FINANCIAL INNOVATIONS AND LEVELS OF RISKS IN COMMERCIAL BANKS IN KENYA

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D53/OL/GAR/26317/2015

A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION (FINANCE OPTION), KENYATTA UNIVERSITY

JANUARY, 2020
DECLARATION

I declare this research project to be my original work that has not been presented for the award of degree at any other university.

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This research project was submitted with my permission as the appointes university supervisor.

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<td>ANOVA</td>
<td>Analysis of Variance</td>
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<tr>
<td>ATM</td>
<td>Automatic Teller Machine</td>
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<tr>
<td>GSM</td>
<td>Global System for Mobile communication</td>
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<tr>
<td>OLS</td>
<td>Ordinary Least Squares</td>
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<tr>
<td>ICT</td>
<td>Information and Communications Technology</td>
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<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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<tr>
<td>NACOSTI</td>
<td>National commission of science technology and innovation</td>
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<td>US</td>
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OPERATIONAL DEFINITION OF TERMS

Agency Banking: A package developed for online banking, allowing you to reach customer bank account quickly and safely.

E-banking: A package developed for online banking, allowing you to reach your bank account quickly and safely.

Electronic Card: Is a convenient tool that allows you to purchase and pay for them conveniently without carrying cash. They include Credit Card, Debit Card and Prepaid Card.

Financial innovation: The development of new financial instruments and new technology, organisations and markets.

Financial Risks: A word that may refer to corporations, government entities, the entire financial system and the entity.

Credit Risk: Apply to the risk of damage resulting from inability of a creditor to repay a loan or satisfy contractual obligations

Liquidity Risk: A corporation, company or even individual's ability to pay its obligations without experiencing catastrophic losses

Market Risk: The propensity for an individual to suffer losses because of factors affecting the overall performance of the financial markets in which he or she is active.

Internet Banking: An electronic payment system which enables customers of a bank or other financial institution to make a variety of financial transactions via the financial institution’s website.
Mobile Banking: A service provided by a bank or other financial institution that helps its customers make financial transactions through mobile devices such as smartphones or tablets remotely.
Commercial banks would find the origins of the different financial threats that arise as a result of global changes, as they can threaten bank stability. Notwithstanding the undisputed importance of financial innovation in recognizing banking performance remains underrated, the influence of innovation on risk management. Therefore, this study aimed at establishing the effect of financial innovations on levels of risks in commercial banks in Kenya. The specific objectives that guided the study include: to determine the effect of internet banking on level of risks in commercial banks in Kenya, to examine the impact of mobile banking on level of risks in commercial banks in Kenya, to establish the effect of agency banking on level of risks in commercial banks in Kenya and to determine the impact of electronic cards on level of risks in commercial banks in Kenya. The study was guided by Silber’s Constraint Theory of Innovation, Merton’s Market Efficiency Theory of Innovation and Diffusion of Innovation Theory. The study adopted a descriptive cross-sectional research design. The target population was all the 42 commercial banks registered with CBK as at December 31st 2016 (CBK, 2016). The unit of observation was the risk management managers, one from each of the 42 commercial banks. This was a census study. The study collected primary data. The primary data was collected from the respondents through a questionnaire. Each questionnaire was followed by a cover letter describing and assuring that all answers were handled confidentially. Before the actual data collection, a pilot study for the questionnaire was performed to find flaws in the concept and the instrument. The study found out that the banks had put effective security measures to mitigate internet banking fraud (risks), the study established that the transaction errors arising from mobile banking exposed the customers and the banks to financial risks and that the user behavior greatly exposed the customers to risks. The study also found out that the information of customers transacting through agency banking was kept confidential for any fraud activity to take place and that system malfunction exposed the bank and the customers to risks. It also found out that technical failures on electronic cards exposed clients and banks to financial risks and that there was high rate of electronic cards fraud in the banking sector. The study concluded that the financial innovations in the Kenya’s banking sector influence the level of risk in commercial banks both negatively and positively. The study therefore recommends that the banks should create creative ways to measure the effect of agency/mobile banking on numerous transactions and improve the requisite contingency plans. The regulator should also track the banking sector closely and strictly enforce conformity with the agent/mobile banking rules, whilst the banks are constantly monitoring agents carefully.
CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Innovation has been a core topic for scholars, because of its important contribution to economic growth and to the stability of financial systems (Lerner & Tufano, 2011). Innovation is a double edged-sword; the right kind of innovation and favourable conditions that may spur banks to invest in new technologies would help the financial system fulfill its functions and, as a consequence, deliver growth; but too much of innovation or innovation which is not properly used can have serious consequences on the overall economy (Beck, Chen, Lin & Song, 2012).

