EFFECT OF FINANCIAL INNOVATIONS ON NON – INTEREST INCOME OF COMMERCIAL BANKS IN KENYA

BY

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DECLARATION

This research dissertation is my original work and has not been presented for an award of a degree in any other University.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

ACH	Automated Clearing House
ATM	Automated Teller Machine
CBK	Central Bank of Kenya
EFT	Electronic Funds Transfer
FSD	Financial Sector Deepening
ICT	Information and Communication Technology
IT	Information Technology
OLS	Ordinary Least Square
ROA	Return on Assets
ROE	Return on Equity
RTGS	Real Time Gross Settlement

OPERATIONAL DEFINITION OF TERMS

Agency banking	Is a banking model whereby a commercial bank contracts an agent approved by the Central Bank of Kenya to provide specific services on behalf of the bank (CGAP, 2010).
Financial innovation	Is the creation of new instruments. It is the act of creating and popularizing new financial instruments, technologies, institutions, and markets (Tufano, 2013).
Non – interest income	Is the income that commercial bank earns from other sources outside their traditional lending operations or revenue that banks earn from other operations apart from their core intermediation services (DeYoung and Rice, 2014).
Mobile banking	Is a banking model whereby a commercial bank uses a mobile banking platform to provide specific services to its customers (CGAP, 2010).
Online banking	Is a banking model whereby a commercial bank uses an internet banking platform to provide specific services to its customers (CGAP, 2010).

ABSTRACT

The study sought to investigate the effect of financial innovations on the non – interest income of commercial banks in Kenya. The study sought to examine how agency banking, mobile banking and online banking as a key financial innovation by commercial banks influenced non – interest income of commercial banks in Kenya. In carrying out the study, descriptive research design was adopted since the main objective was to obtain ideas and insights on the causal – effect relationship between financial innovations and the bank non – interest income. By making use of statistical analysis tools, I performed panel econometric analysis mainly pooled regressions since the study was made up of panel data. The target population of the study was 39 commercial banks that have adopted agency banking in Kenya by year 2020. The study adopted a census in its undertaking. The study period was 2011 – 2020. The study utilized secondary data. The data on the bank non – interest income was collected from the audited financial statements of commercial banks and the Central Bank of Kenya. For the data analysis, STATA software was used. The analysis entailed computation of measures of central tendency as well as the measures of dispersion. In addition to the descriptive statistics, correlation analysis among other model variables were computed to examine the relationship among the variables. To determine the effect of agency banking innovation on the bank non – interest income, the agency banking variables were regressed on the bank non – interest income while controlling for exogenous factors such as bank market share. In this case, an empirical model was relied on. Therefore, a linear empirical model was estimated using a multivariable Pooled Ordinary Least Squares method. In addition to empirical analysis, several diagnostic tests were conducted namely: correlation analysis, heteroscedasticity, multicollinearity, and autocorrelation tests. The model selection test found that fixed effects was the most appropriate model for the study. Based on the fixed effects model, it was evident that agency banking had a positive and significant effect on bank non – interest income. The moderating effect of the bank market share on agency banking had insignificant effect on the bank's non – interest income. Regarding the mobile banking, the results found that based on the fixed effects model, mobile banking had a positive and significant effect on bank non – interest income. The moderating effect of the bank market share on mobile banking had a positive and significant effect on the bank's non – interest income. Regarding the internet banking, the fixed effect model results indicated that internet banking had a positive effect on the bank's non – interest income. At 5 percent level of significance, the effect was found to be significant. However, the moderating effect of the bank market share on internet banking though positive, it was found to be insignificant.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In the last recent two decades, the world has witnessed a revolution in the financial sector with technological innovations being at the centre stage. The adoption of the technology has redefined the provision of the financial services with development of the new financial services being evident to only to meet the customer needs but also the rising need to hedge against some specific risks facing the sector (Kero, 2013). Financial innovations have therefore been leveraged on to meets the new market demands in pursuit of providing financial needs at the least cost and time possible. Financial innovation can be defined as adoption of technology to create new financial products and services to meet the financial markets' needs (El-Chaarani and El-Abiad, 2018).

According to Forrer (2015), financial innovations' mainly focus is enhancing profit maximization of the firm. Further, in addition to enhancing profit maximization is the increase in the firm's market share as well as maximization of the firm's shareholders' wealth. Levine, Levkov, Rubinstein (2013) asserts that leveraging on technology innovations has helped commercial banks expand their geographical coverage through setting up of automatic Teller Machines to offer retail banking services leading to increased bank market share. Further, adoption of financial innovations has been helpful for the firms to store, retrieve and process data (Arnaboldi and Rossignoli, 2015).

In Kenya, the banking industry has seen many changes and transformation on the backdrop of e-banking entrance. According to Xinhua (2012), agency banking has enabled to banks' revenue to

increase in and expansion of financial services in Kenya. However, according to Xinhua (2012), Kenyan commercial banks are yet to free up their banking halls since most customers prefer physical transaction through bank tellers. As a result, Kenyan banks continually revise withdrawal cost upwards at the banking halls as a way of driving customers to transact business at the agency outlets.

According to Aduda & Kingoo (2012) adoption of the financial innovations by Kenyan banks has currently led to bank customers being capable of accessing banking services at the most least time and cost. Further, there is improvement in the quality of the banking services leading to high customer satisfaction levels. However, its notable that despite these highlighted benefits of financial innovations, technology related costs has been a rising budget expenditure in the banks' balance financial records. Further, there is the increased eminent risk of technology related fraud such as cyber-crime among others. This therefore calls for the concerted efforts among the financial sector players to curb the menace if the full potentials and benefits of technology innovations are to be enjoyed by the respective stakeholders. Given this topical issue in the banking industry and the financial sector at large, a bank level analysis into how the adoption of the technology based financial innovations have influenced performance of the banks from perspective of income diversification as opposed to the contemporary profitability perspective is warranted hence the need for this study.

1.1.1 Financial Innovation.

In the recent past decades, financial innovation has received lot of interest from both the researchers as well as the practitioners. Tufano (2013) posits that financial innovation is currently been perceived by the practitioners as the avenue for facilitating the creation of new financial instruments by the financial sector players. According to Solans (2014) financial

innovations have been influential in facilitating ease access of financial services. He defines financial innovations as the creation of the financial product and services by leveraging on the existing technology.

Generally, financial innovations can be broadly categorized into process innovations and product innovations. The first category of product financial innovations entails the creation of new financial products / instruments (Beck et al, 2016). Currently, this form of financial innovation is on an increase in both developed and developing countries. According to Beck, et al, (2016), product financial innovations is considered as the best popularizing new financial instruments in the market.

Further, Otoo (2013) financial innovations are leading to a lot of financial sector transformations. These financial transformations have necessitated the need for deregulation of the financial sector regulations to accommodate for the financial systems' changes. Otoo (2013) documents that within the banking industry some of the major financial innovations include but not limited to internet banking, ATMs, agency banking, credit and debit cards.

According to European Commercial Bank (ECB, 2013), the definition of financial innovation is can be well articulated to be the factors that contribute towards reduction in the cost of offering a financial product or a service. These innovations have been deployed by commercial banks globally to retain their market power through creation of competitive advantage in the markets that seeks at securing their customer niche. Notably, also, the definition of financial innovations can be deemed to arise increasing financial inclusion among the financial excluded population. In the Kenyan context, financial innovations around agency banking, mobile banking among

others have played a key role in enhancing financial inclusion through formal channels as well as transforming the informal sector into formal sector (Kamau and Oluoch, 2016).

Within the financial innovation is the financial systems innovations. Innovations in financial systems comprise of real time gross settlements which is an electronic form of settlement payment in Kenya that allows for processing financial settlement through funds transfer systems that continuously settles itemized gross on a daily basis within a business. This is a web-based system that enables payment transfer time critical funds in real time. According to CBK (2011), its purpose is to increase efficiency by minimizing structural risk in conventional systems of funds payment in clearing houses.

The relationship between financial systems innovations and financial performance cannot be overemphasized. Tahir et al. (2018) conducted a survey on whether financial systems innovations improve financial achievement. The study analysed process innovation used in Pakistan financial system. The study sought to quantify the effects innovation techniques of funds transfer utilized in Pakistani financial system and its effects on the ratio of efficacy.

Secondly is the process innovation that encompasses the initialization of new business procedures resulting in enhanced expansions of markets, efficiency, quality of services and increased accessibility to the banking services (Zacchaeus & Muturi, 2017). Internet banking divulges that, efficiency of the process, time taken, and cost are vital elements that impact the adoption of internet banking. Unger (2013) while evaluating the advantages of the service of internet banking in Europe, the study through a desk review of data collected from six European Countries established that while there may be some economies of scale in technological innovation, aspects of saving time and cost are viewed a key advantage that clients consider when picking services of internet banking in relation to large funds.

According to Muthinja and Chipeta (2018), the banking sector in Kenya has observed that there is new evidence relating adjustment speeds, organizational performance and financial innovation. The study through Koyck distributed lag model used changing estimation panels and computerized generalized technique of moments to measure financial performance. The study established that it is estimated to take 3 years drivers of financial innovation to adjust mobile banking within the organization. Further, it takes 5 years for drivers of financial innovation to adjust Automated teller machines.

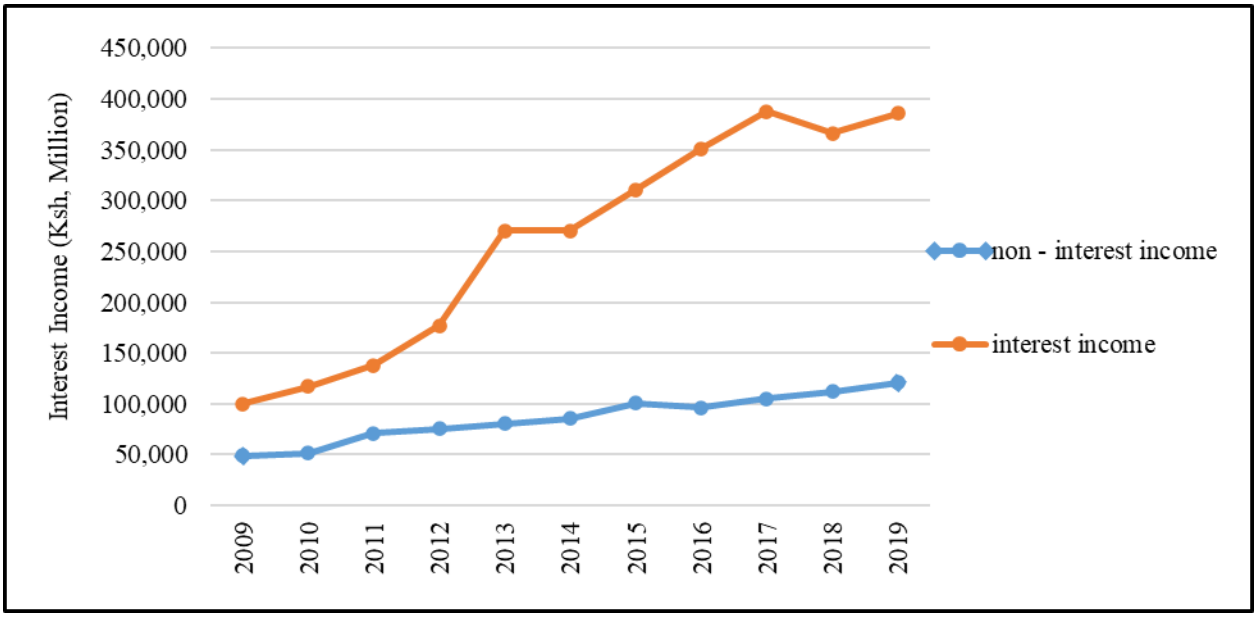
Thirdly is the product innovation. Product innovation has been another area that the banking sector has improved to increase their competitiveness, increase customer base and overall financial performance in Europe (Peng & Kao, 2016). Product innovation in the financial sector encompasses the initialization of hire purchase, leasing, insurance, deposit, new credit among other financial products to the clients triggered by dynamics in the market. An investigation was carried out by Mabrouk and Mamoghli (2015) on banks performance and dynamics of financial innovation: factors of new banking sector. The study through a mixed method that include both quantitative and qualitative data established that innovation products are initialized to better react to dynamics in a market or to enhance the efficiency of the banking institution.

1.1.2 Non – Interest Income

Bank non – interest income is defined as revenue that banks earn from areas outside their lending (Schueffel & Vadana, 2015). From the literature, some of the key bank non-interest incomes include but not limited to deposit and transaction fees, insufficient funds fees, annual fees, monthly account service charges, inactivity fees, check and deposit slip fees among others. In the year 2012 most commercial banks in Kenya showed a decrease in interest income by about forty percent as compared to the previous period. This decrease in interest income compelled

commercial banks to look for other sources of income that would ensure stability in revenue and mitigate themselves from risk exposure (Kiweu, 2012). When a firm diversifies its revenue sources it can reduce the risks it faces, but this will depend on the correlation between different lines of investments and prices of different investment. This discussion clearly points out on the importance of non – interest income as for as commercial banks are concerned. This explains the importance of undertaking a study on matters revolving around banks non – interest income an undertaking envisaged in this study.

