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

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Effect of bank innovations on financial performance of commercial banks in Kenya

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University

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DEDICATION

This thesis is dedicated to my wife Maureen Wanjiru for her love, support and encouragement during the entire duration of the course. Further dedication is to my parents George Ngumi and Beatrice Njambi for their sacrifice in educating me and for teaching me the discipline and value of hard work when I least knew the world. I also dedicate to my children; Sammy Njunji, Sylvia Njambi, Grace Wambura and George Ngumi. This thesis will be a source of motivation for hard work when they become of age.

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ABBREVIATIONS AND ACRONYMS

ATMs	Automated Teller Machines
BCG	Boston Consulting Group
BIS	Bank of International Settlement
CBK	Central Bank of Kenya
EU	European Union
EPS	Earnings Per Share
EFT	Electronic Funds Transfer
FDI	Foreign Direct Investments
GCI	Global Competitiveness Index
GCR	Global Competitiveness Report
GDP	Gross Domestic Product
IBM	International Business Machines
IT	Information Technology
MIS	Management Information System
MTP	Medium Term Plan
POS	Point of Sale
PWC	Pricewaterhouse Coopers
ROE	Return on Equity
ROA	Return on Assets
SMS	Short Message Service
STD	Standard Deviation

UK	United Kingdom
USA	United States of America
WEF	World Economic Forum

ABSTRACT

Kenyan commercial banks have continued to use huge investments in technology based innovations and training of manpower to handle new technologies. The relationship between the growing investment in technology based bank innovations and bank financial performance in Kenya needs to be studied and establish whether innovations have contributed to the financial performance of commercial banks in Kenya. This research studied innovations in the area of automated teller machines, debit and credit cards, internet banking, mobile banking, electronic funds transfer and point of sale terminals. These innovations were studied in relation to their effect on commercial banks' financial performance indicators namely: total income, profit before tax, return on assets and deposits. The main objective of this study was to establish the effect of bank innovations on financial performance of commercial banks in Kenya. The specific objectives were: to establish the effect of bank innovations on income, return on total assets, profitability and customer deposits of commercial bank in Kenya. A descriptive survey design was used while a questionnaire was used to gather primary data. Secondary data was also used to validate the communicative and pragmatic validity of primary data. The target study units for this research were 20 conveniently selected commercial banks. They comprised of 10 listed banks, 2 government owned and 8 private owned commercial banks. The study sample in terms of the respondents covered the senior management only and a sample of 325 was administered with the questionnaire and a 62% response rate was achieved. Statistical analysis was done with the aid of Statistical

Package of Social Sciences (SPSS) software. The findings revealed that bank innovations had statistically significant influence on income, return on assets, profitability and customer deposits of commercial banks in Kenya and tests for significance also showed that the influence was statistically significant. The findings also revealed that mobile phones had a higher moderating effect than internet services on the bank innovations when influencing financial performance of commercial banks in Kenya. Based on the findings of the study, it can be concluded that bank innovations influence financial performance of commercial banks in Kenya positively. It is therefore recommended to the management of commercial banks and the Government continue to explore and implement sustainable business linkages and collaborations with mobile phone service providers as well as the internet service providers as a way of accelerating the penetration of innovations and eventually creating desired impacts in the economy. Banks should leverage on mobiles phones in order to grow their business and customer base. This study did not include all bank innovations and a further study is recommended to include innovations like agency banking, securitization and credit guarantees and their influence on the financial performance of commercial banks.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Innovation consists of firms developing new products or new production processes to better perform their operations, in which case the new products could be based on the new processes (Tufano, 2002; Lawrence, 2010). In the financial services industry, innovation is viewed as the act of creating and popularizing new financial instruments, technologies, institutions and markets, which facilitate access to information, trading and means of payment (Solans, 2003). Lerner (2002) puts forward that innovations are not just critical for firms in the financial services industry, but also affect other companies; for instance, enabling them to raise capital in larger amounts and at a lower cost than they could otherwise and that innovation is an important phenomenon in any sector of a modern economy.

According to Nofie (2011), innovations in the finance sector is the arrival of a new or better product and/or a process that lowers the cost of producing existing financial services. Akamavi (2005) also notes that innovation in the financial services sector has led to recent fundamental changes including; deregulation, increasing competition,

higher cost of developing new products and the rapid pace of technological innovation, more demanding customers and consolidation of corporations.

Financial innovation has been an integral component of economic activity for several millennia (Goetzmann, 2009). About six thousand years ago, the Sumerian city of Uruk blossomed as tradable debt contracts emerged to facilitate a diverse assortment of inter-temporal transactions underlying increased specialization, innovation, and economic development (Goetzmann, 2009). In ancient Rome, private investors steadily developed all of the features of limited liability companies, including freely traded shares, an active stock exchange, and corporations that owned property and wrote contracts independently of the individual shareholders. The creation of these corporations eased the mobilization of capital for innovative, large-scale mining technologies (Malmendier, 2009). Further, Malmendier (2009) indicates that to finance the construction of vast railroad systems in the 19th and 20th centuries, financial entrepreneurs developed highly specialized investment banks, new financial instruments, and improved accounting systems to foster screening by distant investors.

Another profound influence on the provision of financial services has been the huge advance in information technology and communication (Heikkinen and Korhonen 2006). Hamilton, Nigel and Adrian (2007) emphasise that the ability to assimilate data and to perform complex calculations has helped market practitioners to develop new financial products that decompose and repackage different components of financial risk.

These new products can be matched more closely to the demands and risk preferences of both investors and borrowers and thus improve the completeness of financial markets. The innovation process has been underpinned by the widespread and ready electronic access to news and information on economic and financial developments and on market responses.

With the deepening of the reform process, Chinese commercial banks' traditional businesses operations mode 'the wholesale credit operations' have been changing and the ratio of commercial banks' retail businesses have been increasing. For example the Bank of China as an example, during 2006-2007, the growth rate of retail business was 250%, which was 2.5 times of the growth rate of wholesale business at the same period. One of the important reasons for this change is innovation which includes innovation in business philosophy, management, procedure, product, promotion and scientific and technology (Yin and Zhengzheng, 2010).

Financial innovations arise due to several reasons (Batiz-Lazo and Woldesenbet, 2006). Gorton and Metrick (2010) and Batiz-Lazo and Woldesenbet (2006) summarize the reasons for the growth of modern financial innovation as; reduction in bankruptcy costs, tax advantages, reduction in moral hazard, reduced regulatory costs, transparency and customization. A highly turbulent environment leads to successful innovation creating a unique competitive position and competitive advantage and lead to a superior

performance (Roberts and Amit, 2003). This can only be maintained by ceaseless innovation and improvement of the product and the process (Porter, 2004).

In a study on the banking sectors of 11 Latin American countries, Yildirim and Philippatos (2007) stipulate that rivalry between banks pushes the banks to engage in a differentiation processes of the products they supply, and can stimulate financial innovation. Yildrim and Philippatos (2007) find that a high degree of foreign investment in banks' capital is associated with a high level of competitiveness. This improves the quality and differentiation of their products and stimulates financial innovation by introducing more modern skills, management techniques and technologies. Size also makes it easier to diversify business risk by starting up a variety of innovative projects (Corrocher, 2006). Anbalagan (2011) finds that some types of financial innovations are driven by improvements in computer and telecommunication technology and argues that for most people the creation of the Automated Teller Machines was greater financial innovation than asset backed securitization.

Ferreira, Manso, and Silva (2010) found that private instead of public ownership spurs innovation. Empirical evidence using United States data shows that laws (Fan and White, 2003; Armour and Cumming, 2008; and Acharya and Subramanian, 2009), corporate governance (Subramanian, and Subramanian, 2009 and Chemmanur and Tian, 2010), capital structure (Atanassov, Nanda, and Seru, 2007), stock liquidity (Fang, Tian, and Tice, 2010), product market competition (Aghion, Bloom, Blundell, Griffith and

Howitt, 2005), investors' attitude towards failure (Tian and Wang, 2010), and institutional ownership (Aghion, Van Reenen, and Zingales, 2009) all influence innovation.

Financial innovations have led to a revolution in the way the banking business is conducted as found by Yin and Zhengzheng (2010) who demonstrates evidence that Chinese commercial banks have moved from the traditional business operation mode; the wholesale credit operations to the retail mode as a result of technological innovations. In India, Pooja and Singh (2009) conclude that internet banks were larger, more profitable, had higher asset quality, lower administrative expenses and were more efficient compared to the non-internet banks. In Jordan, e-banking resulted to more satisfied customers and better long-term cost saving strategies (Siam, 2006).

Mabrouk and Mamoghli (2010) found that return on assets is positively and significantly associated with the first mover and imitation of product innovations in the Tunisian banking industry. In Ghana over time, technology has increased in importance in Ghanaian banks and has transformed the way banks would serve their clients more conveniently and in the process increase profits and competitiveness while the most revolutionary electronic innovation in Ghana and the world over has been the ATM (Joshua, 2010). In Nigeria, internet banking has resulted to improved e-Commerce and e-Payment services with overall reduction in the amount of currency in circulation (Chiemeke, Evwiekpaefe and Chete, 2006; Ayo, Adebiyi, Fatudimu and Ekong, 2008;

Aderonke and Charles, 2010). In Mauritius, Padachi, Rojid and Seetanah (2008) observe that the two main banks; Mauritius Commercial Bank and the State Bank of Mauritius improved their financial performance on implementation of new technology.

Closer home, Gardachew (2010) document that Ethiopian banks have not been able to achieve efficiency as a result of slow adaptation of technological innovations. In Uganda, adoption of electronic and mobile banking has increased access to banking services (Porteus, 2006). In Kenya, effective use of Information Technology [IT] has led to better utilisation of personnel and organizations assets, increased revenues and increased access to financial services by the general population (Mwania and Muganda, 2011). Ndung'u (2011), concurs that in only four years (2007-2011) of the existence of mobile phone money transfer services in Kenya; four mobile phone operators are in place with 15.4 million customers and over 39,449 agents. Total transactions in 2010 averaged Ksh.2.45 billion a day and Ksh.76 billion a month resulting to lower transaction costs and increased access to financial services. This depicts a very productive market for electronic money transfers (Ndung'u, 2011).

Innovations have posed various challenges to regulators and banks themselves while the breakdown of barriers to the supply of financial products and the large volume of risk pooling and shifting within and across borders has increased the network interconnections within the global financial system (Nigel, Penalver and Nicholas 2008). This has added to the system's complexity and corresponding evolution of financial

system risks posing major challenges for financial institutions and for authorities charged with maintaining financial stability (Nigel, Penalver and Nicholas 2008). New instruments in structured finance develop so rapidly that market infrastructure and systems are not prepared when those instruments came under stress (Mark, 2010).

Pradhah and Mishra (2008), Mario (2007), Noyer (2007) and Iris and Grimes (2003) have pointed out that financial innovations bring risks and uncertainties, particularly with respect to the complexities they pose to the conduct of monetary policy. They concur that central banks operate monetary policy efficiently only in the short term and after sometime, when new instruments are introduced to the market, new challenges emerge which disrupt the conduct of monetary policy. Moreover, new developments in the financial system also require new regulations to ensure the effectiveness of monetary policy is not compromised (Iris and Grimes, 2003). Financial innovation and change in monetary procedures and control follow each other and Central banks have therefore to change their tools, targets and operating procedures from time to time so as to cope with innovation and ensure the sustainability of the financial system (Misati, Njoroge, Kamau and Ouma, 2010).

1.1.1 Kenya Banking Sector

On 30 June 2011, the Kenyan banking sector comprised of 43 commercial banks, 1 mortgage finance company, 6 deposit taking microfinance institutions, 2 credit reference bureaus, 3 representative offices and 124 foreign exchange bureaus (CBK, 2011). The

Kenyan financial sector has undergone tremendous changes in the last two decades (1990-2010). Misati, Njoroge, Kamau and Ouma (2010) for instance, document that financial products have increased, activities and organizational forms have also improved and the overall efficiency of the financial system has increased (CBK 2010). Commercial banks branch network has grown from 530 in 1999 to 1,102 branches by end of June 2011, ATMs increased from 262 to 2,021, number of deposit accounts from approximately 1million with 16,673 staff to 12.8million with 28,846 staff over the same period (CBK, 2011). Consequently, the banking sector productivity score continued to improve where the staff to customers' ratio was 1:444 in June 2011 compared to 1:60 in 1999. Total assets increased from Ksh. 387,371 million in December 1999 to Ksh. 1.9 trillion in June 2011 while customer deposits from Ksh. 235billion to Ksh. 1.4 trillion in June 2011 (CBK, 2011).

The financial sector development in Kenya can be reviewed in three phases (Misati, Njoroge, Kamau and Ouma, 2010). The first phase is the 1970s to early 1980s. During this time, the financial sector was largely dominated by the banking sector, which was characterized by financial repression. The government played a key role in allocating credit to investments by utilizing direct instruments of monetary policy such as interest rate controls, exchange rate controls and allocation of credit to priority sectors among other government restrictions (Misati et al., 2010). The second phase began with the advent of Structural Adjustment Programmes and liberalization policies in the late 1980s and early 1990s. Over this period, relaxation of the interest rate, exchange rate and

capital accounts controls were witnessed. The essence of the financial sector reforms this time was to trigger narrow interest rates spreads, increase availability of financial resources through increased savings, enhance efficiency in credit allocation and increase investments.

Liberalization was also meant to encourage usage of indirect tools in monetary policy formulation. The third phase which is the main focus of this study is the late 1990s to date and can be classified as the era of financial innovation and emerging financial instruments. The period witnessed emergence of new products such as Islamic banking, automatic teller machines (ATMs), plastic money and electronic-money (e-money) amongst others within the banking sector (Misati et al., 2010). Banking industry in Kenya is governed by the Companies Act, the Banking Act, the Central Bank of Kenya Act and other various prudential guidelines issued by the Central Bank of Kenya (CBK). All of the policies and regulations that administer the entire banking industry centers in lifting the controls towards the management and equitable services (Pricewaterhouse Coopers, 2008).

World Economic Forum (WEF) is an independent international organization committed to improving the state of the world by engaging business, political, academic and other leaders of society to shape global, regional and industry agendas. The World Economic Forum's Centre for Global Competitiveness and Performance through its Global Competitiveness Report (GCR) and report series, aims to mirror the business operating

environment and competitiveness of over 140 economies worldwide. The report series identify advantages as well as impediments to national growth thereby offering a unique benchmarking tool to the public and private sectors as well as academia and civil society (World Economic Forum ,2011).

The Global Competitiveness Report *(*GCR*)* remains the flagship publication within the Forum's Centre for Global Competitiveness and Performance. The GCR is based on 12 pillars of competitiveness, providing a comprehensive picture of the competitiveness landscape in countries around the world at all stages of development. The pillars are: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size, business sophistication, and innovation (WEF, 2011).

According to the Global Competitiveness Index (GCI) report of 2011-2012, Kenya ranked 102 overall of the 142 countries ranked with an overall score of 3.8 out of the maximum of 7 putting Kenya among the bottom 50 in terms of competitiveness in the world. Kenya's innovative capacity is ranked 52nd, with high company spending on Research and Development (R&D) and good scientific research institutions collaborating well with the business sector in research activities. The economy is also supported by financial markets that are well developed by international standards (26th

position) indicating potential for growth of the Kenyan banking industry and a relatively efficient labor market (37th position) (WEF, 2011).

The banking industry has been earmarked as a key pillar to the achievement of vision 2030 (a long-term strategy to achieve sustainable growth by year 2030) through increased savings, encouragement of Foreign Direct Investment (FDI), safeguarding the economy from external shocks as well as propelling Kenya to become a leading financial centre in Eastern and Southern Africa. Within the Medium Term Plan (2008-2012) under vision 2030, some of the target areas include development of a safe and reliable payments system that will ensure smooth transfer and settlement of funds between customers and banks as well as between banks. Towards this end, the use of mobile phone networks, internet, payment cards, operational resilience and security will be pursued in order to increase trust, integrity and confidence in the ICT based payment systems (Government of Kenya, 2008).

In comparison with other East African economies, Kenya's banking sector has for many years been credited for its size and diversification. Private credit to GDP, a standard indicator of financial development, was 23.7% in 2008, compared to a median of 12.3% for Sub-Saharan Africa. Based on the same indicator Kenya is ahead of Tanzania which has 12.3% and Uganda with 7.2% (Beck, Demirguc-Kunt and Levine, 2009).

1.2 Statement of the Problem

Despite the undeniable importance of financial innovation in explaining banking performance, the impact of innovation on performance, is still misunderstood for two main reasons, first, there is inadequate understanding about the drivers of innovation and secondly innovations' impact on bank's performance remains lowly untested (Mabrouk and Mamoghli, 2010). A study by De Young, Lang and Nolle (2007) adopt an approach to the innovation performance relationship which does not take into account the antecedents to innovation inside and outside the banking organization, all of which could influence this relationship.

Previous studies like Pooja and Singh (2009), Franscesa and Claeys (2010), Batiz-Lazo and Woldesenbet (2006) and Mwania and Muganda (2011) have produced mixed results regarding the impact of financial innovations on bank performance. Pooja and Singh (2009) and Franscesa and Claeys (2010), in their studies concluded that financial innovations had least impact on bank performance, while Batiz-Lazo and Woldesenbet (2006) and Mwania and Muganda (2011) concluded that financial innovation had significant contribution to bank performance. It is at the center of such mixed conclusions that created and necessitated the need to carry out a study from a Kenyan context to establish the effect of bank innovations on commercial banks' performance.

Kenyan commercial banks have continued to deploy huge investments in technology based innovations and training of manpower to handle the new technologies. Data from

Central Bank of Kenya (2011) indicate that, the number of automated teller machines grew from 166 in 2001 to 2091 in 2010, debit cards increased from 160,000 in 2001 to over 6 million cards by the end of 2010 while mobile banking transactions increased from 48,000 per annum in 2007 to over 250,000 transactions per annum in 2010. Performance of commercial banks in Kenya also grew impressively between years 2001 to 2010 where profit before tax grew from Kshs 2.7 billion in 2001 to Kshs 74 billion in 2010. During the same period, total income grew from Kshs 61billion to Kshs 178 billion while total assets grew from Kshs 425 billion to Kshs 1.7 trillion (CBK, 2011). The relationship between the growing investment in technology based bank innovations and bank financial performance in Kenya needs to be studied. There is need to establish whether innovations have contributed to the financial performance of commercial banks in Kenya.

Lerner and Tufano (2011) in their study on consequences of financial innovations contend that existing empirical evidence and conceptual frameworks can tell more about financial innovation, but there are substantial unanswered questions in the areas of social welfare impact of financial innovations, impact of innovations on financial institutions and a lot of financial innovations research is mainly on case studies. Rafael and Francisco (2007) studied the impact of various regional banking sector developments and innovations during 1986- 2001 in Spain. The study found out that product and service delivery innovations contribute positively to regional Gross Domestic Product (GDP), investment and gross savings growth. These sentiments are shared by

Hendrickson and Nichols (2011), while studying the performance of small banks in the United State with regards to interstate branching and found out that banks perform better when they adopt innovations across their several branches. Based on these studies and the varying gaps in literature, there is need to conduct similar studies in Africa and more so in Kenya where bank innovations have been on the rise in the past decade.

1.3 Objectives

This section outlines the objectives which the study addresses.

1.3.1 General Objective

The main objective of this study was to establish the effect of bank innovations on financial performance of commercial banks in Kenya.

1.3.2 Specific Objectives

The study pursued the following specific objectives;

i) To determine the effect that bank innovations have on total income of commercial banks in Kenya.

ii) To establish the effect that bank innovations have on return on total assets of commercial banks in Kenya.

iii) To establish the effect that bank innovations have on profitability of commercial banks in Kenya.

iv) To determine the effect of bank innovations on customer deposits in Kenyan commercial banks.

v) To establish the moderating influence of mobile phone subscription on financial performance of commercial banks in Kenya.

vi) To establish the influence of internet subscription on financial performance of commercial banks in Kenya.

1.4 Research Hypotheses

This study sought to address the following pertinent research hypotheses;

$H1_1$ Bank innovations have a positive effect on total income of commercial banks in Kenya.

$H1_2$ Bank innovations have a positive effect return on total assets of commercial banks in Kenya.

$H1_3$ Bank innovations have a positive effect on profitability of commercial banks in Kenya.

$H1_4$ Bank innovations have a positive effect on customer deposits in Kenyan commercial banks.

$H1_5$ Mobile phone subscription have positive moderating effect on financial performance of commercial banks in Kenya.

$H1_6$ Internet subscription has positive moderating effect on financial performance of commercial banks in Kenya.

1.5 Justification

The study is relevant to the following stakeholders;

This study is of help to the government of Kenya as it seeks to leverage on technology to grow the financial services sector and enhance financial access and inclusion. One of the key drivers of change in Kenya is information technology and innovations. Through the findings of the study, the government of Kenya is able to appreciate which areas of innovation to support the banking sector by either waiving taxes or other non monetary incentives.

The study findings can help banks in evaluating the importance of financial innovation on their performance in terms of bolstering profitability. Banks, especially commercial ones, are swiftly becoming more aware of the importance of financial innovation in this era and this study adds impetus to knowledge on the link between innovation and performance.

Commercial banks in Africa will learn from this Kenya study and understand the innovations that they can replicate in their businesses in order to improve on their performance. The study findings inform them on which innovations have better link to financial performance and hence save on the costs of conducting cost benefit research in their institutions.

To the scholars, the study is value-added to the existing body of knowledge as it recommends ways for improvement of financial performance by leveraging on technology innovations. Nevertheless, this study serves as a stepping stone for newer research on financial innovation.

1.6 Scope

The study covered 43 commercial Banks licensed by the Central Bank of Kenya. The commercial banks that formed the units of analysis of the study are those that were in operation by close of business of 31st December 2011. The bank innovations used in the study are, automated teller machines, debit and credit cards, point of sale terminals, mobile banking, internet banking and electronic funds transfer. The financial performance measures used are, income, profit before tax, return on assets and customer deposits. Data collection was conducted in the year 2012. The study utilised both primary and secondary data.

1.7 Limitations

Due to time and resource constraints the study only reviewed innovations in the banking industry and therefore did not include other financial sector players such as the stock exchange, insurance, micro finance institutions, Savings and Credit Cooperatives (SACCO's) and pension funds. However this provides an opportunity for further research.

The study experienced an initial slow response from the respondents who complained about the length of the questionnaire. This was mitigated by having constant follow up on phone and physical visits to the respondents' offices by using research assistants.

1.8 Definition of Key Terms

Commercial bank is a financial institution that provides services, such as accepting deposits, giving business loans and auto loans, mortgage lending, and basic investment products like savings accounts and certificates of deposit. The traditional commercial bank is a brick and mortar institution with tellers, safe deposit boxes, vaults and ATMs. However, some commercial banks do not have any physical branches and require consumers to complete all transactions by phone or Internet. In exchange, they generally pay higher interest rates on investments and deposits, and charge lower fees (Business Dictionary, 2011).

Innovation is the application of better solutions that meet new requirements, in articulated needs, or existing market needs. This is accomplished through more effective products, processes, services, technologies, or ideas that are readily available to markets, governments and society ((Boston Consulting Group, 2009).

Automated teller machine (ATM), also known as a Cash Point, Cash Machine, is a computerized telecommunications device that provides the clients of a financial

institution with access to financial transactions in a public space without the need for a cashier, human clerk or bank teller (DeYoung, 2005).

Credit card is any card that may be used repeatedly to borrow money or buy products and services on credit. card that may be used repeatedly to borrow money or buy products and services on credit. Credit cards are issued by financial institutions, retail stores, and other businesses. A credit card offers the card holder revolving credit that can be paid monthly with as little as the required minimum payment. (Francesca and Claeys, 2010).

Debit card is a card which allows customers to access their funds immediately and electronically. Unlike a credit card, a debit card does not have any loan facility (Francesca and Claeys, 2010).

Point of sale (POS) terminal is a retail payment device which; reads a customer's bank's name and account number when a bank card or credit card is swiped (passed through a magnetic stripe reader). It contacts the bank and (if funds are available) transfers or withdraws the customer approved amount and prints a receipt (Business Dictionary, 2011).

Mobile banking is performing banking transactions through a mobile device such as a mobile phone or Personal Digital Assistant (Boston Consulting Group, 2009).

Internet banking is a system which allows individuals to perform banking activities via the internet (Atanassov, Nanda, and Seru, 2007).

Electronic funds transfer is a system of transferring money from one bank account directly to another without any paper money changing hands (Barnes, 2003).

Real time gross settlement (RTGS) is a system for settlement of large-value transactions between banks and other financial institutions (Boston Consulting Group, 2009).

Financial performance is a measure of how well a firm can use assets from its primary mode of business and generate revenues. This term is also used as a general measure of a firm's overall financial health over a given period of time, and can be used to compare similar firms across the same industry or to compare industries or sectors in aggregation. There are many different ways to measure financial performance, but all measures should be taken in aggregation. Line items such as revenue from operations, operating income or cash flow from operations can be used, as well as total unit sales (Business Dictionary, 2011).

Income is revenue for a particular period normally for one year (Dew, 2007).

Profit before tax is a profitability measure that looks at a company's profits before provision of corporate income tax. Profit before tax is the net balance after deducting all

expenses from revenue. It can result to a loss before tax if expenses are higher than revenues (Cicea and Hincu, 2009).

Return on assets is the total resources owned and controlled by a Bank divided by profit before tax (Dew, 2007).

Customer deposit is money placed in a Bank for safe keeping and it is a liability by the Bank owed to the depositor (Business Dictionary, 2011).

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on bank innovations. It discusses the key theories underlying bank innovations, develops a conceptual framework and expounds on the research gaps on bank innovations and financial performance.

2.2 Theoretical Literature Review

A theory is a reasoned statement or group of statements, which are supported by evidence meant to explain some phenomena. A theory is a systematic explanation of the relationship among phenomena. Theories provide a generalized explanation to an occurrence. Therefore a researcher should be conversant with those theories applicable to his area of research (Kombo and Tromp, 2009, Smyth, 2004). According to Trochim (2006) Aguilar (2009), and Tormo (2006), a theoretical framework guides research, determining what variables to measure, and what statistical relationships to look for in the context of the problems under study. Thus, the theoretical literature helps the researcher see clearly the variables of the study; provides a general framework for data analysis; and helps in the selection of applicable research design.

The theories reviewed and which inform the study are, Schumpeter theory of innovation, innovation diffusion theory, task technology fit theory and technology acceptance model. The theories reviewed inform the source of the variables of the study and the interactions between the dependent and independent variables.

2.2.1 Schumpeter Theory of Innovation

Schumpeter (1928) argued that entrepreneurs, who could be independent inventors or R&D engineers in large corporations, created the opportunity for new profits with their innovations. In turn, groups of imitators attracted by super-profits would start a wave of investment that would erode the profit margin for the innovation. However, before the economy could equilibrate a new innovation or set of innovations, conceptualized by Schumpeter as Kondratiev cycles, would emerge to begin the business cycle over again.

Schumpeter (1934) emphasized the role of entrepreneurship and the seeking out of opportunities for novel value generating activities which would expand and transform the circular flow of income, but it did so with reference to a distinction between invention or discovery on the one hand and innovation, commercialization and entrepreneurship on the other. This separation of invention and innovation marked out the typical nineteenth century institutional model of innovation, in which independent inventors typically fed discoveries as potential inputs to entrepreneurial firms.

The author further saw innovations as perpetual gales of creative destruction that were essential forces driving growth rates in a capitalist system. Schumpeter's thinking evolved over his lifetime to the extent that some scholars have differentiated his early thinking where innovation was largely dependent on exceptional individuals/entrepreneurs willing to take on exceptional hazards as an act of will. His later thinking recognized the role of large corporations in organizing and supporting innovation. This resulted in his emphasis on the role of oligopolies in innovation and which later was falsely viewed as the main contribution of his work (Freeman, 1994).

