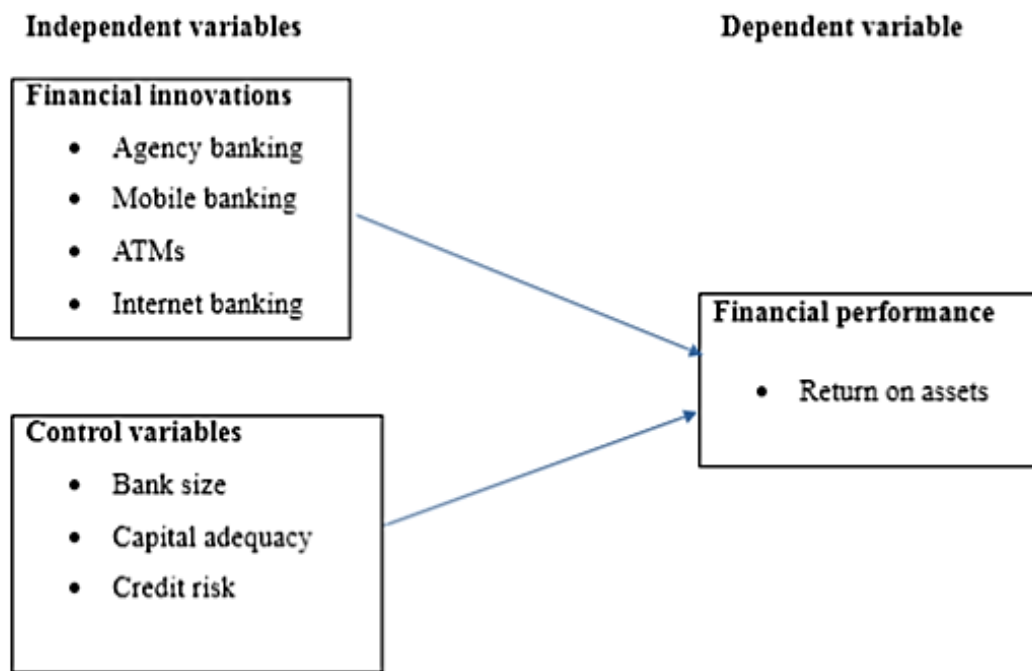
Source: Researcher (2021)

2.6 Summary of Literature Review

Several theories have been proposed to elucidate the expected relationship between macro- financial innovations and bank 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 studies 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 so as to conduct the study. Incorporating four sections, this chapter discussed the research design, the procedure for gathering data, the diagnostic tests and finally, the technique for interpreting the results.

3.2 Research Design

A descriptive research design was used to evaluate the impact of financial innovations on the development of financial sector in Kenya in this investigation. Descriptive research design was used in this study since it allowed for the collection of information on the current state of affairs (Khan, 2008). The research team was well-versed in the subject matter under consideration, but they seek to learn more about the nature of the link between the study variables; as a result, the research design chosen was the most appropriate. More specifically, the goal of descriptive research was to provide an accurate and correct depiction of variables, which assisted in the response to research questions that were posed (Cooper & Schindler, 2003)."

3.3 Population and Sample

Observations from a collection of occurrences of interest, such as those outlined in an investigation, are referred to as a population (Burns & Burns, 2008). The 42 commercial banks in Kenya as of December 31, 2020 formed the basis of this study's participant population (see appendix I)."

3.4 Data Collection

The information was gathered solely from a second hand sources. Secondary information was gathered from the financial reports of commercial banks and the CBK, since it's a requirement for commercial banks to remit reports on regular basis to CBK. Data was collected on an annual basis for five years starting 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 changed 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 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 did not meet the homogeneity of variances assumption, robust regression analysis was 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 23 SPSS computer program was used for the analysis. Central tendency measurements (mean and median) and also measures of dispersion (standard deviation) were calculated by utilizing descriptive statistics. Correlation and regression analysis were required in the context of inferential statistics. Regression analysis involved understanding the cause and effect between the variables whereas correlation analysis established 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, ATMs, mobile banking, internet banking, bank size, capital adequacy and credit risk.

3.6.1 Analytical Model

A multivariate regression model was employed to assess the value of each of the explanatory factors for financial performance in Kenya.

A multivariate regression model was adopted as follows;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon$$

Where:

Y   financial performance

$ß_0$ regression constant (parameter of the function)

$ß_1$, $ß_2$, $ß_3$, $ß_4$, $ß_5$, $ß_6$ and $ß_7$ are the coefficients of independent variables

X_1 agency banking

X_2 mobile banking

X_3 ATMs

X_4 internet banking

X_5 bank size

X_6 capital adequacy

X_7 credit risk

$έ$ error term

3.6.2 Operationalization of Study Variables

Variables	Measurement
Financial performance	Total income to its total assets
Agency banking	Log total value of agency banking transactions
Mobile banking	Log total value of mobile banking transactions
ATMs	Log total value of ATM transactions
Internet banking	Log total value of internet banking transactions
Bank size	Log of total assets
Capital adequacy	Core capital to risk weighted assets
Credit risk	Non-performing loans to total loans

3.6.3 Tests of Significance

In order to judge the overall model's relevance, as well as the statistical importance of each estimated item, parametric tests were conducted. To determine if the overall model was substantial, the study used the F-test, which was derived from the ANOVA, while to find out if any of the individual variables was significant, the study used the t-test, which was derived from ANOVA.