The banking sector in India is currently considerably high but at the same time banking is deemed a very risky industry. Financial institutions may take risks but knowingly do so (Chakrabarti, 2015). It should be borne in mind, though, that banks are very vulnerable entities based on the confidence, brand reputation and, above all, risky control of the consumers. Dawar and Goyal (2017) suggest that banks would collapse in case something goes wrong and the loss of one bank is enough to send shock waves right across the economy. Therefore, bank management must take the utmost care in determining the process and the degree of its risk exposure and handle both efficiently. In addition, bankers need to consider risk management as a continuous and valued board setting activity.
The key to good risk management, according to Pandey (2014), is not to do away with the different inherent risks altogether. For starters, bank lending activities have the inherent risk of future loan losses (credit risk), but banks may charge a premium for their risk taking policies and earn profits from risk taking. Threats for the banks are thus a source of revenue. Nonetheless, risk management in Nigeria's financial system did not yield much of the desired outcome because of problems varying from insider loans and advances to inadequate risk management policies put in place by bank operators. According to Ogunleye (2016), the expansion of loans and advances to family relations, associates and executives without due process has become a common phenomenon in Nigerian banks. This has led to bad debts triggered by insufficient restructuring practices, contributing to the banks' failure to obtain loans and deposits provided to these groups of creditors, leading inevitably to financial distress.

Commercial banks in Kenya are full of diversified business activities working in a highly volatile and also competitive market climate (Charumathi, 2013). The author also suggests that interest-rate uncertainty has caused interest-rate fighting, which places banks earning at risk, while inheriting interest-rate risk exposure. This risk involves financial loss to firms. According to Juma and Atheru (2018), financial risk management is conducted by commercial banks using financial instruments to control financial risk concentration on the business. Effective management of exposure to these threats should increase bank income.

All financial institutions have a growing set of risks. These include credit risk, liquidity risk, demand or price risk, regulatory risk, enforcement and legal risk, and strategic risk,
spanning from banks to microfinance organizations. Deregulation has been a major driver of financial market dynamics, which have had a significant impact on risk management activities today. Capital flow deregulation has led to increased globalization since the 1970s (Sverrisson & Van Dijk, 2000); market deregulation has allowed the rapid expansion of new companies, such as Enron (Bodily & Bruner, 2002; Bratton, 2003); With the restructuring of financial activities, additional threats have been added for some banks that offer insurance policies and insurance companies that finance equity and credit instruments (Broome and Markham, 2000).

1.1.1 Financial Innovations

Banking through technology or electronic banking has emerged as a strategic resource for achieving higher efficiency, control of operations and reduction of cost by replacing paper based and labour intensive methods with automated processes thus leading to higher productivity and profitability (Malhotra & Singh, 2009). According to Sumra and Manzoor (2011) electronic banking not only provides customers with appropriate and faster transactions but also benefits from higher interest rate resulting from cost saving by the banks. On another hand, adopting of e-banking brings additional risks. E-banking operations increased and modified some of the traditional risks associated with banking operations, thereby influencing the overall risk of banking.

The growth of mobile phone and the internet has seen integration of these platforms with banking products and services. With the growth of telecommunication industry; there has
been innovation in mobile phone financial services platform. Use of mobile phones for person to person, person to business, business to person and ATM payment transfers have increasingly taken off and many banks are offering such services. Agent banking is another innovation in the banking sector (CBK, 2015). Kenya's banking sector contains some of the prominent financial developments: mobile phone platforms, internet banking, RTGS (a Kenya Electronic Payment) and agency banking. For instance, the growth of mobile phone platforms has seen integration with banking platforms. For example in 2010, Equity Bank Ltd partnered with Safaricom to launch M-Kesho account that went beyond transfers to micro-savings, micro-credit an micro-insurance, among others (Njuguna, 2011). Agency banking has also grown with time, as at end of year 2014, In 2013, 16 commercial banks had employed 26,750 operational employees, up from 13 banks, out of a possible 44 banks in Kenya (CBK, 2014).

Goderis et al. (2007) also argues that in recent years a new set of financial instruments has been developed that allow banks to be more active in the management of their loan portfolios. Banks have long been able to trade loans or buy insurance to protect themselves against borrower default but the recent explosion of single name credit derivatives products such as credit default swaps, and portfolio products such as collateralized loan obligations, among other financial innovations have the potential to revolutionize bank lending due to the sheer size of credit risk that can be transferred off banks’ balance sheets quickly and with relatively low cost.
1.1.2 Levels of Risks in Commercial Banks

The greater the risk that a bank faces, the more money it can expect to make, as risk is directly proportionate to revenue. Further expense, though, often increases the risk that the bank will endure tremendous damages and be forced out of business (Marrison, 2015). In fact, a bank needs to run its activities today with two goals in mind—to generate income and stay in business. Consequently, banks try to ensure that they are conscious of their risk-taking and are cautious. Ariffin, Archer and Karim (2019) argue that the task of risk management is to establish a trade-off between risk and return. Risk management in the banking sector, actually is a key issue contributing to the integrity of the financial system.