FIGURE 1
Trend of net interest income and non-interest income as percentage of net operating income in Kenya



Source: Central Bank of Kenya

From figure 1 above, it is evident that the non – interest income among the commercial banks in Kenya has been on an upward trajectory from year 2010. This is the period when some technology-based financial innovations were implemented in Kenya specifically the agency banking following the stipulation of operation guidelines by the Central Bank of Kenya. Banks non-Fund Based Income is earned by providing a variety of services, such as trading of securities, assisting companies to issue new

equity financing, securities commissions and wealth management, sale of land, building, and profit and loss on revaluation of assets. Bank and creditor income derived primarily from fees De Young, Hunter, & Udell, (2004).

Examples of non-interest income include deposit and transaction fees, insufficient funds fees, annual fees, monthly account service charges; inactivity fees, check and deposit slip fees. Institutions charge fees that provide non-interest income as a way of generating revenue and ensuring liquidity in the event of increased default rates Stiroh, (2004).

In the face of declining net interest margins, depository institutions have entered new product areas over the past two decades, moving from traditional lending to areas that generate Non-fund Based Income. The change is of importance for financial stability. The more unstable is a bank's earnings stream, the riskier the institution is. The conventional wisdom in the banking industry is that earnings from fee-based products are more stable than loan-based earnings and those fee-based activities reduce bank risk via diversifications De Young & Hunter, (2003).

Apart from accepting deposits and lending money, Banks also carry out, on behalf of their customers the act of transfer of money both domestic and foreign De Young & Roland, (2001) from one place to another. This activity is known as remittance business. Banks issue demand drafts, banker's cheques, and money orders for transferring the money. Banks also have the facility of quick transfer of money also known as telegraphic transfer in return for having rendered this service, the banks charge a pre-decided sum known as exchange or commission or service charge.

1.1.3 Financial innovation and non - interest income

Globally, according to Williams (2016) given the high competition among the financial sector players, the players have turned to financial innovation to diversify their earnings. It's notable that studies on financial innovation and non – interest income of commercial banks in sub-Saharan Africa remains scanty. Generally, financial innovations can be broadly categorized into

process innovations and product innovations. The first category of product financial innovations entails the creation of new financial products / instruments (Beck, Chen, Lin and Song, 2016). Currently, this form of financial innovation is on an increase in both developed and developing countries.

From empirical studies perspective, Nader (2011) examined the effect of mobile banking technology on the profitability of Saudi Arabia commercial banks. The study covered a period from 1998 to 2007. From the study's findings, phone banking was found to have a positive effect on profit levels among the Saudi banks through increased non – interest income. Further, In African context, Bagudu, Khan and Abdul-Hakim (2017) mobile banking and financial performance of commercial banks in Nigeria. The sample size for the study was 22 commercial banks selected via simple random sampling. Upon estimating the regression model, the model estimate revealed that mobile banking positively and significantly affects profitability of Nigerian commercial banks through increased non – interest income.

The relationship between non-core banks' incomes and financial innovations is that financial innovations are used by banks as formidable strategic variables to outstrip the competition and have become an essential means for the bank to improve its performance and to maintain its effectiveness on the market Batiz-Lazo & Woldesenbet, (2006). In a highly turbulent environment, a successful financial innovation creating a unique competitive position can give a bank a competitive advantage and lead to a superior financial returns Lyons & Chatman (2007). This can only be maintained by ceaseless innovation and improvement of the product and the process Porter, (2004). Niehans, (2003) argue that the relevant aspects of technological change include innovations that reduce costs related to the collection, storage, processing, and

transmission of information, as well as innovations that transform how customers' access bank services. Advances in information and communications technology for example, the Internet.

Automatic Telling Machines (ATMs), new intermediation technologies for processes like loan securitization and credit scoring, and the introduction and expansion of financial instruments and markets high yield bonds, commercial paper, financial derivatives all impacted on the levels and types of non-interest income at commercial banks, and as was mentioned in the preceding paragraph, were helped by the process of deregulation Merton, (1990). In essence, these changes meant that banks could extract fee income from customers who were willing to pay for use of ATMs and /or the Internet rather than undertake business at traditional branches. In addition, loan securitization enabled banks to better leverage their equity capital by moving loans off balance sheets. By reducing the amount of deposit funding necessary to originate a dollar's worth of new loans, loan securitization decreases the importance of intermediation in favour of non-interest income (Mabrouk and Mamoghli, 2010). Mansury & Love (2008) noted that financial innovations such as securitization change the ex-ante incentives of financial intermediaries to carefully screen and monitor the borrowers Allen & Carletti, (2006). Wagner (2007) shows that financial innovation that reduces asymmetric information can increase risk-taking due to agency problems between bank owners and managers, or because of lower costs of fragility and increase non-interest income.

1.1.4 Banking industry in Kenya

Kenya's banking industry is anchored on the Banking Act and Central Bank of Kenya (CBK) Act which stipulated various prudential guidelines that govern the industry's operations. Over the time, the industry has undergone several changes given the evolving of the environment within which the industry operates. The Central Bank of Kenya oversees the control of the

banking industry in Kenya. Whilst the main role for the regulator of price stability, CBK is also involved in the developing and effecting monetary policies and promoting the liquidity, solvency, and proper functioning of the financial system (CBK, 2018).

By end of year 2020, Kenya's banking industry comprised of 39 commercial banks (CBK Bank Supervision Department, 2020). The total number of commercial banks in Kenya has been fluctuating over years with a major decline being evidenced in 1980s following collapse of several lenders. Further, 2016 saw placement of Chase bank under receivership. In 2015, Dubai bank and Imperial bank were placed under receivership. To retain market power and profitability, commercial banks have tried to leverage on the technological advancement. Looking at the financial innovations with the banking industry in Kenya at large, one of such innovations is agency banking. The banking industry in Kenya adopted agency banking back in 2010 upon the laying down of the agency banking guidelines by the Central Bank of Kenya. Since its inception in 2010, the innovation has recorded unprecedented growth.

By 2020, it was evident that the delivery of financial services through the agent banking model continued to grow with cumulative of 72,6 17 active agents in the year 2020 transacting Ksh.1.07 trillion in 2020; - a decline from Ksh.1.22 trillion in 2019 (CBK, Bank Supervision Report, 2020). Similarly, mobile banking has also grown substantially with cumulative of 282,929 mobile banking agents in the year 2020 transacting Ksh.605.7 billion; - 58 percent increase in the value of transactions from Ksh.382.9 billion in 2019 (CBK, Bank Supervision Report, 2020). Further, through internet banking embracing of service offerings such as account opening, balance enquiry, cross-platform transactions, and the payment of fees, are rendered to customers through the internet and mobile application avenues. This has drastically reduced the need for

customers to visit their respective branches to initiate such processes. These results evidence the transformations brought about by adoption of various financial innovations within the industry.

1.2 Statement of the problem

The role of technological innovations in provision of the financial service cannot be over-emphasized. Technological based financial innovations improve efficiency and cost reductions in financial services provision. In the recent decades, adoption of the technology to offer financial services among the financial sector players has been on the rise globally. Researchers on this topical issue have found that financial innovation has had a diverse effect on the bank performance in terms of increased earnings, increased bank's stock returns for listed banks, improved efficiency in financial intermediation process among other benefits (Goddard et al., 2017; Mabrouk & Mamoghli, 2017).

Review of banking practice in traditional settings posits that the main source of revenue for the commercial banks was the interest charged on lending. However, with the changing operating environment coupled with the increased competition as the banks serve the same customer niche, there has been a great need to diversify the income sources if banking business are to remain profitable. Further the previous overreliance on the interest income has created a negative bank image especially in the less developed economies as banks are perceived to be exploiting the public given the high levels of interest incomes they earned from lending. These developments have led to banks reengineering their operations inevitably (Chen, et al, 2017).

One of reengineering has been adoption and leveraging on technology to develop new financial products for revenue diversification. In Kenya, on the backdrop of financial innovation, bank non – interest income has grown tremendously from Ksh. 96.37 billion in 2015 to Ksh. 140.04 billion

in 2019 and further slightly rising to Ksh. 140.69 billion in 2020 (CBK, 2020). This represents 44.91 percent increment in the non – interest income for 2015 - 2020 period. The non – interest income by way of fees and commissions charged by banks. The Central bank of Kenya annual report of 2020 attributes the improvement in the non – interest income to adoption of financial innovations by the banks. However, this is the aggregated performance of the entire banking industry. A bank level decomposition on the same is crucial to inform how individual banks are performing in this regard. This therefore resents a need to examine how various forms of financial innovations have contributed to growth in non – interest income among the Kenyan banks.

Several empirical studies to the effect of technology based financial innovations on the banking industry have been conducted. Gündoğdu and Taşkin (2017) reports a positive relationship between technology-based financial innovations and profitability among Turkish banks. Similar findings are reported by Okonkwo et al, (2015) among the Nigerian commercial banks. However, on the contrary Shirley and Sushanta (2016) found that though the adoption of information technology for banking service provision might lead to cost saving., This presents inconclusiveness in the findings.

In the Kenyan context, Alubisia Githii and Mwangi (2018) and Nyathira (2012) examined effect of financial innovations on profitability. However, these studies neglected to focus on agency banking as a form of financial innovation. A sample of local studies evidence that majority of the studies have focused on how technology based financial innovations affect the financial performance of banks from the profitability point of view but mute on other aspects of performance such as income or revenue performance. In addition, existing studies rely on Ordinary Least Squares Method for empirical estimation. Given the endogeneity of commercial

banks operation, panel data analysis methods would be more ideal to consider the endogeneity problems among the commercial banks. This study therefore sought to fill in this research gap from the methodological point of view. This study therefore sought to investigate the effect of financial innovation of the bank's non – interest income in Kenya given the scanty and inconclusiveness of existing research work in this area. In doing so, the study sought to employ panel data analysis to account for bank heterogeneity in their operations.

1.3 Research objectives

1.3.1 General objective

The general objective of the study is to determine the effect of financial innovations on the performance of non – interest income of commercial banks in Kenya.

1.3.2 Specific objectives.

Specifically, the study seeks:

i. To determine the effect of agency banking on the non – interest income among commercial banks in Kenya**.**
ii. To evaluate the effect of mobile banking on the non – interest income among commercial banks in Kenya**.**
iii. To examine the effect of internet banking on the non – interest income among commercial banks in Kenya**.**

1.4 Research hypotheses

The study is guided by the following research hypotheses:

i. Agency banking has no significant effect on the non – interest income among commercial banks in Kenya**.**

ii. Mobile banking has no significant effect on the non – interest income among commercial banks in Kenya**.**

iii. Internet banking has no significant effect on the non – interest income among commercial banks in Kenya.

1.5 Significance of the study

The study would give more insight on the study area and would be of benefit to various stakeholders.

1.5.1 Policy makers

The study is beneficial to the policy makers mainly the government agencies such as the Central Bank of Kenya. The study findings would be crucial in informing shaping of the polices regarding the technology - based innovations. By assessing the effects of the financial innovations on the non -interest incomes it would be crucial to policy makers in designing policies around the regulation of such innovations to ensures that as the banks innovate more technology-based products and services to diversify their income mix, this is not done in a way that it undermines the stability of the banking industry and the financial sector in general. In addition is the significance in informing policy framework that promotes the uptake of these innovations by the intended users

1.5.2 Commercial banks managers

The bank management would also benefit from the study in strategic decision making regarding the implementation of financial innovations aimed at income diversification. The findings of the study would be crucial to the management of the commercial banks in determining which

financial innovation is likely to have the highest and significant effect on the non – interest income. This would inform the management on which technology based financial innovation to prioritise in when deciding which innovation to scale up.

1.5.3 Researchers

Further, is the study's contribution into the existing body of literature. The study would be core in expanding the exiting body of knowledge hence eliciting the possible areas for further study as well as offering empirical literature review for future studies in this area of study.

1.6 Scope of the study

The study focused on agency banking innovation as one of the financial innovations in commercial banking in Kenya. Therefore, the study specifically focused on the commercial banks with the agency banking platform. The study period was 2011 – 2020. The choice of the study period was informed by the need to control for the effect of 2007/ 2008 political turmoil that is likely to have affected financial sector adversely. In addition, is the need to control for the effect of global financial crisis of 2008/2009 which might have had effect on the financial sector at large. In addition, out of the three financial innovations covered by the study, (agency banking, internet banking and mobile banking), mobile banking started in year 2007, internet banking in early 2000 and agency banking in 2010. Therefore, the study purposely picked the study start period to be 2011 when all the three innovations were in implementation.

Further on the scope, the study focused on three specific objectives namely: effect of agency banking non – interest income among commercial banks in Kenya**;** effect of mobile banking non – interest income among commercial banks in Kenya and effect of internet banking non – interest income among commercial banks in Kenya. Secondary data was relied on mainly drawn

from the Central bank of Kenya and the financial statements of the respective commercial banks. The target population of the study was 39 commercial banks.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter offers detailed review of the literature that related to the study topic. In doing so, the chapter offers an appreciation on the literature more specifically, the theories relating to this topical issue. Further, is the review of research studies that have been conducted in this topical area. Review of such research studies points out on the research gaps that the researcher can focus on in making the study more relevant. Moreover, is the ability of such review in providing literature background in terms of what has already been done on the topical issue and what are the contemporary issues in the research area. This enables the researcher to design the study in a manner that makes the study relevant and significant.