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CHAPTER FOUR

DATA ANALYSIS, RESULTS AND FINDINGS

4.1 Introduction

This chapter focuses on analysis of data. It purposed to determine the relationship 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 sought 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 displayed in Table 4.1

Table 4.1: Descriptive Results

	N	Minimum	Maximum	Mean	Std. Deviation
ROA	185	-.244	.070	.00644	.038379
Agency banking	185	8.473	17.293	14.31379	1.647710
Mobile banking	185	4.323	5.588	5.09096	.319403
ATMs	185	5.087	9.407	7.97377	.555799
Internet banking	185	8.473	17.293	14.32992	1.605652
Bank size	185	14.7750	20.6163	17.725991	1.3648773
Capital adequacy	185	.0280	2.1258	.237358	.2113328
Credit risk	185	.0008	38.5539	.355127	2.8284459
Valid N (listwise)	185				

Source: Research Findings (2021)

Table 4.1 displays descriptive analysis. The dependent variable was ROA whereas the independent variable was financial innovations (ATMS, Agency and mobile banking).

Eventually, capital adequacy, credit risk as well as bank size served as the control variables.

4.3 Diagnostic Tests

To ascertain the model viability, a number of diagnostic tests were done, like normality, stationarity, Hausman specification test, Multicollinearity test, homogeneity of variance and autocorrelation.

4.3.1 Normality Test

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

Table 4.2: Test for Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	'Statistic'	'Df'	Sig.	'Statistic'	'Df'	'Sig.'
Y	0.326	185	0.112	0.869	185	0.078
X_1	0.408	185	0.207	0.918	185	0.102
X_2	0.272	185	0.063	0.881	185	0.094
X_3	0.124	185	0.057	0.874	185	0.091
X_4	0.176	185	0.061	0.892	185	0.101
X_5	0.567	185	0.365	0.923	185	0.120
X_6	0.644	185	0.412	0.874	185	0.094
X_7	0.598	185	0.394	0.892	185	0.116
a. Lilliefors Significance Correction						

X_1=Agency banking, X_2= Mobile banking, X_3= ATMs, X_4= Internet banking, X_5= Bank size, X_6= Capital adequacy, X_7= Credit risk and Y= ROA

Source: Research Findings (2021)

The normality test results exhibited a p- value above 0.05 thus the null hypothesis rejection and acceptance of the alternate hypothesis meaning the normality 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

Variable	Collinearity Statistics	
	Tolerance	VIF
Agency banking	0.724	1.382
Mobile banking	0.684	1.463
ATMs	0.697	1.434
Internet banking	0.621	1.610
Bank size	0.703	1.422
Capital adequacy	0.661	1.513
Credit risk	0.634	1.577

Source: Research Findings (2021)

The outcomes in Table 4.3 specify that entire variables utilized had a VIF values <10 and tolerance values >0.2 suggesting that Multicollinearity did not exist.

4.3.3 Heteroskedasticity test

Breusch-Pagan test was employed to gauge heteroscedasticity. Null hypothesis was that variance of error terms is constant. Heteroskedasticity Test Results are tabulated in Table 4.4.

Table 4.4: Heteroskedasticity Results

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity		
Ho: Constant variance		
Variable: fitted values		
chi2(1)	=	0.7003
Prob > chi2	=	0.6429

Source: Research Findings (2021)

The null hypothesis of Homoskedastic error terms is not rejected, according to the results in Table 4.4, which are supported by a 0.6429 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) = 0.324
Prob> F = 0.5360

Source: Research Findings (2021)

The null hypothesis of no serial association is not rejected by the results of Table 4.5 since the p-value is significant (p-value = 0.5360).

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 outcomes.

Table 4.6: Unit Root Test

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

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 display the nature of association between the variables studied in terms of magnitude and direction.