The main profitable business of commercial banks, among others, is lending. The core activity of any commercial bank in the world, Dasah, etal, (2012), which is the basis of net interest income. Cash awards are indeed one of the key sources of revenue, including Hosnaetal, (2009), Bashir, (2000) and Fries et al., 2002: 10); therefore large credit portfolios would imply increased profitability of commercial banks (Aburime, undated). The credit rating is seen as an indicator of banks’ organizational efficiency and financial health. The credit risk, which is a probability that lenders can not or will not repay their debts on time, Sinkey (2002), Coyle, (2000); a likelihood of non-performing loans and defaults, a chance that investments and liabilities will become irrecoverable as Dasah, etal, 2012 and Hefferman (1996) placed it, this influences not just banks’ operating performance, productivity or net interest income but the economy as a whole. It is on this basis that Afriye and Akotey (2010) argue that sound credit risk control is critical to commercial banks’ stability and development.
Most commercial banks are exposed to variations in market worth of their savings because they frequently seize asset securities on their balance sheet which makes them exposed a lot. A sudden market decline in the securities of most commercial banks could force most of the banks to raise capital as most of those financial institution in for instance commercial banks seize important percentages of assets in debt investments extensively considered of as “safe” (as well as U.S government bonds) Therefore, peel back on deposits, not to mention the reduction in shareholders' equity related to investment losses.

Diamond and Dybvig (1983) suggest that banks are potentially susceptible to liquidity exposure by the maturity transition of short-term deposits into long-term loans. The liquidity danger relates to the inability to sell products at or equal to the fair value which, in the case of a particular transaction in a small market, may result in a price decrease. Goodhart (2008) claims that there are two basic aspects of liquidity risk: maturity transition (the maturity of the liabilities and assets of a firm) and the intrinsic resilience of the assets of a business (the degree to which an asset can be exchanged without a substantial loss of value under any market condition). Banks need not care about the transition to maturity if they have the reserves that can be sold without risk. Whereas banks with reserves that are expected to mature in a shorter time may have less need to retain liquid assets. This raises depositor demand and creates liquidity risk. This may trigger the contagion impact of a certain bank or even the entire banking system to collapse (Diamond and Rajan, 2001).
1.1.3 Commercial Banks in Kenya

Kenya’s Banking Sector is regulated by the Central Bank of Kenya (CBK) which oversees industry players such as the Commercial Banks, Forex Bueraus as well as institutions of Non-Bank Financial nature. As at December 2016, Kenya had a total of 42 commercial banks and 1 mortgage finance company with two banks; Chase bank and Imperial bank in receivership (CBK, 2016). The Kenyan banking industry is considered the most mature, fastest-growing and largest in East Africa, thereby making it the regional financial leader. A key driver of growth among Kenyan banks remains their ability to tailor products that meet Kenyans’ needs, which has helped the country attain one of the highest financial inclusion rates in the developing world (The Report, 2017).

The Central Bank categorizes Tier 1, Tier 2 and Tier banks into three. These include the established banks, Especially those on the market who have been accumulating assets worth hundreds of billions of cash and millions of customers for a long time, so it would be almost impossible for them to fall into a financial crisis. In Tier 2, borrowers are medium-sized institutions; there are about seventeen banks in this category and 41.7% of the financial market are jointly regulated relative to their counterparts in Tier One, which collectively holds about 50%. The third tier comprises of 21 small banks controlling 8.4% of the Kenyan economy.

Over the last few years, the banking sector in Kenya has continued to grow in assets, deposits, profitability and products offering, leveraging on
diversification to alternative channels, supported by favourable macroeconomic environment. As a result, players in this sector have experienced increased competition over the last few years resulting from increased innovations among the players and new entrants into the market (CBK, 2015). The banking sector has evolved over the years with new technologies being introduced in the industry. The banks have been in the frontline of automating their functions to give their customers good service. Kenyan banks have engaged in product innovation where internet banking and mobile banking have taken root in various local banks (CBK, 2011).

In the recent past, the banking sector over Kenya has been under beefed scrutiny by creditors after some banks fell into financial crisis and were put under receivership as a result. The closing of Dubai, Imperial and Chase Banks has left many depositors worried about the viability of some of the industrial facilities. The Central Bank categorizes banks into three that are Tier 1, Tier II and Tier III. They consist of the established banks, particularly those that have been on the market for a long time, holding assets worth hundreds of billions of cash and millions of customers, so it would be almost unlikely for them to collapse into a financial crisis. There are six Tier I banks; Equity Bank, Barclays Bank, Kenya Commercial Bank, Co-operative, Standard Chartered Bank and Africa Commercial Bank. The Co-operative Bank, which was named Bank of the Year by the London Financial Times, has estimated reserves of about Sh309 trillion and has a customer base of around 3.4 million members. The bank is intertwined that its inability to function entirely would be troublesome for the broader economic framework, thus, in the
event of a financial death; the government is told that it will save the situation completely.

Within Tier II, borrowers are medium-sized institutions; there are currently seventeen banks in this category which jointly manage 41.7% of the financial market relative to their counterparts in Tier One, which collectively holds about 50%. Banks include Diamond Trust Bank, CFC Stanbic, NIC, Chase Bank, I&M, Bank of Africa, Eco Bank, Family Bank and Housing Finance in this list. The third Tier comprises of 21 small banks controling 8.4% of the Kenyan sector. The banks here are Paramount Universal, ABC, Credit Bank, Guardian, Fidelity, Charterhouse, Consolidated Jamii Bora, and Development bank.