2.2 Theoretical review

Review of the theories upon which the study is based on is crucial in any study. Such reviews provide an opportunity to the researchers to refer to the existing theories hence be capable of conceptualizing the study in a manner that is theory based. In addition, such review helps the researcher in developing the theoretical framework of the study as well as the conceptual framework. In this section, the studies upon which this study was hinged on are discussed in detail. In this case, the discussed on three theories namely: diffusion of innovation theory, bank – led theory and the agency theory was undertaken in this section in support of the study.

2.2.1 Diffusion of innovation Theory

Diffusion of innovation theory was developed by Rogers (1962). The theory posits that organizations strive to transfer and implement innovation within their organization to attain

competitive advantage against their competitors in the market. In addition, the organizations perceiving an innovation to be crucial in reducing the cost of their operations, it will strive to have the innovation popularised among its employees as well as its operations hence the innovation diffusion aspect.

According to the theory, diffusion process is crucial in cascading the innovation. Through the diffusion of the innovation, consumers of the organization get to embrace the product and service offered by the organization to the customers through leveraging on the technology. Additionally, the theory also categorises uses of the innovation into early adopters, early majority, late majority and laggards.

This theory is relevant to the current study in that firms using technology to develop new financial products or even improve on financial services provision will always strive to diffuse their financial innovations among the customers as well as the among the firms' operations. Therefore, commercial banks will try to diffuse financial innovations aimed at diversifying their incomes. As such, commercial banks which have been keen in promoting financial innovations aimed at increasing the non – interest income and reduce reliance on the interest income. In this case, the diffusion of innovation theory is precisely applicable.

2.2.2 Bank-led Theory

The bank-led theory was developed by Lyman, Ivatury and Staschen (2006). According to the theory, financial services agents are key in delivering financial service to customers. As such commercial banks depend on such agents in providing financial service to their customers. It can be noted that this theory largely supports that agency banking model. In this case, a commercial banks contracts an agent to offer financial services on its behalf. This is crucial for the bank to

reduce the operating costs as well as to reach many customers as much as possible without having to set up a physical bank branch. In addition to agency banking, financial services providers could rely on the telecommunication platform such as mobile phone providers to offer financial services through mobile banking platform.

In this case, agency banking is a financial innovation via which the banks partners with the agents and uses technology to deliver financial services to the customers through the agents without necessarily interacting with the customers physically. Through these partnerships, customers can open banks account at the agents premises as well as undertake deposits and withdrawals. Therefore, the bank-led theory roots for branchless banking whereby the bank can offer financial services without necessarily setting up a physical operating branch. This offers avenues for the bank to increase delivery of different financial services using different delivery channel (retailers/ mobile phones. By engaging other players such as agents, the bank can increase its revenues arising from the fees and charges levied on the agency transactions thus increasing its non – interest incomes.

The bank – led theory is applicable in this study by supporting the inclusion of the agency banking in the study as one form of financial innovation. This is underpinned on the fact that the theory largely supports agency banking model. Since the theory asserts that financial services agents are key in delivering financial service, then the theory is very crucial in this study in achievement of objective one of the study's objectives that seeks to examine how agency banking model affects bank's performance from non – interest income point of view.

2.2.3 Merton's market efficiency theory of innovation.

Merton (1990) also provides a valuable rationale for financial innovation. His theory is based on the notion that financial innovations are motivated by forces designed to increase market efficiency and improve social welfare. Merton argued that the market is not perfect hence financial institutions must innovate to improve market efficiency. According to Rene (2000) financial economists generally view the flow of funds to take advantage of investment opportunities and financial innovations as positive forces that makes markets more efficient, facilitate risk sharing and increase growth.

Many researchers have argued that capital flows and financial innovations lead to instability, crashes and other disasters especially the 1987 crash and the derivative disasters in the 1990's but Merton was not convinced that financial innovation was to blame for the crashes. Merton (1990) gives three motivations for producing innovations namely, the creation of new financial structures that allow risk sharing, risk pooling and hedging as well as new financial structures for transferring resources, the improvement of economic efficiency and liquidity and reduction of agency costs.

2.3 Empirical review

A vast body of literature does exist regarding technology – based innovations and how they impact on the performance of the banks globally.

2.3.1 Effect of agency banking on bank performance

In Malaysia, Bakar and Tahir (2019) examined agency banking – profitability nexus among the Malaysia commercial banks. The study was conducted for 2001-2006 with the Multiple linear

regression and artificial neural network applied to predict the expected bank profitability levels. The sample size of the study was 13 Malaysian commercial banks. In the study, bank financial performance was measured using bank's annual return on assets. The end finding of the study was that Malaysian banks' profitability is positively and significantly determined by the number and the value of agency banking transactions. However, the study failed to address the effect of other forms of financial innovations such as internet and mobile banking.

In the African context, Nezianya and Izuchukwu (2014) conducted a study on agency banking – commercial banks nexus in Nigeria. Using a descriptive survey research design, the study found a positive and significant relationship among the two. Further, Oboro and Ukolobi (2021) conducted a study on agent banking channels and the Nigerian banks' performance. The study sought to test four hypotheses that were used to proxy agent banking which are: agent branch network expansion, agent account opening, agent withdrawal transactions, and agent deposits transactions while bank turnover/income was used to measure bank performance. A multivariate analysis was adopted and estimated using Statistical Package for Social Sciences. The study found that agent branch network expansion, agent account opening, agent withdrawal transactions, and agent deposits transactions contribute meaningfully to bank profitability among the Nigerian banks that have adopted agency banking model. However, the study failed to address the effect of other forms of financial innovations such as internet and mobile banking.

In Kenyan context, Karimi (2018) analysed agency banking model among the Kenyan commercial banks. The study applied descriptive research design on 18 Equity bank agents that have adopted the agent banking model. The study found that with the adoption of agency banking, equity bank had not significantly reduced the general administration costs especially the operating costs. In this case, the operation and transaction costs were found to be substantially

high even for agency banking. However, the study found that, there were security measures win place to guard customers' transactions though a need for improvement was cited. However, the study failed to address the effect of other forms of financial innovations such as internet and mobile banking.

Ogutu and Fatoki (2019) explored how bank profitability is affected by electronic banking platform. The study covered 11 NSE listed commercial banks. Quantitative research design was applied with the panel data analysis being relied upon for empirical analysis. The study relied on secondary data that was extracted from CBK banking supervisory reports. Agency banking strongly financial performance of listed commercial banks in Kenya positively. However, the study failed to address the effect of other forms of financial innovations such as internet and mobile banking.

2.3.2 Effect of mobile banking on bank performance

From the global context, in Indonesia, Lasmini et al, (2019) examined how performance of banks is affected by mobile banking. The study covered 41 banks as the research sample that selected based on purposive sampling. Bank performance was measured by Return on Equity. The study found that profitability among the Indonesian commercial banks is positively correlated but not significantly affected by mobile banking transactions. However, the study failed to address the effect of other forms of financial innovations such as internet and agency banking.

Nader (2011) examined the effect of mobile banking technology on the profitability of Saudi Arabia commercial banks. The study covered a period from 1998 to 2007. From the study's findings, phone banking was found to have a positive effect on profit efficiency among the Saudi

banks. However, the study failed to address the effect of other forms of financial innovations such as internet and agency banking.

In African context, Bagudu, Khan and Abdul-Hakim (2017) mobile banking and financial performance of commercial banks in Nigeria. The sample size for the study was 22 commercial banks selected via simple random sampling. Upon estimating the regression model, the model estimate revealed that mobile banking positively and significantly affects profitability of Nigerian commercial banks. Based on the study findings, the study recommended for increased roll – out of the mobile banking platforms among the Nigerian commercial banks. However, the study failed to address the effect of other forms of financial innovations such as internet and agency banking.

In Rwanda, Harelimana (2017) examined how mobile banking platformed affected the financial performance of financial institutions. The study adopted a case study of Unguka Microfinance bank. The study utilized both the quantitative and qualitative research methods. The study conclusions were that mobile banking products offered by Unguka microfinance bank improved the revenue of Unguka ltd in the previous three years. The key services offered through mobile banking platform that significantly affected the banks revenues were found to be accounts funds transfers, payment of utility bills, ordering cheque books as well as ordering for bank statements. However, the study failed to address the effect of other forms of financial innovations such as internet and agency banking.

In the Kenyan context, Kathuo, Rotich and Anyango (2015) studied how performance of banking institutions is influenced by adoption of mobile banking. The study was underpinned on the realization the mobile banking in the recent past years has been heavily applied in the provision

of financial services in Kenya especially on transactions regarding accounts funds transfer and payments of utility bills. The study found that mobile banking has improved efficiency in provision of banking services as well as the bank revenues. However, the study failed to address the effect of other forms of financial innovations such as internet and agency banking.

According to Muthinja and Chipeta (2018), the banking sector in Kenya has observed that there is new evidence relating adjustment speeds, organizational performance and financial innovation. The study through Koyck distributed lag model used changing estimation panels and computerized generalized technique of moments to measure financial performance. The study established that it is estimated to take 3 years drivers of financial innovation to adjust mobile banking within the organization. Also, it takes 5 years for drivers of financial innovation to adjust Automated teller machines. The findings of the study also established that financial performance of banks is estimated to take 1.179 years to realign to 4 financial innovations. Additionally, 0.368 years which is under 1 year is required to attain 50% of the sum total of the dynamic performance of an organization given one unit-maintained change within financial innovation. Also, a 4.926 mean lag was observed being the longest for ATM's while a 2.849 mean lag being the shortest for mobile banking.

2.3.3 Effect of internet / online banking on bank performance

From Gündoğdu and Taşkin (2017) analysed how bank profitability among Turkish commercial banks is affected by online banking. The study period was 2006Q1 and 2015Q2. Simple 19 financial innovation positively affect Turkish commercial banks' net interest margin. However, the study failed to address the effect of other forms of financial innovations such as mobile and agency banking.

Lasmini, et al (2019) studied banks' profitability and financial innovation in Indonesia for 2014-2018 period. Bank profitability was measured by Return on Equity with financial innovation being proxied by mobile and internet banking. The findings were that banks profitability is positively significantly correlated to the value of mobile and internet banking undertaken by a bank in Indonesia. However, the study failed to address the effect of other forms of financial innovations such as mobile and agency banking.

In Bangladesh, Hossain (2021) conducted a study on the public – owned banks. The study relied on the panel data analysis with pooled OLS being the most preferred empirical estimation model. The study findings were contrary to other study findings in that internet banking was found to adversely affect bank profitability due to the perceived internet frauds likely to be linked to internet banking. This finding revealed the possibilities behind the low uptake of internet banking among the bank customers in Bangladesh. However, the study failed to address the effect of other forms of financial innovations such as mobile and agency banking.

From African context, Agboola (2016) analysed the level of adoption, and the effect internet banking has had in Nigeria. The study found the Nigerian banks are leveraging on the technology to offer financial services to their customers in addition to development of new banking products. This revealed a high degree of adoption and utilization of technology in commercial banking in Nigeria. The result of this trend was found to be reduced cost of operations, reduced cost of financial services provision as well as increased bank customer base. This in the long run has a positive effect on the banks' financial performance. However, the study failed to address the effect of other forms of financial innovations such as mobile and agency banking.

Okonkwo, Obinozie, and Echekoba (2015) examine the effect of financial innovation specifically the internet banking and ATM usage on performance on Nigerian Commercial Banks' profitability. The study focused on the 11 Commercial for 2001 – 2013 period. Application of ordinary least square regression model found that adoption of internet banking increased banks' profitability performance mainly the Return on Equity. However, investment in ATMs was found not to really improve banks' performance. However, the study failed to address the effect of other forms of financial innovations such as mobile and agency banking.

In Kenyan context, Alubisia, Githii and Mwangi (2018) investigated how Internet, Mobile banking, of ATMs, Cards usage non-interest income of commercial banks. Then study relied on Descriptive research design was used. The study found that technology based financial innovations majorly affected non-interest income in Kenya. However, the study failed to focus on agency banking as a technology based financial innovations.

Ogutu and Fatoki (2019) explored how bank profitability is affected by electronic banking platform. The study covered 11 commercial banks listed at the Nairobi Securities Exchange. The study focused on mobile banking, ATM banking and online banking platforms. quantitative research design was applied with the panel data analysis being relied upon for empirical analysis. The study relied on secondary data that was extracted from CBK supervisory reports. A strong positive relationship between online banking and financial performance of listed commercial banks in Kenya. However, the study failed to address the effect of other forms of financial innovations such as agency banking.