Table 4.7: Correlation Results

		ROA	Agency banking	Mobile banking	ATMs	Internet banking	Bank size	Capital adequacy	Credit risk
ROA	Pearson Correlation	1							
	Sig. (2-tailed)								
Agency banking	Pearson Correlation	.183*	1						
	Sig. (2-tailed)	.013							
Mobile banking	Pearson Correlation	.189**	.060	1					
	Sig. (2-tailed)	.010	.419						
ATMs	Pearson Correlation	.005	.041	.070	1				
	Sig. (2-tailed)	.949	.580	.345					
Internet banking	Pearson Correlation	.037	.061	.066	.040	1			
	Sig. (2-tailed)	.619	.412	.373	.592				
Bank size	Pearson Correlation	.495**	.163*	.137	.069	.043	1		
	Sig. (2-tailed)	.000	.026	.062	.353	.560			
Capital adequacy	Pearson Correlation	.057	.000	.081	.099	.003	.034	1	
	Sig. (2-tailed)	.438	.995	.272	.181	.972	.643		
Credit risk	Pearson Correlation	.479**	-.022	-.063	-.025	-.096	-.174*	.155*	1
	Sig. (2-tailed)	.000	.764	.393	.737	.191	.018	.036	

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

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

c. Listwise N=185

Source: Field data (2021)

The results in Table 4.8 reveal that agency banking and ROA are positively and significantly correlated (r=0.183**) at 5 % significance level. This implies that agency banking and ROA change in similar magnitude. The results also show that service of mobile banking and ROA are positively and significantly correlated (r=0.189**) at 5 % significance level. This implies that both mobile banking and ROA change in the same direction. Further, results show that ATMs and ROA are positively but

significantly correlated (r=0.005) at 5 % significance level and this also apples for internet banking (r=0.037) at 5 % significance level. In establishing control variables, bank size exhibited a positive and substantial link with ROA. Capital adequacy did not have a significant link with ROA while credit risk had a significant negative relationship with ROA.

4.5 Regression Results

Regression analysis was performed to establish the extent to which ROA is explained by the selected variables as tabulated in Table 4.8 to 4.10.

Table 4.8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.669[a]	.448	.426	.029082

a. Predictors: (Constant), Credit risk, Agency banking, ATMs, Mobile banking, Internet banking, Capital adequacy, Bank size

Source: Field data (2021)

As per findings represented by the adjusted R^2, the independent variables that were studied explained 44.8% of the variations in ROA among commercial banks in Kenya. This therefore means the seven variables contributed 44.8% of the variations in ROA among commercial banks in Kenya whereas factors not examined contribute 55.2%.

Table 4.9: ANOVA Analysis

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.121	7	.017	20.491	.000[b]
	Residual	.150	177	.001		
	Total	.271	184			

a. Dependent Variable: ROA

b. Predictors: (Constant), Credit risk, Agency banking, ATMs, Mobile banking, Internet banking, Capital adequacy, Bank size

Source: Field data (2021)

ANOVA in Table 4.9 show that the data had a 0.000 level of significance hence this indicates that data utilized was appropriate to conclude on variables.

Table 4.10: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	-.543	.033		-7.423	.000
	Agency banking	.106	.004	.126	3.362	.008
	Mobile banking	.113	.011	.108	4.178	.000
	ATMs	.001	.004	021	.370	.712
1	Internet banking	.133	.078	121	4.704	.000
	Bank size	.411	.002	.395	6.823	.000
	Capital adequacy	.002	.001	.104	1.830	.069
	Credit risk	-.506	.001	-.421	-7.304	.000
a. Dependent Variable: ROA						

Source: Field data (2021)

The coefficient of regression was as below;

$Y = -0.543 + 0.106X_1 + 0.113X_2 + 0.133X_3 + 0.411X_4 - 0.506X_5$

Where:

$Y = ROA$; $X_1 = $ Agency banking; $X_2 = $ Mobile banking; $X_3 = $ Internet banking;

$X_4 = $ Bank size; $X_5 = $ Credit risk

4.6 Discussion of Research Findings

The research purposed to findout the effect of financial innovations on ROA. The study utilized a descriptive design while population comprised of 42 Kenyan banks. Information was gathered from 37 banks. Research utilized secondary data which was obtained from CBK and individual banks annual reports. The specific attributes of financial innovations considered were; mobile banking, internet banking, ATMs and agency banking. The control variables were capital adequacy, bank size and credit

risk. Analysis of data utilized both descriptive and inferential statistics. The results are discussed in this section.

The regression results show that agency banking was positively and significantly related with ROA of banks (β=0.106, p=0.008). These findings concur with those of Abdulkadir (2019) who found a positive connection between agency banking and ROA. These findings are also consistent with those of King'ang'ai et al. (2016) who studied the impact of agency banking on performance of banks in Kenya and established a positive and significant effect.

Regression results further revealed that mobile banking was positively and significantly related with ROA of banks in Kenya (β=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 positively and substaintially related with ROA of banks in Kenya (β=0.133, p=0.000). These findings 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 relationship between internet banking and ROA of MFIs.