The growth of mobile phone and the internet has seen integration of mobile banking applications in the delivery of banking products and services. With the growth of telecommunication industry; there has been innovation in mobile phone financial services platform (CBK, 2018). For instance, the growth of mobile phone platforms has seen increased number of mobile banking applications (Njuguna, 2011). Internet subscriptions increased from 7.7 million in June 2012 to 8.5 million, with a total number of Internet users estimated at 13.5 million, almost double that of the past year. Mobile Internet users continued to dominate the Internet market with more than 98% of total Internet data subscriptions (CAK, 2013).
These also seem to have improved financial performance of the banks and efficiency in operations/service delivery hence reducing costs. For instance, in 2016 Co-operative Bank of Kenya reported that increased use of mobile banking, applications and internet banking had helped the bank increase its pretax profit in the first half of 2016 by 19 percent to 10.45 billion shillings ($103.08 million). The bank also reported that operational efficiencies resulting from these projects had seen the Cost-to-Income Ratio improve from 58.8% in December 2015 to 51.4% in June 2016 (Co-operative Bank Financial Report, 2016).

1.2 Statement of the Problem
Technology advances and changing economic circumstances have given fuel for many shifts in the financial sector. All of these innovations combined with improvements in the international financial climate and greater convergence quick financial creativity has resulted between the domestic and international financial markets (Waweru, 2012). Whilst these create new growth opportunities for commercial banks, new risk factors often arise. Toivonen and Tuominen (2013) note that, given the obvious role of financial innovation in the understanding of banking performance is still underestimated by the effect of innovation on risk management, despite the insufficient knowledge of drivers of innovation and the effects of innovation on bank risk management.

Over the last few years, the banking sector in Kenya has continued to grow in assets, deposits, profitability and products offering, leveraging on diversification to alternative channels, supported by favourable macroeconomic environment. As a result, players in this sector have experienced increased
competition over the last few years resulting from increased innovations among the players and new entrants into the market (CBK, 2015). The banking sector has evolved over the years with new technologies being introduced in the industry. The banks have been in the frontline of automating their functions to give their customers good service. Kenyan banks have engaged in product innovation where internet banking and mobile banking have taken root in various local banks (CBK, 2011).

The financial innovation and level of risk that the banking system has acknowledged the origins of the various financial threats resulting from their products and services, as these risks have an impact on bank stability (Cecchetti & Schoenholtz, 2011). Financial innovations, even though beneficial to commercial banks, may amplify risks (Gennaioli, Andrei & Robert, 2012). They are blamed for banks taking excessive risks, and for a general erosion of lending standards leading to the financial risks. Empirical evidence from studies by Keys, Mukherjee, Seru & Vig, 2010) and Gennaioli et al. (2012), show that rise in financial innovations in the banking industry give rise to risks.

In Kenya, commercial banks are increasingly adopting various financial innovations such as RTGS, cards electronic payment/transactions, internet banking where transaction are done online mobile banking and agency banking are associated to level of risk due to their high chance of being hacked.

Some of these new innovations have been found to expose the bank and the consumers to risks (Korir, Sang, Shisia & Mutung’u, 2015). For instance, the recent switch from
magnetic strip ATM cards to the new Chip-Pin faced cards was so to mitigate banking
fraud through that channel; which implies that ATMs as a financial innovation might
have exposed the banks to risks. This is just a one scenario, but is shows the possibility of
financial innovations exposing commercial banks to risks. A report by CBK (2011)
revealed that even though 94% con commercial banks indicated that they were complying
with risk management guidelines, the risks affects 95 per cent of commercial banks
(CBK, 2011). With the advent and adoption of new financial innovations, which some
empirical evidence show they give rise to risks; there is need to establish to what extent
the adopted innovations expose commercial banks in Kenya to risks.

A review of local studies shows most of the studies have concentrated on the
relationship between financial innovations and performance of banks in
Kenya with little emphasis on the relationship between financial innovations and
financial risks in commercial banks. For instance Korir et al. (2015) conducted a study on
financial innovations and performance of commercial banks in Kenya. However, the
study used simple random sampling which is subject to sample biasness. Muiruri and
Ngari (2014) also did a study on the impact of technological developments on the
financial performance of Kenya's commercial banks. Nonetheless, the research used
conducted a study on financial innovation and its effect on the financial performance of
Kenya's commercial banks. However, the study used purposive sampling method.
Therefore, this study sought to establish the relationship between financial innovations
and financial risks in commercial banks in Kenya.
1.3. Objective of the Study

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

1.3.1 Specific Objectives

i. To determine the effect of internet banking on level of risks in commercial banks in Kenya.

ii. To examine the impact of mobile banking on level of risks in commercial banks in Kenya.

iii. To establish the effect of agency banking on level of risks in commercial banks in Kenya.

iv. To determine the impact of electronic cards on level of risks in commercial banks in Kenya.

1.4. Research Hypothesis

H01: There is no significant effect between internet banking and level of risks in commercial banks in Kenya.

H02: There is no significant impact between mobile banking and level of risks in commercial banks in Kenya.

H03: There is no significant effect between agency banking and level of risks in commercial banks in Kenya.