Schumpeter drew a clear distinction between the entrepreneurs whose innovations create the conditions for profitable new enterprises and the bankers who create credit to finance the construction of the new ventures (Schumpeter, 1939). He emphasised heavily that the special role of credit-creation by bankers was 'the monetary complement of innovations' (Schumpeter, 1939). As independent agents who have no proprietary interest in the new enterprises they finance, bankers are the capitalists who bear all the risks (none is borne by the entrepreneurs). That requires having the special ability to judge the potential for success in financing entrepreneurial activities. Schumpeter emphasized that it is just as important to deny credit to those lacking that potential as it is to supply credit to those having it (Schumpeter, 1939).

Schumpeter's brief discussions of historical episodes of innovations in the field of banking might appear to suggest a positive role for financial innovations in financing the

entrepreneurial ventures that produce the primary wave growth spurts. The spread of joint stock banking was cited as one of the most important innovations that occurred in the early 1800s (Schumpeter, 1939). Schumpeter (1939) propositions particularly interesting allusion to innovations in the banking sector is found in Schumpeter's discussion of the banking acts of the 1930s. He stated that the 1933 act introduced important reforms which included the strengthening the Federal Reserve's power to regulate member banks' extension of credit for speculative purposes and the separation of commercial banks and their security affiliates.

For all his insight on the role of innovation, Schumpeter still did not really explain the source of innovation. He was able to point to its importance and its role in timing economic cycles but did not address its source. This rather interestingly allowed Keynesian economics to argue that levels of investment were the cause of innovation. It was not until the 1960s that economists would begin again to search for the source of innovation. The importance of innovation was highlighted by researchers like Abramovitz (1956) and Solow (1957) who were able to demonstrate how little neo-classical economics was able to explain. Based on data on the United States economy from 1909-49, Solow showed that only 12.5 percent of the increase of per capita output could be traced to increased use of capital. This left a surprisingly large 87.5 percent residual that Solow attributed to technical change.

Schumpeter's assertions have been supported by Porter (1992) that innovation is vital for a country's long-run economic growth and competitive advantage. Porter (1992) argues that to compete effectively in international markets, a nation's businesses must continuously innovate and upgrade their competitive advantages. Innovation and upgrading come from sustained investment in physical as well as intangible assets. Financial markets play critical roles in mobilizing savings, evaluating projects, managing risk, monitoring managers, and facilitating transactions.

2.2.2 Innovation Diffusion Theory

According to Dillon and Morris (1996); Rogers (1983 & 2003), the factors which influence the diffusion of an innovation include; relative advantage (the extent to which a technology offers improvements over currently available tools), compatibility (its consistency with social practices and norms among its users), complexity (its ease of use or learning), trialability (the opportunity to try an innovation before committing to use it), and observability (the extent to which the technology's outputs and its gains are clear to see). These elements are not mutually exclusive thus unable to predict either the extent or the rate of innovation diffusion.

Moore and Benbasat (1991) built on the work of Roger (1983), amongst others Tornatsky and Klein (1982) and Brancheau and Wetherbe (1990) and expanded the array of innovation characteristics to seven. Three of the seven innovation characteristics are directly borrowed from Rogers: relative advantage, compatibility, and trialability.

The fourth characteristic, ease of use, is a close relative to Rogers' complexity. It is worth noting that both relative advantage and ease of use are subjective characteristics since they can be viewed differently depending on an individual's perceptions. Fishbein and Ajzen (1980) concur, attitudes towards an object and attitudes regarding a particular behaviour relating to that object can frequently differ. Moore and Benbasat (1991) also derived three further characteristics. While Rogers (1983) included image as an internal component of relative advantage, Moore and Benbasat (1991) found it to be an independent predictor of adoption. Image is the self-perception that adopting an innovation could result in enhanced social status.

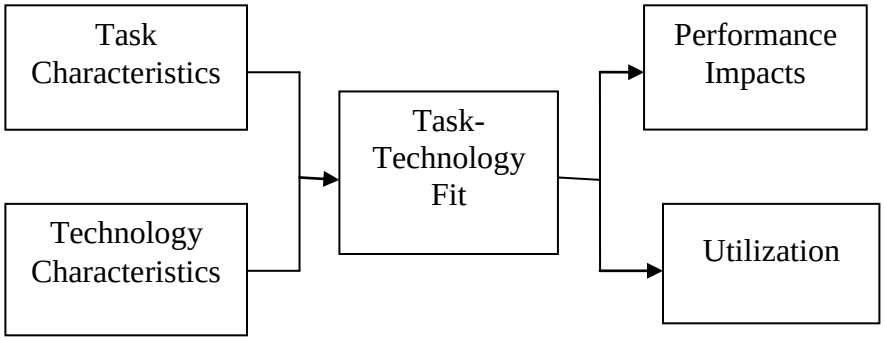
By analyzing Rogers (2003) diffusion of innovation theory through the lens of the Dubin framework, some gaps in the theory emerge (Lundblad and Jennifer, 2003). Organizations are described as a social system, but within organizations, departments or teams can also serve as social systems. Yet the unique issues and elements of departments or teams within a larger organizational context are not addressed in terms of how these boundaries affect the adoption of innovation. In addition, boundaries are not addressed for instances when diffusion of innovation occurs across organizations, such as between schools of a school district or hospitals and clinics within a health care delivery system (Lundblad and Jennifer, 2003). For diffusion of innovation theory in organizations, the only system state defined by the theory is what type of decision-making process is in place for adopting and implementing innovations, identified as optional, collective, authority, and contingent innovation-decisions. Rogers' theory does

not tell us whether the system states of organizations need to be in normal operating mode in order for the theory to apply, or whether the theory holds in all types of organizations or only in certain types (Lundblad and Jennifer, 2003).

Specifically, the theory begins to describe the innovation-decision process within organizations, but not to the level of addressing whether and how the characteristics of an innovation interact to affect its adoption within organizations, or whether organizational type, size, or industry affect adoption. In addition, while there is an innovation-decision process described for individuals and within organizations, there is no description of how the variables interact when innovations are diffused across organizations (Lundblad and Jennifer, 2003).

2.2.3 Task Technology Fit (TTF) Theory

This theory contends that it is more likely to have a positive impact on individual performance and be used if the capabilities of Information Communication and Technology (ICT) match the tasks that the user must perform (Goodhue and Thompson, 1995). Goodhue and Thompson (1995) mention the factors that measure task-technology fit as; quality, locatability, authorization, and compatibility, eases of use/training, production timeliness, systems reliability and relationship with users. The model is useful in the analysis of various context of a diverse range of information systems including electronic commerce systems and combined with or used as an extension of other models related to information systems outcomes.



(Source: Goodhue and Thompson, 1995)

Figure 2.1: Task-Technology Fit Diagram/Schematic of Theory

According to the theory of task-technology fit, the success of an information system should be related to the fit between task and technology, whereby success has been related to individual performance (Goodhue and Thompson, 1995) and to group performance (Zigurs and Buckland, 1998). For group support systems, a specific theory of task-technology fit was developed (Zigurs and Buckland, 1998) and later tested by (Zigurs, Buckland, Connolly and Wilson, 1999) and detailed the requirements of group support systems to fit group tasks. For mobile information systems, task-technology fit has been shown to be generally relevant, but more specific questions regarding the applicability of task-technology fit to mobile information systems remain unanswered (Gebauer and Shaw, 2004).

The theory of task-technology fit maintains that a match between business tasks and information technology is important to explain and predict the success of information

systems (Goodhue and Thompson, 1995; Zigurs and Buckland, 1998). For various scenarios of task and technology, statistical significance has been established of a positive association between task-technology fit and information system success measures, such as use (Dishaw and Strong, 1999), and impact on individual performance (Goodhue and Thompson, 1995) and on group performance (Zigurs et al., 1999). The concept of task-technology fit promises to help identify aspects that are critical to support a given business task, and can, thus, contribute to the success of technology innovations (Junglas and Watson, 2006). One such innovation is represented by mobile technology to support an increasingly mobile workforce (Barnes, 2003).

Upon applying the theory of task-technology fit to mobile information systems, however, it becomes apparent that previous studies have focused mainly on the functionality that is provided by the technology, and have paid less attention to the context in which the technology is being used (Perry, O'Hara, Sellen, Brown, and Harper, 2001). At the same time, however, usability studies suggest that the use-context may have a non-trivial impact on the conditions of task-technology fit (Perry et al., 2001). First, it can be observed that non-functional features, such as weight and size, play a more prominent role in mobile than in non-mobile use contexts (Gebauer and Ginsburg, 2006; Turel, 2006). Second, functional requirements may shift as business tasks are often performed differently in mobile versus non-mobile use contexts (Gebauer and Shaw 2004; Perry et al., 2001; Zheng and Yuan, 2007). As a result of the observable changes of business tasks and related technology requirements, it becomes necessary to

assess the applicability of the theory of task-technology fit to mobile technologies and mobile use contexts, and to carefully determine the needs for theory adjustments and extensions (Junglas and Watson, 2006; Lyytinen and Yoo, 2002).

2.2.4 Technology Acceptance Model

Theories and models used in studies related to the innovations, acceptance and use of new technology are many. For instance, focusing on the technological issues (Davis 1989) advances the Technology Acceptance Model (TAM). This model relates the individuals' behavioural intentions and his/her ICT use. It is suggested that, the actual behaviour of a person is determined by his behavioural intention to use, which is in turn influenced by user's attitude toward and perceived usefulness of the technology. However attitude and perceived usefulness are both determined by ease of use. Adopting the TAM model requires the understanding of end-users requirements regarding usefulness and user friendliness (Pedersen, Leif, Methlie and Thorbjornsen, 2002). From this model, usefulness and user friendliness affect users' attitudes towards any service (ibid.). Davis (1989; 1993), thus suggest that it is important to value user requirements based on perceived usefulness and the user friendliness of the technology rather than other objective measure. Critiques of this model are directed to its inclination to the technological/technical aspects of the technology in question ignoring other factors such as social aspect of the users. In practice, constraints such as limited ability, time, environmental or organizational limits and unconscious habits will limit the freedom to act.

Wang, Wang, Lin and Tang (2003) were interested to identify the factors that determine acceptance of internet banking by the users. According to the Technology Acceptance Model (TAM), perceived ease of use and perceived usefulness constructs are believed to be fundamental in determining the acceptance and use of various Information Technology (IT). These beliefs may not fully explain the user's behaviour toward newly emerging IT, such as internet banking. Using the TAM as a theoretical framework, Wang et al. (2003) introduces "perceived credibility" as a new factor that reflects the user's security and privacy concerns in the acceptance of internet banking. Wang et al. (2003) examines the effect of computer self-efficacy on the intention to use internet banking. The results strongly support the extended TAM in predicting the intention of users to adopt internet banking. It also demonstrates the significant effect of computer self-efficacy on behavioural intention through perceived ease of use, perceived usefulness, and perceived credibility (Wang et al., 2003).

2.2.5 Financial Performance of Commercial Banks

Performance measurement and reporting is now widespread across the private sector as well as public sector of many industrialized and industrializing countries (Williams, 2003). The common tool that is used for this process, key performance indicators (KPIs), have been argued to provide intelligence in the form of useful information about a public and private agency's performance (Williams, 2003). Scholars like Modell (2004), Moynihan (2005), Vakkuri and Meklin (2006) have maintained that the implementation of performance measurement systems possess important symbolic value.

KPIs are viewed as a good management device and a socially constructed tool that makes sense (DeKool, 2004). The fact that KPIs tend to be quantitative has helped to promote their image of objectiveness and rationality. The image of KPIs is further enhanced by their widespread application across the many sectors of many countries. The importance of performance measurement is noted by Ingraham (2005) that it is important to expect that citizens see and understand the results of organisational programs.

Cicea and Hincu (2009) state that commercial banks represent the core of the credit for any national economy. In turn, the credit is the engine that put in motion the financial flows that determine growth and economic development of a nation. As a result, any efficiency in the activities of commercial banks has special implications on the entire economy. The management of every commercial bank must establish a system for assessing investment performance which suits its circumstances and needs and this evaluation must be done at consecutive intervals to ensure the achievement of the Bank's investment objectives and to know the general direction of the behavior of investment activity in the past and therefore predict the future.

Profitability offers clues about the ability of the bank to undertake risks and to expand its activity. The main indicators used in the appreciation of the bank profitability are: Return on equity, ROE (Net income / Average Equity), Return on Asset, ROA (Net income /Total assets) and the indicator of financial leverage or (Equity / Total Assets)

(Dardac and Barbu, 2005). The indicators are submitted to observation along a period of time in order to detect the tendencies of profitability. The analysis of the modification of the various indicators in time shows the changes of the policies and strategies of banks and/or of its business environment (Greuning and Bratanovic, 2004)

A commonly used measure of bank performance is the level of bank profits (Ceylan, Emre and Asl, 2008). Bank profitability can be measured by the return on a bank's assets (ROA), a ratio of a bank's profits to its total assets. The income statements of commercial banks report profits before and after taxes. Another good measure on bank performance is the ratio of pre-tax profits to equity (ROE) rather than total assets since banks with higher equity ratio should also have a higher return on assets (Ceylan, Emre and Asl, 2008).

2.3 Conceptual Framework

A concept is an abstract or general idea inferred or derived from specific instances (Kombo and Tromp, 2009, Miles and Huberman, 1994 and Reichel and Ramey, 1987). Unlike a theory, a concept does not need to be discussed to be understood (Smyth, 2004). A conceptual framework is a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation (Kombo and Tromp, 2009). A conceptual framework is a research tool intended to assist a researcher to develop awareness and understanding of the situation under scrutiny and to communicate it. When clearly articulated, a conceptual framework has potential

usefulness as a tool to assist a researcher to make meaning of subsequent findings. It forms part of the agenda for negotiation to be scrutinized, tested, reviewed and reformed as a result of investigation and it explains the possible connections between the variables (Smyth, 2004).

A conceptual framework for the present study shows the relationship of bank innovations on financial performance of Commercial Banks in Kenya and has been depicted in Figure 2.2 below. Figure 2.2 conceptualizes that bank innovations (Automatic Teller Machines, Debit and Credit cards, Point of Sale (POS) terminals, mobile banking, internet banking and electronic funds transfer) influence on financial performance of the commercial banks ascertained through the total income, profitability, return on assets and customer deposits.

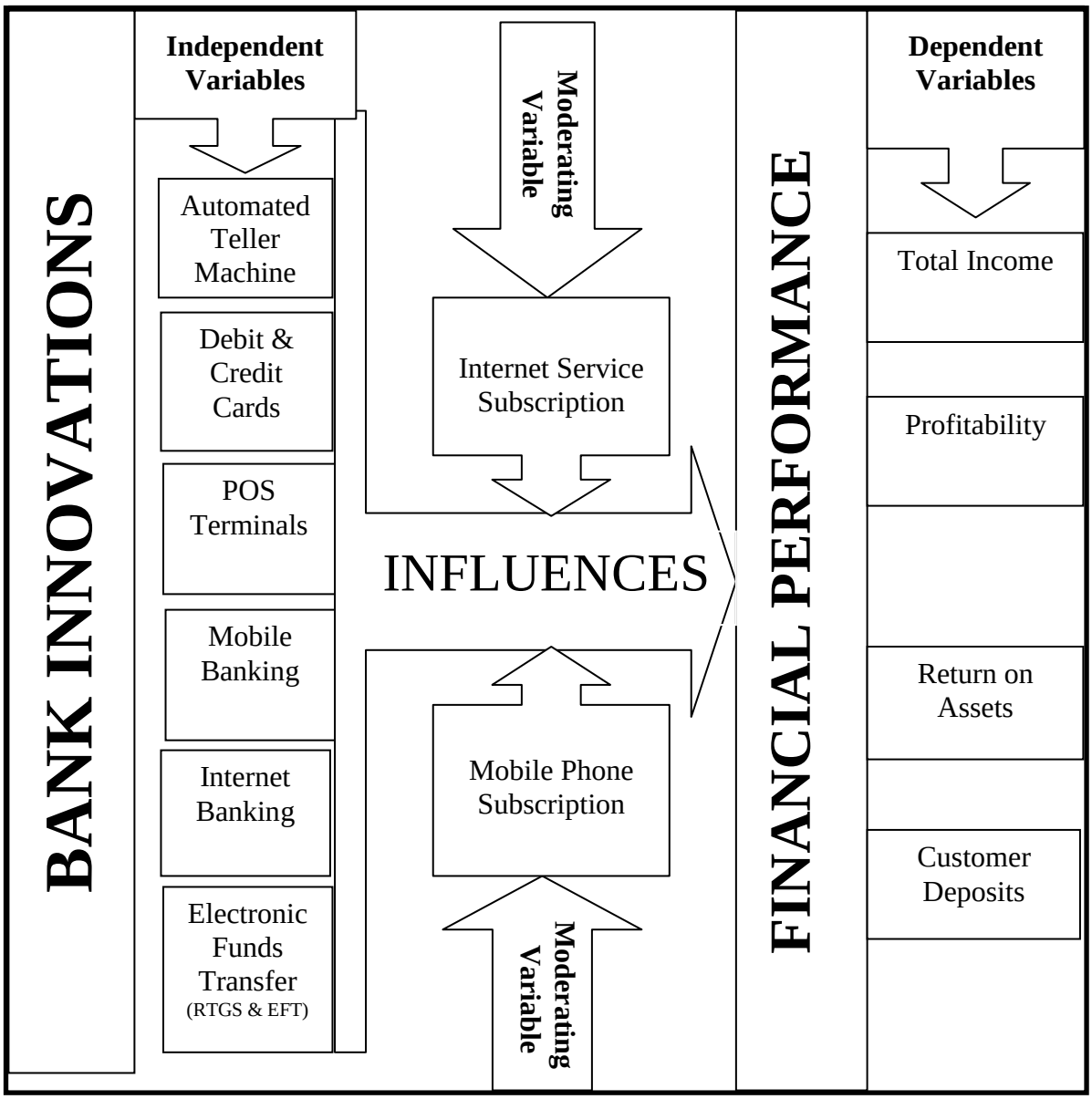


Figure 2.2: Conceptual Framework

2.4 Empirical Literature Review

Empirical literature review is a directed search of published works, including periodicals and books, that discusses theory and presents empirical results that are relevant to the topic at hand (Zikmund et al., 2010). Literature review is a comprehensive survey of previous inquiries related to a research question. Although it can often be wide in scope, covering decades, perhaps even centuries of material, it should also be narrowly tailored, addressing only the scholarship that is directly related to the research question (Kaifeng and Miller, 2008). Through the use of a systematic approach to previous scholarship, literature review allows a researcher to place his or her research into an intellectual and historical context. In other words, literature review helps the author declare why their research matters (Kaifeng and Miller, 2008).

2.4.1 Bank Innovations and Income

In financial services, the lifeblood of a bank is determined by how well it can gather funds from the customers at the lowest cost; buy money, do something with the money, and then sell it to their profit (Dew, 2007). Financial innovations enable firms from all sectors to raise money in larger amounts and at a cheaper cost than they could elsewhere (Lerner, 2006). It becomes obvious that there is a tendency for a bank to minimize costs and expenditures. The other major benefit from e-banking innovation is fee based income (Dew, 2007). If a bank joins in an ATM network, it can generate income from other banks' customers that use its ATM machines or from third parties that cooperate

with it. The more transactions with a third party, the more fee-based income acquired, enforcing the bank to enrich the features of e-banking transactions, such as mobile telephone top-ups, ticketing, paying telephone or electricity bills, house taxes, etc. Joining a certain ATM network will also create customer awareness of that bank and influence the market share (Iftekhar, Schmiedel and Song, 2009).

The relationship between IT expenditures and bank's financial performance or market share is conditional upon the extent of network effect. If the network effect is too low, IT expenditures are likely to (1) reduce payroll expenses, (2) increase market share, and (3) increase revenue and profit (Nadia, Anthony and Scholnick, 2003). The evidence however suggests that the network effect is relatively high in the US banking industry, implying that although banks use IT to improve competitive advantage, the net effect is not as positive as normally expected. In a broader context, the innovation in information technology, deregulation and globalization in the banking industry could reduce the income streams of banks, and thus the strategic responses of the banks, particularly the trend towards mega-mergers and internal cost cutting, are likely to change the dynamics of the banking industry. Given these negative result due to possible network effect, the changing banking environment could still make it insufficient to offset any reduction in income (Nadia, Anthony and Scholnick, 2003).

After developing some innovations, and succeeding, a bank will find new opportunities that could be exploited further and that, in the end, will provide more income for the

bank (Nofie, 2011). Based on the country level retail payment service data from across 27 EU markets, evidence confirms that banks perform better in countries with more developed retail payment services, as measured by accounting ratios and profit and cost efficiency scores (Iftekhar, Schmiedel and Song, 2009). The EU provides a very good testing ground for the link between retail payments and bank performance because the current retail payment infrastructure in the European Union is still fragmented and largely based on traditional national payment habits and characteristics (Kemppainen, 2003 and 2008).This relationship is stronger in countries with more retail payment transaction equipment, like ATMs and POS terminals. Retail payment transaction technology itself can also improve bank performance and heterogeneity among retail payment instruments is associated with enhanced bank performance. Likewise, a higher usage of electronic retail payment instruments seems to stimulate banking business. Additionally, findings reveal that impact of retail services on bank performance is dominated by fee income (Nofie, 2011).

Payment services are an important part of the banking industry, accounting for a significant part of its revenues and operational costs. It is also considered as the backbone of banking activities as it is significantly associated with increased market share of other bank business, e.g. the provision of credit and the evaluation of associated risks (Boston Consulting Group (BCG), 2009). BCG (2009) also reports that payments business accounts for 30-50 percent of bank revenues, and is actually considered the most attractive element of banking business, in terms of income generation, growth

rates, and relatively low capital needs. Hirtle and Stiroh (2007) find a significant link between retail focus by the U.S. banks (retail loan and deposit shares and extent of branching network) and bank stability although such focus also resulted to lower incomes.

Besides the direct impact on bank performance, retail payment transaction technologies have an intensifying effect on the relationship between retail payment services and bank performance. Advanced retail payment transaction technologies will foster innovation and growth in the retail banking sector. This will further create more value associated with retail payment services for banks. On the other hand, if more retail payment transactions have been done through ATMs or POS instead of retail payments offices, banks can be more cost efficient and obtain more income. Innovations of retail payment services have a larger impact on bank performance in countries with a relatively high adoption of retail payment transaction technologies (Iftekhar, Schmiedel and Song, 2009).

ATMs as studied by Massoud and Bernhardt (2002a, 2002b) and McAndrews (2002) consider the possibility that ATM surcharges can impact banks profitability, both directly as well as indirectly through a so-called customer relationship effect. This indirect effect results from a customer at a small bank with relatively few ATMs switching his/her deposit account to a larger bank with a larger number of ATMs in order to avoid paying ATM surcharges. If switching occurs then higher ATM surcharges

should result in an increase in the market share of bank products (e.g. deposits) and profitability of larger banks and a decrease in the market share of deposits and profitability of smaller banks (McAndrews, 2002)

Banks are also earning from innovation led services in a way of commission and annual deductions. The banks charge a certain amount or flat charges or a certain percentage on products and services like ATMs, funds transfer etc. If the eras of traditional banking are compared to the present e-banking eras, the results show that e-banking has contributed positively and proliferated the profits of banks. Banks are gradually transitioning from manual means to the electronic means rather than jumping to electronic banking means. Efficiency has risen as the costs have been reduced; costs of labour, provision of services, time saved, accuracy, reliability and quality of services has improved (Sana, Mohammad, Hassan and Momina, 2011).

Shu and Strassmann (2005) conducted a survey on 12 banks in the US for the period of 1989-1997. They noticed that even though Information Technology has been one of the most essential dynamic factors relating all efforts, it cannot improve banks' earnings. Kozak (2005) investigates the influence of the evolution in Information Technology on the profit and cost effectiveness of the US banking sector during the period of 1992-2003. The study indicates optimistic relationship among the executed Information Technology and together productivity and cost savings. Brynjolfsson and Hitt (2000) indicates that Information Technology contribute significantly to firm level output.

2.4.2 Bank Innovations and Profitability

Simpson (2002) suggests that e-banking is driven largely by the prospects of operating costs minimization and operating revenues maximization. A comparison of online banking in developed and emerging markets revealed that in developed markets lower costs and higher revenues are more noticeable. While Sullivan (2000) finds no systematic evidence of a benefit of internet banking in US click and mortar banks. Furst, Lang and Nolle (2002) find that federally chartered US banks had higher Return on Equity (ROE) by using the click and mortar business model. Furst, Lang and Nolle (2002) also examined the determinants of internet banking adoption and observed that more profitable banks adopted internet banking after 1998 but yet they were not the first movers. Jayawardhena and Foley (2000) show that internet banking results in cost and efficiency gains for banks yet very few banks were using it and only a little more than half a million customers were online in U.K.

Nader (2011) analyzed the profit efficiency of the Saudi Arabia Commercial banks during the period 1998- 2007. The results of his study indicated that availability of phone banking, number of ATMs and number of branches had a positive effect on profit efficiency of Saudi banks. On the contrary he found that the number of point of sale terminals (POSs), availability of PC banking and availability of mobile banking did not improve profit efficiency.

Agboola (2006) in his study on Information and Communication Technology (ICT) in Banking operations in Nigeria using the nature and degree of adoption of innovative technologies; degree of utilization of the identified technologies; and the impact of the adoption of ICT devices on banks, found out that technology was the main driving force of competition in the banking industry. During his study he witnessed increase in the adoption of ATMs, EFT, smart cards, electronic home and office banking and telephone banking. He indicates that adoption of ICT improves the banks' image and leads to a wider, faster and more efficient market. He asserts that it is imperative for bank management to intensify investment in ICT products to facilitate speed, convenience, and accurate services, or otherwise lose out to their competitors.

Malhotra and Singh (2009) in their study on the impact of internet banking on bank performance and risk found out that on average internet banks are larger, more profitable and are more operationally efficient. They also found that internet banks have higher asset quality and are better managed to lower the expenses for building and equipment and that internet banks in India rely substantially on deposits. They further found out that smaller banks that adopt internet banking have been negatively impacted on profitability.

Kagan, Acharya, Rao and Kodepaka (2005) in their study on whether internet banking affects the performance of community banks found that banks that provide extensive online banking services tend to perform better. They further found out that online

banking helps community banks improve their earning ability as measured by return on equity and improved asset quality by reducing the proportion of overdue and underperforming assets.

Hernando and Nieto (2006) while studying whether internet delivery channels change bank's performance, found out that adoption of internet as a delivery channel involved gradual reduction in overhead expenses (particularly, staff, marketing and IT) which translates to an improvement in banks´ profitability. The study also indicates that internet is used as a complement to, rather than a substitute for, physical branches. The profitability gains associated with the adoption of a transactional web site are mainly explained by a significant reduction in overhead expenses. This effect is gradual, becoming significant eighteen months after adoption and reaching a maximum generally two and a half years after adoption. Their study showed that multichannel banks present statistically significant evidence of efficiency gains, that is, reduction in general expenses per unit of output. Banks would further profit from cost reductions to the extent that the Internet delivery channel functions as a substitute for traditional distribution channels. Their analysis shows that this effect varies over time and explains, in terms of cost and income structure, the main drivers of better performance.

DeYoung (2005) analyzed the performance of Internet only banks versus the brick and mortar in the US market and found strong evidence of general experience effects available to all start-ups. Yet there is little evidence that technology based learning

accelerates the financial performance of internet-only start-ups. He finds that bank profitability is lower for pure-play (internet-only) banks in the US market. In a later study DeYoung, Lang and Nolle (2007) analyzed the US community banks market to investigate the effect of internet banking on bank performance. They compared the brick and mortar banks performance to click and mortar banks which do have transactional websites over a three year period. Their findings suggest that internet banking improved bank profitability, via increase in revenues from deposit service charges. Movements of deposits from checking accounts to money market deposit accounts, increased use of brokered deposits, and higher average wage rates for bank employees were also observed for click and mortar banks.