For the control variables, capital adequacy exhibited a not significant positive effect, bank size exhibited a significant positive effect while credit risk exhibited a significant negative effect. The R squared was 0.448. It denotes that the predictor variables chosen contributed 44.8% to variations in ROA. This study concluded therefore that financial innovations have a significant effect on ROA as the overall model was significant.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter makes summaries, concludes on findings as wells as outlines limitations that were encountered. In addition, it provides recommendation for policy makers and gives suggestions on areas where further studies can be done.

5.2 Summary of Findings

The research purposed to assess how financial innovations influence ROA of banks in Kenya. The selected variables for investigation included mobile banking, internet banking, agency banking, credit risk, capital adequacy and bank size. A descriptive research design was chosen to complement the research. Second hand information was gathered from CBK and SPSS was utilized in analyzing the annual data from annual reports of 37 banks from 2016 to 2020 which was 5-year period.

The first objective was to examine the effect of agency banking on ROA among banks in Kenya. The correlation results at 5 % significance level show that agency banking had a positive correlation with ROA. This implies that improvement in agency banking could lead to a rise in ROA. Regression results (β=0.106, p=0.008) show that there exist a positively and substantial effect of agency banking on ROA among banks in Kenya.

The second objective established the effect of mobile banking on ROA among commercial banks in Kenya. The correlation results at 5 % significance level show that mobile banking had a positive correlation with ROA. This implies that improvement in mobile banking could result to increased ROA. Regression results (β=0.113, p=0.000) show that there was a positive and significant effect of mobile banking on ROA among banks in Kenya.

The third objective was to assess the effect of ATMs on ROA among banks in Kenya. The correlation results at 5 % significance level show that ATMs had a positive but not significant correlation with ROA. Regression results $\beta=0.001$, p=0.712) show that there was a positive but not significant effect of ATMs on ROA among banks in Kenya.

The fourth objective was to assess the effect of internet banking on ROA among banks in Kenya. The correlation results at 5 % significance level show that internet banking had a positive correlation with ROA. This implies that improvement in internet banking would lead to increase in ROA. Regression results $\beta=0.133$, p=0.000) show that there was a positive and significant impact of internet banking on ROA among banks in Kenya.

The fifth objective purposed to examine the effect of bank size on ROA among banks in Kenya. The correlation results at 5 % significance level show that bank size had a positive correlation with ROA. This implies that improvement in bank size would lead to increase in ROA. Regression results ($\beta=0.411$, p=0.000) show that there was a positively and substantial effect of bank size on ROA among banks in Kenya.

The sixth objective purposed 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 implies that an increase in capital adequacy would not lead to a substantial change in ROA. Regression results ($\beta=0.002$, p=0.069) show that there was a positive but not significant effect of capital adequacy on ROA among banks in Kenya.

The seventh objective was to examine the effect of credit risk on ROA among banks in Kenya. The correlation results at 5 % significance level show that credit risk had a negative correlation with ROA. The correlation was also statistically significant.

Regression results (β=-0.506, p=0.000) show that there was a negatively and substantial effect of credit risk on ROA among banks in Kenya.

5.3 Conclusions

The study purposed to determine the association between financial innovations and ROA. The study results showed that agency banking recorded a positive and 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.

The findings further indicated 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 had a positive and 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.

In addition, the results revealed that credit risk 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 significantly positive impact on ROA. This might be explained by availability of better governance mechanisms in large banks as compared to small banks.

5.4 Recommendations

From the study findings, agency banking had a significant effect 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.

The study findings reveal that mobile banking had a positive and significant effect 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 study recommends therefore that management 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.

5.5 Study Limitations

The focus was on some of the elements that are thought to affect the ROA of banks in Kenya. The research focused on seven explanatory variables in particular. However, there are other factors that are 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 may describe other factors that influence 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 only concentrated on reports from 2016 to 2020 being five years. It's unclear whether the results will last for a longer period of time. It is also unclear whether similar results will be achieved after 2020. In order to account for key economic events, the study should 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 and deceptive outcomes that cause the value of the variable to change, it was not possible to generalize the conclusions of the research with accuracy. Additionally, findings may be varied if more data was integrated in the regression which made the model to be another limitation.

5.6 Suggestions for Further Research

The study findings revealed an R square of 44.8%. This implies that there are 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 study was limited to commercial banks in Kenya. 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 is advantageous in permitting the researcher to catch the effects of business cycles like recessions and booms.