H04: There is no impact between electronic cards and level of risks in commercial banks in Kenya.
1.5 Significance of the Study

The research would be of interest to the commercial banks management in Kenya particularly the risk managers. The findings would support the management take the right choices towards adoption of financial innovation. They would get some insight on the link between different financial innovations adopted by commercial banks and financial risks; hence inform their future decisions on adoption and implementation of the financial innovations.

For the government and industry regulator (CBK) the study would be relevant to understand how the new financial innovations in the banking industry influence financial risks. The findings would inform future policy on financial innovations in the industry of banking.

This research would also be of interest to potential researchers and scholars because they would use the findings of the study as a reference source and a foundation for further studies. Scholars would have a better understanding on how financial innovations influence financial risks.

1.6 Scope of the Study

This study mainly targeted at the 42 commercial banks active in Kenya. The paper targeted the management staff in the targeted commercials banks. The choice of this study population was informed by the fact that the management staff are aware of how the financial innovations are influencing risks in the banks and the steps that their respective banks are taking to manage risks. The study sought to examine how financial innovations such as internet banking, mobile banking and agency banking influences
risks in the banks. The research gathered primary data from the respondents by using a questionnaire.

1.7 Limitations of the Study

The study was mainly based upon the questionnaire as the primary instrument for data collection. A questionnaire that is not well designed may limit this study in terms of answering the research questions and meeting its objectives. To address this, the researcher subjected the questionnaire to validity and reliability tests to counter any shortcomings in the questionnaires. The researcher shared the questionnaire with experts so as to address any weaknesses on the research instrument.

Another limitation was that due to competition which is often intense among commercial banks and because of strategic reasons, there was a likelihood that some respondents would not be willing to share any information about their organization for fear of disclosing their weaknesses to their competitors. However, this challenge was addressed by using the introduction letter from the university, to ensure that the information obtained was used for academic purposes only. The questionnaire used in the study did not disclose the identity of the respondents.

1.8 Organization of the Study

This study covered five main chapters. The first chapter described sections such as the background of the study, the research questions and objectives and the problem statement. In addition, the chapter contains sections such as the study significance, assumptions of
the study, delimitations and study limitations. This chapter also covered how the other chapter were structured.

Chapter two covered the literature review; it contains the theoretical review, the empirical review based on the objectives/variables of the study. The chapter ends with a conceptual framework which is a diagrammatic presentation that shows the hypothesized relationship between the dependent and independent variables in the study.

Chapter three presents the research methodology to be adopted. It describes the research design, size, the target population, sampling technique and sample size, instrument used in the data collection, data collection methods and finally the data analysis technique.

Chapter four chapter covered the presentation, analysis and interpretation of the results and findings of the study, and lastly chapter five covered the summary of the findings, conclusions, policy recommendations as well as recommendations for further research
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

Chapter two focus on the review carried out on literature related to the study. The sections covered include; the theoretical review, and the conceptual framework. In the literature, it reviews other authors’ works on financial innovations and financial risks. The last section presents conceptual framework.

2.2 Theoretical Literature Review

This section discusses the theories that are established by other authors and scholars and is being guided by Silber’s Constraint Theory of Innovation and Merton’s Market Efficiency Theory of Innovation.

2.2.1 Silber’s Constraint Theory of Innovation

Silber (1975) attributes financial innovations to attempts by profit maximizing firms to reduce the impact of various types of constraints that reduces profitability. The theory points out that the purpose of profit maximization of financial institutions is the key reason of financial innovation. Silber notes that there are some restrictions (including external handicaps and internal handicaps such as organizational management) in the process of pursuing profit maximization. Although these restrictions not only guarantee the stability of management they reduce the efficiency of financial institution so the institutions strive to cast them off.
Silber defines the particular conditions that will enable the emergence of a financial innovation (dividing them into instruments and practices), such as the arrival or imposition of an exogenous constraint. He discerns two kinds of constraint: a possible reduction of firm's utility, hence a new tool is required to bring it back to its previous level of utility 'abnormally' high (success innovation) (Silber, 1975). He considers as the main historical causes of innovation by US banks as a response to a reduction of their utility or adversity innovation: the interest rate ceiling, where banks tried to endogenize exogenous items of their balance sheet (Certificate of Deposit, Eurodollars and bank-related commercial paper); the decline in the markets for particular assets (introduction of long term loans from commercial banks during the 1930s); a declining growth rate of sources of funds (new products in order to attract new funds) and an increase of the risk of a particular asset or of all assets due to the economic environment (interest on the other hand, examples of 'success innovations' are the extensive use of cost reducing information technology and elaborate new finance theories in the financial sector and several new products designed to cope with the rising yield of assets in order to attract new funds, summarizing Silber's contribution in comparison with other contributions) (Llewellyn, 2009).

Silber proposes that the three possible ways a financial firm could innovate are: by endogenizing an exogenous item of the balance sheet, introducing an existing financial instrument from another country or industry into the firm's portfolio and thirdly as the mixture of the above two
ways, taking the form of a modification of an existing instrument (Anderloni & Bongini 2009).