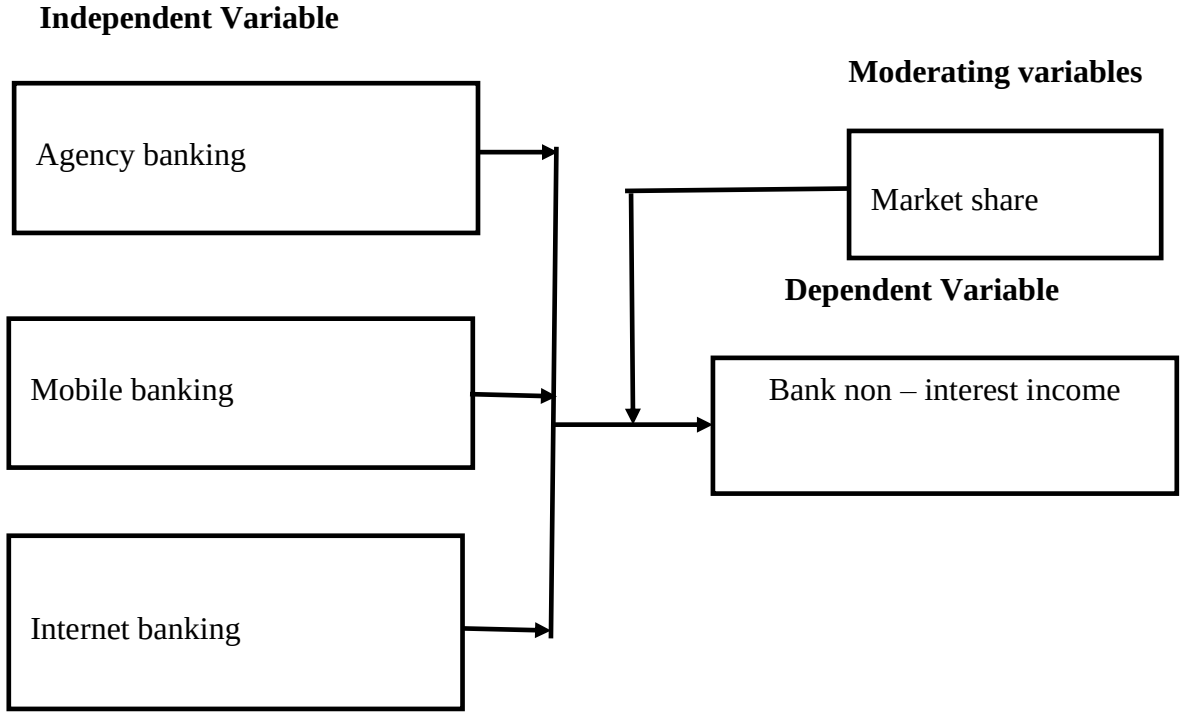
In Kenya, Amed and Wamugo (2018) investigated how commercial banks performance is being affected by financial innovation. The study was anchored on the constraint induced innovation

theory, the theory of cost innovation and resource-based theory having adopted descriptive design. It concluded that products of financial innovation such as ATM banking, internet banking, mobile banking and agency banking are positively and considerably impacting commercial banks performance through the many avenues including increased efficiency and productivity, costs of infrastructure, reduced banking cost and increased profits.

2.4 Conceptual Framework

Based on the empirical review, the conceptual framework of the study is presented in figure 2. the conceptual framework diagrammatically shows the linkage between the dependent variable and independent variables. The identification of the variables is based on what other empirical studies reviewed in their studies.

Figure 2:
Conceptual Framework



2.5 Conceptualization and measurement of variables

Within the study, the study variables were defined and measured as follows:

Agency banking: This is defined by adoption of the agency banking model by the bank. By adoption we mean the bank having active agents conducting agency banking activities on behalf of the bank. Within the study, agency banking was operationalized and measured by three attributes namely: the numbers of active agents in a year, the value of the deposits made through bank agents in a year, the value of withdrawals made through bank agents in a year (Bakar and Tahir, 2019; Nezianya and Izuchukwu, 2014).

Mobile banking: This is defined by adoption of the mobile banking model by the bank. By adoption we mean the bank having mobile banking platform. Within the study, mobile banking was operationalized and measured by two attributes namely: the value of the deposits made through mobile banking platform in a year, the value of withdrawals made through mobile banking platform in a year (Lasmini, et al; 2019; Bochaberi and Omagwa, 2021).

Internet / Online banking: This is defined by adoption of the internet banking model by the bank. By adoption we mean the bank having an internet banking platform. Within the study, internet banking was operationalized and measured by two attributes namely: the value of the deposits made through internet banking platform in a year and the value of withdrawals made through internet banking platform in a year (Agboola, 2016).

Bank non – interest income: This is defined as the bank income that is outside interest income arising from bank lending. This was a summation of income from fees and commissions income,

foreign exchange gain and other non – interest operating income as presented in the bank's financial statements in a year (Central bank of Kenya, 2019).

Table 1
Conceptualization and measurement of variables

Variable	Definition	Measurement	Measurement scale
Agency banking	Refers to a banking model where a bank uses of registered agents to provide financial service es	The value of the deposits made through bank agents in a year, the value of withdrawals made through bank agents in a year	Interval scale
Mobile banking	Refers to a banking model where a bank uses of a mobile platform to provide financial service es	the value of the deposits made through mobile banking platform in a year, the value of withdrawals made through mobile banking platform in a year	Interval scale
Internet banking	Refers to a banking model where a bank uses of an internet or online platform to provide financial service es	the value of the deposits made through internet banking platform in a year and the value of withdrawals made through internet banking platform in a year.	Interval scale
Bank non – interest income	Refers to the bank income that is outside interest income arising from bank lending	a summation of income from fees and commissions income, foreign exchange gain and other non – interest operating income as presented in the bank's financial statements in a year.	Interval scale

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter covers the research methodology that was adopted by the study. More precisely, the chapter looks at the research design, the target population, sample and sampling procedures, research instruments, data sources and collection, data processing and analysis and lastly the diagnostic tests.

3.2 Research design

The study employed quantitative research design given its application of secondary data. Specifically, a descriptive research design was applied. The adopted research design was preferred given its ability to give empirical insights on the causal – effect linkage between independents and dependent variable of the study. Further, this design was fitted where the study sought to apply statistical tools to conduct inferential statistics analysis. Therefore, based on this study design, the study sought to explore and explain how financial innovation affects the non – interest income.

3.3 Target Population

Neuman (2000) defines research target population as all the units that the researcher wishes to conduct as study on as the units of analysis. The target population of the study therefore forms the study sampling frame from which the researcher draws the sample for the research purposes. Given this definition, the target population for this study was all the commercial banks registered and operating in Kenya under the regulation of the Central Bank of Kenya as at the year 2020. This therefore constitutes 42 commercial banks. However, 3 commercial banks were eliminated from the analysis since they are under liquidation. They include imperial bank, Dubai bank and Charterhouse bank. This leaves the study target population

being 39 commercial banks. The study target population is presented in table1 in appendices. The summary of the target population is as defined in table 2.

Table 2
Target Population

Bank Tier	Number
Tier 1	9
Tier 2	9
Tier 3	21
Total	**39**

3.4 Sampling and sampling procedure

A sample is defined as a representative portion of the entire target population the researcher wishes to study (Mugenda and Mugenda, 1999). During sampling there is need to pay attention and be objective as much as possible to ensure that the sample is a good representation of the entire population. Sampling is therefore the process of selecting or drawing a sample from the study target population. The study adopted census hence sampling was not necessary.

3.5 Research instrument

The study relied on the secondary data. The data was collected from the commercial banks with the agency banking model over the years. Excel sheet with the variables of concern was used to extract data from the various data sources. The excel sheet sought to tabulate data on all study variables namely: annual non – interest income, number of active agents, the value of agency banking deposits annually, value of annual agency banking withdrawals, value of

annual agency banking funds transfers. Data of the total bank's assets which measures the size of the bank was also be tabulated as well as the bank market share by total assets.

3.6 Data sources and collection

To achieve the objectives of the study, credible data was core to necessitate analysis. The study utilized secondary data. The data on the bank non – interest income was collected from the audited financial reports of commercial banks for the period 2011 – 2020. Granular data was therefore be sought from the Central Bank of Kenya – Banks Supervision Unit. In addition, data on the control variables such as market share was also obtained from the Central Bank of Kenya Annual Bank Supervision Reports publications. The data collected from the secondary data sources of the respective study variables was tabulated on the excel data sheet used for data collection for export to the data analysis software. It is notable that since the sampled banks have different times of adoption of the different forms of financial innovations, led into unbalanced panel data. This is because data for the late adopters of financial innovation forms may not be available for some years when compared to the early adopters. This results into unbalanced panel data. Therefore, during the analysis, the necessary techniques for analyzing unbalanced panel data were applied.

3.8 Data processing and analysis

The study utilized secondary data in its empirical analysis. The study utilized panel data given that the data entails data from the sampled commercial banks for 10 years. STATA software was applied in analysing data. To start with descriptive statistics on the measures of central tendency and dispersion were computed to obtain information on the general trends of the study variables. To determine the effect of financial innovation on the non – interest income of the commercial banks in Kenya, panel regression models namely Pooled OLS, fixed effects and random effects model were fitted. Upon fitting the models, the appropriate

diagnostic tests were applied to determine the most appropriate model. To address the challenge of the incomplete data that may be occasioned by some banks do not have agency banking platform, standard panel methods of estimating the Pooled OLS, fixed effects and random effects models for unbalanced panel data were applied. In this case, standard fixed effects, random effects, and pooled OLS models were ran on the entire unbalanced data to get the models' estimates.

Pooled OLS model

The pooled regression model as the name posits pools the data observations together without recognising the cross sectional or time series aspect of the data. Therefore, under the pooled OLS, the cross sectional and times series properties of data is completely ignored (Wooldridge 2009). In this case the sum of squared residuals of the estimated pooled OLS are the smallest. Notably, the Pooled OLS assumes Linearity in parameters, no multicollinearity, homoscedasticity, no autocorrelation and zero conditional mean. Pooled OLS model general presentation is described as follows:

$$Y_{it} = \alpha + \beta X_{it} + \varepsilon_{it} \qquad (3.1)$$

From the model, i captures the cross-sectional aspect of the data while t captures the time series dimension of the data. β is the model coefficients for the independent variables. Further, X_{it} is the vector of independent coefficients and ε_{it} is the model error term.

Fixed effects model

The fixed effects model assumes that changes within the unit of analysis, but sum changes are time invariant. In this case, the intercept of the model varies from one unit of analysis to another. However, its notable that the model allows individuality of the unit of analysis. Under the fixed effects model, the correlation between error term of the entity and

independent variables are time-invariant (Wooldridge 2009). As such the model fails to allow any correlations between entity's error term and model constant.

For hypothesis testing point of view, the null hypothesis states that the time-invariant across entities is zero with the alternative hypothesis being set that the time-invariant across entities is not equal to zero. The general representation of the fixed effects model is presented as follows:

$$Y_{it} = \beta_1 X_{it} + \alpha_i + \mu_{it} \quad \ldots\ldots(3.2)$$

Where: Y_{it} dependent variable, β is the model coefficients for the independent variables. Further, X_{it} is the vector of independent coefficients and ε_{it} is the model error term. α_i is the unknown intercept for each firm and μ_{it} is the model the error term.

Random effects model

The random effect model allows heterogeneity of the units of analysis across time. In this model, entities' variations are assumed to be random in nature implying uncorrelation between dependent and independent variables' variations (Wooldridge 2009). Further, the intercept and slope of regressors are the same across individuals. In addition, the correlation between the model error terms and the independent variables is assumed to be zero. For hypothesis testing point of view, the null hypothesis states that the variance across entities is zero is equal to zero with the alternative hypothesis being set that the variance across entities is zero is not equal to zero. The general representation of the random effects model is presented as follows:

$$Y_{it} = \beta X_{it} + \alpha + \mu_{it} + \varepsilon_{it} \quad \ldots\ldots(3.3)$$

Where: Y_{it} dependent variable, β is the model coefficients for the independent variables. Further, X_{it} is the vector of independent coefficients and ε_{it} is the model error term. α is the intercept for each entity, μ_{it} is the between entity error term and ε_{it} is the within entity error term.

From the general empirical panel regression model, the specific empirical regression for the study is defined as follows:

$$\text{NII}_{it} = \alpha_0 + \beta_1 \text{Agency banking}_{it} + \beta_2 \text{Mobile banking}_{it} + \beta_3 \text{Internet banking}_{it} + \beta_4 \text{Bank market share}_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.4)$$

Where, NII_{it} is the non – interest income for bank *i* in time *t*, $Ageny\ banking_{it}$ is the value of transactions through agency banking for bank *i* in time *t*, $Mobile\ banking_{it}$ is the value of mobile banking transactions for bank *i* in time *t*, $Internet\ banking_{it}$ is the value of internet banking transactions for bank *i* in time and $Bank\ market\ share_{it}$ is the market share of bank *i* in time *t*. Bank market share is used as the control variables for the empirical model.

3.9 Diagnostic tests

Diagnostics testes are used to tackle many types of bias that may occur in research intending to assess the correctness of diagnostic tests (Feinstein, 2002). The study carried out various diagnostic tests to ascertain the estimates of the model are consistent to warrant reliability in hypotheses testing. The following diagnostic test were carried out:

3.9.1 Correlation Analysis

Correlation analysis is applied to test the relationship among the model variables (Kothari & Garg, 2014). Under the test, the possible results could be positive or negative relationship. Under the positive correlation, the variables tend to move in the same direction while under

negative correlations the variables tend to move in opposite direction. The Correlation analysis results ranges from -1 to +1. Within the study, Pearson's correlation was applied to undertake correlation analysis among the study variables.