Finally, this research relied on a model of regression, which has its own set of limitations, like incorrect results and errors when a variable is changed. Future study should concentrate on models such as the Vector Error Correction Model 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. ABC Bank (Kenya)
2. Bank of Africa
3. Bank of Baroda
4. Bank of India
5. Barclays Bank of Kenya
6. Chase Bank Kenya (In Receivership)
7. Citibank
8. Commercial Bank of Africa
9. Consolidated Bank of Kenya
10. Cooperative Bank of Kenya
11. Credit Bank
12. Development Bank of Kenya
13. Diamond Trust Bank
14. Dubai Islamic Bank
15. Ecobank Kenya
16. Equity Bank
17. Family Bank
18. First Community Bank
19. Guaranty Trust Bank Kenya
20. Guardian Bank

21. Gulf African Bank

22. Habib Bank AG Zurich

23. Housing Finance Company of Kenya

24. I&M Bank

25. Imperial Bank Kenya (In receivership)

26. Jamii Bora Bank

27. Kenya Commercial Bank

28. Mayfair Bank

29. Middle East Bank Kenya

30. National Bank of Kenya

31. NIC Bank

32. Oriental Commercial Bank

33. Paramount Universal Bank

34. Prime Bank (Kenya)

35. SBM Bank Kenya Limited

36. Sidian Bank

37. Spire Bank

38. Stanbic Bank Kenya

39. Standard Chartered Kenya

40. Trans National Bank Kenya

41. United Bank for Africa

42. Victoria Commercial Bank

Source: CBK (2021)

Appendix II: Research Data

Bank	Year	ROA	Agency banking	Mobile banking	ATMs	Internet banking	Bank size	Capital adequacy	Credit risk
1	2016	0.008	9.653	5.350	8.040	13.449	16.9342	0.1645	0.1426
	2017	0.003	11.265	5.338	8.025	14.595	16.9451	0.1528	0.1566
	2018	0.006	10.369	5.446	8.329	14.645	17.0576	0.1560	0.1829
	2019	0.000	9.626	5.365	8.338	14.883	17.1451	0.1844	0.1989
	2020	0.002	13.454	5.439	8.334	15.079	17.1964	0.1538	0.1490
2	2016	-0.015	13.449	5.429	5.087	14.605	18.0537	0.1639	0.2325
	2017	0.000	14.595	5.476	8.024	15.989	17.8408	0.1616	0.2606
	2018	0.001	14.645	5.514	8.112	15.922	17.8080	0.1578	0.2816
	2019	0.004	14.883	5.511	8.171	15.858	17.7090	0.1602	0.3383
	2020	-0.046	15.079	5.544	6.785	15.785	17.5996	0.1083	0.4139
3	2016	0.030	14.605	5.465	7.043	13.760	18.0376	1.9617	0.0754
	2017	0.036	15.989	5.588	7.594	14.577	18.2332	0.3053	0.0846
	2018	0.041	15.922	5.184	8.172	14.940	18.3812	0.3229	0.0586
	2019	0.032	15.858	5.152	8.090	14.722	18.6278	0.3466	0.0882
	2020	0.029	15.785	5.261	8.133	15.115	18.7805	0.3274	0.0828
4	2016	0.035	13.760	5.229	7.999	15.332	19.2998	0.1840	0.0420
	2017	0.028	14.577	5.289	8.182	13.573	19.3751	0.1786	0.0521
	2018	0.026	14.940	5.247	8.079	14.286	19.4197	0.1803	0.0556
	2019	0.023	14.722	5.303	8.917	14.465	19.6003	0.1638	0.0610
	2020	0.020	15.115	5.331	8.189	14.998	19.7397	0.1667	0.0560
5	2016	0.026	15.332	5.330	8.122	11.145	17.5571	0.4230	0.0202
	2017	0.034	13.573	5.348	8.143	12.798	17.6829	0.4574	0.0139
	2018	0.037	14.286	5.314	8.107	12.500	17.8521	0.5397	0.0207
	2019	0.031	14.465	5.419	8.199	12.966	17.9537	0.4392	0.0713

	2020	0.037	14.998	4.960	7.396	14.089	17.9514	0.4842	0.0936
6	2016	0.039	11.145	5.092	8.555	13.254	18.2945	0.2832	0.0580
	2017	0.033	12.798	5.125	7.141	14.251	18.4534	0.2637	0.0192
	2018	0.040	12.500	5.110	8.034	13.175	18.4028	0.2555	0.0368
	2019	0.037	12.966	5.166	8.154	14.129	18.2656	0.2764	0.0162
	2020	0.030	14.089	5.166	8.178	12.968	18.3858	0.2715	0.0257
7	2016	0.017	13.254	5.207	7.774	15.661	19.1891	0.1792	0.1059
	2017	0.029	14.251	4.737	7.575	16.210	19.2507	0.1845	0.0745
	2018	0.023	13.175	4.760	8.192	15.935	19.3199	0.1732	0.0831
	2019	0.023	14.129	4.837	8.026	16.061	19.3172	0.1573	0.0797
8	2020	0.003	12.968	4.765	8.032	16.087	16.4642	0.0939	0.0553
	2016	-0.015	15.661	4.855	7.780	13.912	16.4487	0.0790	0.1176
	2017	-0.025	16.210	4.820	6.449	13.143	16.4149	0.0509	0.1527
	2018	-0.042	15.935	4.862	8.182	13.890	16.3718	0.0280	0.1533
	2019	-0.045	16.061	4.878	7.674	14.067	16.2888	0.1352	0.2568
9	2020	-0.006	16.087	4.873	8.528	14.072	16.1464	0.1551	0.0638
	2016	0.009	13.912	4.925	8.123	13.029	16.3200	0.2285	0.0722
	2017	0.009	13.143	4.934	8.182	13.022	16.4904	0.1477	0.0754
	2018	0.014	13.890	5.012	7.911	13.254	16.7006	0.1451	0.0724
	2019	0.010	14.067	4.771	7.885	13.502	16.8910	0.1496	0.0870
10	2020	0.034	14.072	4.721	7.899	13.758	19.6518	2.1258	0.0342
	2016	0.036	13.029	4.692	7.848	15.034	19.6787	0.2277	0.0390
	2017	0.029	13.022	4.688	7.731	15.011	19.7736	0.2268	0.0620
	2018	0.031	13.254	4.677	8.248	15.578	19.8406	0.1618	0.1009
	2019	0.031	13.502	4.602	7.253	16.112	19.9402	0.1505	0.0979