The internet offers a potential competitive advantage for banks and this advantage lies in the areas of cost reduction and more satisfaction of customer needs (Bradley and Stewart, 2003 and Jaruwachirathanakul and Fink, 2005). Encouraging customers to use the Internet for banking transactions can result in considerable operating costs savings (Sathye, 1999). The internet is the cheapest distribution channel for standardized bank operations, such as account management and funds transfer (Polasik and Wisniewski, 2009). Customer dissatisfaction with branch banking because of long queuing and poor customer service is an important reason for the rapid movement to electronic delivery (Karjaluoto, Mattila and Pento, 2002). The commitment of senior management is a driving force in the adoption and exploitation of technology (Shiels, McIvor and O'Reilly, 2003).

Shirley and Sushanta (2006) studied the impact of information technology on the banking industry and analyzed both theoretically and empirically how information technology (IT related products are internet banking, electronic payments, security investments, information exchanges, Berger, 2003) related spending can affect bank profits via competition in financial services that are offered by the banks. Using a panel of 68 US banks for a period of over 20 years to estimate the impact of IT on profitability of banks, they found out that though IT might lead to cost saving, higher IT spending can create network effects lowering bank profits. They further contend that the relationship between IT expenditures and bank's financial performance is conditional to the extent of network effect. They say that if network effect is too low, IT expenditures are likely to; reduce payroll expenses, increase market share, and increase revenue and profit.

Bank for International Settlement (BIS) in their study recognized that safe and efficient retail payment systems enhance the effectiveness of the financial system, boost consumer confidence and facilitate the functioning of commerce (BIS, 2003). Conceptionally, payment systems are coined as being two-sided markets (Rochet and Tirole, 2006). Virtually every economic transaction involves the use of a payment instrument, such as cheques, electronic funds transfers, etc. (Berger, 2003). Hasan, Schmiedel and Song (2009) in their study to provide a combined and integrated view of the importance and significance of retail payments for bank performance using country level retail payment service data across 27 EU markets found out that, countries with

more developed retail payment services, banks perform better, in terms of both their accounting ratios and their profit and cost efficiency. They further found that the relationship is stronger in countries with higher levels of retail payment transaction equipment, like ATMs and POS terminals.

Mabrouk and Mamoghli (2010) in their study on Dynamics of Financial Innovation and Performance of Banking Firms: Context of an Emerging Banking Industry, analyzed the effect of the adoption of two types of financial innovations namely; product innovation (telephone banking and SMS banking etc) and process innovation (Magnetic strip card (debit, ATM and credit card), Automatic cash dispenser; (Automatic teller machine; Electronic payment terminal etc) on the performance of banks. Their analysis included two adoption behaviours, first mover in adoption of the financial innovation and imitator of the first movers. They found out that first mover initiative in product innovation improves profitability while process initiative has a positive effect on profitability and efficiency. Banks that imitate are less profitable and less efficient than first movers

2.4.3 Bank Innovations and Return on Assets

Looking at the influence of technology on the Jordanian banks Akram and Allam (2010) used a Pooled Data Regression using Pooled Least Square to measure the level of investment in information technology on improving the matrix of financial and operational performances. The results of measurements using test of hypothesis showed that there is an impact on the use of Management Information Systems [MIS] in

Jordanian banks in the market value added (MVA), Earnings Per Share (EPS), Return on Assets (ROA) and Net Profit Margin (NMP). However, the test of hypothesis also showed that there was no impact of the use of MIS in Jordanian banks to improve the Return on Equity [ROE]. They concluded that due to the increased costs of investment in information technology which might work to reduce the return on the property.

Onay, Ozsoz and Helvacıoğlu (2008) in their study on the impact of internet banking on bank profitability in Turkey analyzed the effects of online banking activities on the performance of the banking sector using panel data from 14 commercial and savings banks in the country that had adopted internet banking between 1996 and 2005. They estimated the effect of online banking activities on the three common determinants of bank performance, namely the return on assets, return on equity and return on the financial intermediation margin. They found out that besides investment in e-banking being a gradual process, internet banking variable has had a positive effect on the performance of the banking system in Turkey in terms of returns to equity only with a lag of two years.

Arnaboldi and Claeys (2008) while comparing the performance of different online banking models over the period 1995-2004 in Finland, Spain, Italy and the UK, found out that internet banks were performing better in terms of average returns to assets (or equity), and do not seem to run higher operational costs for the little income they generate. They explain the performance of banks using a group of selected bank specific

features, but also adding country specific macroeconomic indicators and information technology related ratios. They further say that by focusing mostly on bank deposits, the banks cannot gain benefits from more rewarding banking activities and clients interested in value added products still prefer interaction with a physical branch and therefore internet banks need to reach a minimum dimension in order to become profitable. They further contend that online banking as a process innovation is largely driven by factors external to the banking industry which include percentage of households with access to internet at home, a higher broadband penetration rate, and higher outlay on R&D employment that are all factors positively influencing internet bank performance.

Hasan, Schmiedel and Song (2010) analysed the performance of multi-channel commercial banks *vis à vis* traditional banks in Italy. Internet adoption seems to influence positively bank performance, measured in terms of ROA and ROE. Hernando and Nieto (2006) examined the impact on bank financial performance in the Spanish banking market when a transactional website was set up. The authors conclude that the adoption of the internet as a delivery channel gradually reduces overhead expenses. This cost reduction boosts the performance of banks about one year and a half after the adoption in terms of ROA, and after three years in terms of ROE. In line with DeYoung (2005), this study proves that the internet had been used more as a complement than as a substitute for physical branches, suggesting the dominance of a multi-channel banking model.

2.4.4 Bank Innovations and Customer Deposits

Banks have invested heavily in ATM machines, due to their cost advantages on a per-transaction basis, where it's less than teller or telephone human operator. This has led banks to attempt to change customer behaviour through the addition of fees (the "stick") and the variety of rebates (the "carrots"), to migrate customers away from high-cost delivery systems (Frei, Harker and Hunter, 1997). Also, Massoud, Saunders and Scholnick (2006) found that the level of ATM surcharge is positively related to deposits market share of large banks, while Prager (2001) finds it negatively related to deposits market share of small banks.

Nyangosi and Arora (2011) argue that financial institutions adopted different electronic distribution channels to meet the demands of customers. In their study to examine the adoption of information technology in Kenyan banks focusing on services provided through internet and mobile banking, they found out that inclusion of information technology in banking business was necessary to achieve excellence goal. The study further revealed that ATM technology is the most available technology while SMS banking was also found useful. They also found out that customers use bank websites to know the products, use internet banking to check balance, know after sale services and buy products, an indication that internet banking is gaining popularity and becoming vital in financial transaction events.

Internet banking allows customers to perform a wide range of banking transactions electronically via the bank's Web site. When first introduced, internet banking was used mainly as an informational medium in which banks marketed their products and services on their Web sites. With the development of secured transaction technologies, more banks are using internet banking as a transactional as well as an informational medium. As a result internet banking, users can now perform common banking transactions such as writing checks, paying bills, transferring funds, printing statements and checking account balances online using a computer (Acharya and Kagan, 2004).

Mohammed, Siba, Sankar, Mahapatra and Sreekumar (2009) assert that E-banking also called online banking is an outgrowth of PC banking. E-banking uses the internet as the delivery channel by which to conduct banking activity, for example, transferring funds, paying bills, viewing checking and savings account balances, paying mortgages and purchasing financial instruments and certificates of deposits. Electronic banking has experienced explosive growth and has transformed traditional practices in banking (Gonzalez, 2008). Maholtra and Singh, (2007) also agree with Mohammed, et. al., (2009) and conclude that e- banking is leading to a paradigm shift in marketing practices resulting in high performance in the banking industry. Simpson (2002) and Brewer (2001) argued that community banks have to introduce new banking products and services that have greater appeal to changing customer base in order to be competitive in the market place and electronic banking services, such as online banking could be one of the alternatives (Gupta and Collins, 1997). According to Christopher and Mike (2006), E

banking has become an important channel to sell the products and services and is perceived to be necessity in order to stay profitable.

Mahdi and Mehrdad (2010) used chi-square to determine the impact of e-banking in Iran and their findings from the view points of customers is that, e-banking caused higher advantages to Iranians. In other words, Iran banks provide services that the customers are deriving satisfaction with particular reference to the use of e-banking. In a similar study, Jayawardhena and Foley (2000) explore e-banking as a new delivery channel arguing that e-banking may help to overcome the inherent disadvantages of traditional banks and it is very clear that if e-banking is conducted successfully it leads to big volume of transactions. Mahdi and Mehrdad (2010) concluded that ATMs in banking sectors will cause cash circulation decreases, the efficiency of banking sector will increase, as client banking costs decrease (less cash fees to pay), shop keeper / service provider costs will decrease, and bank costs decrease (cash storage, less checking and processing costs), and that customers don't have enough knowledge related to e-banking in Iran.

Larger banking groups are better placed to go online with an internet bank. Although internet banks can pursue an aggressive strategy to position them in the market, and quickly attract new clients with high yielding deposits, this seems less important for traditional banks, which have already reached a stable position in the market. Instead, large banks can better reap the benefits of scale effects and obtain larger productivity

gains via cost reductions in branches and personnel. They so receive a more stable flow of income and so obtain a strategic advantage over other banks (Nickerson and Sullivan, 2003).

Financial innovation is aimed at obtaining more capital at the lowest cost as possible and majority of the fund composition is high-cost funds such as deposit accounts or time deposits. Only a small amount of funds are low-cost, such as saving accounts. Therefore, banks must innovate well and every innovation must be communicated effectively and attractively to their targeted market (Iftekhar, Schmiedel and Song, 2009). Customers prefer to deposit money into a system in which they can obtain a good payment service (Kemppainen, 2003 & 2008). Innovation improves the movements of deposits from checking accounts to money market deposit accounts, increases use of brokered deposits, and higher average wage rates for bank employees for click and mortar banks (Sushanta and Ho, 2006).

If ATMs are largely available over geographically dispersed areas, the benefit from using an ATM will increase since customers will be able to access their bank accounts from any geographic location they want (Milne, 2006). This would imply that the value of an ATM network increases with the number of available ATM locations, and the value of a bank's network to a customer will be determined in part by the final network size of the bank. Internet banking adoption has a positive impact on the level of deposits and loans per branch (Ceylan and Emre, 2011). As operational activities are provided

via Internet branches and internet banking facilitates, banks increase personnel with a lag of one year, as they focus on their core banking activities of deposit collection and lending via branches (Ceylan and Emre, 2011).

One aspect of mobile phones in the developing world that is being looked at with some anticipation is the introduction of mobile financial services and transactions. Many if not most rural users in less developed countries have no access to financial services of any kind, and getting these "unbanked" citizens linked somehow into the formal banking sector is a priority for many governments. However, the evidence to date of initial efforts in this regard is mixed. While users are employing the mobile banking systems to make payments for things such as airtime and pre-paid electricity, and many are using them for sending remittances back to friends and relatives in their rural villages, there is little evidence to date of an increase in the number of users registering for more formal banking services via mobile phone, such as savings and credit services (Ivatury and Pickens, 2006; Morawczynski, 2008).

2.4.5 Internet Service and Performance

Today, information and communication technology has become the heart of banking sector, while banking industry is the heart of every robust economy. Electronic banking system has become the main technology driven revolution in conducting financial transactions. However, banks have made huge investments in telecommunication and electronic systems, users have also been validated to accept electronic banking system as

useful and easy to use (Adesina and Ayo, 2010). According to Loonam and O'Loughlin (2008), ICT advancements, globalization, competition and changing social trends such as heightened customer proactiveness and increased preferences for convenience have caused intense restructuring of the banking industry.

Simpson (2002) reveals that electronic banking is motivated largely by the prospects of operating costs minimization and operating revenues maximization. An evaluation of online banking in developed and emerging markets reveals that in developed substitute for physical branches for delivering banking services. ICT revolution has distorted the conventional banking business model by making it possible for banks to break their comfort zones and value creation chain so as to allow customer service delivery to be separated into different businesses. Thus, for example, primarily Internet banks distribute insurance and securities as well as banking products, but not all the products they distribute are produced by their group (Delgado and Nieto, 2004). Besides them, Haq (2005) also states that banks exist because of their ability to achieve economies of scale in minimizing asymmetry of information between savers and borrowers. The unit costs of internet banking fall more rapidly than those of traditional banks as output increases as a result of balance sheet growth.

The usage of ICT can lead to lower costs, but the effect on profitability remains inconclusive, owing to the possibility of ICT effects that arise as a result of consistence high demand of skilled work force, issues of increasing demand to meet customers'

expectation for customer service delivery, trustworthiness of the information system and competition in financial services (Aliyu & Tasmin, 2012). Aliyu and Tasmin (2012) further assert that it is quite evident from their study that enhancing ICT in the banking industry is a must in a rapidly changing market place, as the ICT revolution has set the stage for exceptional increase in financial activity across the globe.

Chung and Dutta (2012) found that online or internet based banking has become quite common. Banks have also realized the potential of internet banking and have recognized that it is necessary to integrate the customers' new lifestyle and web based activity preferences with their business models. Adoption of internet banking leads to cost reduction and hence likely to increase banks' profitability. Introduction on internet banking has brought unprecedented speed in banking system and has been playing a major role in the globalization of banking system. As internet banking makes inroads to banking business, market participants have also started to use internet for security trading activities. Online trading has led to an upward trend in trading frequency, trading volume, and turnover ratio.

Daneshvar and Ramesh (2012) conducted a study on panel data of two public banks for the period 1998-2009 to examine impact of IT investments on profitability and productivity of Indian public sector banks. The study used two statistical tools in terms of correlation and regression analysis. The results indicated that investments on IT contributed to increased amount of deposits and return on assets (ROA) as profitability,

profit per employees as productivity indicator and decrease the net non performing assets ratio and staff cost. The study also showed that public banks tried to adopt cost reduction and assets quality strategies to compete in the Indian bank market. Ram, Kagan and Lingam (2008) examined the impact of online banking intensity on the financial performance of community banks. The actual impact of online banking on performance was measured by regressing the profit efficiency index against a number of correlates including online banking intensity measure. Their results indicated that the increasing use of internet as an additional channel of marketing banking services has significantly improved the financial performance of community banks.

2.4.6 Mobile Phone Service and Performance

Sub-Saharan Africa has some of the lowest levels of infrastructure investment in the world. Merely 29 percent of roads are paved, barely a quarter of the population has access to electricity, and there are fewer than three landlines available per 100 people (International Telecommunication Union, ITU, 2009; World Bank, 2009a&b). Yet access to and use of mobile telephony in sub-Saharan Africa has increased dramatically over the past decade. There are ten times as many mobile phones as landlines in sub-Saharan Africa and 60 percent of the population has mobile phone coverage (ITU, 2009). Mobile phone subscriptions increased by 49 percent annually between 2002 and 2007, as compared with 17 percent per year in Europe (ITU, 2008).

The effect of mobile phones has been particularly dramatic in rural Africa, where in many places, mobile phones have represented the first modern telecommunications infrastructure of any kind. Mobile phones have greatly reduced communication costs, thereby allowing individuals and firms to send and to obtain information quickly and cheaply on a variety of economic, social, and political topics. An emerging body of research shows that the reduction in communication costs associated with mobile phones has tangible economic benefits, improving agricultural and labour market efficiency and producer and consumer welfare in specific circumstances and countries. As telecommunication markets mature, mobile phones in Africa are evolving from simple communication tools into service delivery platforms (Jensen, 2007; Aker, 2008; Aker, 2010; Klonner and Nolen, 2008). This has shifted the development paradigm surrounding mobile phones from one that simply reduces communication and coordination costs to one that could transform lives through innovative applications and services.

According to Aker and Mbiti (2010), there is a strong correlation between mobile phone coverage, the types of services offered, the price of such service, and firm performance. In markets with limited competition, profit-maximizing firms to offer more limited services at higher prices. Rayhan, Sohel, Islam, and Mahjabin (2012) in their study on mobile banking in Bangladesh concluded that, mobile phone banking offers the potential to extend low cost virtual bank accounts to a large number of currently un-banked individuals. Mobile phones enhance the ability of electronic banking solutions to offer

customers an enhanced range of services at a low cost. Mobile banking is real time on-line banking, available anytime, anywhere throughout the country, it is convenient, affordable and secure and therefore it is much more effective in developing savings habits and hence leading to increase in bank deposits. Mobile phone also makes access to banking and advanced payment transactions at affordable cost. A positive aspect of mobile phones is that mobile networks can reach remote areas at low cost both to the consumer and the bank.

2.5 Critique of Existing Literature

From reviewed relevant literature, it has come out strongly from several writers like; Dew (2007), Lerner (2006), Iftekhar , Schmiedel and Song (2009), Nadia, Anthony and Scholnick (2003), Nofie (2011), Hirtle and Stiroh (2007), Agboola (2006), Malhotra and Singh, (2009), Hernando and Nieto (2006), DeYoung (2005), and Acharya and Kagan (2004) that innovations have positive impact on performance indicators. They have agreed on the transformational effects of innovations on bank performance and operational efficiency. However other scholars like; Nadia, Anthony and Scholnick (2003), McAndrews (2002), Nader (2011), Akram and Allam (2010) and Prager (2001) found out that innovations have negative effects on performance indicators. These mixed results and alternative views from different countries and writers are mainly as a result of lack of comprehensive analysis of multiple innovations and performance indicators. This study intends to take a departure from past studies and incorporate several

innovations and their effect on multiple bank performance indicators. There is also concentration of innovation-performance studied on profitability and mostly in developed and emerging economies leaving a paucity of innovation performance literature for Africa and Kenya specifically. This literature gap is addressed by this comprehensive study.

2.6 Research gaps

From the foregoing review of relevant literature, it is evident that research in the area of bank innovations has been done but not in a comprehensive approach. All the literature reviewed indicates that previous researchers only concentrated on a few variables of innovations while this study covers additional important variables that were omitted by previous studies like electronic funds transfer systems, mobile banking and point of sale terminals. This makes the study more comprehensive. From survey of relevant literature, it has been found that there are few studies specific to Kenya on the link of financial innovations and performance of commercial banks and they omitted moderating variables. This study therefore intends to fill these pertinent gaps in literature by studying the effects of bank innovations on selected key performance indicators of commercial banks in Kenya.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter focuses on data collection, processing and analysis methods. Data collection instruments and procedures are also discussed as well as the target population and study sample. Zikmund, Babin, Carr and Griffin (2010) describe a research methodology as a part that must explain technical procedures in a manner appropriate for the audience. It achieves this by addressing the research and sample designs used for the study, the data collection and fieldwork conducted for the study and the analysis done to the collected data. Dawson (2009) states that research methodology is the philosophy or general principle which guides the research. Kombo and Tromp (2009) concur with Zikmund et al. (2010) that research methodology deals with the description of the methods applied in carrying out the research study.

3.2 Research Design

Dawson (2002) describes the purpose of this section as to set out a description of, and justification for, the chosen methodology and research methods. Polit and Beck (2003) describe a research design as the overall plan for obtaining answers to the questions

being studied and for handling some of the difficulties encountered during the research process. Miller and Yang (2008) and Kothari (2004) describe a research design as the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. Kombo and Tromp (2009) describe a research design as the review of the overall research aim, the literature and chosen research methods. Kothari (2004) states that research design facilitates the smooth sailing of the various research operations, thereby making research as efficient as possible, yielding maximal information with minimal expenditure of effort, time and money.

Lavrakas (2008) asserts that choosing an appropriate research design depends on; the nature of the research questions and hypotheses, the variables, the sample of participants, the research settings, the data collection methods and the data analysis methods. Thus, a research design is the structure, or the blueprint, of research that guides the process of research from the formulation of the research questions and hypotheses to reporting the research findings. In designing any research study, the researcher should be familiar with the basic steps of the research process that guide all types of research designs. Also, the researcher should be familiar with a wide range of research designs in order to choose the most appropriate design to answer the research questions and hypotheses of interest.

This study used descriptive survey research design. Lavrakas (2008) describes a descriptive survey research design as a systematic research method for collecting data from a representative sample of individuals using instruments composed of closed-ended and/or open-ended questions, observations, and interviews. It is one of the most widely used non-experimental research designs across disciplines to collect large amounts of survey data from a representative sample of individuals sampled from the targeted population. Orodho (2003) and Kothari (2004) describe a descriptive survey design as a design that seeks to portray accurately the characteristics of a particular individual, situation or a group. According to Polit and Beck (2003) in a descriptive study, researchers observe, count, delineate, and classify. They further describe descriptive research studies as studies that have, as their main objective, the accurate portrayal of the characteristics of persons, situations, or groups, and/or the frequency with which certain phenomena occur.

Descriptive research design has been used in other studies like Clarence (2010) in analysis of sociological analysis of youth inactivity in the Philippine while Saeed (2010) used it to study supply chain as well as risk management concepts on the oil industry and Moodley (2007) used it to investigate the impact of employee satisfaction levels on customer service in the service utility at Telkom South Africa. In view of the above definitions, descriptions and strengths, descriptive survey is the most appropriate design for this study.

3.3 Target Population

Lavrakas (2008) defines a population as any finite or infinite collection of individual elements. Hyndman (2008) describes a population as the entire collection of 'things' in which we are interested. According to Zikmund et al. (2010) and Kothari (2004), a population refers to all items in any field of inquiry and is also known as the 'universe'. Polit and Beck (2003) refer to population as the aggregate or totality of those conforming to a set of specifications. The target population for this study was at two levels. The first target population was at institutional level where the study targeted 44 licenced commercial banks in Kenya. The second level of target population was senior management employees of the 44 commercial banks in operation in Kenya as at 31st December, 2011. The main reason for choosing senior management employees was because they are responsible for performance of their respective banks and have higher level of appreciation on how innovations influence financial performance. They are also responsible for managing performance of their units through the departmental budgets and action plans.

According to the Central Bank of Kenya annual supervison report of year 2011, as at 31st December 2011 there were 7021 management employees in the banking sector in Kenya of which approximately 20% were in the senior management cadre. According to CBK (2012), the total number of commercial banks comprise of forty three commercial banks and one mortgage finance institution (appendix IV) by December 2011. Central

Bank of Kenya is the major licensing institution of commercial banks and mortgage finance institutions in Kenya and hence was used as an authoritative source for banking sector information.

In this study, there are two types of population. There is the target population and accessible population. Accessible population refers to the population in the research to which the researcher can apply their conclusions (Castilo, 2009). Target population refers to the entire group of individuals or objects to which researchers are interested in generalizing the conclusions (Castilo, 2009). In this this study the target population comprise of all senior management employees of 20 conveniently sampled commercial banks in Kenya. The accessible population was all senior management employees who could be easily included in the sample on the day of determining the final study sample of all the sampled banks which were 20 in number.

3.4 Sampling Frame

The sampling frame for this study consist of all the licensed commercial banks and mortgage finance institutions in operation in Kenya as at December, 2011 as they appear in the Central Bank of Kenya database and also as laid on appendix IV. The Central Bank of Kenya supervision report of 2011 outlines the grouped number of employees in the banking sector as at 31st December 2011. The employment data is disaggregated between the various cadres of employees in the sector. Central bank of Kenya supervision report also provides the list, physical address and contact details of all the

commercial banks in Kenya. The concentration of this study is the management cadre. Lavrakas (2008) defines a sampling frame as a list of the target population from which the sample is selected and that for descriptive survey designs a sampling frame usually consists of a finite population.

Gill and Johnson (2002) on the other hand describe a sampling frame as a list of members of the research population from which a random sample may be drawn. Mugenda and Mugenda (2003) and Kothari (2004) define the term sampling frame as a list that contains the names of all the elements in a universe. Polit and Beck (2003) refer to a sampling frame as the technical name for the list of the elements from which the sample is chosen from.

3.5 Sample and Sampling Technique

Lavrakas (2008) describes a sample in a survey research context as a subset of elements drawn from a larger population. Kombo and Tromp (2009) and Kothari (2004) also describe a sample as a collection of units chosen from the universe to represent it. Gerstman (2003) states that a sample is needed because a study that is insufficiently precise, lacks the power to reject a false null hypothesis and is a waste of time and money. A study that collects too much data is also wasteful. Therefore, before collecting data, it is essential to determine the sample size requirements of a study.

Polit and Beck (2003), strongly recommend that it is more practical and less costly to collect data from a sample than from an entire population. The risk, however, is that the sample might not adequately reflect the population's behaviours, traits, symptoms, or beliefs. Various methods of obtaining samples are available. These methods vary in cost, effort, and skills required, but their adequacy is assessed by the same criterion of the representativeness of the selected sample. The quality of the sample for quantitative studies depends on how typical, or representative, the sample is of the population with respect to the variables of concern in the study.

The study used a purposive sampling procedure to identify the sample units. Lavrakaz (2008) states that a purposive sample, also referred to as a judgmental or expert sample, is a type of non-probability sample. The main objective of a purposive sample is to produce a sample that can be logically assumed to be representative of the population. This is often accomplished by applying expert knowledge of the population to select in a non-random manner a sample of elements that represents a cross-section of the population. Miller and Yang (2008) and Kothari (2004) define purposive sampling as involving deliberate selection of particular units of the universe for constituting a sample which represents the universe. Burns and Grove (2003) in their study emphasise that purposeful sampling method enable the researcher to select specific subjects who will provide the most extensive information about the phenomenon being studied.

The sample units were twenty (20) commercial banks of which ten (10) are listed commercial banks (Barclays Bank Ltd, CFC Stanbic Bank Ltd, Diamond Trust Bank Kenya Ltd , Housing Finance Co Ltd, Kenya Commercial Bank Ltd, National Bank of Kenya Ltd, NIC Bank Ltd, Standard Chartered Bank Ltd, Equity Bank Ltd and Co-operative Bank of Kenya Ltd), two (2) government owned commercial banks (Consolidated Bank and Development Bank of Kenya Ltd) and eight (8) private owned banks (Commercial Bank of Africa, Bank of Baroda, Bank of India, Giro Bank, K-Rep Bank, Habib Bank, Transnational Bank and Credit Bank). The sampled banks were selected because they have readily available information and have a higher level of information disclosure. These are also the banks that have invested heavily in various innovations based on information available from their annual reports.

This sample of banks was chosen due to ease of access to information especially from listed and Government owned banks. These banks also account for a significant size of over 80% of the Kenyan banking industry in terms of a composite market share index of net assets, total deposits, shareholders' funds, number of loan accounts and number of deposit accounts (CBK, 2012).

Besides having a convenient purposive sample of twenty (20) banks, this study used simple random sampling for distribution of the questionnaires. A sample of 325 was used which was distributed to the banks based on their composite market share index of 2011 which is computed by the Central Bank of Kenya. The selection of twenty banks

represented an effective sample of 45% of the target population of 44 banks. The 325 sampled senior managers represented as sample of 23% of senior managers in the 20 sampled banks. The above sample size of 20 banks which is a 45% sample and the 20% sample of senior managers is acceptable in the light of research specialists as; Gall and Borg (2007), Gay (1992), Currier (1984) , Cohen, Manion and Morrison (2000) and Best (1996) who all agree that a ten per cent sample is adequate for a descriptive study.

3.6 Data Collection Instruments

The study used questionnaires to obtain qualitative data for analysis which was further validated from analysis results from secondary data quantitative analysis. Schwab (2005) defines questionnaires as measuring instruments that ask individuals to answer a set of questions or respondent to a set of statement. Mugenda and Mugenda (2003) and Kothari (2004) define a questionnaire as a document that consists of a number of questions printed or typed in a definite order on a form or set of forms.

According to Dawson (2002), there are three basic types of questionnaires; closed ended, open-ended or a combination of both. Closed-ended questionnaires are used to generate statistics in quantitative research. As these questionnaires follow a set format, and as most can be scanned straight into a computer for ease of analysis and greater numbers can be produced. Open-ended questionnaires are used in qualitative research, although some researchers will quantify the answers during the analysis stage. The questionnaire does not contain boxes to tick, but instead leaves a blank section for the

respondent to write in an answer. Whereas closed-ended questionnaires might be used to find out how many people use a service, open-ended questionnaires might be used to find out what people think about a service. As there are no standard answers to these questions, data analysis is more complex. Also, as it is, opinions which are sought rather than numbers, fewer questionnaires need to be distributed. However, many researchers tend to use a combination of both open and closed questions. That way, it is possible to find out how many people use a service and what they think about that service on the same form. Many questionnaires begin with a series of closed questions, with boxes to tick or scales to rank, and then finish with a section of open questions for more detailed response.