3.9.3 Autocorrelation Analysis

Autocorrelation or serial correlation describes an instance in which the error terms are correlated (Walter, 2009). Autocorrelation test is a post estimation diagnostic test. The study employed the Durbin-Watson test. This test was centered around the null hypothesis of no serial correlation. If the errors are correlated to each other, then they are said to be auto correlated or serially correlated. Autocorrelation when noted, makes the coefficient estimates to be inefficient though nonetheless unbiased. To test for this instance, the Durbin Watson test is carried out (Walter, 2009). A Durbin Watson statistic of 2 implies absence of autocorrelation. However, if $d<2$ or $d>2$, there is evidence of either positive or negative autocorrelation. A Durbin Watson statistic of 0 indicates positive autocorrelation while a Durbin Watson statistic of 4 indicates negative autocorrelation.

3.9.4 Multicollinearity test

Multicollinearity problem mainly arises when two independent variables are linearly dependent. It is a measure of inter-correlations or inter-associations among the independent variables of the model (Guajarati, 2007). Multicollinearity test is a post estimation diagnostic test. The study applied the Variance Inflation Factor (VIF) or collinearity matrices was used to check for its presence. A rule of thumb of VIF 10, was applied in testing for multicollinearity problem whereby a VIF of less than 10 implies absence of multicollinearity among the independent variables.

3.9.5 Heteroscedasticity test

Heteroscedasticity is an econometric problem where the error terms have no constant variance (variance is not the same). This is a post estimation diagnostic test. Non-existence means that confidence levels and test statistics are biased (Greene, 2003). It is a serious problem in econometrics that tends to have consequences on the Ordinary Least Square (OLS) estimators. Although the OLS estimator stays unbiased, the estimated standard error is incorrect. This means that the confidence intervals and hypotheses tests cannot be trusted. Moreover, the OLS estimator is no longer Best, Linear and Unbiased Estimators (BLUE). In this study, we note that there is no need for testing for heteroskedasticity problem. This is because the study relied on the Generalized Linear models for estimation. Ideally, from the econometric point of view, the Generalized Linear Models effectively accommodates the problem of skewness in data and heteroscedasticity through variance-weighting. Upon estimating the empirical model, Breusch-Pagan-Godfrey test was used to examine heteroscedasticity.

3.9.6 Hausman Test

This is a post estimation test when dealing with the panel data. The Hausman test is applied to differentiate between fixed effects model and random effects model in panel data (Gujarati, 2007). Usually, the random effect is preferred under the null hypothesis due to higher efficiency, while under the alternative hypothesis, the fixed effects is at least consistent and thus preferred (Gujarati, 2007). To choose between fixed or random effects the Hausman test is carried out where the null hypothesis is in favour of random effects over the fixed effects (Baltagi, 2005).

Table 3
Summary of diagnostic tests

Type of test	How to test	Hypotheses
Correlation Analysis	Use of Pearson's correlation	H_0: variables are not strongly correlated. H_1: variables are strongly correlated
Autocorrelation Analysis	Use of Durbin Watson test	H_0: No serial correlation in error term H_1: There is serial correlation in error term
Multicollinearity test	Use of Variance Inflation Factor	H_0: Absence of Multicollinearity H_1: Presence of Multicollinearity
Heteroscedasticity test	Used of Breusch-Pagan-Godfrey test	H_0: Presence of homoscedasticity H_1: Presence of heteroscedasticity
Hausman Test	Use of Hausman Chi2 Statistic test	H_0: the preferred model is random effects H_1: the preferred model is the fixed effects

CHAPTER FOUR

DATA ANALYSIS, RESULTS, AND INTERPRETATION

4.1 Introduction

This chapter covers data analysis, results, and the interpretations of the study results. In particular, the chapter covers the descriptive statistics of the variables, regression model results, the interpretation of both the tests and the regression model results are covered in this chapter. In addition, the diagnostic tests of the analysis are reported and discussed in this chapter.

4.2 Descriptive Statistics

The study covered a period of 10 years dating from period 2011 – 2020. The study sample was 39 commercial banks operating in Kenya for the period under the study. Data was collected from audited financial reports of commercial banks for the period 2011 – 2020. In addition, granular data was collected from the Central Bank of Kenya – Banks Supervision Unit. In addition, data on the control variables such as bank market share was also obtained from the Central Bank Annual Bank Supervision Reports publications. It is notable that since the sampled banks have different times of adoption of the different forms of financial innovations, this leads into unbalanced panel data. However, to avoid data gaps, STATA was used to extrapolate the missing data points under the unbalanced panel techniques prior to data analysis. Therefore, the total data points of the study were 390 arising from a product of 39 commercial banks s for 10 years.

Table 4
Overall Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Non-interest income (‘000 mill)	390	1869.65	3729.49	22	25903	3.677	18.30
Agency banking (‘000 mill)	390	2538.76	12748.06	2	15742	9.077	9.25
Mobile banking (‘000 mill)	390	2270.77	3920.47	18	30763	3.677	19.88
Internet banking (‘000 mill)	390	1978.15	3857.86	6	26998	3.578	17.20
Market share (%)	390	2.565	3.688	0.04	20.53	2.331	8.37

The descriptive statistics of the study variables found that for the period under the study review the mean non - interest income for the 39 commercial banks was Ksh 1,869.654 million. This signifies a substantial level of non – interest income among the Kenyan commercial banks. The minimum and maximum levels of non – interest incomes indicate that the minimum non – interest income was approximately Ksh 22 million with highest being ksh 25,903 million in a given year. On the distribution point of view, the results indicate that the non – interest income is positively skewed with a skewness level of 3.677. In addition, regarding the kurtosis value indicate that the non – interest income has a kurtosis value of 18.308 hence non - normally distributed.

The agency banking value descriptive statistics results indicate that the mean of the agency banking value for the 39 commercial banks under the study period was Ksh 2,538.764 million. The bank with the least value of agency banking was Ksh 2 million in a particular year with the highest being ksh, 15,741 million for a given year. On the distribution point of view, the results indicate that value of the agency banking transaction is positively skewed with a skewness of 9.077. In addition, regarding the kurtosis value indicate that the value of agency banking transaction has a kurtosis value of 9.256 hence non - normally distributed.

The mobile banking value descriptive statistics results indicate that the mean of the mobile banking value for the 39 commercial banks under the study period was Ksh 2,270.779 million. The bank with the least value of agency banking was Ksh 18 million in a particular year with the highest being ksh, 30,763 million for a given year. On the distribution point of view, the results indicate that value of the mobile banking transaction is positively skewed with a skewness of 3.677. In addition, regarding the kurtosis value indicate that the value of mobile banking transaction has a kurtosis value of 19.881 which is greater than 3.0 hence non - normally distributed.

The internet banking value, the descriptive statistics results indicate that the mean of the internet banking value for the 39 commercial banks under the study period was Ksh 1,978.154 million. The bank with the least value of internet banking was Ksh 6 million in a particular year with the highest being Ksh 26,998 million for a given year. On the distribution point of view, the results indicate that value of the internet banking transaction is positively skewed with a skewness of 3.577. In addition, regarding the kurtosis value indicate that the value of internet banking transaction has a kurtosis value of 17.207 hence non - normally distributed.

The bank market share descriptive statistics results indicate that the mean of the bank market share for the 39 commercial banks under the study period was 2.56 percent. The bank with the least industry market share was 0.04 percent in a particular year with the highest market share being 20.53 percent for a given year. On the distribution point of view, the results indicate that the bank market share is positively skewed with a skewness of 2.331. In addition, regarding the kurtosis value indicate that the bank market share has a kurtosis value of 8.3769 hence non - normally distributed.

Table 5
Descriptive Statistic for Non- Interest Income

	Year	Obs	Mean	Std.Dev.	Min	Max
Non-interest income	2011	39	650.9231	1338.257	51	7174
	2012	39	707.8462	1414.925	41	7633
	2013	39	866.7949	1651.9	45	8378
	2014	39	1047.128	1842.106	22	8936
	2015	39	1349.872	2359.019	28	11382
	2016	39	1818.923	3079.403	36	14010
	2017	39	2178.128	3599.78	36	14769
	2018	39	2773.821	4731.437	140	22775
	2019	39	3311	5384.887	107	25177
	2020	39	3992.103	6361.809	209	25903

A decomposition of the descriptive statistics of each variable across years reveals that for the non – interest income the mean non – interest income varies significantly across the years. It is also notable that the mean non – interest income has been increasing in the consecutive years with 2011 having the least and 2020 with the highest. Similar trend is exhibited in the standard deviation, minimum values, and the maximum values.

Table 6
Descriptive Statistics for Agency Banking

Variable	Year	Obs	Mean	Std.Dev.	Min	Max
Agency banking	2011	39	432.9487	1106.138	3	6375
	2012	39	494.4359	1371.98	2	6849
	2013	39	820.9231	2090.712	2	10930
	2014	39	1167.821	3644.873	3	21836
	2015	39	1850.718	7152.422	3	44194
	2016	39	2624.128	10255.95	3	63378
	2017	39	3134.103	12554.06	6	78302
	2018	39	3874.692	17006.24	2	106486
	2019	39	4440.564	19512.37	2	122410
	2020	39	6547.308	24945.52	22	157418

A decomposition of the descriptive statistics for agency banking across years reveals that the

mean agency banking value varies significantly across the years. It is also notable that the mean agency banking value has been increasing in the consecutive years with 2011 having the least and 2020 with the highest. Similar trend is exhibited in the standard deviation, and the maximum values with the minimum values eliciting mixed trends of decline and rise within the consecutive years.

Table 7
Descriptive Statistics for Mobile Banking

Variable	Year	Obs	Mean	Std.Dev.	Min	Max
Mobile banking	2011	39	738.4872	1249.072	42	7026
	2012	39	856.8462	1368.126	38	7049
	2013	39	1049.692	1536.117	43	7894
	2014	39	1238.103	1644.921	19	8198
	2015	39	1638.333	2308.137	18	10774
	2016	39	2236.667	3155.558	22	13695
	2017	39	2475.923	3309.902	33	14483
	2018	39	2985.256	4153.211	141	17664
	2019	39	3885.667	5591.485	94	25383
	2020	39	5602.821	7207.888	126	30763

A decomposition of the descriptive statistics for mobile banking across years reveals that the mean agency banking value varies significantly across the years. It is also notable that the mean mobile banking value has been increasing in the consecutive years with 2011 having the least and 2020 with the highest. Similar trend is exhibited in the standard deviation, and the maximum values with the minimum values eliciting mixed trends of decline and rise within the consecutive years.

Table 8
Descriptive Statistics for Internet Banking

	Year	Obs	Mean	Std.Dev.	Min	Max
Internet banking	2011	39	674.1538	1052.033	6	4955
	2012	39	851.3846	1475.015	10	6635
	2013	39	977.1026	1636.617	12	7572

	2014	39	1165.256	1794.452	14	7330
	2015	39	1536.026	2385.986	32	11401
	2016	39	1895.641	3271.939	19	17239
	2017	39	2310.923	4096.786	34	19871
	2018	39	2868.385	5201.47	34	26998
	2019	39	2978.538	4915.708	31	20139
	2020	39	4524.128	6723.393	61	23350

A decomposition of the descriptive statistics for internet banking value across years reveals that the mean agency banking value varies significantly across the years. It is also notable that the mean internet banking value has been increasing in the consecutive years with 2011 having the least and 2020 with the highest. Similar trend is exhibited in the standard deviation, internet banking value and the maximum values within the consecutive years.

Table 9
Descriptive Statistics for Market Share

	Year	Obs	Mean	Std.Dev.	Min	Max
Market share	2011	39	2.564615	4.245092	0.14	20.52
	2012	39	2.564103	4.228052	0.1	20.53
	2013	39	2.572821	3.856214	0.19	17.31
	2014	39	2.565128	3.685601	0.07	15.95
	2015	39	2.563846	3.756562	0.08	16.9
	2016	39	2.564103	3.747279	0.04	15.97
	2017	39	2.563846	3.560584	0.04	14.02
	2018	39	2.564359	3.423122	0.1	14.45
	2019	39	2.564359	3.393954	0.11	14.35
	2020	39	2.564359	3.293527	0.12	13.63

A decomposition of the descriptive statistics for market share across years reveals that the mean market share value varies significantly across the years. It is also notable that the mean market share consecutive years elicit mixed trends. Similar trend is exhibited in the standard deviation and minimum values elicit mixed trends of decline and rise. However, the maximum has been declining across consecutive years implying an element of increasing competitiveness among the industry players.

4.3 Correlational analysis

Prior to fitting of the model correlational analysis was conducted to determine whether there were variables that were strongly correlated with each other. The Pearson Correlational Analysis was applied in computing for the correlation among the variables. The results are presented in table 10. The correlational analysis was meant to find out the level of relationship among the study variables**.**

Table 10
Correlation coefficient

Variables	(1)	(2)	(3)	(4)	(5)
Non-interest income	1.000				
Agency banking value	0.445	1.000			
	(0.000)				
Mobile banking value	0.507	0.578	1.000		
	(0.000)	(0.000)			
Internet banking value	0.298	0.439	0.800	1.000	
	(0.000)	(0.000)	(0.000)		
Market share	0.362	0.339	0.716	0.652	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	

Note: significance levels are in brackets

The results indicate that the non – interest income is positively correlated with the value of agency banking with the correlation coefficient between the two being 44.5 percent. The significance level however indicates that the relationship between the two is significant. In addition, non – interest income is positively correlated with the value of mobile and internet banking with correlation of 50.7 and 29.8 percent respectively. The two correlation levels were found to be significant as indicated by the significance levels. Similar results are reported for the relationship between non – interest income and bank markets share. However, it's notable that strong positive correlation was found for mobile banking and internet banking at 80 percent. This relationship could be explained by the fact that both banking platforms could sometimes be used complementary by the bank customers.