11	2020	0.004	13.758	4.529	7.706	16.133	16.6135	0.2508	0.2601
	2016	0.002	15.034	4.547	7.709	14.321	16.6072	0.2355	0.2098
	2017	0.007	15.011	4.455	7.709	14.378	16.5449	0.2323	0.2981
	2018	0.070	15.578	4.489	8.182	14.636	16.5472	0.3147	0.3695
12	2019	0.024	16.112	4.335	8.130	14.473	19.4199	0.1463	0.0241
	2020	0.024	16.133	4.323	7.594	14.276	19.6087	0.1850	0.0325
	2016	0.019	14.321	5.350	7.942	14.288	19.7107	0.1901	0.0666
	2017	0.019	14.378	5.338	7.684	15.268	19.7497	0.2111	0.0629
	2018	0.019	14.636	5.446	8.025	15.616	19.7719	0.2091	0.0683
13	2019	-0.230	14.473	5.365	8.100	16.384	14.7750	0.7005	38.5539
	2020	-0.119	14.276	5.439	7.114	16.312	15.4739	0.2990	0.0037
	2016	-0.064	14.288	5.429	8.002	8.654	16.0114	0.1486	0.0095
14	2017	0.002	15.268	5.476	8.146	8.473	17.7749	0.2496	0.0622
	2018	-0.043	15.616	5.514	7.932	8.765	17.6683	0.1944	0.1628
	2019	-0.021	16.384	5.511	8.058	8.937	17.7944	0.1599	0.3770
	2020	0.004	16.312	5.544	8.159	8.982	17.8130	0.1659	0.1735
	2016	0.002	8.654	5.229	7.763	14.510	18.1380	0.1622	0.1448
15	2017	0.040	8.473	5.289	8.038	14.426	19.8748	0.2017	0.0272
	2018	0.035	8.765	5.247	8.646	15.198	19.9761	0.1966	0.0628
	2019	0.036	8.937	5.303	8.040	15.635	20.0779	0.2041	0.0553
	2020	0.035	8.982	5.331	8.112	14.631	20.1671	0.1593	0.0710
	2016	0.036	14.510	5.330	7.893	15.810	20.3283	0.1979	0.0873
16	2017	0.024	14.426	5.348	6.324	15.807	18.2134	0.1441	0.0367
	2018	0.005	15.198	5.314	8.503	16.632	18.0567	0.2078	0.1197
	2019	-0.014	15.635	5.419	7.823	16.553	18.0516	0.1986	0.1923

	2020	0.004	14.631	4.960	8.497	16.488	18.0204	0.1952	0.1618
	2016	0.012	15.810	4.950	8.338	13.903	18.1831	0.1869	0.1409
17	2017	-0.001	15.807	4.901	8.498	14.147	16.4941	0.1145	0.2346
	2018	-0.004	16.632	4.960	8.498	15.608	16.5210	0.1399	0.3195
	2019	0.009	16.553	5.067	8.107	15.939	16.6697	0.1534	0.4078
	2020	-0.012	16.488	5.027	8.575	15.781	16.6992	0.0911	0.4882
	2016	0.010	13.903	5.092	7.755	14.201	16.7474	0.0810	0.4145
18	2017	0.009	14.147	5.125	8.134	14.758	17.5282	0.2649	0.0916
	2018	0.013	15.608	5.110	7.837	15.067	17.2864	0.2547	0.1108
	2019	0.007	15.939	5.166	6.572	15.193	17.2774	0.2387	0.1088
	2020	0.002	15.781	5.166	7.977	15.299	17.4516	0.2597	0.1467
	2016	0.020	14.201	5.207	8.759	14.735	17.1856	0.2428	0.1090
19	2017	0.016	14.758	4.737	7.374	14.401	16.4972	0.1763	0.0304
	2018	0.016	15.067	4.760	7.533	14.583	16.5037	0.1904	0.0169
	2019	0.010	15.193	4.837	7.743	14.620	16.5757	0.2022	0.0453
	2020	0.014	15.299	4.765	8.371	14.876	16.5997	0.2275	0.0757
	2016	0.011	14.735	4.855	8.040	11.683	16.6120	0.2220	0.0689
20	2017	0.029	14.401	4.820	7.854	12.546	17.0226	0.1577	0.0842
	2018	0.018	14.583	4.862	7.594	11.930	17.1171	0.1872	0.0923
	2019	0.005	14.620	4.878	7.523	12.984	17.2596	0.1620	0.0929
	2020	0.004	14.876	4.873	8.552	13.008	17.3218	0.1866	0.1064
	2016	0.005	11.683	4.925	7.728	13.706	17.3744	0.1711	0.1534
21	2017	0.029	12.546	4.934	8.003	14.077	16.1408	0.3213	0.0792
	2018	0.024	11.930	5.012	8.174	14.217	16.3419	0.3911	0.1871
	2019	0.011	12.984	4.771	8.494	14.403	16.8845	0.2463	0.0745