Mugenda and Mugenda (2003) and Kothari (2004) agree that questionnaires have various merits, like; there is low cost even when the universe is large and is widely spread geographically; it is free from the bias of the interviewer; answers are in respondents' own words; respondents have adequate time to give well thought out answers; respondents who are not easily approachable can also be reached conveniently; large samples can be made use of and thus the results can be made more dependable and reliable. They also concur that the main demerits of questionnaires are; low rate of return of the duly filled in questionnaires; bias due to no-response is often indeterminate; it can be used only when respondents are educated and cooperating; the control over questionnaire may be lost once it is sent; there is inbuilt inflexibility because of the difficulty of amending the approach once questionnaires have been dispatched; there is

also the possibility of ambiguous replies or omission of replies altogether to certain questions i.e. interpretation of omissions is difficult; it is difficult to know whether willing respondents are truly representative and this method is likely to be very slow. In view of the advantages and the need to gather more information, questionnaires were administered to senior bank managers to solicit their views concerning the effect of bank innovations on performance of commercial banks.

Secondary data from the sampled banks was collected on; value of total income, value of total profit before tax, value of total assets, value of total deposits; number of ATMs, number of debit cards, number of credit cards, number of POS terminals, number of mobile banking users, number of internet banking users and the volume of electronic funds transfers. This secondary data was collected from the Central Bank of Kenya and annual reports of the banks. Kothari (2004), defines secondary data as data that is already available, referring to the data which have already been collected and analyzed by someone else. Polit and Beck (2003) explain that secondary research involves the use of data gathered in a previous study to test new hypotheses or explore new relationships. They also indicate that secondary analysis of existing data is efficient and economical because data collection is typically the most time-consuming and expensive part of a research project. Secondary data was used to validate the findings from analysis of primary data which was corrected using questionnaires. The strategy of using both primary and secondary data to address the same study objectives was meant to improve

the interpretive coherence and improve both communicative and pragmatic validity of the study results.

3.7 Data Collection Procedure

Primary data was collected through the administration of questionnaires to senior management bank employees. Two research assistants were engaged to mainly make follow-up of the administered questionnaires. The entry point to the banks was mainly through either the human resource or finance departments. Kothari (2004) describe primary data as those which are collected afresh and for the first time, and thus happen to be original in character. Louis, Lawrence and Morrison (2007) describes primary data as those items that are original to the problem under study while Ember and Ember (2009) describe primary data as data collected by the investigator in various field sites explicitly for a comparative study.

Secondary data was obtained from the Central Bank of Kenya, Kenya National Bureau of Statistics and the Banking survey manuals. Dawson (2009) states that secondary research data involves the data collected using information from studies that other researchers have made of a subject. Ember and Ember (2009) describe secondary data as data collected by others and found by the comparative researcher in ethnographies, censuses and histories.

3.8 Pilot Test

The study carried out a pilot test to test the validity and reliability of the questionnaires in gathering the data required for purposes of the study. Kombo and Tromp (2009) and Kothari (2004) describe a pilot test as a replica and rehearsal of the main survey. Dawson (2002) states that pilot testing assists researchers to see if the questionnaire will obtain the required results. According to Polit and Beck (2003), a pilot study or test is a small scale version, or trial run, done in preparation for a major study. King (2001) states that the term pilot study has been misused by some researchers who appear to use it as an excuse for not using a bigger sample. Polit and Beck (2003) states that the purpose of a pilot test is not so much to test research hypotheses, but rather to test protocols, data collection instruments, sample recruitment strategies and other aspects of a study in preparation for a larger study. The questionnaire was validated by discussing it with two randomly selected senior managers of the two banks. Their views were evaluated and incorporated to enhance content and construct validity of the questionnaire.

Reliability was tested by use of twenty four questionnaires which were piloted with randomly selected bank employees who were not included in the final study sample. This was meant to avoid response bias in case they were to complete the same questionnaire twice. The rule of the thumb suggests that 5% to 10% of the target sample should constitute the pilot test (Cooper and Schilder, 2011; Creswell, 2003; Gall and

Borg, 2007). The pilot test sample was within the recommendation. The twenty four questionnaires were coded and input into Statistical Package for Social Sciences [SPSS] version 20 for running the Cronbach reliability test. The reliability of the questionnaire was tested using the Cronbach's alpha correlation coefficient with the aid of Statistical Package for Social Sciences (SPSS) software. The results of the reliability test produced an overall Cronbach Alpha correlation coefficient of 0.887. The closer Cronbach's alpha coefficient is to 1, the higher the internal consistency reliability (Sekaran, 2003). A coefficient of 0.7 is recommended for a newly developed questionnaire and therefore 0.887 was adequate for this study.

3.9 Data Processing and Analysis

Ordinarily, the amount of data collected in a study is rather extensive and research questions and hypotheses cannot be answered by a simple perusal of numeric information and therefore data need to be processed and analyzed in an orderly and coherent fashion. Quantitative information is usually analyzed through statistical procedures. Statistical analyses cover a broad range of techniques, from simple procedures that we all use regularly like computing an average to complex and sophisticated methods. Although some methods are computationally formidable, the underlying logic of statistical tests is relatively easy to grasp, and computers have eliminated the need to get bogged down with detailed mathematical operations (Polit and Beck, 2003).

Besides using frequencies and descriptive analysis, the study used multiple linear regression analysis to test the statistical significance of the various independent variables (automated teller machines, debit cards, credit cards, point of sale terminals, mobile banking, internet banking and electronic funds transfer) on the dependent variables (total income, profit before tax, return on assets and customer deposits). Faraway (2002) states that multiple linear regressions are used in situations where the number of independent variables is more than one. According to International Business Machines (IBM) (2010), the assumptions of linear regression must be met by the data to be analyzed, these assumptions state that the coefficients must be linear in nature, the response errors should follow a normal distribution and the errors should have a common distribution.

Regression analysis is a statistical tool for the investigation of relationships between variables. Usually, the investigator seeks to ascertain the causal effect of one variable upon another. For example the effect of a price increase upon demand or the effect of changes in the money supply upon the inflation rate. To explore such issues, the researcher assembles data on the underlying variables of interest and employs regression to estimate the quantitative effect of the causal variables upon the variable that they influence. The researcher also typically assesses the statistical significance of the estimated relationships, that is, the degree of confidence that the true relationship is close to the estimated relationship. Regression analysis is also valuable for quantifying the impact of various simultaneous influences upon a single dependent variable. Further, because of omitted variables bias with simple regression, multiple regression is often

essential even when the researcher is only interested in the effects of one of the independent variables. Jackson (2009) states that multiple regression analysis involves combining several predictor variables in a single regression equation. With multiple regression analysis, we can assess the effects of multiple predictor variables (rather than a single predictor variable) on the dependent measure.

In this study the following were the regression equations that were used to test the significance of the study hypotheses:

Objective one - To determine if bank innovations influence total income of commercial banks in Kenya. The following multiple linear regression equation was used to determine the effect of bank innovations on total income of commercial banks

$$Total\ Income = \beta_{01}+\beta_{11}X_1+\beta_{21}X_2+\beta_{31}X_3+\beta_{41}X_4+\beta_{51}X_5+\beta_{61}X_6+\beta_{71}X_{7+}\ \beta_{81}X_{8+}\ \varepsilon$$

Total income was measured in Kenya shilling earnings of commercial banks. The independent variables of; automated teller machines, debit and credit cards, point of sale terminals, mobile banking, internet banking and electronic funds transfer. They are represented by $X_1, X_2, X_3, X_4, X_5, X_6,$ respectively while the moderating variables of mobile phone subscriptions and internet service subscription were represented by X_7 and X_8 respectively. β_0 is the constant or intercept while $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ and β_8 are the corresponding coefficients for the respective independent variables and moderating variables. ε is the error term which represents residual or disturbance factors or values

that are not captured within the regression model. The interpretation of X, β and ε is the same for the subsequent equations for testing the other study objectives. Interpretations are as stated above.

Objective two - To establish whether bank innovations influence return on total assets of commercial banks in Kenya. The following is a multiple linear regression equation used to determine the effect of bank innovations on the return on assets of commercial banks

$$\textit{Return on Assets} = \beta_{02} + \beta_{12}X_1 + \beta_{22}X_2 + \beta_{32}X_3 + \beta_{42}X_4 + \beta_{52}X_5 + \beta_{62}X_6 + \beta_{72}X_{7+} \beta_{82}X_8 + \varepsilon$$

Return on assets was measured by dividing the profit before taxation of the banks by their total assets and then multiplied by 100% to get a percentage return on assets.

Objective three - To establish the influence of bank innovations on profitability of commercial banks in Kenya. The following is a multiple linear regression equation used to determine the effect of bank innovations on profitability of commercial banks

$$\textit{Profit Before Tax} = \beta_{03} + \beta_{13}X_1 + \beta_{23}X_2 + \beta_{33}X_3 + \beta_{43}X_4 + \beta_{53}X_5 + \beta_{63}X_6 + \beta_{73}X_{7+} \beta_{83}X_8 + \varepsilon$$

Profit before tax was obtained from the profit and loss statements of the banks.

Objective four - To determine the influence that bank innovations have on customer deposits of Kenyan commercial banks. The following is a multiple linear regression

equation to be used to determine the effect of bank innovations on the deposits taken by commercial banks

$$Total\ Deposits = \beta_{04}+\beta_{14}X_1+\beta_{24}X_2+\beta_{34}X_3+\beta_{44}X_4+\beta_{54}X_5+\beta_{64}X_6+ \beta_{74}X_{7+} \beta_{84}X_8 +\varepsilon$$

Total deposits were obtained from the balance sheet of the banks. Deposits are the customer funds held by commercial banks at a particular time and are expressed in Kenya shillings.

Objective five - To establish the moderating effect of mobile phone subscription and internet subscription on financial performance of commercial banks in Kenya. The effect of mobile phone subscription and internet subscription on financial performance (total income, return on assets, profit before tax and deposits) was tested at intervals on each of the above objectives one to four. The independent variables from β_1X_1 to β_6X_6 were dropped and equations tested the effect of moderating variables β_7X_7 and β_8X_8 on each of the financial performance indicators.

Where:

$\{\beta_i;\ i=1,2,3,4,5,6,7,8\}$ = The coefficients representing the various independent and moderating variables.

$\{X_i;\ i=1,2,3,4,5,6,7,8\}$ = Values of the various independent (covariates) and moderating variables.

ε is the error term which is assumed to be normally distributed with mean zero and constant variance.

Hosmer and Stanley (2000) emphasize that regression methods have become an integral component of any data analysis concerned with describing the relationship between a response variable and one or more explanatory variables. It is often the case that the outcome variable is discrete, taking on two or more possible values. It is important to understand that the goal of an analysis using this method is the same as that of any model building technique used in statistics; to find the best fitting and most parsimonious, yet reasonable model to describe the relationship between an outcome (dependent or response) variable and a set of independent (predictor or explanatory) variables. These independent variables are often called covariates.

The data that was obtained from the questionnaires was primarily qualitative and was analyzed using linear multiple regression to identify the most important and statistically significant financial innovation that had impacted most on bank financial performance. According to IBM (2010), linear multiple regression is useful in situations where there are more than two independent variables and/or dependent variables. Tether (2001) uses a linear multiple regression procedure in a study to identify the population's idea of the definition of innovation across various sectors in the United Kingdom.

IBM Base (2010), states that a paired samples t-test compares the means of two variables for a single group. The study also used paired samples t-test of significance to

test whether the change in the independent variables was statistically significant. The t-test of significance was used to test whether the change in the independent variables was statistically significant. The above statistical tests were conducted through the use of Statistical Package for Social Science (SPSS) version 20 (Andy, 2009).

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Introduction

This study investigated the influence of bank innovations on financial performance of commercial banks in Kenya. Specifically, the study investigated the effect that automated teller machines, debit and credit cards, point of sale terminals, mobile banking, internet banking and electronic funds transfer have on financial performance as indicated by income, profit before tax, return on assets and customer deposits. The moderating variables for the study were internet services and mobile phone subscription. This contains details of; the response rate, sample characteristics, presentation of data analysis, interpretation and discussion of findings. Data presentation is organized based on the specific objectives of the study.

4.1.1 Kenya's Banking Sector Performance in 2012

Performance of commercial banks in Kenya grew impressively between years 2001 to 2010 where profit before tax grew from Kshs 2.7billion in 2001 to Kshs 74billion in 2010. During the same period total income grew from Kshs 61billion to Kshs 178billion while total assets grew from Kshs 425billion to Kshs 1.7trillion (CBK, 2011). According

to Central Bank Supervision Report (2013), the banking sector reflected solid performance in 2012. This performance can partly be attributed to improvement in the GDP growth which grew to 4.6% in 2012 compared to 4.4% in 2011. Total customer deposit base increased from Shs 1.488 trillion in 2011 to Shs 1.708 trillion in 2012, an increase of 14.8%. Total assets grew by 15.4% from Shs 2.021 trillion in 2011 to Shs 2.330 trillion in 2012. Net advances to customers increased from Shs 1.152 trillion in 2011 to Shs 1.296 trillion in 2012, an increase of 12.5%. Profit before tax increased from Shs 89.5 billion in 2011 to Shs 107.9 billion in 2012, an increase of 20.5% (CBK, 2013).

The net interest income in 2012 increased by Shs 32.0 billion (24.2%) over the 2011 levels. The growth in other operating income in 2012 of Shs 5.4 billion is attributed to an increase over 2011levels in fees and commission income of Shs 1.7 billion (3.7%), other income (which includes trading income from Government securities) of Shs 2.1 billion (20.2%) and foreign exchange trading income of Shs 1.6 billion (8.3%). Return on shareholders' equity for the sector in 2012 was 33.1% compared to 32.1% in 2011. The overall industry return on assets for 2012 was 5.0% (CBK, 2013).

4.2 Study Preliminaries

This section presents the basic characteristics of the sample of the study.

4.2.1 Response Rate

Primary data was collected between May and August 2012 using a questionnaire while a self constructed data collection sheet was used to collect secondary data. Three hundred and twenty five (325) questionnaires were issued to randomly selected bank senior managers from 20 commercial banks. Two hundred and two questionnaires were returned representing a 62% response rate. The response rate is considered adequate given the recommendations by Saunders, Lewis and Thornhill (2007) who suggest a 30-40% response, Sekaran (2003) who document 30%, Mugenda and Mugenda (2003) advise on response rates exceeding 50% and Hager, Wilson, Pollack and Rooney (2003) recommend 50%. Based on these assertions, this implies that the response rate for this study was adequate.

4.2.2 Sample Demographics

This section outlines the general characteristics of the respondents in terms of their age, departments where they work and the years of experience in the banking sector.

4.2.2.1 Age

Table 4.1 shows that majority of the respondents were aged above 30 years with most (72%) of them being in the age group of between 41 to 50 years. The rest of respondents (28%) fell within the age of between 20 and 40 years. This shows that majority of the respondents were not in the youth brackets which is mainly between the age of 18 to 35 years. This is contrary to some common belief that commercial banks in Kenya have a youthful workforce. On the other hand only few respondents were above fifty years which is in line with many banks' workforce which is mainly aged below fifty years due to the periodic employee realignments which normally witness exit of older employees through either voluntary exit or employer initiated early retirement.

Table 4.1: Distribution by Age in Years

Age Bracket	21-30	31-40	41-50	Over 50	Total
Frequency	10	48	88	56	202
Percent	5	23	44	28	100

4.2.2.2 Departments

Data on Table 4.2 show that majority of the respondents (75%) worked within finance, ICT and audit departments while the rest (25%) were within executive, credit and HR departments. This kind of distribution could have been influenced by the entry point behaviour at the commencement of data collection, where in most banks the heads of finance were the main contact persons while in other banks it was the ICT and audit departments. However the nature of the study generated more interest from the finance,

ICT and audit departments as they are the departments which champion innovations in the bank set up. These are also the departments which can have interest with an innovation related study because these are the departments with high utilization of ICT innovations in a bank set up.

Table 4.2: Distribution by Departments

Department	Executive	Finance	ICT	Audit	Credit	HR	Total
Frequency	10	64	50	37	25	16	202
Percent	5	32	25	18	12	8	100

4.2.2.3 Banking Sector Experience

Table 4.3 indicates that 99% (n=201) of the respondents had worked in the banking sector for more than 5 years, 56% had worked for less than 10 years. This finding suggests that majority of the respondents joined the sector after year 2003 which is in line with the growth experienced in the past decade in the sector. Aggregate bank employees in Kenya in 2002 were 10,884 and grew to 30,056 by end of 2011 indicating staff growth of 2.76 times (CBK, 2012). This also shows that banks have recruited more people to oversee the tremendous growth witnessed in the last decade and transformed themselves as sources of employment and have also attracted various skills in the past decade. The results also indicate a stable and a sticky job environment which shows that most banks have turned themselves into employers of choice in the country by initiating several employee retention strategies and hence the many respondents who had worked for the banking sector for more than ten years.

Table 4.3: Respondents Banking Sector Experience

Years	1-5 yrs	5-10 yrs	Over 10 yrs	Total
Frequency	1	110	91	202
Percent	1	54	45	100

4.3 Study Variables Data Analysis

This section presents the findings and discussion in the order of the five specific objectives of the study. Frequencies and descriptive statistics are presented first followed by inferential statistics. The questionnaire responses were based on a likert scale which was coded with numerical values for ease of data analysis. The values assigned to the likert were 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree.

4.3.1 Effect of Bank Innovations on the Income of Banks

The first objective of the study was to determine the influence that bank innovations have on total income of commercial banks in Kenya. The objective was assessed by use of statements which were on the questionnaire where the respondents indicated their degree of agreement with the statements.

4.3.1.1 Automated Teller Machines (ATMs)

Data on Table 4.4 show responses on statements regarding the effects of ATMs on the income of commercial banks. Eighty percent of the respondents agreed that ATMs affected fees based income of the banks positively while 20% were indifferent and none of the respondents disagreed with the statement that ATMs have a positive effect on

commission income of banks. Asked whether ATMs influenced the interest incomes of banks positively, 55% disagreed, 18% agreed while 27% were neutral. On whether ATMs in general improved the income generating potential of commercial banks, 37% were indifferent, 32% agreed while 31% disagreed. The mean score of responses regarding ATMs was 3.03 on a 5 point scale. The average overall standard deviation of 0.833 infers that 68% of the responses were spread within one standard deviation of the overall mean. The standard deviation for each response line is also shown on the Table 4.4. The standard deviation statistical rule of 68%, 95% and 99.7% applies in all the interpretations in the rest of the document. This means that one standard deviation has 68% of the data spread around the mean and 95% for two standard deviations and 99.7% for three standard deviations.

These results corroborate with a study conducted by Jushua (2010) in Ghana which concluded that ATMs were capable of improving bank's commission incomes and also improved service convenience to the customers. Dew (2007) also confirms these findings in a study conducted in Australia which found that ATMs assisted banks to improve fee based incomes. A study done in the United States of America by Iftekhar, Schimiedel and Song (2009) concluded that ATMs installed in retail payment systems make banks to obtain more income. The findings of this study in relation to ATMs as confirmed by previous studies by Jushua (2010), Dew (2007) and Iftekhar, Schimiedel and Song (2009) are in line with the scene in Kenya where ATMs increased by 620 from 1691 in July 2009 to 2311 in September 2012 representing an increase of 36.7% within a

period of 39 months. The increase demonstrates initiatives by banks to increase provision of their services by adopting cost effective channels (CBK, 2012)

These findings show that commercial banks in Kenya have continued to invest in ATMs because they believe that such investment will yield to better incomes for the banks either directly or indirectly. The impact on incomes will be directly through levying of ATM withdrawal fees for both its customers and non customers. ATMs will also contribute to income indirectly where the bank manages to attract customers due to their wide networks of ATMs but the customers end up utilizing other income generating services of the bank like loans, bancassurance and credit cards.

Table 4.4: Automated Teller Machines and Bank Income

Statement	% Strongly Disagree	% Disagree	% Neutral	% Agree	% Strongly Disagree	Mean	STD
ATMs have had a positive effect of increasing commission fee based income			20	77	3	3.83	0.448
ATMs have influenced positively the increase of interest based income	36	19	27	17	1	2.28	1.157
ATMs have expanded the income generating potential of the bank	5	26	37	32	1	2.99	0.895
Average						**3.03**	**0.833**

4.3.1.2 Debit and Credit Cards

Debit and credit cards were seen to influence commission fee income by 73% of the respondents while 27% were indifferent as laid on Table 4.5. On whether debit and credit cards influenced the income generating potential of commercial banks, 43% agreed while 48% were either indifferent or neutral. The mean score of the responses was 3.50 which indicate that majority of the respondents agreed with the statements on the assertion that debit and credit cards had the potential of improving bank income. The average standard deviation of 0.638 means that, 68% of the responses were within one standard deviation from the mean.

Similar results have been reported by Nofie (2011) using a data set of 27 European countries and found that debit and credit cards had the potential to improve bank incomes and this concurs with the above results. Similar results were found in Nigeria by Agboola (2006) which found that smart cards made banks more efficient and enabled them to earn more commission income especially from their retail outlets. These studies and the findings of this current study support the trend in the Kenya banking sector where banks have been expanding their reach by use of credit and debit cards and their numbers grew from 3,385,534 in July 2009 to 8,784,503 in September 2012 which is a more than double increase of cards in circulation in Kenya (CBK, 2012).

This increase in cards is an indication of the banks' aggressive approach towards investing in card innovation. Banks in Kenya normally earn transaction fees income from card transactions. Banks have also partnered with many supermarket stores in the country with the objective of income sharing from transaction incomes. To encourage usage of the cards by customers, some banks in Kenya have created loyalty point system upon usage of the cards and also established discount arrangements with various retail outlets in order to encourage usage of the cards and eventually income to the bank.

Table 4.5: Debit and Credit Cards and Bank Income

Statement	% Strongly Disagree	% Disagree	% Neutral	% Agree	% Strongly Disagree	Mean	STD
Debit & credit cards have had a positive effect of increasing commission fee based income			27	70	3	3.75	0.487
Debit & credit cards have influenced positively the increase of interest based income		17	32	50	2	3.36	0.775
Debit & credit cards have expanded the income generating potential of the bank		8	48	43	2	3.38	0.653
Average						**3.50**	**0.638**

4.3.1.3 POS Terminals

Table 4.6 shows that 76% disagreed with the assertion that POS terminals increase bank commission income, 14% agreed while 10% were indifferent. Also 77% disagreed that POS terminals improved the banks income generating potential while only 6% agreed. The mean score of the responses is 2.14 which show that POS terminals did not influence positively the growth of bank incomes. The average standard deviation of 0.805 indicates that 68% of the responses were spread within one standard deviation from the mean score.

These findings are consistent with those ones of Nader (2011) in a study done in Saudi Arabia which found that POS terminals did not improve bank incomes. Findings by Kemppainen (2003 and 2008) in Finland found that POS terminals were only beneficial to banks when they had large retail infrastructure. Similar findings were found in USA by Iftekhar, Schimiedel and song (2009). However the growth of POS terminals from 5063 in July 2009 to 17702 in September 2012 is a 3.5 times growth or 250% growth rate, show that, banks in Kenya are growing the terminals not for income motives but due to other considerations (CBK, 2012).

POS terminals are customer access points and may therefore not form income motive for commercial banks. Many banks in Kenya have established POS terminals in various

retail outlets in order to create accessibility of the banking system to their customers. The POS terminals are also placed at various outlets to improve the accessibility and usage of debit and credit cards. POS terminals are part of the wider enterprise resource planning modules for banks and they are mainly aimed at increase the bank cash service distribution channels among various customer shopping outlets.

Table 4.6: POS Terminals and Bank Income

Statement	% Strongly Disagree	% Disagree	% Neutral	% Agree	% Strongly Disagree	Mean	STD
POS terminals have had a positive effect of increasing commission fee based income	17	59	10	12	2	2.19	0.885
POS terminals have influenced positively the increase of interest based income	17	59	18	5	1	2.12	0.763
POS terminals have expanded the income generating potential of the bank	18	59	18	5	1	2.11	0.767
Average						**2.14**	**0.805**

4.3.1.4 Mobile Banking

Data on table 4.7 show that mobile banking had the potential to improve incomes of banks. Those who agreed that mobile banking increased commission fee incomes were 70% while only 9% disagreed. The mean score of 3.38 indicate that majority of the respondents agreed that mobile banking improved the banks' income generating

potential. The standard deviation of 0.713 means that majority of the responses were spread within one standard deviation around the mean.

In corroborating the evidence with a Kenyan study regarding mobile banking by Misati, Njoroge, Kamau and Ouma (2010), it is revealed that mobile banking had expanded the range of services that a bank could offer and hence expanded incomes for banks. Similar findings were shown in a study in Uganda by Porteus (2006) and another one in Tunisia by Mabrouk and Mamogholi (2010) who concluded that mobile banking helped to increase bank incomes and profitability. Kenya mobile payments have been growing at a high rate as witnessed by the growth from 17 million transactions worth 40 billion Kenya shillings in July 2009 to 52 million transactions worth 138 billion Kenya shillings in October 2012 (CBK, 2012). This growth in mobile payments supports the findings of this study and those of other corroborating studies.

Mobile banking has experienced high penetration levels in Kenya because it offers an alternative service delivery channel for banks which is both accessible and affordable to many customers. The ease and speed with which customers can transact on mobile phones has made mobile banking very popular to both the banks and the customers. Banks have managed to create collaborations with mobile telephony providers which have increased the type and number of transactions that banks and customers can conduct on the mobile phone and thus creating more opportunities for income generation for banks.

Table 4.7: Mobile Banking and Bank Income

Statement	% Strongly Disagree	% Disagree	% Neutral	% Agree	% Strongly Disagree	Mean	STD
Mobile banking has had a positive effect of increasing commission fee based income		9	20	65	5	3.66	0.717
Mobile banking has influenced positively the increase of interest based income	4	35	51		10	2.77	0.925
Mobile banking has expanded the income generating potential of the bank			31	67	2	3.71	0.498
Average						**3.38**	**0.713**

4.3.1.5 Internet banking

Table 4.8 shows that 53% of the respondents disagreed on whether internet banking improved bank commission fee incomes while 18% agreed. On whether internet banking improved the generally ability of a bank to make more incomes 73% disagreed and only 10% agreed. The mean score for the responses was 2.32 on a 5 point scale indicating that internet banking did not lead to increased bank incomes in view of the respondents' opinions. The responses were spread within a standard deviation of 0.915 from the mean.

The findings of this study show that internet banking is used by bank as a convenience platform to enable customers to transact as opposed to it being an avenue for banks to make more revenue. These findings are inconsistent with previous studies done by Pooja

and Singh (2009) and Molhotra and Singh (2009) in India, Simpson (2002) in USA, Sullivian (2000) in USA and Arnaboldi & Claeys (2008) in Finland, Spain, Italy and UK where they all concluded that internet banking improved bank incomes and profitability.

Internet is provided at a minimal charge by many internet service providers and hence making it available as a platform for banks to offer their services. This explains the reason why many banks in Kenya do not charge the access fees on a customer account through the internet and hence internet is not an avenue for banks to make money but it has become a value-add to customers. Charging bank customers for accessing their accounts through the internet will amount to a double charge by both the bank and the internet service providers. Therefore internet does not induce revenue motive among banks in Kenya.