Similarly, is the relationship between mobile banking and bank market share with 71.6 percent. This could be explained by the fact the larger the bank in terms of market share by asset the higher the possibility that such bank invests more in digital banking platforms such as mobile banking to reach their diverse customers in remote geographical areas. Such areas could not be well served by internet to support internet banking. Secondly, bank agents could be unwilling to set shops in such areas. Third more banked population possess mobile phone thus making mobile banking platform most preferred branchless banking platform by large bank pursuing to cut operational costs that are associated with physical bank branch.

4.4 Diagnostic test

Various diagnostic tests were conducted in the study to determine some quantitative issues that have to be addressed in the actual data analysis. In this case, diagnostic tests discussed in the research methodology were conducted accordingly. These include heteroscedasticity, multicollinearity, autocorrelation and Hausman test. The results of the tests are discussed as follows:

i. Heteroscedasticity test

To undertake the heteroscedasticity test, Breusch-Pagan / Cook-Weisberg test for heteroscedasticity was applied. The test was conducted in line to the specification in the study methodology in attempt to ascertain whether the variance of the error terms is constant or non – constants across the observations.

Table 11
Breusch-Pagan / Cook-Weisberg Test Results – Test for Heteroscedasticity

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity	
Ho: Constant variance	
Chi2(1) = 11.70	prob > chi2 = 0.6006

The result indicates that the Chi – square of the Breusch-Pagan-Godfrey test was 11.70 with a chi square statistic greater than 5 percent (Prob > chi2 = 0.6006) indicating absence of heteroscedasticity in the fitted empirical model.

ii. Multicollinearity

To undertake the multicollinearity test, Variance Inflation Factor test for heteroscedasticity was applied. The test was conducted in line to the specification in the study methodology in attempt to ascertain whether any of the two-model explanatory variable were highly corrected with each other. The multicollinearity test results are presented in table 12.

Table 12
Multicollinearity test results

Variable	**VIF**	**1/VIF**
Mobile banking value	4.170	0.240
Internet banking value	2.880	0.347
Market share	2.160	0.463
Agency banking value	1.530	0.654
Mean VIF	**2.68**	

The results posit that the mean value of Variance Inflation Factor is equal to 2.68 for the regression model. Applying the VIF of 10 as the test threshold, we conclude that the absence of multicollinearity among the variables since the mean Variance Inflation Factor for both models are less than 10.

iii. Autocorrelation

To undertake the autocorrelation test, Durbin's Alternative test and Breusch-Godfrey LM test

test for autocorrelation were applied. The tests were conducted in line to the specification in the study methodology in attempt to ascertain whether serial correlation across the observations exists. The autocorrelation y test results are presented in table 13.

Table 13
Autocorrelation test results

Durbin's Alternative test for Autocorrelation			
lags(p)	F- statistics	Df	Prob > F
1	0.105	1	0.6835
Breusch-Godfrey LM test for Autocorrelation			
lags(p)	F- statistics	Df	Prob > F
1	0.116	1	0.6724
H0: no serial correlation			

In testing for the serial correlation within the models, two test were applied namely the alternative Durbin Watson test and the Breusch-Godfrey LM. The results show that for the Probability values for the respective F – statistics for both the alternative Durbin Watson test and the Breusch-Godfrey LM are greater than 5 percent indicating absence of autocorrelation.

iv. Hausman Test

The Hausman test was applied to determine the most appropriate model between the fixed effects and the random effects model. The results for the Hausman test are presented in table 14.

Table 14
Hausman test results

	(b) fixed	(B)	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Agency banking	-0.0334	-0.0582	0.0248	0.0437
Mobile banking	0.7600	0.7925	-0.0325	0.0397
Internet banking	0.0695	0.0670	0.0025	0.0164
Market share	-206.6029	-70.6670	-135.9360	57.4457
Agency ×market share	0.0126	0.0139	-0.0013	0.0037
Mobile ×market share	-0.0600	-0.0557	-0.0043	0.0034
Internet ×market share	0.0120	0.0043	0.0078	0.0028

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B) ^ (-1)] (b-B) = 13.44

Prob>chi2 = 0.0093

From the results, the computed Chi2 statistics is 13.44. The respective probability for the Chi2 statistics is 0.0093. Using the 5 percent significance level, we find that the probability of the chi2 statistics is less than 5 percent significance level. This implies that the fixed effects model is most appropriate as opposed to the random effects model. We therefore conclude that the fixed effect model yields more valid results as opposed to the random effects model. This conclusion further implies that the non – interest income among the commercial banks arising from technological innovation is not much different across the banks.

4.5 Model fitting

This section covers the empirical model results for the regression of model estimated as per the specific objectives of the study. In addition, the section discusses the findings the study based on the empirical models fitted using the data collected. Lastly, the section covers the diagnostic test carried out during the analysis.

4.5.1 Regression model

To determine the effect of financial innovations on the performance of non – interest income of commercial banks in Kenya, regression model was fitted. It is notable that the study dealt with the panel data. This is because the study focused on 39 commercial banks for 10 years leading to 390 study observations. Therefore, that data had both the cross-sectional aspect as well as the time series thus being panel data. The study therefore estimated the three regression models for the panel data as envisaged in chapter three of the study on the study methodology. These included the pooled ordinary least squares model, the fixed effects and the random effects model. It is notable that each of three models are estimated first without that moderating variable and secondly with the moderating variable. The results of the models and their respective interpretation are presented as follows:

Fixed effects model

This was found to be the most appropriate regression model. The fixed effects model generally assumes time invariant implying that the group means across the panels are held constant. First the fixed effect model is estimated without the moderating effect of the bank market share. From table 15 results which presents the results of the fixed regression model without the moderating variable (bank market share).

Table 15
Fixed effects regression model results without moderating effect

Non – interest income	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Agency banking	0.111	0.014	7.72	0.000	0.083	0.14	***
Mobile banking	0.191	0.06	3.19	0.002	0.073	0.309	***
Internet banking	0.159	0.06	2.66	0.008	0.041	0.276	***
Market share	-408.07	92.68	-4.40	0.000	-590.37	-225.77	***
Constant	1886	251.37	7.50	0.000	1391.6	2380.39	***

Mean dependent var	1869.654	SD dependent var	3729.496
R-squared	0.440	Number of obs	390
F-test	68.055	Prob > F	0.000
Akaike crit. (AIC)	6885.708	Bayesian crit. (BIC)	6905.539

**** p<.01, ** p<.05, * p<.1*

The fitted model is as follows:

$$NII = 1886 + 0.111\text{A}gencybanking + 0.191Mobilebanking + 0.159Internetbanking - 408.17marketshare$$

The fixed effects regression model results without the moderating variable indicates that agency banking has a positive effect on the bank non – interest income levels among the Kenyan banks. The results indicate that a one unit increase in the value of agency banking transaction increases the non – interest income by ksh. 0.111 million or equivalent of ksh 111,000 holding other factors constant. This indicates that the non - interest revenue arising

from use of agency banking contributes a sizeable share of the non – interest income among the Kenyan banks. To determine the significance of the effect of agency banking on bank non – interest income, we rely on the t – value and the respective p – value. The t – value is 7.72 which is greater than 1.96 value for z – distribution. In addition, the respective p – value is 0.000. This implies that at 5 percent level of significance, effect agency banking on bank non – interest income is significant.

On the mobile banking front, the results indicate that mobile banking has a positive effect on the bank non – interest income levels among the Kenyan banks. The results indicate that a one unit increase in the value of mobile banking transaction increases the non – interest income by ksh. 0.191 million or equivalent of ksh 191,000 holding other factors constant. This indicates that the non - interest revenue arising from use of mobile banking contributes a sizeable share of the non – interest income among the Kenyan banks. To determine the significance of the effect of mobile banking on bank non – interest income, we rely on the t – value and the respective p – value. The t – value is 3.19 which is greater than 1.96 value for z – distribution. In addition, the respective p – value is 0.000. This implies that at 5 percent level of significance, effect mobile banking on bank non – interest income is significant.

On the internet banking front, the results indicate that internet banking has a positive effect on the bank non – interest income levels among the Kenyan banks. The results indicate that a one unit increase in the value of internet banking transaction increases the non – interest income by ksh. 0.159 million or equivalent of ksh 159,000 holding other factors constant. This indicates that the non - interest revenue arising from use of mobile banking contributes a sizeable share of the non – interest income among the Kenyan banks. To determine the significance of the effect of mobile banking on bank non – interest income, we rely on the t – value and the respective p – value. The t – value is 2.66 which is greater than 1.96 value for z

– distribution. In addition, the respective p – value is 0.000. This implies that at 5 percent level of significance, effect mobile banking on bank non – interest income is significant.

Further, the fixed effects regressions model was estimated considering the moderating effect of the bank market share among the financial innovation variables. The results are presented in table 16.

Table 16
Fixed effects regression model results with moderating effect

Non – interest income	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Agency banking	0.033	0.126	0.26	0.792	-0.282	0.215	
Mobile banking	0.76	0.129	5.91	0.000	0.507	1.013	***
Internet banking	0.07	0.091	0.76	0.446	-0.11	0.249	
Market share	-206.60	96.04	-2.15	0.032	-395.50	-17.7	**
Agency ×market share	0.013	0.011	1.11	0.266	-0.01	0.035	
Mobile ×market share	0.060	0.012	4.84	0.000	-0.036	-0.084	***
Internet ×market share	0.012	0.011	1.14	0.254	-0.009	0.033	
Constant	1135.08	276.14	4.11	0.000	591.93	1678.22	***

Mean dependent var	1869.654	SD dependent var	3729.496
R-squared	0.492	Number of obs	390
F-test	47.529	Prob > F	0.000
Akaike crit. (AIC)	6853.701	Bayesian crit. (BIC)	6885.431

**** p<.01, ** p<.05, * p<.1*

With the moderating effect of the bank markets share, agency banking was found to have a positive effect on bank non – interest income with one unit increases in the value of agency banking transaction found to increase non – interest income by Ksh 0.033 million holding

other factors constant. However, the effect was found to be insignificant since the t – value is less than 1.96 in absolute terms and the p – value was greater than 5 percent significance level.

However, mobile banking was found to have a positive effect on the non – interest income with one unit increase in the value of mobile banking transaction found to increase non – interest income by Ksh 0.76 million holding other factors constant. Significant effect was reported since the t – value is greater than 1.96 in absolute terms and the p – value was less than 5 percent significance level. Similar results were reported for internet banking though the effect was insignificant.

Looking at the moderating effect, the interaction between bank market share and value of agency banking transactions was found to have a positive effect on the non – interest income. However, the effect was found to be insignificant. Similarly, the interaction between bank market share and value of mobile banking transactions was found to have a positive effect on the non – interest income. However, at 5 percent level of significance, the effect was found to be significant. Further, the interaction between bank market share and value of internet banking transactions was found to have a positive effect on the non – interest income though the effect was insignificant.

The fitted fixed effects model with a moderating variable is as follows:

$$NII = 1135.08 + 0.033\text{A}gencybanking + 0.76Mobilebanking + 0.07Internetbanking - 206.60marketshare + 0.013agency \times mktshare + 0.06mobile \times mktshare + 0.012\,\text{int}\,ernet \times mktshare$$

Pooled Ordinary Least Squares model.

The pooled OLS model generally pools all the data together with no recognition for the cross-sectional element of the data. Therefore, the heterogeneity in the data in terms of the units of

the analysis in this case the heterogeneity among the listed firms is absolutely ignored. From table 17 results which presents the results of the pooled regression model without the moderating variable (bank market share).

Table 17
Pooled OLS regression model results without moderating effects

Non-interest income	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Agency banking	0.066	0.015	4.36	0.000	0.036	0.096	***
Mobile banking	0.535	0.081	6.57	0.000	0.375	0.695	***
Internet banking	-0.294	0.069	-4.27	0.000	-0.429	-0.159	***
Market share	81.494	62.261	1.31	0.191	-40.92	203.909	
Constant	859.473	191.865	4.48	0.000	482.239	1236.707	***

Mean dependent var	1869.654	SD dependent var	3729.496
R-squared	0.324	Number of obs	390
F-test	46.181	Prob > F	0.000
Akaike crit. (AIC)	7377.670	Bayesian crit. (BIC)	7397.500

**** p<.01, ** p<.05, * p<.1*

The pooled regression model results without the moderating variable indicates that agency banking has a positive effect on the bank non – interest income levels among the Kenyan banks. The results indicate that a one unit increase in the value of agency banking transaction increases the non – interest income by ksh. 0.066 or equivalent of ksh 66,000 holding other factors constant. This indicates that the non - interest revenue arising from use of agency banking contributes a sizeable share of the non – interest income among the Kenyan banks. To determine the significance of the effect of agency banking on bank non – interest income, we rely on the t – value and the respective p – value. The t – value is 4.36 which is greater than 1.96 value for z – distribution. In addition, the respective p – value is 0.000. This implies

that at 5 percent level of significance, the effect of agency banking on bank non – interest income is significant.