Research literature has shown that firms that are less profitable in their respective sector are disproportionately innovative. Moreover, their decrease in profitability, which can be attributed to external competition or government regulation, has provided these firms with the necessary motivation to innovate in a bid to increase profitability. This finding is consistent with the suggestion in the work of Silber that investment in innovation is a rational response to an unfavorable competitive position (Tufano, 2003).

This theory is important to the analysis as it explains that commercial banks in the changing landscape come up with new ways of generating profits. The theory suggests that there are limitations within and outside the enterprise that an invention offers the opportunity to operate on the market in order to boost financial performance. As the theory suggests, financial creativity is adding significantly to a commercial bank's financial performance.

### 2.2.2 Merton’s Market Efficiency Theory of Innovation

Merton (1990) also provides a valuable rationale for financial innovation. This theory is based on the notion that financial innovations are motivated by forces designed to increase market efficiency and improve social welfare. Merton
argued that the market is not perfect hence financial institutions must innovate to improve market efficiency.

According to Rene (2000) financial economists generally view the flow of funds to take advantage of investment opportunities and financial innovations as positive forces that makes markets more efficient, facilitate risk sharing and increase growth. Many have argued that capital flows and financial innovations lead to instability, crashes and other disasters especially the 1987 crash and the derivative disasters in the 1990’s but Merton was not convinced that financial innovation was to blame for the crashes.

Merton (1990) gives three motivations for producing innovations namely, the creation of new financial structures that allow risk sharing, risk pooling and hedging as well as new financial structures for transferring resources, the improvement of economic efficiency and liquidity and reduction of agency costs. This theory is significant for the research, since it is focused on the premise that financial advances are driven by factors designed to improve market efficiency and social welfare

2.2.3 Diffusion of Innovation Theory
Diffusion of Innovation Theory was developed by E. M. Rogers in 1962. The theory seeks to explain how, why, and at what rate new ideas and technology spread. Rogers argues that diffusion is the process by which an innovation is communicated over time among the participants in a social system. Rogers defines diffusion as “the process in which an innovation
is communicated thorough certain channels over time among the members of a social system” (Rogers, 2003).

Diffusion research has focused on five areas: the characteristics of an innovation which may influence its adoption; the decision-making process that occurs when individuals consider adopting a new idea, product or practice; the characteristics of individuals that make them likely to adopt an innovation; the consequences for individuals and society of adopting an innovation; and communication channels used in the adoption process (Rogers, 2003).

Rogers proposes that four main elements influence the spread of a new idea: the innovation itself, communication channels, time, and a social system. This process relies heavily on human capital. The innovation must be widely adopted in order to self-sustain. Within the rate of adoption, there is a point at which an innovation reaches critical mass. The information flows through networks. The nature of networks and the roles opinion leaders play in them determine the likelihood that the innovation will be adopted. Innovation diffusion research has attempted to explain the variables that influence how and why users adopt a new information medium, such as the Internet. Opinion leaders exert influence on audience behavior via their personal contact, but additional intermediaries called change agents and gatekeepers are also included in the process of diffusion (Moseley, 2004).
A number of studies (for example, Kemal, 2009; Akhavein, Frame and White, 2005) have been conducted about the diffusion of financial innovations. Diffusion research centers on the conditions which increase or decrease the likelihood that a new idea, product, or practice will be adopted. This study therefore informs the concept of adoption of financial innovations in the banking sectors in Kenya; and it helps understand those factors that increase or decrease the likelihood of adoption.

2.3 Empirical Literature Review

2.3.1 Internet Banking and Financial Risks
Research by Marafon, Basso, Espartel, de Barcellos and Rech (2018) examined perceived danger and internet banking intention: the consequences of self-confidence and risk tolerance. A study of 180 Brazilian banking customers was performed. The Johnson-Neyman scale was used to assess tolerance and important regions along with level of self-confidence and recognition of risks. Self-confidence and tolerance of risks mitigate the connection between perception of risk and desire to use internet banking. The influence of perceived risk on internet banking choices is lower for people with high self-confidence than for people with low self-confidence; similarly, for people with high risk approval, the effect of perceived risk on internet banking strategies is lower than for those with low risk acceptance.

A study by Sullivan (2010) compared the financial performance and risk of a sample of banks that are located in Tenth Federal Reserve District states and observed that the profitability and risk of the non internet banks and internet banks in the sample are similar. On the other hand, Ciciretti, Hasan, and Zazzara (2009) found a significant positive relationship between offerings of
internet banking products and Italian banks’ performance and a significant negative relationship between the adoption of internet activities and banks' risks. Thus, this study was however conducted on Italian banks and the findings therefore can be generalized in the Kenyan Context.

Using information drawn from banks in Italy, Hasan et al. (2012) found that the Internet banking institutions were performing significantly better than the non-internet groups. Additionally, the risk variables associated with the Internet group continued to be lower relative to the non-Internet group. The asset-liability variables revealed that on average the banks in this Internet group were larger and had significantly higher trading and investment activities and less dependent on retail deposits (both demand and saving deposits) relative to the non-Internet group. The only category where the Internet group showed a lower performance was the noninterest expense category. It found a significant and positive link between offering of Internet banking activities and banks’ profitability and a negative but marginally significant association between the adoption of Internet banking and bank risk levels particularly due to increased diversification.