Table 4.8: Internet Banking and Bank Income

Statement	% Strongly Disagree	% Disagree	% Neutral	% Agree	% Strongly Disagree	Mean	STD
Internet banking has had a positive effect of increasing commission fee based income	12	41	29	18		2.52	0.926
Internet banking has influenced positively the increase of interest based income	19	54	9	18		2.26	0.965
Internet banking has expanded the income generating potential of the bank	19	54	17	10		2.18	0.853
Average						**2.32**	**0.915**

4.3.1.6 Electronic Funds Transfer (EFT)

Table 4.9 show a mean score of 3.33 which indicates that majority of the respondents agreed that EFT has the ability to influence bank income positively. For example 63% agreed that EFT influenced positively commission fee incomes of banks while 19% disagreed. Electronic funds transfer was seen to influence positively the bank income generating capacity by 53% of the respondents while 25% disagreed. The results show that 68% of the responses were within one standard deviation from the mean as supported by an actual standard deviation of 0.942.

These findings corroborate those ones of Sana, Mohammad, Hassan and Momina (2011) in a study done in Pakistan which concluded that electronic banking led to better incomes for the banks. Agboola (2006) in a study done in Nigeria concluded that EFT not only improved a banks image but also its incomes and subsequently profitability. The findings are also supported by the fact that EFT payments in Kenya declined from 2357 transactions worth 397 billion Kenya shilling in July 2009 to 2266 worth 214 billion Kenya shilling by June 2012. In Kenya EFT system has been partially replaced by the RTGS which has grown from transaction value of 1.2 billion Kenya shillings in July 2009 to 1.6 billion Kenya shillings in June 2012 (CBK, 2012).

Compared to cheques clearing system, EFT system has the ability to improve the velocity of money within the bank payment system and hence more money is moved within the economy within a short period. This presents an opportunity of banks to make

more money. EFT transaction charges are also higher compared cheque clearance charges and hence EFT system is capable of netting in more income for banks.

Table 4.9: Electronic Funds Transfer and Bank Income

Statement	% Strongly Disagree	% Disagree	% Neutral	% Agree	% Strongly Disagree	Mean	STD
Electronic funds transfer has had a positive effect of increasing commission fee based income	1	18	18	58	5	3.49	0.877
Electronic funds transfer has influenced positively the increase of interest based income	6	18	22	51	3	3.24	0.995
Electronic funds transfer has expanded the income generating potential of the bank	4	21	22	50	3	3.26	0.953
Average						**3.33**	**0.942**

4.3.1.7 Correlations – Income and Bank Innovations (Primary Data)

Table 4.10 presents the degree of correlation and levels of significance between bank income and bank innovations. All the bank innovations display weak correlation relationship with bank incomes. However within the innovations which are the independent variables, POS terminals have a high correlation of 86%. This high correlation between independent variables leads to multicollinearity between the variables and it leads to spurious results. A high degree of multicollinearity can also prevent computer software packages from performing the matrix inversion required for

computing the regression coefficients or it may make the results of that inversion inaccurate and unstable. Therefore in order to satisfy the regression analysis, the variable of POS terminals was dropped when conducting the regression analysis.

Table 4.10: Correlations - Income and Bank Innovations (Primary Data)

Variable	Coefficient Type	Income	Automated Teller Machines	Debit and Credit Cards	Point of Sale Terminals	Mobile Banking	Internet Banking	Electronic Funds Transfer
Income	Pearson Correlation	1						
	Sig. (2-tailed)							
Automated Teller Machines	Pearson Correlation	0.083	1					
	Sig. (2-tailed)	0.429						
Debit and Credit Cards	Pearson Correlation	-0.139	0.104	1				
	Sig. (2-tailed)	0.187	0.324					
Point of Sale Terminals	Pearson Correlation	0.187	0.205	0.113	1			
	Sig. (2-tailed)	0.073	0.050	0.283				
Mobile Banking	Pearson Correlation	0.015	0.367	0.622	0.576	1		
	Sig. (2-tailed)	0.886	0.000	0.000	0.000			
Internet Banking	Pearson Correlation	0.240	0.233	-0.263	0.856	0.376	1	
	Sig. (2-tailed)	0.021	0.025	0.011	0.000	0.000		
Electronic Funds Transfer	Pearson Correlation	-0.012	0.674	0.059	0.399	0.440	0.425	1
	Sig. (2-tailed)	0.912	0.000	0.576	0.000	0.000	0	

4.3.1.8 Regression Analysis – Income and Bank Innovations (Primary Data)

In testing the hypothesis, a regression equation model was used in the form of;

$Y = \beta_{11}X_1 + \beta_{21}X_2 + \beta_{31}X_3 + \beta_{41}X_4 + \beta_{51}X_5 + \varepsilon$ .The regression equation excluded the POS terminals variable due to its high collinearity with internet banking. The variables of the study were Y= income, X_1 = ATMs, X_2 = debit and credit cards, X_3 = mobile banking, X_4 = internet banking and X_5 = electronic funds transfer. The indicators of the model fitness are shown on Table 4.11. The coefficients indicate that the correlation coefficient (R) between the independent variables and total income is 0.704 which is a positive strong relationship. The coefficient of determination (R Square) of 0.496 indicates that the model can explain 49.6% of the variations or changes in the dependent variable of total income. In other words ATMs, debit & credit cards, mobile banking, internet banking and EFT can explain 49.6% of changes in total income of commercial banks in Kenya.

Table 4.11: Model Fitness - Income and Bank Innovations (Primary Data)

Indicator	Coefficient
R	0.704
R Square	0.496
Std. Error of the Estimate	7464.565

Table 4.12 presents the analysis of variance (ANOVA) on the influence of bank innovations on bank incomes. The results indicate that the model is statistically significant in explaining the impact of bank innovations on incomes of commercial banks on Kenya. Put differently, it means that the ANOVA results indicate that the combined effect of bank innovations is statistically significant in explaining variations in bank incomes at a level of significance of 0.05 and fail to accept the null hypothesis and conclude that bank innovations have a positive influence of income of banks.

Table 4.12: ANOVA - Income and Bank Innovations (Primary Data)

Indicator	Sum of Squares	Df	Mean Square	F	Sig.
Regression	4775000000	5	955000000	17.139	0.000
Residual	4854000000	87	55720000		
Total	9629000000	92			

Table 4.13 shows the coefficients on the influence of the individual independent variables on the dependent variable. The Beta coefficients indicate the extent to which bank income changes due to a unit change in the independent variable. The positive Beta coefficients indicate that a unit change in the independent variable leads to a positive change in bank income. For example a unit change in debit and credit cards led to 962.02 units of positive change in bank income indicating a positive relationship between the two variables. A negative Beta coefficient indicates an inverse effect between the variables in that a unit change in the independent variable leads to a negative change in total income. For example a unit change in mobile banking leads to -925.615 units of negative change in total income.

Table 4.13 also presents the level of significance also called the p value. This is the coefficient that is used to test hypothesis and the significance of the independent variables. The level of significance for this study is 0.05 and therefore if the p value is less that 0.05 we fail to accept the null hypothesis and accept if the p value is greater than 0.05. The p-value of internet banking is 0.028 which is less than the 0.05 level of significance. This means that internet banking is significant in influencing the income of commercial banks in Kenya positively. The other variables of ATMs, debit & credit cards, mobile banking and EFT have levels of significance (p value) greater than 0.05 which indicates that these independent variables are not significant in explaining changes of incomes of Kenyan commercial banks. The hypothesis of the study was stated that; bank innovations have a positive influence on total income of commercial banks in Kenya. Based on the p value coefficients of the bank innovations, we fail to reject the null hypothesis and conclude that the bank innovations of ATM, debit & credit cards, mobile banking and EFT do not have significant influence on total income of commercial banks in Kenya. However we also fail to accept the null hypotheses on internet banking and conclude that internet banking has a positive influence on incomes of commercial banks in Kenya.

These findings are consistent with a study conducted in India by Pooja and Singh (2009) which concluded that internet usage in banks led to more income and profits. Dew (2007) also found that internet usage led to more income. Contradictory results were found by Iftekhar, Schmiedel and Song (2009) who assert that if a bank joins in an ATM

network, it can generate income from other banks' customers that use its ATM machines or from third parties that cooperate with it. Further contradictory results were report by Kemppainen (2003 & 2008) in a study done among the European Union where the study concluded that relationship between innovations is stronger in countries with more retail payment transaction equipment, like ATMs and POS terminals. Nofie (2011) also has contrary findings and reveal that impact of retail payment innovations like ATM, POS and cards led to growth of bank fee income.

The findings of this study have produced mixed results as compared to previous studies. As an example Barclays bank of Kenya does not charge its customers for use of ATM and hence no income for the bank from its ATMs. The fees charged by Kenyan banks for use of ATM, POS, debit & credit card, mobile banking and internet banking is quite minimal to make meaningful and significant contribution to the total income of commercial banks compared to other income sources like interest income. For example, according to CBK (2012) interest income contributed 71% of year 2011 total banking sector income compared to 12% from fees and commissions which is mainly from services delivered through innovative channels. These numbers support the findings of this study in terms of the level of significance of innovations on income of commercial banks in Kenya.

Table 4.13: Regression Coefficients - Income and Bank Innovations (Primary Data)

Indicator	Beta	Std. Error	t	Sig.
Automated Teller Machines	2516.794	1728.637	1.456	0.149
Debit and Credit Cards	968.02	2313.13	0.418	0.677
Mobile Banking	-925.615	2637.338	-0.351	0.726
Electronic Funds Transfer	-1894.588	1539.055	-1.231	0.222
Internet Banking	2114.243	945.904	2.235	0.028

4.3.1.9 Regression - Bank Innovations and Income (Secondary Data)

In order to further corroborate the findings from the primary data, secondary data on the bank innovations and performance of commercial banks was corrected for the period 2002 to 2011.The data corrected was for the entire commercial banking sector. The individual bank innovations revealed high multicollinearity and a composite variable was computed to represent the bank innovations. Regression results on Table 4.14 for bank innovations on bank incomes indicate that the combined effect of bank innovations can explain 79.8% variations of incomes of commercial banks in Kenya. Further regression tests on Table 4.15 show that bank innovations represented by the secondary data for ten years are significant at 0.000 in explaining incomes of commercial banks in Kenya and hence confirms the alternate hypothesis. These results agree with the regression results from the primary data which were derived from questionnaire responses.

Table 4.14: Bank Innovations and Income Model Fitness (Secondary Data)

Indicator	Coefficient
R	0.893
R square	0.798
Standard Error Estimate	52927.871

Table 4.15: Bank Innovations and Income ANOVA (Secondary Data)

Indicator	Sum of Squares	Df	Mean Square	F	Sig.
Regression	99750000000	1	99750000000	35.609	0.000
Residual	25210000000	9	2801000000		
Total	1.25E+11	10			

4.3.2 Effect of Bank Innovations on the Rate of Return on Assets

The second objective of the study was to establish the influence that bank innovations have on return on assets of commercial banks in Kenya. The objective was verified from respondents by use of likert scaled statements on a questionnaire.

4.3.2.1 ATMs and Return on Assets

As shown on Table 4.16, 70% agreed and 10% strongly agreed while 5% were neutral and 15% disagreed that ATMs influenced operational costs of a bank and hence return on assets. On whether ATMs could recoup the initial investments within three years 75% agreed, 5% strongly agreed and 20% were indifferent. On a five point scale, the mean score for the effect of ATMs on return on assets was 3.47. This mean score indicates that there were more respondents who agreed to the statements that ATMs influenced return on assets of commercial banks positively. The standard deviation of

the responses is 0.666 indicating a spread of within one standard deviation from the mean.

Akram and Allam (2010) conducted a study in Jordan and found that use of information technology which is embodied in ATMs improved the matrix of financial and operational performance. The study concluded that information technology had an impact on return on assets which is consistent to the findings of this study. Further study that confirms the findings of this study was done in the US by Nadia, Anthony and Scholnick (2003) which found that use of information technology platforms like ATMs led to responses on internal cost cutting leading to better return on assets.

The findings indicate that ATMs have the potential to generate income for banks and hence the aggressive ATM network expansion by commercial banks in Kenya. Another development relates to partnerships between banks and intermediate financial institutions (savings and credit cooperative societies and micro-finance institutions) in terms of sharing ATM platforms indicating the potential that ATM machines have in enhancement of bank incomes. Moreover, ATM machines are now located at non-traditional locations like at the petrol stations, supermarkets, universities and colleges and in the rural areas, indicating the importance that banks attach to ATM machines in reaching and maintaining customers and strategically earning fees for their use.

Table 4.16: ATMs and Return on Assets

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
ATMs influence reduction of operational costs and hence better return on assets for the bank		15	5	70	10	3.75	0.493
ATMs investments have payback period of less than 3 years and hence good return on assets		1	20	75	5	3.85	0.493
Incomes from ATMs have had positive impact on bank income margins	7	37	23	30	2	2.82	1.011
Average						**3.47**	**0.666**

4.3.2.2 Debit/Credit Cards and Return on Assets

The effect of debit and credit cards on returns on assets is presented on Table 4.17. On whether debit and credit cards can influence reduction of banks' operational costs, 51% disagreed, 20% agreed while 29% were neutral. Regarding whether debit and credit cards have a payback of three years, it was agreed by 95% of the respondents and 4% disagreed and 2% were neutral. The mean score was 3.30 which show that most of the respondents agreed that debit and credit cards influence the return on assets of commercial banks positively. The responses resulted to a standard deviation of 0.663 indicating that they were concentrated within the mean within one standard deviation.

The findings of this study are consistent with those of a study conducted in Tunisia by Mabrouk and Mamoghli (2010) which concluded that magnetic strip cards which are either debit or credit cards improved profitability of a bank and hence the return on assets. Debit and credit cards do not involve a heavy initial capital outlay and hence have a shorter payback period. Nofie (2011) and Kemppainen (2003 & 2008) found that use of cards enabled banks to make more income and hence better return on bank assets if the banks encouraged their customers to use them at retails outlets.

Many banks have created partnerships with several retail outlets like supermarkets, hospitals, petrol stations and hotels and managed to have joint income sharing agreements when bank customers use their cards at such outlets. Cards also present a convenient opportunity for customers to transact without the need to carry cash and hence leading to high growth in use of cards and therefore more income for the banks.

Table 4.17: Debit/Credit Cards and Return on Assets

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Debit & credit cards influence reduction of operational costs and hence better return on assets for the bank	9	42	29	18	2	2.60	0.942
Debit & credit cards investments have payback period of less than 3 years and hence good return on assets	1	3	2	91	4	3.95	0.307
Incomes from debit & credit cards have had positive impact on bank income margins	1	11	45	41	3	3.33	0.741
Average						**3.30**	**0.663**

4.3.2.3 POS Terminals and Return on Assets

Table 4.18 shows responses related to the effect of POS terminals on return on assets of commercial banks. There were 86% of respondents who agreed that POS terminals were capable of influencing the reduction of the operational costs of banks while 10% were neutral and 4% disagreed. It was agreed by 82% of the respondents that POS terminals recouped their initial investments costs within three years while 14% were neutral and 6% disagreed. The mean score was 3.64 which show that there was more agreement that POS terminals influenced the returns on assets of commercial banks positively. The standard deviation was 0.587 meaning a close spread around the mean.

Complementary findings were found by Kemppainen (2003 & 2008) in a study done among the EU countries found that POS terminals were capable of improving banks' profitability and hence return on assets which is in line with findings of this study. The findings are further supported by Nofie (2011) and Iftekhar, Schmiedel and Song (2009) who found that POS terminals contributed to banks' income and return on assets where there are more retail payments transaction equipment like the POS terminals.

Point of Sale terminals network is being expanded by the Kenyan banks because it provides an opportunity to serve more bank customers not only in the urban areas but also in rural and remote areas. POS terminals have provided an opportunity for Kenyan commercial banks to establish agent banking in non-traditional bank locations and therefore providing more income for banks. POS terminals also does not require huge initial capital outlay but has a high income generating potential because it allows customers to deposit cash, purchase, pay bills and access statements thus enabling banks to earn more and improving their return on assets.

Table 4.18: POS Terminals and Return on Assets

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
POS terminals influence reduction of operational costs and hence better return on assets for the bank		4	10	76	10	3.91	0.469
POS terminals investments have payback period of less than 3 years and hence good return on assets	1	5	14	76	5	3.78	0.469
Incomes from POS terminals have had positive impact on bank income margins	5	9	47	38	2	3.22	0.824
Average						**3.64**	**0.587**

4.3.2.4 Mobile Banking and Return on Assets

The results in Table 4.19 shows that mobile banking reduces operational costs as agreed by 86% of the respondents 10% were neutral and 2% disagreed. Investments in mobile banking were recouped within three years as agreed by 80% of the respondents and 65% agreed that mobile banking was capable of having a positive impact on bank margins. The mean score of the responses was 3.79 implying that mobile banking influences

return on assets positively. The standard deviation was 0.477 which meant the existence of the responses clustering within one standard deviation from the mean.

Aker and Mbiti (2010) and Rayhan, Sohel, Islam and Mahjabin (2012) support these findings using data from Africa and Bangladesh respectively and found that mobile phones offered an opportunity for banks to improve their incomes and hence better return on assets by having a large number of virtual mobile accounts especially for the unbanked individuals.

Many banks in Kenya have embraced the use of mobile phones and have seen their business operations transformed and leading to more income. There are increased collaborations between banks and mobile phone telephony providers which is mainly driven by income sharing and customer retention. The competition for income generating initiatives through the mobile phones has made banks to participate in competing for space in the SIM card. This means that the more a bank makes its activities visible on the SIM card the more income it is likely to make towards recovering its investments in mobile banking. Some banks are even operating raffles to encourage customers to increase their transaction on the mobile phone with an objective to reduce their operational costs. Many banks in Kenya have catchy buzzwords for their mobile banking solutions which is an indication of the aggression being employed to grow mobile banking and subsequently influence growth of commission income. Some of the common buzzwords for mobile banking in Kenya are *pesa pap, pesa chap chap,*

quick cash, mobikash, pesa mkononi and e-cash. This is indicative of the competition for mobile banking in the Kenyan market. The buzzwords also allude to accessing cash with fewer hassles which is all meant to attract more customers and then more commission income for the banks.

Table 4.19: Mobile Banking and Return on Assets

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Mobile banking influence reduction of operational costs and hence better return on assets for the bank		2	10	77	11	3.98	0.448
Mobile banking investments have payback period of less than 3 years and hence good return on assets	3	2	15	77	3	3.76	0.448
Incomes from mobile banking have had positive impact on bank income margins		5	30	61	4	3.63	0.536
Average						**3.79**	**0.477**

4.3.2.5 Internet Banking and Return on Assets

Table 4.20 shows the influence of internet banking on return on assets. Internet banking was seen to be good in reducing operational costs of a bank and hence better return on assets by 79% of the respondents, 20% were neutral and 1% disagreed. Thirty six percent agreed that internet banking contributed well to bank margins while 57% were indifferent and 14% disagreed. The mean score for the responses was 3.40 indicating

more agreement with the statements on whether internet banking was capable of influencing return on assets. The standard deviation was 0.642 inferring a close spread around the mean of the responses.

In concurrence with the findings, Akram and Allam (2010) tested a hypothesis in a study on Jordanian banks and found that use of information technology like internet had impact on return on assets, net profit margin, market value added and earnings per share. Similar findings were reported by Onaz, Ozsoz and Helvacioglu (2008) in a study conducted in Turkey which concluded that besides investment in e-banking being a gradual process, internet banking had a positive effect on the return on assets and return on equity of the banking system in Turkey. Further corroboration is found in Finland, Spain, Italy and the UK by Arnaboldi and Claeys (2008) where a study concluded that online banking made banks perform better in terms of returns on assets.

These findings point to the aggressive nature of Kenyan banks in the use of online channels for service delivery. It is quite common to note in the Kenyan media when banks notify their customers on some system upgrades in order to deliver better services. Notable recent examples include banks like Kenya Commercial Bank, Equity Bank and Postbank changed their core banking platforms. This shows the value that banks have on online systems of banking. Due to the investment in internet banking, banks in Kenya have managed to serve corporate customers from their offices through internet links which involves accessing their bank accounts and transacting from their office premises.

This has led to reduction and control of banks' operational costs and hence better profits leading to improved return to assets.

Table 4.20: Internet Banking and Return on Assets

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Internet banking influence reduction of operational costs and hence better return on assets for the bank		1	20	75	4	3.82	0.500
Internet banking investments have payback period of less than 3 years and hence good return on assets	2	12	50	36	1	3.22	0.730
Incomes from internet banking have had positive impact on bank income margins	2	12	57	28	1	3.15	0.697
Average						**3.40**	**0.642**

4.3.2.6 Electronic Funds Transfer and Return on Assets

The responses on the influence of Electronic Funds Transfer (EFT) on return on assets are presented on Table 4.21. Thirty six percent of the respondents agreed, 42% were neutral and 23% disagreed with the statement that EFT could influence the reduction of operational costs. Income earned through EFT contributed positively to bank margins as agreed by 61%, 35% were neutral and 5% disagreed. The responses had a mean score of 3.52 indicating the existence of more agreement with the statements on the positive

influence of EFT on banks' return on assets. The standard deviation for the results was 0.737.

Hasan, Schimiedel and Song (2010), Hernado and Nieto (2006) and DeYoung (2005) in studies done in Italy, Spain and USA respectively, concluded that investment in electronic technology seemed to influence positively the performance of banks as measured by return on assets and return on equity. The conclusions also suggested that electronic technology like the internet and EFT were used more as a complement than as a substitute for physical branches, suggesting the dominance of a multi channel banking model.

The findings of this study and corroborations from previous empirical studies suggest that EFT technology has been helpful to both the banks and their customers. Electronic funds transfer has been popular among Kenyan banks due to the ease of transferring funds from one bank to another and from one customer to another. The EFT system has even been bolstered by the introduction of the Real Time Gross Settlement (RTGS) system which is gradually replacing EFT especially for large transactions. The EFT and the RTGS are better than the ordinary cheques payment system because funds move faster in the banking system and hence creating a momentum for making more commission income among the banks.

Table 4.21: Electronic Funds Transfer and Return on Assets

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Electronic funds transfer influence reduction of operational costs and hence better return on assets for the bank	2	21	42	35	1	3.13	0.802
Electronic funds transfer investments have payback period of less than 3 years and hence good return on assets	1	2	25	62	10	3.79	0.685
Incomes from electronic funds transfer have had positive impact on bank income margins		5	35	51	10	3.66	0.725
Average						**3.52**	**0.737**

4.3.2.7 Correlations – Return on Assets and Bank Innovations (Primary Data)

Table 4.22 presents the Pearson birvariate correlation coefficients between returns on assets and bank innovations and also between the bank innovations. Debit and credit cards have the highest correlation with return on assets of 0.22. Negative correlations are also seen between return assets and ATMs (-0.073), POS terminals (-0.084), mobile banking (-0.092), internet banking (-0.04) and EFT (-0.104). This indicates that with a unit change of each of the bank innovations there is a resultant negative unit change in

return on assets. There is high collinearity arising from ATMs to POS terminals and mobile banking and therefore ATMs variable was dropped in the regression analysis to control for multicollinearity.

Table 4.22: Pearson's Correlation – Return on Assets and Bank Innovations

Variable	Coefficient Type	Return on Assets	Automated Teller Machines	Debit and Credit Cards	Point of Sale Terminals	Mobile Banking	Internet Banking	Electronic Funds Transfer
Return on Assets	Pearson Correlation	1						
	Sig. (2-tailed)							
Automated Teller Machines	Pearson Correlation	-0.073	1					
	Sig. (2-tailed)	0.487						
Debit and Credit Cards	Pearson Correlation	0.220	0.058	1				
	Sig. (2-tailed)	0.035	0.581					
Point of Sale Terminals	Pearson Correlation	-0.084	0.699	-0.324	1			
	Sig. (2-tailed)	0.423	0.000	0.002				
Mobile Banking	Pearson Correlation	-0.092	0.771	-0.362	0.916	1		
	Sig. (2-tailed)	0.382	0.000	0.000	0.000			
Internet Banking	Pearson Correlation	-0.04	0.023	0.009	0.425	0.42	1	
	Sig. (2-tailed)	0.708	0.828	0.929	0.000	0.000		
Electronic Funds Transfer	Pearson Correlation	-0.104	-0.147	0.219	0.083	0.098	0.679	1
	Sig. (2-tailed)	0.323	0.16	0.036	0.431	0.352	0.000	

4.3.2.8 Regression Analysis – Return on Assets and Bank Innovations (Primary Data)

Table 4.23 shows the effectiveness of the model in measuring the influence of bank innovations on return on assets of commercial banks in Kenya. The overall correlation coefficient (R) between return on assets and bank innovations is a strong positive correlation of 0.972. The coefficient of determination (R Square) indicates that the bank innovations in the regression model can explain 94.4% of the variations in return on assets of commercial banks in Kenya holding other factors constant.

Table 4.23: Model Fitness – Return on Assets and Bank Innovations (Primary Data)

Indicator	Coefficient
R	0.972
R Square	0.944
Std. Error of the Estimate	0.77288

Table 4.24 presents the analysis of variance of the bank innovations that are included to explain the return on assets of commercial banks in Kenya. The overall significance of the model is 0.000 which is at level of significance of 0.05 and fail to accept the null hypothesis and conclude that bank innovations have a positive influence of return on assets of commercial banks in Kenya. This shows that the bank innovations included in the model have an overall high significance in explaining the return on assets of

commercial banks in Kenya. The individual significance levels of the bank innovations are presented on Table 4.25.

Table 4.24: ANOVA – Return on Assets and Bank Innovations (Primary Data)

Indicator	Sum of Squares	df	Mean Square	F	Sig.
Regression	880.061	5	176.012	294.66	0.000
Residual	52.036	87	0.597		
Total	932.097	92			

Table 4.25 shows the regression coefficients of the individual independent variables. The results indicate that debit and credit cards are significant in explaining the return on assets of commercial banks in Kenya. The other banks' innovations are not significant in explaining variation in the return on assets of commercial banks in Kenya. This leads us to fail to accept the null hypothesis and conclude that debit and credit cards have a positive influence on return on assets of commercial banks in Kenya and also we fail to reject the null hypothesis and conclude that POS terminals, mobile banking, internet banking and electronic funds transfer are not significant in explaining the return on assets of commercial banks in Kenya.

These findings are supported by Hasan, Schimiedel and Song (2010), Hernado and Nieto (2006) and DeYoung (2005) in studies done in Italy, Spain and USA respectively. These studies concluded that investment in electronic technology seemed to influence positively the performance of banks as measured by return on assets and return on equity. The conclusions also suggested that electronic technology like the internet and

EFT were used more as a complement than as a substitute for physical branches, suggesting the dominance of a multi channel banking model.

Debit and credit cards do not require a lot of initial investment outlay and hence it explains why they are significant in contributing to the return on assets. The margin arising from card business of commercial banks is high. POS terminals, mobile banking and internet banking require heavy initial investment outlay and hence, initially they have lower income margins and therefore lesser contribution to return on assets.

Table 4.25: Regression Coefficients – Return on Assets and Bank Innovations (Primary Data)

Indicator	Beta	Std. Error	t	Sig.
Debit and Credit Cards	0.493	0.128	3.847	0.000
POS Terminals	0.208	0.365	0.569	0.570
Mobile Banking	-0.104	0.333	-0.312	0.755
Internet Banking	0.16	0.17	0.945	0.347
Electronic Funds Transfer	-0.245	0.17	-1.44	0.154

4.3.2.9 Regression Analysis –Bank Innovations and Return on Assets (Secondary Data)

Table 4.26 and Table 4.27 present the regression analysis results of secondary data on bank innovations and performance of commercial banks for ten years from 2002 to 2011. Results on Table 4.26 indicate that the combine influence of bank innovations can explain 55.5% variations in return on assets of commercial banks in Kenya. This is further supported by results on Table 4.27 which reveal that bank innovations are

significant at 0.008 in explaining the return on assets of commercial banks in Kenya and supported the alternate hypothesis. These findings are support by the regression results of the primary data which also reveal a statistically significant influence of bank innovations on the return on assets.