On the mobile banking front, the results indicate that mobile banking has a positive effect on the bank non – interest income levels among the Kenyan banks. The results indicate that a one unit increase in the value of mobile banking transaction increases the non – interest income by ksh. 0.535million or equivalent of ksh 53,500 holding other factors constant. This indicates that the non - interest revenue arising from use of mobile banking contributes a sizeable share of the non – interest income among the Kenyan banks. To determine the significance of the effect of mobile banking on bank non – interest income, we rely on the t – value and the respective p – value. The t – value is 6.57 which is greater than 1.96 value for z – distribution. In addition, the respective p – value is 0.000. This implies that at 5 percent level of significance, effect mobile banking on bank non – interest income is significant.

On the internet banking front, the results indicate that internet banking has a negative effect on the bank non – interest income levels among the Kenyan banks. The results indicate that a one unit increase in the value of internet banking transaction reduces the non – interest income by ksh. -0.294 million or equivalent of ksh 29,400 holding other factors constant. This indicates that the non - interest revenue arising from use of mobile banking contributes a sizeable share of the non – interest income among the Kenyan banks. To determine the significance of the effect of mobile banking on bank non – interest income, we rely on the t – value and the respective p – value. The t – value is -4.27 which is greater than 1.96 value for z – distribution. In addition, the respective p – value is 0.000. This implies that at 5 percent level of significance, effect mobile banking on bank non – interest income is significant.

Regarding the market share, results indicate that bank market share has a negative effect on the bank non – interest income levels among the Kenyan banks. The results indicate that a

one unit increase in the bank's market share by asset base increases the non – interest income by ksh. 81.494 million holding other factors constant. The t – value and the p – value indicates that at 5 percent level of significance, effect of bank market share is not significant.

The fitted pooled OLS model is as follows:

$$NII = 1135.08 + 0.033\text{A}gencybanking + 0.76Mobilebanking + 0.07Internetbanking - 206.60marketshare + 0.013agency \times mktshare + 0.06mobile \times mktshare + 0.012\,\text{int}\,ernet \times mktshare$$

Further, the pooled regressions model was estimated considering the moderating effect of the bank market share among the financial innovation variables. The results are presented in table 18.

Table 18
Pooled OLS regression model results with moderating effects

Non-interest income	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Agency banking	-0.188	0.144	-1.30	0.193	-0.472	0.096	
Mobile banking	0.539	0.158	3.41	0.001	0.228	0.85	***
Internet banking	0.225	0.136	1.65	0.099	-0.042	0.493	*
Market share	101.31	67.671	1.50	0.135	-31.74	234.364	
Agency ×market share	0.024	0.014	1.74	0.083	-0.003	0.052	*
Mobile ×market share	0.005	0.016	0.29	0.769	-0.026	0.036	
Internet ×market share	-0.055	0.013	-4.20	0.000	-0.081	-0.029	***
Constant	588.409	222.405	2.65	0.008	151.118	1025.7	***

Mean dependent var	1869.654	SD dependent var	3729.496
R-squared	0.368	Number of obs	390
F-test	31.809	Prob > F	0.000
Akaike crit. (AIC)	7357.407	Bayesian crit. (BIC)	7389.136

**** p<.01, ** p<.05, * p<.1*

With the moderating effect of the bank markets share, agency banking was found to have a negative effect on bank non – interest income with one unit increases in the value of agency

banking transaction found to reduce non – interest income by Ksh 0.188 million holding other factors constant. However, the effect was found to be insignificant since the t – value is less than 1.96 in absolute terms and the p – value was greater than 5 percent significance level.

However, mobile banking was found to have a positive effect on the non – interest income with one unit increases in the value of mobile banking transaction found to increase non – interest income by Ksh 0.539 million holding other factors constant. Significant effect was reported since the t – value is greater than 1.96 in absolute terms and the p – value was less than 5 percent significance level. Similar results were reported for internet banking though the effect was insignificant.

Looking at the moderating effect, the interaction between bank market share and value of agency banking transactions was found to have a positive effect on the non – interest income. However, the effect at 5 percent level of significance, was found to be insignificant. Similarly, the interaction between bank market share and value of mobile banking transactions was found to have a positive effect on the non – interest income. However, the at 5 percent level of significance, the effect was found to be insignificant. However, the interaction between bank market share and value of internet banking transactions was found to have a negative effect on the non – interest income. However, at 5 percent level of significance, the effect was found to be significant.

The fitted pooled OLS model with moderating variable is as follows:

$$NII = 588.40 - 0.188\text{Agency banking} + 0.539\text{Mobile banking} + 0.225\ \text{Internet banking} + 101.3\ \text{market share} + 0.024\text{Agency} \times \text{market share} + 0.005\text{Mobile} \times \text{market share} - 0.055\text{Mobile} \times \text{market share}$$

Random effects model

Random effect model was estimated without the moderating effect of bank market share. The results are presented in table 19. From results, agency banking was found to have a positive effect on the bank non – interest income levels among the Kenyan banks.

Table 19
Random effects regression model results without moderating effect

Non – interest income	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Agency banking	0.097	0.014	7.06	0.000	0.07	0.123	***
Mobile banking	0.257	0.059	4.36	0.000	0.141	0.372	***
Internet banking	0.099	0.059	1.68	0.092	-0.016	0.214	*
Market share	-232.565	76.218	-3.05	0.002	-381.949	-83.18	***
Constant	1441.939	459.41	3.14	0.002	541.512	2342.366	***

Mean dependent var	1869.654	SD dependent var	3729.496
Overall R-squared	0.213	Number of obs	390
Chi-square	262.919	Prob > chi2	0.000
R-squared within	0.433	R-squared between	0.102

**** p<.01, ** p<.05, * p<.1*

The results indicate that a one unit increase in the value of agency banking transaction increases the non – interest income by ksh. 0.097 million or equivalent of ksh 97,000 holding other factors constant. This indicates that the non - interest revenue arising from use of agency banking contributes a sizeable share of the non – interest income among the Kenyan banks. To determine the significance of the effect of agency banking on bank non – interest income, we rely on the t – value and the respective p – value. The t – value is 7.06 which is greater than 1.96 value for z – distribution. In addition, the respective p – value is 0.000. This implies that at 5 percent level of significance, effect agency banking on bank non – interest income is significant.

On the mobile banking front, the results indicate that mobile banking has a positive effect on the bank non – interest income levels among the Kenyan banks. The results indicate that a one unit increase in the value of mobile banking transaction increases the non – interest income by ksh. 0.257 million or equivalent of ksh 257,000 holding other factors constant. This indicates that the non - interest revenue arising from use of mobile banking contributes a sizeable share of the non – interest income among the Kenyan banks. To determine the significance of the effect of mobile banking on bank non – interest income, we rely on the t – value and the respective p – value. The t – value is 4.36 which is greater than 1.96 value for z – distribution. In addition, the respective p – value is 0.000. This implies that at 5 percent level of significance, effect mobile banking on bank non – interest income is significant.

On the internet banking front, the results indicate that internet banking has a positive effect on the bank non – interest income levels among the Kenyan banks. The results indicate that a one unit increase in the value of internet banking transaction increases the non – interest income by ksh. 0.099 million or equivalent of ksh 99,000 holding other factors constant. This indicates that the non - interest revenue arising from use of mobile banking contributes a sizeable share of the non – interest income among the Kenyan banks. To determine the significance of the effect of mobile banking on bank non – interest income, we rely on the t – value and the respective p – value. The t – value is 1.68 which is less than 1.96 value for z – distribution. In addition, the respective p – value is 0.092. This implies that at 5 percent level of significance, effect mobile banking on bank non – interest income is insignificant given that the p –value is greater than 5 percent significance level.

The fitted random effects model without moderating variable is as follows:

$$NII = 1441.9 + 0.097\text{Agency banking} + 0.257\text{Mobile banking} + 0.099\ \text{Internet banking} - 232.5\ \text{market share}$$

Further, the random effects regressions model was estimated considering the moderating effect of the bank market share among the financial innovation variables. The results are presented in table 20.

Table 20
Random effects regression model results with moderating effect

Non – interest income	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Agency banking	-0.058	0.122	-0.48	0.632	-0.296	0.18	
Mobile banking	0.792	0.125	6.32	0.000	0.547	1.038	***
Internet banking	0.067	0.092	0.73	0.465	-0.113	0.247	
Market share	-70.667	79.642	-0.89	0.375	-226.762	85.428	
Agency ×market share	0.014	0.011	1.27	0.204	-0.008	0.035	
Mobile ×market share	0.056	0.012	4.56	0.000	-0.08	-0.032	***
Internet ×market share	0.004	0.01	0.41	0.682	-0.016	0.025	
Constant	793.02	463.524	1.71	0.087	-115.471	1701.511	*

Mean dependent var	1869.654	SD dependent var	3729.496
Overall r-squared	0.230	Number of obs	390
Chi-square	319.873	Prob > chi2	0.000
R-squared within	0.486	R-squared between	0.102

**** p<.01, ** p<.05, * p<.1*

With the moderating effect of the bank markets share, agency banking was found to have a negative effect on bank non – interest income with one unit increases in the value of agency banking transaction found to reduce non – interest income by Ksh 0.058 million holding other factors constant. However, the effect was found to be insignificant since the t – value is less than 1.96 in absolute terms and the p – value was greater than 5 percent significance level.

However, mobile banking was found to have a positive effect on the non – interest income with one unit increases in the value of mobile banking transaction found to increase non – interest income by Ksh 0.792 million holding other factors constant. Significant effect is

reported since the t – value is greater than 1.96 in absolute terms and the p – value was less than 5 percent significance level. Similar results were reported for internet banking though the effect was insignificant.

Looking at the moderating effect, the interaction between bank market share and value of agency banking transactions was found to have a positive effect on the non – interest income. However, at 5 percent level of significance, the effect was found to be insignificant. Similarly, the interaction between bank market share and value of mobile banking transactions was found to have a positive effect on the non – interest income. At 5 percent level of significance, the effect was found to be significant. Further, the interaction between bank market share and value of internet banking transactions was found to have a positive effect on the non – interest income though the effect was insignificant.

The fitted random effects model with moderating variable is as follows:

$$NII = 793.02 - 0.058\text{Agency banking} + 0.792\text{Mobile banking} + 0.067\ \text{Internet banking} - 232.5\ \text{market share} + 0.014\text{Agency} \times \text{market share} + 0.056\text{Mobile} \times \text{market share} + 0.004\text{Mobile} \times \text{market share}$$

Effect of agency banking on the non – interest income among commercial banks

Based on the regression models results, the model selection test found that fixed effects is the most appropriate model for the study. Based on the fixed effects model, it is evident that agency banking has a positive and significant effect on bank non – interest income. The moderating effect of the bank market share on agency banking have insignificant effect on the bank's non – interest income.

In Malaysia, Bakar and Tahir (2019) examined agency banking – profitability nexus among the Malaysia commercial banks. The study was conducted for 2001-2006 with the Multiple linear regression and artificial neural network applied to predict the expected bank

profitability levels. The sample size of the study was 13 Malaysian commercial banks. In the study, bank financial performance was measured using bank's annual return on assets. The end finding of the study was that Malaysian banks' profitability is positively and significantly determined by the number and the value of agency banking transactions.

In the African context, Nezianya and Izuchukwu (2014) conducted a study on agency banking – commercial banks nexus in Nigeria. Using a descriptive survey research design, the study found a positive and significant relationship between non – interest income and agency banking. Similar study was conducted by Oboro and Ukolobi (2021) among the Nigerian banks' performance. The study sought to test four hypotheses that were used to proxy agent banking which are: agent branch network expansion, agent account opening, agent withdrawal transactions, and agent deposits transactions while bank turnover/income was used to measure bank performance. A multivariate analysis was adopted and estimated using Statistical Package for Social Sciences. The study found that agent branch network expansion, agent account opening, agent withdrawal transactions, and agent deposits transactions contribute meaningfully to bank profitability among the Nigerian banks that have adopted agency banking model.

In Kenyan context, Karimi (2018) analysed agency banking model among the Kenyan commercial banks. The study applied descriptive research design on 18 Equity bank agents that have adopted the agent banking model. The study found that with the adoption of agency banking, equity bank had not significantly reduced the general administration costs especially the operating costs. In this case, the operation and transaction costs were found to be substantially high even for agency banking. However, the study found that, there were security measures win place to guard customers' transactions though a need for improvement was cited.

In addition, Ogutu and Fatoki (2019) explored how bank profitability is affected by electronic banking platform. The study covered 11 NSE listed commercial banks in Kenya. Quantitative research design was applied with the panel data analysis being relied upon for empirical analysis. The study relied on secondary data that was extracted from CBK banking supervisory reports. A strong positive effect of agency banking on bank's financial performance of listed commercial banks in Kenya is reported.