	2020	0.010	13.008	4.721	8.499	13.678	17.0273	0.2729	0.0922
22	2016	0.017	13.706	4.692	7.803	12.438	18.0874	0.1813	0.0437
	2017	0.013	14.077	4.688	8.340	12.652	18.0912	0.1769	0.0692
	2018	0.002	14.217	4.677	8.347	13.478	18.0282	0.1700	0.1081
	2019	-0.010	14.403	4.602	7.794	12.387	17.9190	0.1534	0.2494
	2020	-0.002	13.678	4.529	7.826	13.474	17.8490	0.1456	0.2356
23	2016	0.037	12.438	4.547	7.654	14.836	19.0716	0.2020	0.0248
	2017	0.037	12.652	4.455	7.810	14.657	19.1652	0.1815	0.0289
	2018	0.030	13.478	4.489	7.784	15.143	19.2966	0.1858	0.0870
	2019	0.026	12.387	4.335	7.727	15.496	19.3315	0.1792	0.1079
	2020	0.033	13.474	4.323	7.794	16.198	19.4287	0.2156	0.0979
24	2016	0.001	14.836	5.350	8.241	13.923	16.6358	0.1625	0.0517
	2017	-0.011	14.657	5.338	8.574	14.970	16.5742	0.2008	0.1720
	2018	-0.037	15.143	5.446	8.238	15.174	16.3714	0.1933	0.1331
25	2016	0.035	15.496	5.365	7.692	16.404	20.1400	0.1536	0.0446
	2017	0.033	16.198	5.439	7.971	16.372	20.2045	0.1801	0.0705
	2018	0.030	13.923	5.429	7.667	13.149	20.2873	0.1663	0.0766
	2019	0.034	14.970	5.476	8.427	13.172	20.3868	0.1955	0.0627
	2020	0.028	15.174	5.514	8.496	14.291	20.6163	0.1903	0.1016
26	2016	-0.013	16.404	5.511	8.076	13.916	15.4706	0.3933	0.1590
	2017	-0.005	16.372	5.544	7.880	13.792	15.4489	0.5708	0.1807
	2018	0.000	13.149	5.465	6.393	15.999	15.4946	0.4494	0.3825
	2019	0.000	13.172	5.588	7.731	16.552	15.9516	0.3119	0.1374
27	2016	0.003	14.291	5.184	8.070	17.119	16.1101	0.3869	0.0821
	2017	0.009	13.916	5.152	7.806	17.293	16.1741	0.3316	0.0718