Table 4.26: Bank Innovations and Return on Assets Model Fitness (Secondary Data)

Indicator	Coefficient
R	0.745
R Square	0.555
Std. Error of the Estimate	2.21273

Table 4.27: Bank Innovations and Return on Assets ANOVA (Secondary Data)

Indicator	Sum of Squares	df	Mean Square	F	Sig.
Regression	55.029	1	55.029	11.239	0.008
Residual	44.066	9	4.896		
Total	99.095	10			

4.3.3 Effect of Bank Innovations on Bank Profitability

The third objective of the study was to establish the influence of bank innovations on profitability of commercial banks in Kenya. Data for this objective was gathered using likert scale questionnaires which were issued to randomly selected respondents who work for commercial banks in Kenya.

4.3.3.1 ATMs and Bank Profitability

Table 4.28 displays the results of responses from respondents regarding the influence of ATMs on the profitability of commercial banks in Kenya. Ninety percent of the respondents agreed that ATMs have incomes which carry high margins and hence leading the high profits for banks. Two percent were neutral while 8% disagreed. Regarding whether ATMs have low maintenance or operational costs, 95% agreed while 3% were neutral and 2% disagreed. Thirty three percent agreed that investment in ATMs by banks was driven by profits, 44% were neutral and 24% disagreed. The mean score of the statements was 3.70 which indicate more agreement with the statements on whether ATMs contributed positively to the profits of commercial banks in Kenya. The responses were spread closely to the mean as indicated by the standard deviation of 0.525.

These results are corroborated through the findings of Nader (2011) in a study conducted among Saudi Arabia banks during the period 1998-2007 where the results of the study confirmed that availability of ATMs and branches had a positive effect of profit efficiency of Saudi banks. Agboola (2006) in a study in Nigeria found that the increase in the adoption of ATMs had a positive impact on a bank's image and its profitability. These findings are further supported by Hasan, Schimiedel and Song (2009) in a study

across the European Union which concluded that ATMs increased bank profitability in terms of accounting ratios and cost efficiency.

In Kenya ATMs are capable of generating some income for commercial banks due to the convenience they offer to bank customers. Banks in Kenya have been marketing themselves by showcasing their ATM network across the country with an objective to attract more customers and eventually contribute to bank profits. Some banks in Kenya have further invested in intelligent ATMs which have face and finger print detection capabilities all in the need to attract more customers.

Table 4.28: ATMs and Profitability

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Income from ATMs has high margin hence contributing positively to bank annual profitability	2	6	2	78	12	3.92	0.324
ATMs have low maintenance costs leading to high levels of profitability over their economic lifetime		2	3	75	20	4.13	0.399
Investment in ATMs in mostly motivated by profits to the bank	4	20	44	31	2	3.05	0.853
Average						**3.70**	**0.525**

4.3.3.2 Debit/Credit Cards and Bank Profitability

Responses regarding the effect of debit and credit cards on banks' profitability are presented on Table 4.29. Thirteen percent of the respondents agreed, 17% were neutral

and 70% disagreed with the assertion that debit and credit cards have good margins which contribute to profits. Seventy two percent agreed, 28% were neutral and 1% disagreed with the statement that debit and credit cards have low maintenance costs. Regarding whether banks aim at making profits when investing in debit and credit cards, 10% agreed, 52% were neutral and 39% disagreed. The mean score for the responses was 2.93 which indicate less agreement on the influence that debit and credit cards have on the profitability of commercial banks in Kenya. The responses were spread closely to the mean as indicated by a standard deviation of 0.642.

The findings corroborate with those of Agboola (2006) in a study conducted in Nigeria which concluded that smart cards or debit and credit cards improved banks' income generation and had low capital needs and boosted banks' profits. Nofie (2011) also asserts that retail payment instruments like debit and credit cards are capable of enhancing bank performance.

Banks and card issuers have been using several methods to encourage customers to use their cards. These include rotary, discounts at selected service points, reduced interest charges and affordable repayment terms. All these strategies are meant to contribute to the banks' bottom line. Cards are also affordable to both the banks and the customers and they don't require a lot of maintenance costs both at acquisition and when in operation. This makes cards quite attractive as an instrument for conducting transactions

for customers and the banks. This high usage of cards attracts commission income for the bank which adds to the banks' profits.

Table 4.29: Debit/Credit Cards and Profitability

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Income from debit and credit cards has high margin hence contributing positively to bank annual profitability	5	65	17	13		2.37	0.637
Debit and credit cards have low maintenance costs leading to high levels of profitability over their economic lifetime		1	28	68	4	3.76	0.581
Investment in debit and credit cards is mostly motivated by profits to the bank	4	35	52	10		2.68	0.707
Average						**2.93**	**0.642**

4.3.3.3 POS Terminals and Bank Profitability

Table 4.30 presents percentage of respondents along with their degree of agreement with the assertion of the influence of POS terminals on banks' profits. Eighty percent of the respondents agreed that incomes derived from POS terminals have good margins, 65% agreed that POS terminals have low maintenance costs and 39% agreed that investment in POS terminals is driven by banks' profit motive. The mean score of the responses was 3.54 which show that there was more agreement with the statements on whether POS

terminals have a positive influence on banks' profitability. A standard deviation of 0.713 shows that the responses were spread around the mean within one standard deviation.

These findings contradict those of Nader (2011) in a study of Saudi Arabia commercial banks which concluded that the availability of POS terminals did not improve the profit efficiency of the banks for the period 1998 to 2007. However the findings are confirmed by Hasan, Schimiedel and Song (2009) in a study conducted in Italy which concluded that availability of POS terminals made banks to improve their profits and cost efficiency. Also Kemppainen (2003 & 2008) found that in the European Union, retail payments would support bank profitability if there was existence of retail payment transactions like the POS terminals.

In Kenya POS terminals have been used mainly at service points like hotels, petrol stations and supermarkets. Recently this has changed due to establishment of agent banking where the main equipment for facilitating transaction is the POS terminal. Due to the increased use of POS terminals banks have managed to reach out to the unbanked segment of the society and hence improving on their commission income.

Table 4.30: POS Terminals and Profitability

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Income from POS terminals has high margin hence contributing positively to bank annual profitability		5	15	47	33	4.08	0.722
POS terminals have low maintenance costs leading to high levels of profitability over their economic lifetime		6	29	62	3	3.62	0.645
Investment in POS terminals is mostly motivated by profits to the bank	4	40	18	37	2	2.91	0.771
Average						**3.54**	**0.713**

4.3.3.4 Mobile Banking and Bank Profitability

Responses on the influence of mobile banking on the profitability of commercial banks in Kenya are presented on Table 4.31. Ninety seven percent of the respondents agreed that incomes from mobile banking have high margin, 91% agreed that maintenance costs of mobile banking are low and 78% disagreed that profits is the main objective of banks when investing in mobile banking. The mean score of 3.35 shows that there was more agreement with the statements on whether mobile banking influences positively the

profitability of commercial banks in Kenya. The standard deviation was 0.602 meant that the responses were spread around the mean within one standard deviation.

Similar to the findings on mobile banking and bank profitability, Porteus (2006) asserts that in Uganda mobile banking has increased access to banking services and subsequently income and profits for the banks. In Kenya, Ndung'u (2011) concurs that mobile banking has revolutionalised the money transfer business and has created further innovations that have lowered the transaction costs for both the banks and customers.

This transformation of money transfer business has translated to more incomes and profits to the banks. This confirms why Kenya has appeared in the global map in the front of mobile money transfer services. Due to the potential in mobile banking, the model has been replicated in other countries and seems to be a threat to the traditional money transfers services like the EFT and cheque system. Many retail transactions in Kenya have moved to the mobile phone. Bank customers can move money from their bank accounts to their e-money accounts or from their e-money to their bank accounts. This improvement of the mobile money services has increase the velocity and circulation of money in the country and has resulted to more profits for the banks through commission incomes.

Table 4.31: Mobile Banking and Profitability

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Income from mobile banking has high margin hence contributing positively to bank annual profitability	1	2		87	10	4.03	0.517
Mobile banking has low maintenance costs leading to high levels of profitability over their economic lifetime	1	2	6	81	10	3.97	0.572
Investment in mobile banking is mostly motivated by profits to the bank	19	59	18	4		2.06	0.717
Average						**3.35**	**0.602**

4.3.3.5 Internet Banking and Bank Profitability

Table 4.32 shows responses of the extent of influence of internet banking on profitability of commercial banks in Kenya. Forty percent agreed that incomes from internet banking have good margins, 15% were neutral and 44% disagreed. On whether internet banking have low maintenance or running cost, 68% agreed, 22% were neutral and 10% disagreed. Fifty eight percent disagreed with the statement that banks are mainly driven by profits when investing in internet banking while 32% were neutral and only 10% agreed. The mean score for the responses was 2.99 which indicate that there was less agreement on the assertion that internet banking has a positive influence on bank

profitability. The mean score was very close to 3.00 which would mean there was indifference on the nature of influence that internet banking have on bank profits. The standard deviation was 0.817 meaning that at least 68% of the responses were spread within one standard deviation of the mean.

These findings are inconsistent to those of Malhotra and Singh (2009) who found that, in India, larger internet banks were more profitable. However their study also found that smaller banks had their profitability impacted negatively by internet adoption. DeYoung, Lang and Nolle (2007) also had contrary findings in the USA which concluded that internet banking improved bank profitability. Another contrary finding was reported in India by Kagan, Acharya, Rao and Kodepaka (2005) that internet banking helped community banks to improve their earning ability.

The findings show that Kenyan commercial banks do not invest in internet banking with a sole objective of making high incomes from the service. Internet banking in Kenya is mainly used as a compliment of other service delivery channels in order to create convenience to the customers. Internet banking is also used as a competitiveness tool in order to attract and retain mainly the corporate clients. In Kenya, internet banking is mainly used by corporate clients who would be given the service at highly subsidized rates due to the fact that corporate customers have several ways of contributing to the banks' profitability like through loans, overdrafts, letters of credit and cheques processing.

Table 4.32: Internet Banking and Profitability

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Income from internet banking has high margin hence contributing positively to bank annual profitability	8	36	15	39	1	2.88	1.058
Internet banking has low maintenance costs leading to high levels of profitability over their economic lifetime		10	22	60	8	3.66	0.584
Investment in internet banking is mostly motivated by profits to the bank	10	48	32	10		2.42	0.808
Average						**2.99**	**0.817**

4.3.3.6 Electronic Funds Transfer and Bank Profitability

Table 4.33 presents responses on the influence of EFT on profitability of commercial banks in Kenya. Seventy nine percent of the respondents disagreed, 11% were neutral and 10% agreed that income from EFT has high margin and hence contributing to bank profits. Regarding whether EFT has low maintenance costs; 63% agreed, 25% were neutral and 12% disagreed. Seventy four percent disagreed that banks are mainly driven by profits when they invest in EFT facilities. The mean score for the response was 2.73 which indicates there was less agreement with the statements to support the assertion that EFT have a positive influence on profitability of commercial banks in Kenya. The

standard deviation of 0.930 showed that 68% of the responses were spread within one standard deviation of the mean.

These finding are corroborated by Shirley and Sushanta (2006) in a study of 68 US banks for a period of 20 years. The study concluded that although electronic payments can lead to cost savings, it can create network effects that could lower bank profits. Further evidence in support of the findings was found in 12 US banks by Shu and Strassmann (2005) where it was found that investments in information technology was an essential improvement for banks but could not improve banks' earnings. Contrary to the findings on EFT and bank profitability, Sana, Mohammad, Hassan and Momina (2011) in a study conducted in Pakistan found that electronic funds transfer reduced costs, saved time, improved accuracy, improved reliability and quality of services and eventually led to improved profitability for the banks.

The findings reveal that investment in EFT technology is important to banks but they cannot rely on it to improve their profits. Also in Kenya EFT technology is gradually being replaced by the RTGS system and mobile banking due to the low versatility of EFT systems.

Table 4.33: Electronic Funds Transfer and Profitability

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Income from electronic funds transfer has high margin hence contributing positively to bank annual profitability	10	69	11	10		2.20	0.806
Electronic funds transfer have low maintenance costs leading to high levels of profitability over their economic lifetime	5	7	25	44	19	3.65	0.841
Investment in electronic funds transfer is mostly motivated by profits to the bank	19	55	8	9	8	2.33	1.143
Average						**2.73**	**0.930**

4.3.3.7 Correlations – Profitability and Bank Innovations (Primary Data)

Table 4.34 shows the correlation coefficients between bank profitability and bank innovations. The highest correlation between profitability and bank innovations is with electronic funds transfer of 0.222 and the lowest is with debit and credit cards of 0.000. Mobile banking has a high collinearity with internet banking (0.761) and electronic funds transfer (0.721). This indicates the existence of multicollinearity arising from mobile banking and can lead to unstable regression and therefore mobile banking were excluded in the regression estimations.

Table 4.34: Pearson Correlation – Profit and Bank Innovations

Variable	Coefficient Type	Profitability	Automated Teller Machines	Debit and Credit Cards	Point of Sale Terminals	Mobile Banking	Internet Banking	Electronic Funds Transfer
Profitability	Pearson Correlation	1						
	Sig. (2-tailed)							
Automated Teller Machines	Pearson Correlation	-0.080	1					
	Sig. (2-tailed)	0.446						
Debit and Credit Cards	Pearson Correlation	0.000	-0.098	1				
	Sig. (2-tailed)	0.998	0.354					
Point of Sale Terminals	Pearson Correlation	-0.124	0.346	-0.155	1			
	Sig. (2-tailed)	0.239	0.001	0.139				
Mobile Banking	Pearson Correlation	0.080	0.370	0.418	0.056	1		
	Sig. (2-tailed)	0.449	0.000	0.000	0.593			
Internet Banking	Pearson Correlation	0.094	-0.124	0.823	-0.177	0.761	1	
	Sig. (2-tailed)	0.374	0.240	0.000	0.091	0.000		
Electronic Funds Transfer	Pearson Correlation	0.222	-0.114	0.650	-0.355	0.724	0.896	1
	Sig. (2-tailed)	0.033	0.281	0.000	0.001	0.000	0.000	

4.3.3.8 Regression Analysis – Profitability and Bank Innovations (Primary Data)

Table 4.35 presents the coefficients of model fitness on how effective bank innovations explain bank profitability. The profitability has an overall correlation with bank innovations of 0.691 which is strong and positive. Bank innovations that are included in the model explain 47.8% of the changes or variations in profitability of commercial banks in Kenya. This shows that 52.2% of the variations in profitability is explained by other factors not captured in the model. This presents an opportunity for future studies to include additional variables that could explain banks' profitability.

Table 4.35: Model Fitness – Profitability and Bank Innovations (Primary Data)

Indicator	Coefficient
R	0.691
R Square	0.478
Std. Error of the Estimate	2529.61008

Table 4.36 shows the overall significance of the regression estimation model. It indicates that the model is significant in explaining the relationship between profitability and bank innovations at a 5% level of significance. The analysis of variance of the predictors of the model have a significance is 0.000 and fails to accept the null hypothesis and

conclude that bank innovations have a positive influence of profitability of commercial banks in Kenya.

Table 4.36: ANOVA – Profitability and Bank Innovations (Primary Data)

Indicator	Sum of Squares	df	Mean Square	F	Sig.
Regression	504200000	6	84040000	13.133	0.000
Residual	551000000	86	6398927.157		
Total	1.06E+09	92			

On Table 4.37 the regression coefficients of the predictors (bank innovations) are presented. Results indicate that electronic funds transfer is significant in explaining profitability of commercial banks with a significance of 0.02 which is less that a p-value of 0.05. Due to this finding we fail to accept the null hypothesis and conclude that EFT has a significant influence on the profitability of commercial banks in Kenya. We also fail to reject the null hypothesis and conclude that ATMs, debit cards, point of sale terminals and internet banking do not have significant influence on profitability of commercial banks in Kenya.

These findings are corroborated by findings on EFT and bank profitability by Sana, Mohammad, Hassan and Momina (2011) in a study conducted in Pakistan that found that electronic funds transfer reduced costs, saved time, improved accuracy, improved reliability and quality of services and eventually led to improved profitability for the banks. Additionally Nofie (2011) found that a higher usage of electronic retail payment instruments seems to stimulate banking business leading to better bank performance dominated by fee income.

The results of the regression estimating confirms the multiplier effect created through money transfer through the EFT system. Money transfer to or from a bank generates fees income and when the money reaches the other bank there are multiple of transactions that may arise from that money. It can be used to pay liabilities or it can be invested as a deposit by the customer and hence providing an opportunity for the bank to lend out the money and hence earn interest income over the tenure of the deposit. This means that EFT has both direct and indirect ways of boosting bank profitability.

Table 4.37: Regression Coefficients – Profitability and Bank Innovations (Primary Data)

Indicator	Beta	Std. Error	t	Sig.
Automated Teller Machines	-579.723	725.129	-0.799	0.426
Debit and Credit Cards	-496.086	694.161	-0.715	0.477
Point of Sale Terminals	153.114	693.486	0.221	0.826
Internet Banking	-1662.961	1028.42	-1.617	0.109
Electronic Funds Transfer	2887.163	916.899	3.149	0.002

4.3.3.9 Regression Analysis– Bank Innovations and Profitability (Secondary Data)

Secondary data on bank innovations and profit before tax for the banking industry for the period 2002 to 2011 was analysed using regression tests. Results on Table 4.38 show that bank innovations explain 82.8% variations of profit before tax of commercial banks in Kenya. Table 4.39 reveals that bank innovations are statistically significant in explaining profit before tax of commercial banks in Kenya and hence supports the

alternate hypothesis of the study. These results resonate the regression results of primary data which revealed a statistically significant influence of bank innovations on profitability of commercial banks in Kenya.

Table 4.38: Bank Innovations and Profit before Tax Model Fitness (Secondary Data)

Indicator	Coefficient
R	0.91
R Square	0.828
Std. Error of the Estimate	19834.50918

Table 4.39: Bank Innovations and Profit Before Tax ANOVA (Secondary Data)

Indicator	Sum of Squares	df	Mean Square	F	Sig.
Regression	17030000000	1	17030000000	43.293	0.000
Residual	3541000000	9	393400000		
Total	2.06E+10	10			

4.3.4 Effect of Bank Innovations on Customer Deposits

The fourth objective of the study was to determine the influence that bank innovations have on customer deposits of commercial banks in Kenya. Information used to arrive at the findings for addressing the objective was gathered by use of a questionnaire. Specifically the respondents were requested to provide their views on whether; ATMs, debit and credit cards, POS terminals, mobile banking, internet banking and electronic funds transfer have influence on the mobilization of customer deposits in the Kenyan banking sector.

4.3.4.1 ATMs and Customer Deposits

Table 4.40 presents the percentage of respondents who responded to statements on the influence of ATMs on deposits. On whether the availability of ATMs have attracted more retail deposits, 95% of the respondents agreed to the statement while 2% were neutral and 2% disagreed. Eighty four percent agreed that ATMs provided ease of access to deposits by the customers while 6% disagreed and 9% were neutral. On whether ATMs have led to attraction of corporate customers, 48% disagreed, 13% were neutral and 39% agreed. The mean score for the responses was 3.65 on a scale of one to five. This shows that there was more agreement with the statements regarding the ability of ATMs to influence mobilization of customer deposits. The data was spread closely to the mean within one standard deviation as indicated by a standard deviation of 0.734.

In line with the finding of this study, a study in the USA by Massoud, Saunders and Scholnick (2006) found that banks were using ATMs surcharge to mobilize deposits and it was concluded that the level of ATM surcharge was positively related to deposits market share of large banks. Milne (2006) in a study conducted in Turkey concluded that ATMs led to increase of customers and hence deposits due to ease of accessibility to their bank accounts. Other similar findings were revealed by Frei, Harker and Hunter (1997) who found that banks were using ATMs to change customer behaviour by migrating them away from high cost delivery systems.

Automatic teller machines have been used expansively by banks in Kenya as a way of marketing their attractiveness. On many occasions banks display the extent of ATM network as a way of attracting mostly the retail customers. It is also quite common to note banks advertising in their annual reports on the number of ATMs and even the capabilities of the ATMs in order to create customer appeal. Deposits are a key component of banks' structure and funding mechanism and hence the banks use various methods like ATMs to provide an appeal to attract customers and their deposits.

Table 4.40: ATMs and Deposits

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
ATM services have attracted more retail depositors for the bank		2	2	79	16	4.063	0.410
ATMs have enabled customers to access their deposits with ease for withdrawal		6	9	60	24	4.031	0.759
ATMs have attracted corporate depositors and deposits	14	34	13	29	10	2.87	1.032
Average						**3.65**	**0.734**

4.3.4.2 Debit/Credit Cards and Customer Deposits

Table 4.41 displays the percentage of responses on the influence of debit and credit cards on customer deposits. Regarding the influence of debit and credit cards on the mobilization of retails customers, 80% agreed, 8% were neutral and 12% disagreed. On whether debit and credit cards provided customers ease to access their deposits, 80% agreed, 9% were neutral and 11% disagreed. Fifty five percent disagreed, 3% were neutral and 42% agreed that debit and credit cards attracted corporate customers and corporate deposits. The mean score for the responses was 3.59 which indicates more agreement with the statements in support of the assertion that debit and credit cards are capable of providing a platform for attracting customer deposits. The standard deviation was 0.904.

A study in Kenya by Nyangosi and Arora (2011) concluded that financial institutions in Kenya were using electronic distribution channels to meet the demands of customers. Mabrouk and Mamoghli (2010) and Brewer (2001) also concluded that magnetic strips which are embodied in credit and debit cards improved the management of customer information and hence enabled banks to revolutionalize their banking services.

Kenyan commercial banks have transformed from using pass books to use of plastic cards for managing customer information. Savings or current accounts that are operated by retail customers are accompanied with a card which carries customer information in a

magnetic strip. This has made many customers join banks that have cards with many capabilities. In some instances banks have been organizing preferential treatment for their customers in case they use their cards at specified retails outlets. Some banks also have introduced cards that allow some customers to be served at special counters which have shorter or no queues. Such cards have special names in some banks like, gold card, premium card and exclusive card. Through such card promotions the banks attract deposits from high end premiums customers or high networth customers.

Table 4.41: Debit/Credit Cards and Deposits

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Debit & credit cards services have attracted more retail depositors for the bank	2	10	8	32	48	4.142	0.776
Debit & credit cards services have enabled customers to access their deposits with ease for withdrawal	5	6	9	40	40	4.032	0.964
Debit & credit cards services have attracted corporate depositors and deposits	39	16	3	32	10	2.587	0.971
Average						**3.59**	**0.904**

4.3.4.3 POS Terminals and Customer Deposits

Table 4.42 shows the distribution of responses on whether POS terminals influence customer deposits. Ninety six percent agreed; 3% neutral and 2% disagreed that POS terminals influence the recruitment of retail customers among commercial banks in Kenya. POS terminals provided customers ease of access to their accounts and withdrawals as it was agreed by 85% of the respondents while 9% were neutral and 6% disagreed. Fifty percent disagreed, 12% neutral and 39% agreed that POS terminals attracted corporate customers and deposits. The mean score for the responses was 3.86 indicating that the respondents had more agreement that POS terminals help to attract customer deposits. The standard deviation of 0.730 meant that at least 68% of the responses were spread around the mean.

Kamppainen (2003 & 2008) found POS terminals as an innovation that enhances banking business especially among retails customers. Hasan, Schmiedel and Song (2009) in a study among EU countries found that retail bank business was more pronounced among banks that had invested in POS terminals and other retail electronic payment systems.

Usage of POS terminals in Kenya has been on the rise since the year 2010 due to the introduction of agent banking. Agent banking has provided many customers the opportunity to access their bank accounts without having to travel to a physical branch.

Those banks that were first movers in agent banking attracted a huge customer following and hence enabled access to deposits which eventually bolstered the funding mechanism of such banks. Kenyan bank customers are capable of accessing their bank accounts even from the rural and remote locations of the country. This has made the unbanked to also take their money to the bank and thus boosting the deposits of banks.

Table 4.42: POS Terminals and Deposits

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
POS terminal services have attracted more retail depositors for the bank		2	3	41	55	4.475	0.499
POS terminal services have enabled customers to access their deposits with ease for withdrawal		6	9	39	46	4.244	0.857
POS terminal services have attracted corporate depositors and deposits	4	46	12	38	1	2.863	0.833
Average						**3.86**	**0.730**

4.3.4.4 Mobile Banking and Customer Deposits

Table 4.43 shows the percentage of respondents and their views on how mobile banking influence customer deposits among Kenyan commercial banks. Mobile banking services influenced the mobilization of retail customer deposits as agreed by 97% of the respondents. Mobile banking also provided ease of access for customers to their bank accounts as agreed by 85% of the respondents. Fifty six percent of the respondents

disagreed that mobile banking influences the attraction or recruitment of corporate customers and deposits. The mean score for the responses was 3.75 indicating more agreement that mobile banking influences customer deposits mobilization among commercial banks in Kenya. The standard deviation was 0.713 inferring a strong spread of the responses around the mean of the responses.

Similar findings are found in studies conducted in South Africa by Ivatury and Pickens (2006) and Morawcynski (2008) which concluded that the introduction of mobile banking led to introduction of mobile financial services and transactions. Mobile banking is being used to make payments for things such as airtime, pre-paid electricity and sending remittances to friends. According to Rayhan, Sohel, Islam, and Mahjabin (2012) in their study on mobile banking in Bangladesh, it was concluded that mobile phone banking offers the potential to extend low cost virtual bank accounts to a large number of currently un-banked individuals.

Similar to Rayhan, Sohel, Islam, and Mahjabin (2012) it can be concluded that mobile banking enhances the ability of electronic banking solutions to offer customers an enhanced range of services at a low cost. Mobile banking is real time on-line banking, available anytime, anywhere throughout the country, it is convenient, affordable and secure and therefore it is much more effective in developing savings habits and hence lead to increase in bank deposits. Mobile phone also makes access to banking and advanced payment transactions at affordable cost. A positive aspect of mobile banking is

that mobile networks can reach remote areas at low cost both to the consumer and the bank. Kenya has appeared in the global technology arena due to a high rate of mobile technology adopted and the way it has transformed ways of doing things to individuals and organizations.

Table 4.43: Mobile Banking and Deposits

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Mobile banking services have attracted more retail depositors for the bank		1	2	55	42	4.376	0.498
Mobile banking services have enabled customers to access their deposits with ease for withdrawal		6	9	40	45	4.234	0.852
Mobile banking services have attracted corporate depositors and deposits	4	52	21	22	1	2.653	0.790
Average						**3.75**	**0.713**

4.3.4.5 Internet Banking and Customer Deposits

Table 4.44 presents the percentage of respondents on their views on how internet banking influence customers deposits mobilization among Kenyan commercial banks. Internet banking did not provide an attract point to retails deposits and customer since 56% of the respondents disagreed, 9% were neutral and 36% agreed. Ninety four percent agreed that internet banking provided easy access to customer accounts and provided

ease of withdrawal. Internet banking was a key attraction to corporate customers and their deposits as agreed by 85% of the respondents. The mean score for the responses was 3.67 which indicate more agreement with the assertion that internet banking positively influenced customer deposits. The standard deviation was 0.684.

The findings are corroborated by several studies across many countries. According to Acharya and Kagan (2004) it was found in India that internet banking attracted many customers due to the wide range of banking transactions that could be performed electronically via the bank's web site. Nickerson and Sullivan (2003) found that in the USA, use of internet banking was an aggressive strategy to position banks in the market and quickly attract new clients with high yielding deposits than traditional banks. Further confirmatory studies were conducted in the USA and India by Simpson (2002) and Mohammed, Siba, Sankar, Mahapatra and Sreekumar (2009) respectively. Both studies concluded that internet banking had transformed traditional banking and led to explosive growth of banks in terms of customer base and deposits.