Nzevela (2015) study focused on how risks related to Internet banking risk management techniques impacts the financial performance of Kenya's commercial banks. Data from primary sources as well as secondary sources was obtained. Primary data were gathered using a standardized questionnaire which was provided to managers of risk. The study found that activities in internet banking risk management had a good, albeit marginal,
impact on financial performance. It is believed that Internet banking risk management do
not have any impact on Kenya's commercial banks performance.

2.3.2 Mobile banking and Financial Risks

Research by Ibrahim, Ahmad, Shahid, and Akbar (2015) explored the effect of risk and
ethics on mobile banking adoption in Pakistan. The study solely dependent on primary
data that was sourced from a sample of 500 university students both from private and
public in the Pothohar area during the field survey. SPSS program was used to measure
the association and regression analysis. The findings of the analysis revealed an
insignificant relationship with ethics and a substantial relationship with danger was
identified.

Waweru (2012) carried out a study on the effects of financial innovations
on risk management among commercial banks in Kenya. Secondary data
was collected from risk manual, financial products reports and audited
financial reports of 18 commercial banks that made were selected to
represent the 43 commercial banks in Kenya. The study found out that
financial innovations have exposed commercial banks in Kenya to various
risks including credit risk, liquidity risk, strategic risk, interest rate risks,
country risk, compliance risk and reputational risk and all these risks
should therefore inform overall risk management of the institutions through
a realistic risk index factor at any one period. The researcher recommends
more robust risk mitigation practices and policies to ensure that all elements
of risk are captured in the risk index factors of commercial banks. The
findings of the study also indicated that total new current accounts, total new savings accounts, credit reference bureaus and automated trading system at the stock exchange had a positive correlation with the overall risk management framework for commercial banks. On the other hand mobile banking and real time gross settlements had a negative correlation with the risk management framework.

Beck et al. (2012) conducted a study using a sample of more than 1,500 banks across 32 developed countries between 1996 and 2006. They found out that a higher level of financial innovation is associated with higher bank risk taking and fragility, especially among banks with smaller market shares, lower loan-asset ratios and higher growth rates. This suggests that smaller banks, banks that diversify away from traditional intermediation and faster growing banks are relatively more fragile in countries with higher levels of financial innovation. The relationship between financial innovation and bank fragility is driven by higher profit volatility of banks in countries with higher levels of financial innovation. Consistent with these findings, we show that banks’ profitability dropped at a higher rate during the recent crisis in countries with higher pre-crisis levels of financial innovation and this relationship is stronger among banks with smaller market shares and lower loan-asset ratios. Overall, these findings are consistent with both the bright and the dark sides of financial innovation.
2.3.3 Agency Banking and Financial Risks

A study conducted by Argamo (2015) based on the impact of Agency Banking on the financial performance of Kenya's commercial banks in 2014: A Chase Bank case study. The target population of this analysis was 174 people employed at Chase Bank headquarters. A method of stratified sampling was carried. Data was quantitative in nature which was obtained using semi-structured questionnaires. It was concluded that a favorable and important relationship exists between quality of bank services, reduced cost together with transactions done by the consumers arising from Chase Bank's agency banking and financial results.

Chiteli (2016) conducted a study on Agent Banking Operations in Commercial Banks in Kisumu City. The study established that commercial banks encounter challenges in agent banking operations; these include operational risk and reputational risks among others. For instance some retail agents have underperformed and some have been robbed, and as a result the bank’s public image has suffered. The operational risk mentioned has caused reputational risk, and liquidity shortfalls in the retail agent’s cash drawer. Use of retail agents has increased the risk that customers are unable to understand their rights and press claims when aggrieved. Customers are protected against fraud by laws and regulations. But it is not clear to customers how they are protected against fraud when they use retail agents to conduct financial transactions. For instance. The agents also encounters liquidity risk challenges in providing banking services and the challenges whereby retail agents especially those that are relatively small, unsophisticated, and remote, may not have enough cash to
meet customers’ requests for withdrawals and may lack experience in the more complex liquidity management required for offering financial services.

Vutsengwa and Ngugi (2015) conducted a study to assess the challenges facing commercial banks in sustainability of agency banking in Kenya. The population of this study comprised of all the agency banking outlets in Nairobi. The study concludes that security and privacy implications for all stakeholders should be a prerequisite for sanctioning by the government. The study recommends that banks should embrace a good information security system for convenience, confidentiality, integrity, and availability, by doing this the value of the information will be sustained.

Musau (2017) conducted an analysis of the utilization of agency banking on performance of selected banks in Nairobi County. The study showed that liquidity availability in the outlets and security affected banks performance in addition to leading to frustrated customers. The study therefore recommends that, banks should give more attention to security and find better ways of vetting the agents in order to make sure that a huge amount of transaction are handled efficiently. A study by Atandi (2013) explored challenges experienced in agent banking in Kenya also identified insecurity issues with also fear of robbery were affecting agency banking operations.