Effect of mobile banking on the non – interest income among commercial banks

Regarding the mobile banking, the results found that based on the fixed effects model, mobile banking has a positive and significant effect on bank non – interest income. The moderating effect of the bank market share on mobile banking have a positive and significant effect on the bank's non – interest income. The study findings concur with Nader (2011) who examined the effect of mobile banking technology on the profitability of Saudi Arabia commercial banks. The study covered a period from 1998 to 2007. From the study findings, phone banking was found to have a positive effect on profit efficiency among the Saudi banks.

In African context, Bagudu, Khan and Abdul-Hakim (2017) mobile banking and financial performance of commercial banks in Nigeria. The sample size for the study was 22 commercial banks selected via simple random sampling. Upon estimating the regression model, the model estimate revealed that mobile banking positively and significantly affects profitability of Nigerian commercial banks. Based on the study findings, the study recommended for increased roll – out of the mobile banking platforms among the Nigerian commercial banks.

In Rwanda, Harelimana (2017) examined how mobile banking platformed affected the financial performance of financial institutions. The study adopted a case study of Unguka

Microfinance bank. The study utilized both the quantitative and qualitative research methods. The study conclusions were that mobile banking products offered by Unguka microfinance bank improved the revenue of Unguka ltd in the previous three years. The key services offered through mobile banking platform that significantly affected the banks revenues were found to be accounts funds transfers, payment of utility bills, ordering cheque books as well as ordering for bank statements.

In the Kenyan context, Kathuo, Rotich and Anyango (2015) studied how performance of banking institutions is influenced by adoption of mobile banking. The study was underpinned on the realization the mobile banking in the recent past years has been heavily applied in the provision of financial services in Kenya especially on transactions regarding accounts funds transfer and payments of utility bills. The study found that mobile banking has improved efficiency in provision of banking services as well as the bank revenues.

Further, Bochaberi and Omagwa (2021) studied the mobile banking and financial performance of selected commercial banks in Kenya. The study concentrated on selected commercial banks, that is, Equity bank Kenya limited, Co-operative bank of Kenya limited, KCB bank Kenya Limited and Family bank Kenya limited. The study implemented purposive sampling where the respondents focused on provided the data that was required. The study also uncovered that mobile banking is reliable to customers, enables the bank to reach the most unbanked people, is safe and affordable, it is efficient and increases the number of transactions in commercial banks.

Effect of internet banking on the non – interest income among commercial banks

Lastly, regarding the internet banking, the fixed effect model results indicate that internet banking has a positive effect on the bank's non – interest income. The effect, at 5 percent level of significance, was found to be significant. However, the moderating effect of the bank

market share on internet banking though positive, it was found to be insignificant. This finding agrees with Gündoğdu and Taşkin (2017) who analysed how bank profitability among Turkish commercial banks is affected by online banking. The study period was 2006Q1 and 2015Q2. Simple regression analysis was applied for empirical data analysis. The model estimates found the financial innovation positively affect Turkish commercial banks' net interest margin.

Similarly, Lasmini et al, (2019) studied banks' profitability and financial innovation in Indonesia for 2014-2018 period. Bank profitability was measured by Return on Equity with financial innovation being proxied by mobile and internet banking. The findings were that banks profitability is positively significantly correlated to the value of mobile and internet banking undertaken by a bank in Indonesia.

Further, in Bangladesh, Hossain (2021) conducted a study on the public – owned banks. The study relied on the panel data analysis with pooled OLS being the most preferred empirical estimation model. The study findings were contrary to other study findings in that internet banking was found to adversely affect bank profitability due to the perceived internet frauds likely to be linked to internet banking. This finding revealed the possibilities behind the low uptake of internet banking among the bank customers in Bangladesh.

From African context, Agboola (2016) analysed the level of adoption, and the effect internet banking has had in Nigeria. The study found the Nigerian banks are leveraging on the technology to offer financial services to their customers in addition to development of new banking products. This revealed a high degree of adoption and utilization of technology in commercial banking in Nigeria. The result of this trend was found to be reduced cost of operations, reduced cost of financial services provision as well as increased bank customer base. This in the long run has a positive effect on the banks' financial performance.

In Nigeria, Okonkwo, Obinozie, and Echekoba (2015) examined the effect of financial innovation specifically the internet banking and ATM usage on performance on Nigerian Commercial Banks' profitability. The study focused on the 11 Commercial for 2001 – 2013 period. Application of ordinary least square regression model found that adoption of internet banking increased banks' profitability performance mainly the Return on Equity. However, investment in ATMs was found not to really improve banks' performance.

In Kenyan context, Alubisia, Githii and Mwangi (2018) investigated how Internet, Mobile banking, of ATMs, Cards usage non-interest income of commercial banks. Then study relied on descriptive research design was used. The study found that technology based financial innovations majorly affected non-interest income in Kenya.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter presents the summary, conclusion, and recommendations of the study. Specifically, the chapter presents summary of the findings after data analysis in line with the study variables. In addition is the coverage of the study conclusions arising from the summary of the findings. Lastly, are the policy recommendations drawn from the study findings.

5.2 Summary

From the study findings it is evident that the three financial innovations covered in the study have a positive effect on the bank's non – interest income. Agency, mobile and internet banking were found to positively affect bank's non – interest income among the Kenyan banks. However, upon moderation of the bank market share, the moderating effect was found to have insignificant effect on bank's non – interest income.

5.2.1 Agency banking and bank non – interest income.

Based on the regression models results, the model selection test found that fixed effects is the most appropriate model for the study. Based on the fixed effects model, it is evident that agency banking has a positive and significant effect on bank non – interest income. The moderating effect of the bank market share on agency banking have insignificant effect on the bank's non – interest income. This could be explained by the increasing number of bank active agents over years following the launch of the agency banking in Kenya. Commercial

banks could be adopting agency banking in attempt to transfer operation risks to the agents in areas whereby banks are not willing to operate physical bank branches.

Secondly, with the increased operational costs, commercial banks could be preferring agency banking top cut down on the physical branch operating costs hence informing the significant effect of agency banking on bank non – interest income. Further with the increased competition among the commercial banks, banks are reviewing ways of cutting down on their operation costs. Registration of the banks agents in remotes areas to undertake deposits collection, bills payments, checking account balances among other services without necessarily having to visit the banks have proved viable.

5.2.2 Mobile banking and bank non – interest income.

Regarding the mobile banking, the results found that based on the fixed effects model, mobile banking has a positive and significant effect on bank non – interest income. The moderating effect of the bank market share on mobile banking have a positive and significant effect on the bank's non – interest income. The positive and significant effect mobile banking on non – interest income could perhaps infer into increased penetration of the mobile banking ion the advent of digital lending platforms by non – bank institutions. As a result, commercial banks could have responded by setting up respective mobile banking platform to secure their customer base and address competition arising from the fintechs.

In addition, the positive effect of mobile banking on bank non – interest income could be explained by the increased mobile phone access by large portion of the population. This could make it easier for the banks to us the mobile phone as a platform to offer banking services. Further, given the ability of the banks to use telecommunication data to assess the behaviour of the users from the consumers' point of view, commercial banks see a potential

in setting up mobile banking platform to take advantage of large data in the telecommunications to develop financial products that are target population tailor made.

5.2.3 Internet banking and bank non – interest income.

Regarding the internet banking, the fixed effect model results indicate that internet banking has a positive effect on the bank's non – interest income. The effect at 5 percent level of significance, was found to be significant. However, the moderating effect of the bank market share on internet banking though positive, it was found to be insignificant. The finding of the positive and significant effect of internet banking on bank non – interest income could be informed by increased internet access in the country overtime. This is due to a vibrant expansion of internet infrastructure in the country arising from both fibre optic as well as low-cost mobile internet through mobile phone bundles. Therefore, bank customers with access to internet could opt to use internet banking as opposed to visiting the bank branch physically.

5.3 Conclusions

Based on the study findings it can be concluded the financial innovations in Kenya has positive and significant effect on the banks' non – interest income among the Kenyan banks. In particular, it is evident that agency banking has a positive and significant effect on bank non – interest income. The moderating effect of the bank market share on agency banking have insignificant effect on the bank's non – interest income. Further, regarding the mobile banking, the results found that based on the fixed effects model, mobile banking has a positive and significant effect on bank non – interest income. The moderating effect of the bank market share on mobile banking have a positive and significant effect on the bank's non – interest income. Lastly, regarding the internet banking, the fixed effect model results

indicate that internet banking has a positive effect on the bank's non – interest income. At 5 percent level of significance, the effect was found to be significant. However, the moderating effect of the bank market share on internet banking though positive, it was found to be insignificant.

5.4 Recommendations

Based on study findings, the study postulates several recommendations. First, is the need for the commercial banks to invest in agency banking model by enrolling more active bank agents. This could go a long way in increasing the number of agency transactions which imply increased value of agency banking transactions which will affect the generation of non – interest income through the agency banking fee.

Secondly is the need for commercial banks to develop more mobile banking-based products and services that are customer tailor – made. In this case the banks could explore development of new products and services under the mobile banking platform. In addition, the banks could explore undertaking product and services differentiation of the existing products and services to specifically reach out to the existing customer base. This would increase the value of non – revenue income from mobile banking platform.

Thirdly is the need for the commercial banks to develop more internet banking-based products and services that are customer tailor – made. In this case the banks could explore development of new products and services under the mobile banking platform. In addition, the banks could explore undertaking product and services differentiation of the existing products and services to specifically reach out to the existing customer base. This would increase the value of non – revenue income from mobile banking platform. Further, is the need to sensitize their customers on the products and services under internet banking to

include customers who are not currently using the internet banking to consider using the platform.

In addition, with regard to policy makers mainly the government, the study's findings is crucial in developing policies that promote financial innovations. Policies that hinder financial innovations such as introduction of too many levies and excise duties on the financial innovation platforms are detrimental to the growth of these platforms and therefore are likely to adverse effect non-interest income hence reducing the taxes the banking industry's corporate tax payment to the government.

Lastly regarding the contribution to the existing literature, the study findings offer a platform for future studies to investigate financial innovation products at a granular level and find the extent to which these specific products influence non – interest income contribution at bank level. Future studies could leverage on this study to examine how Mshwari has affected the non – interest income of NCBA bank. Another study could examine how equitel has affected the non – interest income of Equity bank and so on. Such studies could therefore validate on challenge the findings of this study.

5.5 Recommendations for Future Research

The study recommends future studies to conduct similar analysis for listed commercial banks and non – listed commercial banks. Such studies would be crucial in relating the how financial innovations are likely to influence bank non – interest income between listed banks and non-listed banks categories. In this case such studies could offer a valuable explanation as to the question as to whether the effect of financial innovations on the bank non – interest income is statistically significant between the listed banks category and non – listed banks category. In this case the binary variable of being listed or non – listed could be used as a moderating variable. The rationale behind this recommendation is that the listed banks are

likely to be under more pressure to post exemplary financial performance to attract more public investors hence are likely to be early adopters of financial innovations aimed at boosting their revenues generation.

5.6 Limitations of the study

The study had a number of limitations in its undertaking. The study focused on the three forms of financial innovations namely agency banking, mobile banking and internet banking. The study was therefore limited in that it did not focus on other variables or aspects that could be good measures of financial innovations among commercial banks. Such variables or aspects could be annual investments (in terms of value or costs) in Information technology integration by banks. This could be a good measure of bank's passion in investing in modern technology to support innovations aimed at improving efficiency of their operations. However, the challenge was getting this granular data on investment in IT for every bank thus limiting the study in this front.

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APPENDICES

Appendix 1: Study target population

	Bank	Bank tier
1	ABSA Bank Kenya Plc	Tier 1
2	Diamond Trust Bank	Tier 1
3	Equity Bank	Tier 1
4	I & M Bank Ltd	Tier 1
5	KCB Bank Kenya	Tier 1
6	NCBA Bank	Tier 1
7	Stanbic Bank	Tier 1
8	Standard Chartered	Tier 1
9	Co-operative Bank	Tier 1
10	Bank of Baroda	Tier 2
11	Bank of India	Tier 2
12	Citibank N.A.	Tier 2
13	Ecobank Kenya	Tier 2
14	Family Bank	Tier 2
15	HFC Ltd	Tier 2
16	National Bank of Kenya	Tier 2
17	Prime Bank	Tier 2
18	SBM Bank	Tier 2
19	Access Bank Plc	Tier 3
20	African Banking Corporation Ltd	Tier 3
21	Bank of Africa Ltd	Tier 3
22	Consolidated Bank	Tier 3
23	Credit Bank	Tier 3
24	Development Bank of Kenya	Tier 3
25	DIB Bank	Tier 3
26	First Community Bank	Tier 3
27	Guaranty Trust Bank	Tier 3
28	Guardian Bank	Tier 3
29	Gulf African Bank	Tier 3
30	Habib Bank AG Zurich	Tier 3
31	Kingdom Bank	Tier 3
32	Mayfair CIB Bank	Tier 3
33	Middle East Bank	Tier 3
34	M-Oriental Commercial Bank	Tier 3
35	Paramount Bank	Tier 3
36	Sidian Bank	Tier 3
37	Spire Bank	Tier 3
38	UBA Kenya Bank	Tier 3
39	Victoria Commercial Bank	Tier 3