Use of internet has become an essential component of peoples' live both at an individual level and in the corporate world. Companies in Kenya prefer to conduct their banking with commercial banks that have internet banking services because it provides them with ease of transacting without having to physically presents themselves in the bank. Internet banking therefore provides cost savings on the operations of a bank account to both the banks and their customers. High end retail customers also like banking with

banks which provide them with internet banking. They can access their bank accounts and transact as they travel around the world on business. Internet banking saves them, from the hassle of queuing in the banking halls and the hours spent travelling to bank branches.

Table 4.44: Internet Banking and Deposits

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Internet banking services have attracted more retail depositors for the bank	2	54	9	34	2	2.79	0.903
Internet banking services have enabled customers to access their deposits with ease for withdrawal		4	2	84	10	4.00	0.299
Internet banking services have attracted corporate depositors and deposits		6	9	41	44	4.23	0.851
Average						**3.67**	**0.684**

4.3.4.6 Electronic Funds Transfer and Customer Deposits

Table 4.45 displays the percentage distribution of responses on the influence of Electronic Funds Transfer (EFT) on customer deposits. Fifty five percent disagreed that EFT attracts more retails customers while 33% were neutral and 13% agreed. On whether EFT provided ease of access to bank accounts and withdrawal, 65% disagreed. Fifty nine percent agreed that EFT was important in attracting corporate customers and deposits. The mean score for the responses was 2.91 indicating that EFT did not

influence mobilization of customer deposits to a great extent but to a moderate extent. The standard deviation was 0.592 indicating a spread around the mean of the majority of the responses.

Contrary to the findings of this study, Agboola (2006) found that ICT was the main driving force of competition in the Nigerian banking industry. It was concluded that EFT and other similar ICT adoptions facilitated speed, convenience and accurate services which were meant to attract customers. Nofie (2011) and Kemppainen (2008) also found that electronic payment instruments stimulate banking business and could be exploited further to improve bank's competitiveness.

The findings of this study and those from other parts of the world have produced mixed results. This could partly be explained by the existence of multiple platforms on which customers could conduct their transactions and hence crowding out the effectiveness of EFT system in Kenya. In Kenya bank customers have several means of transferring their money compared to other economies. The EFT system has already faced stiff competition from internet banking, mobile banking and the real time gross settlement system and hence making EFT a less preferred innovation among bank customers.

Table 4.45: Electronic Funds Transfer and Deposits

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Electronic funds transfer services have attracted more retail depositors for the bank	2	53	33	11	2	2.59	0.537
Electronic funds transfer have enabled customers to access their deposits with ease for withdrawal	2	63	16	11	9	2.63	0.537
Electronic funds transfer have attracted corporate depositors and deposits	2	27	13	38	21	3.50	0.702
Average						**2.91**	**0.592**

4.3.4.7 Correlations – Customer Deposits and Bank Innovations (Primary Data)

Table 4.46 presents correlation coefficients between customer deposits and bank innovations. The highest positive correlation between customer deposits and innovations is with EFT with 0.229 followed by that of ATMs (0.028) and debit/credit cards (0.012) while the other innovations had negative correlations with customer deposits. Mobile banking is highly correlated with debit/credit cards and POS terminals and hence can lead to spurious regression coefficients. Mobile banking is therefore excluded in the regression model.

Table 4.46: Pearson's Correlation – Customer Deposits and Bank Innovations

Variable	Coefficient Type	Customer Deposits	Automated Teller Machines	Debit and Credit Cards	Point of Sale Terminals	Mobile Banking	Internet Banking	Electronic Funds Transfer
Customer Deposits	Pearson Correlation	1						
	Sig. (2-tailed)							
Automated Teller Machines	Pearson Correlation	0.028	1					
	Sig. (2-tailed)	0.790						
Debit and Credit Cards	Pearson Correlation	0.012	0.273	1				
	Sig. (2-tailed)	0.907	0.009					
Point of Sale Terminals	Pearson Correlation	-0.083	0.358/	0.926	1			
	Sig. (2-tailed)	0.429	0.000	0.000				
Mobile Banking	Pearson Correlation	-0.056	0.133	0.787	0.86	1		
	Sig. (2-tailed)	0.596	0.207	0.000	0.000			
Internet Banking	Pearson Correlation	-0.070	0.377	-0.28	-0.027	0.016	1	
	Sig. (2-tailed)	0.505	0.000	0.007	0.801	0.881		
Electronic Funds Transfer	Pearson Correlation	0.229	0.150	-0.456	-0.453	-0.411	-0.061	1
	Sig. (2-tailed)	0.028	0.154	0.000	0.000	0.000	0.566	

4.3.4.8 Regression Analysis – Customer Deposits and Bank Innovations (Primary Data)

The robustness of the regression model is presented on Table 4.47. The results indicate that the overall correlation between customer deposits and bank innovations is 0.731 which is a positive and strong correlation. The coefficient of determination is indicated by R square of 0.534 showing that the predictors in the model can explain 53.4% of the variations in customer deposits. There are other factors that can explain 46.6% variations in changes in customer deposits.

Table 4.47: Model Fitness – Customer Deposits and Bank Innovations (Primary Data)

Indicator	Coefficient
R	0.731
R Square	0.534
Std. Error of the Estimate	40166.4

Table 4.48 shows the overall significance of the predictors in explaining customer deposits. At a level of significance of 5% the model predictors are significant in explaining changes in customer deposits of commercial banks in Kenya with a 0.000 level of significance and fails to accept the null hypothesis and conclude that bank innovations have a positive influence of customer deposits of commercial banks in

Kenya. The individual levels of significance for each predictor are presented on Table 4.49.

Table 4.48: ANOVA – Customer Deposits and Bank Innovations (Primary Data)

Indicator	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.614E+11	5	32270000000	20.005	0.000
Residual	1.405E+11	87	1613000000		
Total	3.019E11b	92			

The regression coefficients of the predictor variables are presented on Table 4.49. The results indicate that debit and credit cards and POS terminals are significant in explaining changes of customer deposits of commercial banks in Kenya. At a level of significance of 0.05, debits and credit cards have a significance value of 0.034 and POS terminals have 0.037. This therefore leads to the failure to accept the null hypothesis and conclude that debit and credit cards and POS terminals are significant in explaining changes in customer deposits in Kenyan commercial banks while ATMs, internet banking and EFT are not significant in explaining changes in customer deposits.

The findings also concur with those of another study conducted in Kenya by Nyangosi and Arora (2011) which concluded that financial institutions in Kenya were using electronic distribution channels to meet the demands of customers. Mabrouk and Mamoghli (2010) and Brewer (2001) also concluded that magnetic strips which are embodied in credit and debit cards improved the management of customer information and hence enabled banks to revolutionalize their banking services. Kamppainen (2003

and 2008) found POS terminals as an innovation that enhances banking business especially among retail customers. Hasan, Schmiedel and Song (2009) in a study among EU countries found that retail bank business was more pronounced among banks that had invested in POS terminals and other retail electronic payment systems.

Debit and credit cards present a versatile method through which banks and customers manage information and bank accounts. This means that when the capabilities of the cards are better and enhanced than those of competitors, banks can attract high net worth customers and hence more business for the banks. POS terminals in Kenya have regenerated into channels for mass banking through the agent banking model and also they have been transformed as key payment platforms at selected retail outlets. This has led many banks to become attractive to many customers due to the combined appeal created by multiple functionalities of debit and credit cards and POS terminals.

Table 4.49: Regression Coefficients – Customer Deposits and Bank Innovations (Primary Data)

Indicator	Beta	Std. Error	t	Sig.
Automated Teller Machines	-1415.202	15311	-0.092	0.927
Debit and Credit Cards	55568.219	25865.7	2.148	0.034
Point of Sale Terminals	65814.343	31036.5	2.121	0.037
Internet Banking'	1611.188	12181.9	0.132	0.895
Electronic Funds Transfer	8119.2	5381.2	1.509	0.135

4.3.4.9 Regression Analysis – Bank Innovations and Customer Deposits (Secondary Data)

In order to cross examine the results from the primary data, secondary data on customer deposits and bank innovations was gathered and subjected to regression analysis. Table 4.50 shows results of model robustness which indicates that 70.7% of the variations in customer deposits among commercial bank in Kenya can be explained by bank innovations. This is further supported by results on Table 4.51 which show that bank innovations have a statistically significant influence on customer deposits of commercial banks in Kenya at a p value of 0.001 with an F-statistic of 21.766 which support the alternate hypothesis of the study.

Table 4.50: Bank Innovations and Deposits Model Fitness (Secondary Data)

Indicator	Coefficient
R	0.841
R Square	0.707
Std. Error of the Estimate	485059

Table 4.51: Bank Innovations and Deposits ANOVA (Secondary Data)

Indicator	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.121E+12	1	5.121E+12	21.766	0.001
Residual	2.118E+12	9	2.353E+11		
Total	7.24E+12	10			

Table 4.52 contains the summary of mean scores for objectives one to four. The table summarizes the degree of agreement of respondents' views on the influence of bank innovations on financial performance of commercial banks in Kenya. The results indicate that bank innovations had the highest positive influence on customer deposits. These findings are supported by the existence of many initiatives to mobilize customers and their deposits through various innovation channels. There are several ATMs that display deposit products of banks and many banks' websites also mainly advertise deposit products and the associated customer benefits. Mobile banking is also used by banks to encourage customers to deposit cash in their bank accounts.

Table 4.52: Summary of Respondents Mean Scores (Primary Data)

Type of Innovation	Income	Return on Assets	Profitability	Deposits	Average
Automated Teller Machines	3.03	3.47	3.70	3.65	3.47
Debit & Credit Cards	3.50	3.30	2.93	3.59	3.33
Point of Sale Terminals	2.14	3.64	3.54	3.86	3.29
Mobile Banking	3.38	3.79	3.35	3.75	3.57
Internet Banking	2.32	3.40	2.99	3.67	3.09
Electronic Funds Transfer	3.33	3.52	2.73	2.91	3.12
Average	**2.95**	**3.52**	**3.21**	**3.57**	**3.31**

Table 4.53 presents the prediction power of bank innovations on banks' financial performance indicators on both primary and secondary data. The coefficient of determination or the R square indicates the percentage of variations in the outcome variable that can be explained by the predictor variables. The results show that bank

innovations can explain 94.4% of the variations in return on assets followed by deposits (53.4%), Income (49.6%) and lastly profitability with 47.8% R square. The R square coefficients for the secondary data are also shown on Table 4.53 and they also indicate strong coefficient of determinations for bank innovations on financial performance indicators. The average of the R square for both the primary data (0.613) and the secondary data (0.722) are also strong which shows that bank innovations that have been included in this study can explain a large variation in the financial performance of commercial banks in Kenya. Innovations have improved bank assets utilization capabilities and hence improving their potential for return on assets. An example is the ATMs which could perform very few functions ten years ago, but due to innovations, ATMs are capable of providing several services. This makes it possible for banks to recoup their investments fasters than it was possible a decade ago due to innovations. On an overall basis bank innovations can explain 61.3% of the variations in the financial performance of commercial banks in Kenya.

Table 4.53: Summary of Bank Innovations Regression Power Using R-Square

Dependent Variable	Primary Data	Secondary Data
Return on Assets	0.944	0.555
Deposits	0.534	0.707
Income	0.496	0.798
Profitability	0.478	0.828
Average	**0.613**	**0.722**

4.3.5 Moderating Effect of Mobile Phones and Internet Services

The fifth objective of the study was to establish the moderating influence of mobile phones and internet services on the financial performance of commercial banks in Kenya. In satisfying this objective data was gathered through questionnaires and analysis presented in form of frequencies. Further tests on the moderating effect was done using inferential coefficients as presented later in this section.

4.3.5.1 Mobile Phones and Bank Performance

Table 4.54 shows the frequencies of responses on the effect of mobile phones on the performance of commercial banks in Kenya. The mean score of the responses was 4.04 indicating a high degree of agreement that mobile phones influenced banks' financial performance. Ninety percent agreed that use of mobile phones has increased access to bank services to customers while 83% agreed that use of mobile phones has brought in more profitable business ventures for banks. Seventy five percent of the respondents agreed that use of mobile phones had assisted in mobilizing deposits while 90% agreed that use of mobile phones has led to attraction of more retail clients than corporate clients among Kenyan banks.

According to International Telecommunication Union, [ITU] (2009), access and use of mobile telephony in sub-Saharan Africa has increased dramatically over the past decade. There are ten times as many mobile phones as landlines and 60% of the population has mobile phone coverage. This provides a good avenue for banks to deliver their services

and expansion of their profitability. Aker and Mbiti (2010) found a strong correlation between mobile phone coverage and firm performance. Also Rayhan, Sohel, Islam and Mahjabin (2012) found that mobile phone coverage in Bangladesh was key in enhancing banks' performance in terms for profitability and deposits growth.

Mobile phones have transformed the way banking business is done in Kenya. Many customers can perform some basic bank account enquiries using their mobile phones. Such services include checking balance, downloading mini-statements, reporting suspect transactions, payment of bills and deposit of cash in to their accounts. These services attract some commission fees which add to the income and profits of banks. Banks also advertise their new products to their customers through the use of short message services and hence creating more awareness. The mobile phone instrument has therefore presented a convenient service delivery platform for both the banks and their customers leading to a win-win type of innovation. Customers get their services at their convenience while banks earn income and improve their margins due to improved cost of doing business.

Table 4.54: Mobile Phones and Bank Performance

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	STD
Use of mobile phones has increased customer access to bank services	2	5	3	43	47	4.28	0.773
Use of mobile phones has added to more profitable business avenues to the bank	1	3	13	48	35	4.13	0.785
The use of mobile phones has improved the level of deposits for the bank	3	12	7	63	14	3.74	0.633
Use of mobile phones has led to more bank innovations	1	4	12	68	14	3.91	0.633
Mobile phones have led to more retail customers than corporate customers to the bank		2	8	65	25	4.13	0.671
Average						**4.04**	**0.699**

4.3.5.2 Internet Service and Bank Performance

Table 4.55 presents frequencies on responses on how internet service influences performance of commercial banks in Kenya. The mean score of the responses was 3.44 which indicate more agreement with the statements in support of the assertion that internet service has a positive influence on the financial performance of commercial

banks. Sixty five percent of the respondents agreed that use of internet services increased customers' access to bank services while 61% agreed that use of internet services had generated profitable business avenues for the banks. Fifty three percent agreed that use of internet services helped to improve deposit mobilization while 57% agreed that use of internet services had led to attraction of more retail customers than corporate customers.

Simpson (2002) reveals that electronic banking is motivated largely by the prospects of operating costs minimization and operating revenues maximization. Haq (2005) also states that use of internet has improved the ability to achieve economies of scale in minimizing asymmetry of information between savers and borrowers and that the unit costs of internet banking fall more rapidly than those of traditional banks as output increases as a result of balance sheet growth. Chung and Dutta (2012) also assert that internet based banking led to cost reduction and hence likely to increase bank's profitability. They also concluded that bank customers have also been using the internet for security trading activities. Also, Ram, Kagan and Lingan (2008) concluded that the increasing use of internet as an additional channel of marketing banking services significantly improved financial performance of community banks.

In Kenya, internet has been used widely by commercial banks to market their services through their corporate websites. The internet has also been used by commercial banks to send bulk emails to their customers when informing about new services, products and

developments. Internet is also used as a conveyance channel for delivering internet banking services. This shows that the internet has presented an avenue for banks to promote their services and attract new customers and hence more business leading to higher performance. The cost of internet has also reduced drastically over time making it a cost effective service delivery channel.

Table 4.55: Internet Service and Bank Performance

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std Deviation
Use of internet services has increased customer access to bank services	6	20	9	62	3	3.35	0.920
Use of internet services has added to more profitable business avenues to the bank	9	13	17	58	3	3.31	1.025
The use of internet services has improved the level of deposits for the bank	4	14	30	50	3	3.34	0.766
Use of internet services has led to more bank innovations		1	20	53	27	4.05	0.700
Internet services have led to more retail customers than corporate customers to the bank	9	32	2	52	5	3.13	0.845
Average						**3.44**	**0.851**

4.3.5.3 Moderating Effect of Mobile Phones and Internet Service on Bank Innovations and Income

Table 4.56 presents the effect of moderation from mobile phones and internet services on bank innovations and their subsequent effect on bank incomes. The moderation was tested by using the coefficient of determination which is used to explain the power of regression predictors in explaining the outcome variable. The R square demonstrates the power of the predictor variables in explaining the outcome. The R square was determined in two levels, one level was done before the moderating variable which is also called the interaction term and the second level was tested after including the interaction term in the model. The moderation influence was tested for each of the innovations or predictor. The interaction term or the moderator was created out of a product of standardized scores of each predictor or innovation and that of the moderator which is mobile phones and internet service.

As shown on Table 4.56, the moderation of mobile phones on the bank innovations was more pronounced on electronic funds transfer where the percentage change in the coefficient of determination was higher (9.8%) followed by POS terminals (8.3%) and internet banking (7.2%). Moderation of mobile phones on the other variables was low to moderate. Internet service had high moderation on EFT services (15.7%) in predicting bank income. Internet service had low moderation on the other innovations when predicting or determining bank incomes. The mean percentage moderation effect of

mobile phones on bank innovations was 5% and that of internet service was 3.4%. This means that mobile phones had higher moderation effect than internet service on bank innovations in influencing income of commercial banks in Kenya.

The results show that mobile phones have high moderation on bank innovations in determining bank income. The moderation results are consistent with the existence of campaigns by banks in encouraging their customers to use mobile phones in conducting transactions. Use of mobile phones by bank customers yields to more income for the banks both directly and indirectly

Table 4.56: Moderation Effect on Income

Variable	Mobile Phones				Internet Services			
	R-Square Before Moderation	R-Square After Moderation	Percent Moderation Effect	p-value	R-Square Before Moderation	R-Square After Moderation	Percent Moderation Effect	p-value
Automatic Teller Machines	0.455	0.461	1.3%	0.000	0.457	0.465	1.8%	0.000
Debit and Credit Cards	0.438	0.440	0.5%	0.000	0.469	0.474	1.1%	0.000
POS Terminals	0.472	0.511	8.3%	0.000	0.471	0.472	0.2%	0.000
Mobile Banking	0.448	0.458	2.2%	0.000	0.456	0.458	0.4%	0.000
Internet Banking	0.485	0.520	7.2%	0.000	0.483	0.489	1.2%	0.000
Electronic Funds Transfer	0.448	0.492	9.8%	0.000	0.471	0.545	15.7%	0.000
Average	**0.458**	**0.480**	**5.0%**		**0.468**	**0.484**	**3.4%**	

4.3.5.4 Moderating Effect of Mobile Phones and Internet Service on Bank Innovations and Return on Assets

Table 4.57 presents the results of tests conducted on the moderating effect of mobile phones and internet services on bank innovation in influencing return to assets of commercial banks in Kenya. The results indicate minimal or no moderation effect from both mobiles phones and internet service on bank innovations in influencing returns to

assets of commercial banks in Kenya. All the changes in the R square are less than 1% and in some cases there in no change in the R square. The means scores for the change in R square are also negligible and less that 1% from both mobile phones and internet service. The results indicate that the combined moderation effect of mobile phones and internet services has a very low moderation effect of bank innovations in influencing return to assets of commercial banks in Kenya.

These results imply that mobile phones and bank innovations as independent predictors of return on assets are effective than the interaction effect created through moderation. There are other factors that lead to better return on assets other than the moderating effect of mobile phones and internet service. The use of mobile phones and internet service as independent predictors of returns on assets has significant influence on return on assets than the indirect influence generated by the interaction of the moderators with bank innovations.

Table 4.57: Moderation Effect on Return on Assets

Variable	Mobile Phones				Internet Services			
	R-Square Before Moderation	**R-Square After Moderation**	**Percent Moderation Effect**	**p-value**	**R-Square Before Moderation**	**R-Square After Moderation**	**Percent Moderation Effect**	**p-value**
Automatic Teller Machines	0.936	0.936	0.0%	0.000	0.941	0.943	0.2%	0.000
Debit and Credit Cards	0.943	0.945	0.2%	0.000	0.943	0.943	0.0%	0.000
POS Terminals	0.926	0.932	0.6%	0.000	0.941	0.941	0.0%	0.000
Mobile Banking	0.912	0.912	0.0%	0.000	0.941	0.941	0.0%	0.000
Internet Banking	0.931	0.933	0.2%	0.000	0.942	0.942	0.0%	0.000
Electronic Funds Transfer	0.931	0.931	0.0%	0.000	0.942	0.943	0.1%	0.000
Average	**0.930**	**0.932**	**0.2%**		**0.942**	**0.942**	**0.1%**	

4.3.5.5 Moderating Effect of Mobile Phones and Internet Service on Bank Innovations and Profitability

Table 4.58 shows the results of moderation of mobile phones and internet service on bank innovations in influencing profitability of commercial banks in Kenya. Mobile phones have a higher moderation effect on EFT (20.6%) followed by debit and credit cards (17.1%), internet banking (12.5%), mobile banking (4.1%), POS terminals (2.2%)

and finally ATMs (0.4%). Internet service has a higher moderation on POS terminals (7.1%), EFT (5.6%) and internet banking (3.8%). The mean score of the change in the moderation effect for mobile phones is 9.6% compared to 2.9% for internet service. These results show that mobile phones have higher moderation effect than internet service on bank innovations in influencing profitability of commercial banks in Kenya.

These results are in line with the trend that commercial banks in Kenya have taken in partnering with mobile telephony companies in an effort to boost their profitability. The leading mobile telephony company in Kenya; Safaricom Kenya Limited has been rated as the most profitable company in the East African region for three consecutive years (2009 – 2011). This fact has made many commercial banks to make concerted efforts to develop partnerships. Money transfer services have continued to contribute to the profitability of mobile phone companies and there are more mobile phone subscribers than bank account holders in Kenya. This fact has made commercial banks realize that they can boost their profitability through leveraging on the volume business from mobile phone subscribers.

Table 4.58: Moderation Effect on Profitability

Variable	Mobile Phones				Internet Services			
	R-Square Before Moderation	R-Square After Moderation	Percent Moderation Effect	p-value	R-Square Before Moderation	R-Square After Moderation	Percent Moderation Effect	p-value
Automatic Teller Machines	0.399	0.400	0.3%	0.000	0.409	0.410	0.2%	0.000
Debit and Credit Cards	0.410	0.480	17.1%	0.000	0.409	0.411	0.5%	0.000
POS Terminals	0.401	0.410	2.2%	0.000	0.408	0.437	7.1%	0.000
Mobile Banking	0.415	0.432	4.1%	0.000	0.415	0.415	0.0%	0.000
Internet Banking	0.417	0.469	12.5%	0.000	0.416	0.432	3.8%	0.000
Electronic Funds Transfer	0.433	0.522	20.6%	0.000	0.444	0.469	5.6%	0.000
Average	**0.413**	**0.452**	**9.6%**		**0.417**	**0.429**	**2.9%**	

4.3.5.6 Moderating Effect of Mobile Phones and Internet Service on Bank Innovations and Customer Deposits

Table 4.59 presents the indicators of the moderation effect of mobile phones and internet service on bank innovations in influencing deposits of commercial banks in Kenya. Mobile phones have highest moderation on EFT (19.8%) while internet services have highest moderation on debit and credit cards (10.7%) in influencing bank deposits. The percentage moderation mean score for mobile phones was 4.1% compared to 5% for internet services. These results imply that internet services have a higher moderation

than mobile phones on bank innovations in determining influence on bank deposits among commercial banks in Kenya.

The results are in line with the increased use of internet services by commercial banks in Kenya when advertising about their several deposit products. Banks send emails to customers to inform them about their deposit offerings than they do through mobile phones. Commercial banks in Kenya have websites where they display their various deposit products and the benefits and interest rates associated with each deposit product. Many bank customers use the internet to familiarize themselves with bank deposit products than they would do on the mobile phone. This is because the cost of the internet service is cheaper than mobile phone calls or short messaging services when getting information on deposits. Internet service presents more detailed information than mobile calls and text messages.

Table 4.59: Moderation Effect of Customer Deposits

Variable	Mobile Phones				Internet Services			
	R-Square Before Moderation	R-Square After Moderation	Percent Moderation Effect	p-value	R-Square Before Moderation	R-Square After Moderation	Percent Moderation Effect	p-value
Automatic Teller Machines	0.481	0.481	0.0%	0.000	0.487	0.494	1.4%	0.000
Debit and Credit Cards	0.479	0.488	1.9%	0.000	0.487	0.539	10.7%	0.000
POS Terminals	0.471	0.472	0.2%	0.000	0.492	0.524	6.5%	0.000
Mobile Banking	0.470	0.473	0.6%	0.000	0.494	0.520	5.3%	0.000
Internet Banking	0.473	0.478	1.1%	0.000	0.491	0.491	0.0%	0.000
Electronic Funds Transfer	0.499	0.598	19.8%	0.000	0.505	0.536	6.1%	
Average	**0.479**	**0.498**	**4.1%**		**0.493**	**0.517**	**5.0%**	

Table 4.60 summarises the moderation effect of mobile phones and internet service on financial performance indicators of commercial banks in Kenya. The results show that mobile phones have a high mean percentage of moderation of 3.7% compared to 2.3% of internet services. This weighted mean moderation effect is in line with the aggressive utilization of mobiles phones within the financial services sector in Kenya and hence the higher moderation effect. In Kenya we also have more mobile subscribers than internet users and hence the higher moderation effect of mobile phones on the performance of commercial banks in Kenya.

Table 4.60: Summary of Moderation Effect of Dependent Variables

Dependent Variable	Mobile Phones				Internet Services			
	R-Square Before Moderation	R-Square After Moderation	Percent Moderation Effect	p-value	R-Square Before Moderation	R-Square After Moderation	Percent Moderation Effect	p-value
Income	0.458	0.480	5.0%	0.000	0.468	0.484	3.4%	0.000
Return on Assets	0.930	0.932	0.2%	0.000	0.942	0.942	0.1%	0.000
Profitability	0.413	0.452	9.6%	0.000	0.417	0.429	2.9%	0.000
Deposits	0.479	0.498	4.1%	0.000	0.493	0.517	5.0%	0.000
Average	**0.570**	**0.591**	**3.7%**	0.000	**0.580**	**0.593**	**2.3%**	0.000

4.4 Discriminant Analysis

Discriminant analysis is a method of analysing mean differences between mutually exclusive groups. It permits the testing of hypothesis that there is more than one significant way of describing how groups differ on a weighted linear combination of the discriminating variables. This study had six independent variables also called discriminating variables (ATMs, POS terminal, debit and credit cards, mobile banking, internet banking and electronic funds transfer). A discriminant analysis assists in establishing whether the variability in the means of the independent variables discriminates dependingt on mutually exclusive groupings of banks. Discriminant function analysis is useful in determining whether a set of variables is effective in predicting category membership.

Kenyan commercial banks are classified into three peer groups using a weighted composite index that comprises; assets, deposits, capital size, number of deposit accounts and number of loan accounts. A bank with a weighted composite index of 5 percent and above is classified as a large bank, a medium bank has a weighted composite index of between 1 percent and 5 percent while a small bank has a weighted composite index of less than 1 percent. For the period ended 31st December 2012, there were 6 large banks which accounted for 53.7 percent of the market share, 15 medium banks with a market share of 36.8 percent and 22 small banks (CBK, 2012).

The sample of the study had 20 banks which were classified according to the above peer groups (large, medium and small peer groups). The sample had 6 banks in the large peer group, 7 in the medium peer group and 7 in the small peer group. The results of the discriminant analysis are explained in the following section.

Table 4.61 shows that 85.9% of the variance in the bank innovations used in the study are accounted for by the peer grouping of the banks. This is further supported by an Eigen value of 0.965 which means that the latent grouping variables can be explained by the independent variables (bank innovations) to the extent of 85.9%. The first latent grouping function or dimension also has a canonical correlation of 0.701 which means that the correlation between the peer groups and the bank innovations correlate at 70.1% based on the first latent grouping function.

Table 4.61: Eigenvalues

Function	Eigen Value	% of Variance	Cumulative %	Canonical Correlation
1	0.965	85.9	85.9	0.701
2	0.158	14.1	100	0.369

Table 4.62 shows that the first grouping function is significant at 0.000 and has a Wilks' coefficient of 44%. This means that bank innovations are able to explain 66% of the variations based on the peer group classifications.