	2018	0.008	13.792	5.261	7.785	17.168	16.1683	0.3093	0.0940
	2019	-0.002	15.999	5.229	7.774	13.112	16.3327	0.3442	0.1931
28	2016	-0.009	16.552	5.289	7.867	13.473	18.6473	0.1399	0.1116
	2017	0.001	17.119	5.247	7.521	13.262	18.5348	0.0715	0.1749
	2018	0.007	17.293	5.303	7.597	13.123	18.5148	0.0542	0.3001
	2019	-0.001	17.168	5.331	8.036	13.795	18.5591	0.0370	0.3913
	2020	-0.008	13.112	5.330	8.490	13.178	18.5343	0.1150	0.3564
29	2017	0.027	13.473	5.348	7.767	13.273	18.9262	0.2059	0.0912
	2018	0.026	13.262	5.314	7.157	13.209	18.9481	0.2304	0.1126
	2019	0.020	13.123	5.419	7.908	13.166	19.1442	0.2227	0.1089
	2020	0.020	13.795	4.960	6.900	13.466	19.1550	0.1869	0.1224
30	2016	0.015	13.178	4.950	7.826	15.871	16.1693	0.2412	0.0519
	2017	0.011	13.273	4.901	7.594	15.840	16.0592	0.2741	0.0828
	2018	0.012	13.209	4.960	8.497	16.080	16.0711	0.2946	0.1056
	2019	0.024	13.166	5.067	7.600	16.570	16.1067	0.2853	0.1318
	2020	0.009	13.466	5.027	7.545	16.744	16.1615	0.2450	0.1211
31	2016	0.031	15.871	5.092	7.684	14.117	17.9899	0.1729	0.0170
	2017	0.029	15.840	5.125	7.358	16.162	17.9950	0.2216	0.0362
	2018	0.029	16.080	5.110	7.707	16.371	18.1721	0.2248	0.0486
	2019	0.023	16.570	5.166	8.483	16.383	18.4220	0.3729	0.0606
	2020	0.024	16.744	5.166	7.988	16.476	18.5049	0.4136	0.1018
32	2016	-0.005	14.117	5.207	7.950	12.591	18.7977	0.1509	0.1025
	2017	-0.192	16.162	4.737	8.002	12.628	16.0873	0.1281	0.8832
	2018	-0.029	16.371	4.760	8.009	13.081	16.2608	0.1644	0.7290
	2019	0.019	16.383	4.837	8.841	13.343	18.0733	0.2425	1.2528

	2020	0.012	16.476	4.765	9.347	13.520	18.0994	0.2312	0.8521
33	2016	0.019	12.591	4.855	9.038	13.042	16.7655	0.2468	0.1284
	2017	0.001	12.628	4.820	8.843	13.456	16.8541	0.2325	0.2383
	2018	-0.022	13.081	4.862	7.572	14.169	16.7757	0.1646	0.2780
	2019	-0.015	13.343	4.878	8.891	14.455	17.0467	0.1440	0.2035
	2020	0.004	13.520	4.873	9.185	14.617	17.0908	0.1793	0.1968
34	2016	0.024	13.042	4.925	9.407	13.562	19.1552	0.1870	0.0411
	2017	0.021	13.456	4.934	9.161	14.290	19.1847	0.1812	0.0505
	2018	0.017	14.169	5.012	9.117	14.979	19.3319	0.1684	0.0666
	2019	0.022	14.455	4.771	8.875	14.970	19.4537	0.1740	0.0945
	2020	0.021	14.617	4.721	9.372	14.799	19.4947	0.1834	0.0998
35	2016	0.027	13.562	4.692	7.562	14.378	19.2707	0.2116	0.1015
	2017	0.036	14.290	4.688	7.631	14.704	19.3389	0.2091	0.0829
	2018	0.024	14.979	4.677	7.695	14.957	19.4705	0.1852	0.0896
	2019	0.028	14.970	4.602	7.952	14.831	19.4694	0.1947	0.1169
	2020	0.027	14.799	4.529	7.916	14.540	19.5264	0.1773	0.0953
36	2016	-0.034	14.378	5.350	8.659	16.000	16.4876	0.1745	0.3332
	2017	-0.054	14.704	5.338	8.553	16.274	16.4404	0.1627	0.1677
	2018	-0.101	14.957	5.446	8.434	16.135	16.2268	0.1265	0.4271
	2019	-0.244	14.831	5.365	8.215	16.242	16.0372	0.2201	0.5598
	2020	-0.069	14.540	5.439	8.325	16.445	15.7413	0.2060	0.7111
37	2016	0.016	16.000	5.429	7.606	14.742	16.1624	0.2164	0.1103
	2017	0.011	16.274	5.476	7.743	14.835	16.1547	0.2230	0.1156
	2018	0.004	16.135	5.514	7.728	14.036	16.1419	0.2908	0.2416
	2019	-0.007	16.242	5.511	7.821	14.621	16.1414	0.2111	0.2211

	2020	-0.009	16.445	5.544	8.057	14.727	16.0475	0.2015	0.2857
38	2016	-0.034	14.742	5.465	8.146	13.179	15.8672	0.2379	0.0180
	2017	0.004	14.835	5.588	8.228	13.505	15.5385	0.3868	0.0186
	2018	0.003	14.036	5.184	6.365	13.509	15.6880	0.3878	0.0436
	2019	0.003	14.621	5.152	7.870	14.283	16.5455	0.3316	0.1276
	2020	0.004	14.727	5.261	7.513	14.396	16.5936	0.2537	0.2432
39	2016	0.036	13.179	5.229	7.917	10.741	16.8122	0.1930	0.0329
	2017	0.026	13.505	5.289	8.049	10.802	16.9247	0.2545	0.0255
	2018	0.024	13.509	5.247	7.456	10.946	17.0730	0.2274	0.0008
	2019	0.014	14.283	5.303	7.851	11.867	17.2917	0.2109	0.0308
	2020	0.015	14.396	5.331	7.694	12.995	17.4010	0.2015	0.0506