Table 4.62: Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1 through 2	0.44	71.179	12	0.000
2	0.864	12.693	5	0.026

Table 4.63 indicates the canonical classification ability of the bank innovations. The results show that 66% of the original classifications have been retained based on the mean variances of bank innovations. It can therefore be concluded that bank innovations are a good predictor of classifying banks in addition to other factors that can be used.

Table 4.63: Predicted Group Membership

	Peer Group	Large Peer Group	Medium Peer Group	Small Peer Group	Total
Count	Large Peer Group	3	1	2	6
	Medium Peer Group	1	6	0	7
	Small Peer Group	2	1	4	7
%	Large Peer Group	52.3	14.3	33.4	100
	Medium Peer Group	15	85	0	100
	Small Peer Group	28.2	12.1	59.7	100

66.0% of original grouped cases correctly classified.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study investigated the effect of bank innovations on financial performance of commercial banks in Kenya. The bank innovations that were studied are; automated teller machines (ATMs), debit and credit cards, point of sale (POS) terminals, mobile banking, internet banking and electronic funds transfer. Financial performance indicators that were studied are, income, return on assets, profitability and customer deposits. The study also had two moderating variables which are internet services and mobile phones. This chapter summarizes the findings of the study and makes conclusions upon which recommendations are drawn. Suggestions for further study are also captured as a way of filling the gaps identified in the study. The study pursued five objectives and five hypotheses upon which conclusions are aligned to.

5.2 Summary of Findings

Evidence from previous studies on whether bank innovations influence bank performance showed that there were mixed results based on the operating environment and the level of adoption. In Kenya there is a high level of adoption of innovations in the

banking sector. Before the actual final data collection, a pilot study was conducted where the content validity and reliability of the questionnaires were tested. The validity was enhanced through discussion of the questionnaire contents with two randomly selected bank managers. The reliability was tested through statistical package for social sciences (SPSS) and Cronbach alpha correlation coefficient was used to satisfy the reliability tests. The study sample had 325 questionnaires distributed and 202 were duly completed and returned for analysis. This represented a response rate of 62% which according to Saundres, Lewis and Thornbill (2007), Sekaran (2003) and Mugenda and Mugenda (2003) is good response rate.

5.2.1 Preliminary Findings

The findings of the study revealed that the combined effect of bank innovations influenced bank performance positively. These findings were both supported by the frequencies of the responses from the respondents which were presented in the form of percentages and mean scores. Among the bank financial performance indicators; bank innovations had the highest positive influence on mobilization of customer deposits. The results of the analysis of the moderating variables revealed that mobile phones had a higher moderating influence on bank innovations than internet service.

5.2.2 To determine the influence of bank innovations on income of commercial banks in Kenya

The first objective of the study was to set to establish the influence of bank innovations on income of commercial banks in Kenya. The findings revealed that bank innovations have a positive influence on the income of commercial banks in Kenya. This finding is supported by the coefficient of determination which shows that the variations in bank incomes are explained by bank innovations. The influence of bank innovations on income is also statistically significant and hence the alternate hypothesis was accepted. This means that the influence is not by chance. Commercial Banks in Kenya have been using innovations to grow their businesses and subsequently their incomes. Banks are also at an early stage of some innovations and due to such short time, incomes may not have been influenced by innovations to a great extent.

5.2.3 To establish the influence that bank innovations have on return on total assets of commercial banks in Kenya

The second objective of the study sought for establish the nature of unfluence that bank innovations had on return on total assets of commercial banks in Kenya. Results revealed that bank innovations had positive influence on return on assets of commercial banks in Kenya. This is supported by the coefficient of determination which shows that

banks innovations explain the variations in return on assets of commercial banks in Kenya. The test for significance also showed that the influence was statistically significant and hence the alternate hypothesis was accepted. This means that bank innovations are good at skimming out incomes and having a good return to their initial outlay. Innovations are also able to be modified and upgraded to improve their capabilities and hence improving return on assets for the banks.

5.2.4 To establish the influence that bank innovations have on profitability of commercial banks in Kenya

The third objective of the study was to establish the influence of bank innovations on profitability of commercial banks in Kenya. The results showed that bank innovations have a moderate influence on profitability of commercial banks in Kenya. The analysis produced a coefficient of determination which showed the percentage of variations in profitability which is explained by bank innovations. The significance test showed that influence of bank innovations on bank profitability was statistically significant and hence the alternate hypothesis was accepted. Majority of the respondents agreed that bank innovations had a positive influence of bank profitability. Banks in Kenya have been boosting their earning capability and controlling costs through adoption of innovations like mobile banking, internet banking and recently the agency banking.

5.2.5 To determine the influence that bank innovations have on customer deposits among Kenyan commercial banks

The fourth objective sought to establish the influence of bank innovations on the customer deposits of commercial banks in Kenya. Findings on the influence of bank innovations on customer deposits mobilization showed that variations in customer deposits can be explained by bank innovations. This finding is further supported by regression results which showed that bank innovations have a statistically significant influence on the financial performance of commercial banks in Kenya and therefore the alternate hypothesis was accepted. This meant that bank innovations have a positive influence on financial performance of commercial banks in Kenya. Commercial banks in Kenya use various innovation delivery channels to recruit customers who deposit their savings. The innovation delivery channels that are used in Kenya when recruiting bank customers are, mobile banking, internet banking, credit cards, automated tellers machines and more recently the agency banking.

5.2.6 To establish the moderating influence of mobile phones subscription and internet service subcription on financial performance of commercial banks in Kenya

The fifth and sixth objective of the study sought to establish the moderating influence of mobile phones subscription and internet service subscription on bank innovations in influencing financial performance of commercial banks in Kenya. The findings revealed that mobile phones have a higher moderating effect than internet services on the bank innovations when influencing financial performance of commercial banks in Kenya. The moderation effect was tested using the change in the coefficient of determination. The overall change in the coefficient of determination for mobile phones was higher compared tothe one for internet services. Mobiles phones have been used to enhance the capabilities of various bank innovations and hence creating a higher moderation effect. In some banks, automated teller machines and bank accounts have been linked to customer mobile phones in order to alert the customers when a transaction occurs related to the customer account. Mobile phones have also been interfaced with core banking softwares of banks in order to enable deposit and withdrawal of cash and also viewing of interim statements. Mobile phones are also being used by banks to market their products through bulk short messaging service. In Kenya there are more mobile phone users than

internet users hence making the mobile phone a crucial delivery channel for commercial banks.

5.3 Conclusion

Based on the findings of the study, it can be concluded that bank innovations influence financial performance of commercial banks in Kenya positively. The adoption of innovations by commercial banks has a high potential of improving financial performance and hence better returns to the shareholders. The versatility of innovations has made their adoption rate to be high among both the banks and their customers. It could have been challenging if the adoption was only with either the banks or the customers. Banks in Kenya have continued to perform well even when other sectors of the economy show lagged performance. This can be explained by the use of innovations which have enabled banks to start making income away from traditional sources like interest, trade and asset financing. Banks have been able to make more commission income from transactions done on innovation channels like; mobile phones, internet, credit cards and point of sale terminals.

Innovations were found to have a high prediction power in terms of grouping banks using predictive discriminant analysis. It is therefore important for the Central bank of Kenya to consider grouping banks based on their market share of innovations and link the ranking to their profitability. This kind of ranking will provide some competition among banks and lead to better services to customers. It should alos be noted that the

performance on the Kenyan banking sector is not purely and wholly derived from bank innovations because there are other drivers of financial performance in the sector like; regulations, human resource, quality of management and corporate governance.

5.4 Recommendations

The recommendations are based on the findings on the objectives of the study.

5.4.1 Influence of bank innovations on income

Banks should continue investing in innovation delivery channels because they are able to control their costs much better as compared to investment in brick and mortar or physical branches. The volume of transactions that can be processed on channels like the internet and mobile are high as compared to delivering such transactions using manual processes. This helps to minimize the cost per unit of service and hence better returns to the banks. Commercial banks should explore more ways of maximizing their utilization and returns from mobile banking and internet banking.

5.4.2 Influence of bank innovations on return on assets

Since technological innovation is aggressively and continuously adopted in Kenya, the government should provide incentives for research and development to research scientists who would continue to invest their time and skills in discovering more bank innovations. It is recommended that the government also pursues a strategy to provide

incentives for technology transfer from more developed economies in order to promote the adoption of world class innovations.

5.4.3 Influence of bank innovations on profitability

Information and communication technology (ICT) professionals should invest their time, effort and resources towards innovations. This will mean more income for the professionals if the innovations become successful. In Kenya there are some citizens who are still unbanked due to poor access to financial services. ICT professionals should explore ways of providing innovative solutions for reaching the unbanked. This can result to more financial deepening and better financial development for the country and hence better profitability for the banks.

5.4.4 Influence of bank innovations on bank deposits

Innovation has its set of challenges especially related to security threat which can lead to reputation risk among banks and loss of confidence by the customers. The main users of bank innovations are depositors. Without deposits and depositors the sustainability of banks would be at risk. This therefore calls for better management of innovations in a manner that boosts depositors' confidence. System developers therefore need to create enhanced and effective security systems which can detect, control, prevent and manage fraud incidents on the various innovation channels. This recommendation is derived

from the growing threat of system intrusion by hackers which can erode the desired gains of bank innovations.

5.4.5 Moderating influence of mobile phones and internet on bank financial performance

Mobile phones and internet have been found to have a major influence in delivering technology driven banking services. It is recommended that commercial banks continue to create sustainable business linkages and collaborations with mobile phone service providers as well as the internet service providers. Findings revealed that mobile phones had a higher moderating effect than internet service and this can be attributed to the level of penetration and ease of access of mobile phones to the public. Banks should leverage on mobile phones in order to grow their business and customer base. The Government should continue to offer more incentives for technologies that use mobile phones as their delivery platforms.

5.5 Areas for Further Research

This study did not include all bank innovations and a further study is recommended to include innovations like agency banking, securitization and credit guarantees and their influence on the financial performance of commercial banks. A more detailed study can be conducted to establish whether the adoption of financial innovations contributed to financial deepening in Kenya.

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APPENDICES

Appendix I: Letter of Authorization

Date……
To
Managing Director
Name of the Bank……..
P.O. Box ……
NAIROBI

Dear Sir,

RE: RESEARCH DATA ON "EFFECT OF BANK INNOVATIONS ON FINANCIAL PERFORMANCE OF COMMERCIAL BANKS IN KENYA".

I am a student pursuing a Doctorate Degree in Business Administration- Finance Option at Jomo Kenyatta University of Agriculture and Technology. I' am required to undertake a research thesis as partial fulfilment for the award of this higher degree. My research topic is stated above and kindly request for your assistance in making my research a success.

This purpose of this letter is therefore to request you to grant permission to collect relevant data from your organization from selected respondents among your management staff. The information collected will be treated with utmost confidentiality and will be used for the purposes on this research only. For your information, the output of this research will add value to banks in Kenya in terms of appreciating the value or otherwise of innovations within their business operations.

I wish your Bank fruitful business.

Yours Sincerely

Patrick Ngumi
Student Reg No. HD433/1108/2010

Appendix II: Letter of Introduction

Date……
To…….
……..
Dear Sir/Madam,

RE: COLLECTION OF RESEARCH DATA

My name is Patrick Ngumi and a PhD student in Business Administration – Finance option at Jomo Kenyatta University of Agriculture and Technology. Currently, I' am carrying out a research on the "*Effect of bank innovations on financial performance of commercial banks in Kenya"*. I 'am in the process of gathering relevant data for this study. You have been identified as one of the collaborators and respondents in this study and kindly request for your assistance towards making this study a success.

I therefore kindly request you to take some time to respond to the attached questionnaire. I wish to assure you that your responses will be treated with confidentiality and will be used solely for the purpose of this study.

I thank you in advance for your time and responses. It will be appreciated if you can fill the questionnaire within the next 5days to enable early finalization of the study.

Yours Sincerely

Patrick Ngumi
Student Reg No. HD433/1108/2010

Appendix III: Questionnaire

This questionnaire is a meant to collect data regarding the *effect of bank innovations on financial performance of commercial banks in Kenya*.

SECTION A: GENERAL INFORMATION

1: **Bank Particulars**

Name of the Bank (Optional) …….

2: Respondent Particulars

Gender: Male ☐ Female ☐

Age Bracket (tick as appropriate)

No	Age Bracket	Tick as Appropriate
i.	10-20	
ii.	21-30	
iii.	31-40	
iv.	41-50	
v.	Over 50	

Department (tick as appropriate)

No	Department	Tick as Appropriate
i.	Executive	
ii.	Finance	

No	Department	Tick as Appropriate
iii.	ICT	
iv.	Audit	
v.	Credit	
vi.	Liabilities	
vii.	HR	
viii.	Others	

How long have you worked in the Banking Sector (tick as appropriate)

No	Period	Tick as appropriate
i.	Less than 1 yr	
ii.	Btw 1-5 yrs	
iii.	Btw 5-10 yrs	
iv.	Over 10 yrs	

SECTION B: EFFECT OF BANK INNOVATIONS ON TOTAL INCOME

This section has statements regarding the effect of bank innovations on incomes of the bank. Kindly respond with the response that matches you opinion. Please tick as appropriate in the boxes using a tick (√) or cross mark (x).

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
Automated Teller Machines (ATMs)						
1.	ATMs have had a positive effect of increasing commission fee based income					

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
2.	ATMs have influenced positively the increase of interest based income					
3.	ATMs have expanded the income generating potential of the bank					
Debit & Credit Cards						
4.	Debit & credit cards have had a positive effect of increasing commission fee based income					
5.	Debit & credit cards have influenced positively the increase of interest based income					
6.	Debit & credit cards have expanded the income generating potential of the bank					
Point of Sale (POS) Terminals						
7.	POS terminals have had a positive effect of increasing commission fee based income					
8.	POS terminals have influenced positively the increase of interest based income					
9.	POS terminals have expanded the income generating potential of the bank					
Mobile Banking						
10.	Mobile banking has had a positive effect of increasing commission fee based income					
11.	Mobile banking has influenced positively the increase of interest based income					

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
12.	Mobile banking has expanded the income generating potential of the bank					
Internet Banking						
13.	Internet banking has had a positive effect of increasing commission fee based income					
14.	Internet banking has influenced positively the increase of interest based income					
15.	Internet banking has expanded the income generating potential of the bank					
Electronic Funds Transfer						
16.	Electronic funds transfer has had a positive effect of increasing commission fee based income					
17.	Electronic funds transfer has influenced positively the increase of interest based income					
18.	Electronic funds transfer has expanded the income generating potential of the bank					

SECTION C: EFFECT OF BANK INNOVATIONS ON RETURN ON ASSETS

This section has statements regarding the effect of bank innovations on return on assets of the bank. Kindly respond with the response that matches you opinion. Please tick as appropriate in the boxes using a tick (√) or cross mark (x).

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
Automated Teller Machines (ATMs)						
1.	ATMs influence reduction of operational costs and hence better return on assets for the bank					
2.	ATMs investments have payback period of less than 3 years and hence good return on assets					
3.	Incomes from ATMs have had positive impact on bank income margins					
Debit & Credit Cards						
4.	Debit & credit cards influence reduction of operational costs and hence better return on assets for the bank					
5.	Debit & credit cards investments have payback period of less than 3 years and hence good return on assets					
6.	Incomes from debit & credit cards have had positive impact on bank income margins					
Point of Sale (POS) Terminals						

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
7.	POS terminals influence reduction of operational costs and hence better return on assets for the bank					
8.	POS terminals investments have payback period of less than 3 years and hence good return on assets					
9.	Incomes from POS terminals have had positive impact on bank income margins					
Mobile Banking						
10.	Mobile banking influence reduction of operational costs and hence better return on assets for the bank					
11.	Mobile banking investments have payback period of less than 3 years and hence good return on assets					
12.	Incomes from mobile banking have had positive impact on bank income margins					
Internet Banking						
13.	Internet banking influence reduction of operational costs and hence better return on assets for the bank					
14.	Internet banking investments have payback period of less than 3 years and hence good return on assets					
15.	Incomes from internet banking have had positive impact on bank					

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
	income margins					
Electronic Funds Transfer						
16.	Electronic funds transfer influence reduction of operational costs and hence better return on assets for the bank					
17.	Electronic funds transfer investments have payback period of less than 3 years and hence good return on assets					
18.	Incomes from electronic funds transfer have had positive impact on bank income margins					

SECTION D: EFFECT OF BANK INNOVATIONS ON BANK PROFITABILITY

This section has statements regarding the effect of bank innovations on profitability of the bank. Kindly respond with the response that matches you opinion. Please tick as appropriate in the boxes using a tick (√) or cross mark (x).

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
Automated Teller Machines (ATMs)						
1.	Income from ATMs has high margin hence contributing positively to bank annual profitability					
2.	ATMs have low maintenance costs leading to high levels of profitability over their economic lifetime					
3.	Investment in ATMs in mostly motivated by profits to the bank					
Debit & Credit Cards						
4.	Income from debit and credit cards has high margin hence contributing positively to bank annual profitability					
5.	Debit and credit cards have low maintenance costs leading to high levels of profitability over their economic lifetime					
6.	Investment in debit and credit cards is mostly motivated by profits to the bank					

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
Point of Sale (POS) Terminals						
7.	Income from POS terminals has high margin hence contributing positively to bank annual profitability					
8.	POS terminals have low maintenance costs leading to high levels of profitability over their economic lifetime					
9.	Investment in POS terminals is mostly motivated by profits to the bank					
Mobile Banking						
10.	Income from mobile banking has high margin hence contributing positively to bank annual profitability					
11.	Mobile banking has low maintenance costs leading to high levels of profitability over their economic lifetime					
12.	Investment in mobile banking is mostly motivated by profits to the bank					
Internet Banking						
13.	Income from internet banking has high margin hence contributing positively to bank annual profitability					
14.	Internet banking has low maintenance costs leading to high levels of profitability over their economic lifetime					

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
15.	Investment in internet banking is mostly motivated by profits to the bank					
Electronic Funds Transfer						
16.	Income from electronic funds transfer has high margin hence contributing positively to bank annual profitability					
17.	Electronic funds transfer have low maintenance costs leading to high levels of profitability over their economic lifetime					
18.	Investment in electronic funds transfer is mostly motivated by profits to the bank					

SECTION E: EFFECT OF BANK INNOVATIONS ON CUSTOMER DEPOSITS

This section has statements regarding the effect of bank innovations on deposits of the bank. Kindly respond with the response that matches you opinion. Please tick as appropriate in the boxes using a tick (√) or cross mark (x).

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
Automated Teller Machines (ATMs)						
1.	ATM services have attracted more retail depositors for the bank					
2.	ATMs have enabled customers to access their deposits with ease					

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
	for withdrawal					
3.	ATMs have attracted corporate depositors and deposits					
Debit & Credit Cards						
4.	Debit & credit cards services have attracted more retail depositors for the bank					
5.	Debit & credit cards services have enabled customers to access their deposits with ease for withdrawal					
6.	Debit & credit cards services have attracted corporate depositors and deposits					
Point of Sale (POS) Terminals						
7.	POS terminal services have attracted more retail depositors for the bank					
8.	POS terminal services have enabled customers to access their deposits with ease for withdrawal					
9.	POS terminal services have attracted corporate depositors and deposits					
Mobile Banking						
10.	Mobile banking services have attracted more retail depositors for the bank					
11.	Mobile banking services have enabled customers to access their deposits with ease for withdrawal					

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
12.	Mobile banking services have attracted corporate depositors and deposits					
Internet Banking						
13.	Internet banking services have attracted more retail depositors for the bank					
14.	Internet banking services have enabled customers to access their deposits with ease for withdrawal					
15.	Internet banking services have attracted corporate depositors and deposits					
Electronic Funds Transfer						
16.	Electronic funds transfer services have attracted more retail depositors for the bank					
17.	Electronic funds transfer have enabled customers to access their deposits with ease for withdrawal					
18.	Electronic funds transfer have attracted corporate depositors and deposits					

SECTION F: EFFECT OF MOBILE PHONES AND INTERNET SERVICES ON BANK PERFORMANCE

This section has statements regarding the effect of mobile phones and internet services on bank performance. Kindly respond with the response that matches you opinion. Please tick as appropriate in the boxes using a tick (√) or cross mark (x).

No	Statement	Strongly disagree	Disagree	Neither agree not disagree	Agree	Strongly agree
		1	2	3	4	5
Mobile Phones						
1.	Use of mobile phones has increased customer access to bank services					
2.	Use of mobile phones has added to more profitable business avenues to the bank					
3.	The use of mobile phones has improved the level of deposits for the bank					
4.	Use of mobile phones has led to more bank innovations					
5.	Mobile phones have led to more retail customers than corporate customers to the bank					
Internet Services						
6.	Use of internet services has increased customer access to bank services					
7.	Use of internet services has added to more profitable business avenues to the bank					
8.	The use of internet services has improved the level of deposits for the bank					
9.	Use of internet services has led to more bank innovations					
10.	Internet services have led to more retail customers than corporate customers to the bank					

Thank you for taking your time to respond to this research questionnaire.

Appendix IV: List of Commercial Banks in Kenya

Bank Name	% Market Size Index - 2011	Bank Name	% Market Size Index - 2011
1. Kenya Commercial Bank Ltd	14.52	23. Consolidated Bank of Kenya Ltd	0.68
2. Barclays Bank of Kenya Ltd	8.9	24. Equatorial Commercial Bank Ltd	0.57
3. Co-operative Bank of Kenya Ltd	8.41	25. African Banking Corporation Ltd	0.63
4. Standard Chartered Bank Ltd	7.74	26. Giro Commercial Bank Ltd	0.6
5. Equity Bank Ltd	9.98	27. Gulf African Bank Ltd	0.6
6. CFC Stanbic Bank Ltd	5.1	28. Fidelity Commercial Bank Ltd	0.5
7. Commercial Bank of Africa Ltd	3.98	29. Habib AG Zurich	0.44
8. I & M Bank Ltd	4.09	30. Guardian Bank Ltd	0.44
9. Citibank N.A.	3.96	31. K-Rep Bank Ltd	0.47
10. National Bank of Kenya Ltd	3.59	32. First Community Bank Ltd	0.41
11. Diamond Trust Bank Ltd	3.77	33. Victoria Commercial Bank Ltd	0.4
12. NIC Bank Ltd	3.7	34. Habib Bank Ltd	0.32
13. Prime Bank Ltd	1.64	35. Trans-National Bank Ltd	0.44
14. Bank of Baroda Ltd	1.83	36. Oriental Commercial Bank Ltd	0.31
15. Ecobank Ltd	1.02	37. Credit Bank Ltd	0.28
16. Bank of Africa Ltd	1.7	38. Paramount-Universal Bank Ltd	0.28
17. Chase Bank Ltd	1.49	39. Middle East Bank Ltd	0.26
18. Family Bank Ltd	1.34	40. UBA Kenya Bank Ltd	0.16
19. Bank of India	1.17	41. Dubai Bank Ltd	0.15
20. Imperial Bank Ltd	1.27	42. Jamii Bora Bank Ltd	0.24
21. Fina Bank Ltd	0.69	43. Charterhouse Bank Ltd	0.00
22. Development Bank of Kenya Ltd	0.46	44. Housing Finance Company of Kenya Ltd	1.48

(Source: Central Bank of Kenya, 2012)

Appendix V: Secondary Data Collection Sheet

Innovation Type	Unit	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
ATMs	No. of ATMs	2205	2091	1827	1510	1078	737	555	324	263	174
Debit & Credit Cards	No. of Cards	8670602	6304984	3809102	1636519	1078555	823323	566125	416153	378324	220233
POS Terminals	No. of POS Terminals	18179	16604	15871	15236	10970	2334	1680	1180	1156	1080
Mobile Banking	No. of mobile banking transactions	432998200	311046200	193500400	62740000	5470000					
EFT & RTGS	Number of EFTs	1241533	904717	390737	273941	180312	142445	50697	47040	41765	38936
Internet Users	No. of internet users	12538030	7832352	3648406	3334085	1712191	1423546	1104728	1049230	994519	397694
Operating Income	Kshs Millions	207573	177980	137368	119578	55970	45663	61508	53892	53059	48084
Return on Assets	Percent	4.40	4.43	3.52	3.54	3.48	2.80	1.90	2.27	2.38	0.90

Innovation Type	Unit	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002
Profit Before Tax	Kshs Millions	89453	74272	48926	43293	35091	27012	19358	15022	13830	5784
Deposits	Kshs Millions	1488168	1236549	1006021	918007	727946	602568	504469	445233	405482	360642
Moderating Variables											
Internet Subscription	Number	4258287	3096952	1824203	1132354	677009	711773	375198	414871	497260	157250
Mobile Phone Subscription	Number	25279768	20119304	17362257	12933653	11440077	7340317	5263676	2546157	1590785	1325222

Appendix VI: Variables Operationalization Framework

No	Variable Name	Nature of Variable	Variable Indicators & Measurement	Data Collection Method	Type of Scale	Type of Analysis	Level of Analysis
1	Automated Teller Machine	Independent	Number of Automated Teller Machines in use by the end of each year	Questionnaire for primary data Secondary data collection sheet	Ordinal for primary data Nominal for secondary data	Quantitative	Frequencies Descriptive analysis Inferential analysis
2	Debit & Credit Cards	Independent	Number of total debit and credit cards on issue by the end of each year	Questionnaire for primary data Secondary data collection sheet	Ordinal for primary data Nominal for secondary data	Quantitative	Frequencies Descriptive analysis Inferential analysis
3	POS Terminals	Independent	Number of total point of sale terminals on issue by the end of each year	Questionnaire for primary data Secondary data collection sheet	Ordinal for primary data Nominal for secondary data	Quantitative	Frequencies Descriptive analysis Inferential analysis
4	Mobile Banking	Independent	Number of mobile banking users by the end of each year	Questionnaire for primary data Secondary data collection sheet	Ordinal for primary data Nominal for secondary data	Quantitative	Frequencies Descriptive analysis Inferential analysis
5	Internet Banking	Independent	Number of internet banking	Questionnaire for primary data	Ordinal for primary data	Quantitative	Frequencies Descriptive

No	Variable Name	Nature of Variable	Variable Indicators & Measurement	Data Collection Method	Type of Scale	Type of Analysis	Level of Analysis
			users by the end of each year	Secondary data collection sheet	Nominal for secondary data		analysis Inferential analysis
6	Electronic Funds Transfer (RTGS & EFT)	Independent	Kenya shillings value of amounts transfer via RTGS and EFT by the end of each year	Questionnaire for primary data Secondary data collection sheet	Ordinal for primary data Nominal for secondary data	Quantitative	Frequencies Descriptive analysis Inferential analysis
7	Total Income	Dependent	Kenya shilling value of cash and non-cash earnings in a financial year	Questionnaire for primary data Secondary data collection sheet	Ordinal for primary data Nominal for secondary data	Quantitative	Frequencies Descriptive analysis Inferential analysis
8	Profit before Tax	Dependent	Kenya shilling value of profit before tax by the end of each year	Questionnaire for primary data Secondary data collection sheet	Ordinal for primary data Nominal for secondary data	Quantitative	Frequencies Descriptive analysis Inferential analysis
9	Return on Assets	Dependent	Kenya shilling Value of total assets divided by profit before tax by the end of each year	Questionnaire for primary data Secondary data collection sheet	Ordinal for primary data Nominal for secondary data	Quantitative	Frequencies Descriptive analysis Inferential analysis

No	Variable Name	Nature of Variable	Variable Indicators & Measurement	Data Collection Method	Type of Scale	Type of Analysis	Level of Analysis
10	Deposits	Dependent	Kenya shilling value of total deposits by the end of each year	Questionnaire for primary data Secondary data collection sheet	Ordinal for primary data Nominal for secondary data	Quantitative	Frequencies Descriptive analysis Inferential analysis