2.3.4 Electronic Cards and Financial Risks

Adud and Kingoo (2012) conducted a study on Electronic Banking among Commercial Banks in Kenya. The authors revealed that while the rapid
development of information technology has made some banking tasks more efficient and cheaper, there are problems associated with this financial innovation plastic card fraud, particularly on lost and stolen cards and counterfeit card fraud. The study recommended that it is important that e-banking innovations are made by sound analysis of risks so that to avoid harms on the bank performance. This study however was only limited to electronic banking, as the only form of financial innovations. The proposed study will look at a more wide scope of financial innovations.

Muiruri and Ngari (2014) conducted a study on how innovations relates to the performance in regards to finance among players in the banking industry in Kenya. Secondary data was collected from a total of bank’s for the periods 2008-2012. The study found out that banks have been motivated by the different interests to pursue different financial innovations. This study however was only concerned with financial innovations and financial performance of commercial banks, but did not deeply look at how the financial innovations expose the banks to risks; a gap that will be filled by this study.

In another study Maina (2014) revealed that innovations relating to finance particularly on institution, product and innovations process positively affects commercial banks’ management of credit risk. Bonyi (2015) did a study related to how financial innovation affected banking industrys’ management of risk in Kenya. The work also found out that indeed banks in Kenya operate in a risky environment, however,
they have managed to mitigate risks through investments in more secure money transfers for instance internet banking and mobile banking.

### 2.4 Summary

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Observation</th>
<th>Gaps</th>
<th>Addressing Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diamond and Dybvig (1983)</td>
<td>Banks and Liquidity Creation: A Simple Exposition of the Diamond-Dybvig Model</td>
<td>Banks create liquidity and transform assets by investing into illiquid loans which are financed with liquid deposits.</td>
<td>This mismatch causes banks vulnerability to liquidity risk.</td>
<td>In order to lessen the maturity gap between assets and liabilities or the inherent liquidity risk, banks can adequately manage the liquidity risk underlying liquid asset buffer through a structure of balance sheet.</td>
</tr>
<tr>
<td>Ahmad and Ariff (2007)</td>
<td>Key determinants of credit risk of commercial banks on emerging economy banking systems compared with the developed</td>
<td>The study highlighted that credit risk in emerging economy banks is higher than</td>
<td>It is evident from empirical literature that, the results of studies on credit risk and</td>
<td>This study aimed to add value into the available stock, and applied the panel data analysis method, similar to that used by Okel et al</td>
</tr>
</tbody>
</table>
2.5 Conceptual Framework
A conceptual framework is used to give a conceptualization of how variables relates to each other and shows the relationship graphically or diagrammatically. The conceptual framework in Figure 2.1 below shows the way in which independent variables interacts with the dependent variable. Internet banking, mobile banking, agency banking are the independent variables while dependent variable is financial risks.
Figure 2.1: Conceptual Framework
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes research methodology that was employed in carrying out the study; it also contains the target population, and the sampling design, test of reliability and validity, procedures used to collect data and how data was analysed.

3.2 Research Design

A descriptive cross-sectional research design was utilized. This design is scientific way used in studying how a number of variables relate to each other, the behavioural aspect of the subject matter exclusive of any influences whatsoever, it tries to attempts to explain and show the meaning of present circumstances in terms of, that is, ‘what is’. The design aims at examining the occurrence of incidence at differing time and locations (Kothari, 2008). A descriptive cross–sectional design aims at seeking to secure information which explains the existence of phenomena through obtaining information from varying groups of respondents on implementations, thoughts, conduct or values.

This design in addition permits examining how two variables relate to each other and nothing is changed since data collected is the same time and there is no room for any manipulation of data on individual variable (Lewis & Thornhill, 2009). The design therefore helped establish how financial innovations relates to financial risks through hypothesis testing.
3.3 Target Population

Target population refer to the group of individual that the researcher intends to make
generalization of study results. The target population consisted of 42 commercial
banks that are registered with CBK by 31st December of 2016 (CBK, 2016) (see
Appendix v). The respondents were risk management managers, one from each of the 42
commercial banks. Table 3.1 presents information on the population used in this study.

Table 3.1: Study Population

<table>
<thead>
<tr>
<th>Population Category</th>
<th>Size of Population (No.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Managers</td>
<td>42</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>

A census method was done 42 risk managers was done. Cooper and Schindler (2011)
argue that if the population under investigation is not so large or relatively small, a
census survey provide better results than any sample survey, provided efficient and trained staff is employed in the research study. In this study the study population consisted of 42 risk managers, from 42 banks which differ from one another.

3.4 Sample Size and Procedures

Kothari (2004) said a sample is a part of the universe that is reflective of the universe as a
whole. Orodho and Kombo (2002) said the term 'pick' applies to a collection of
components from a larger population. Seeing that an analysis that is insufficiently exact is
an exercise in futility and cash, a sample is needed. The sample has been determined
using the formula Yamane which assumes normal distribution. That is n= N/1+N (e) 2
where \( n \) represents the sample size, \( N \) represents the size of population and \( e \) is the error of sampling. This study allowed the error of sampling on 0.1. The sample size was therefore 42 respondents. \( n = \frac{42}{1+42(0.052)} = 42 \), Table 3.2 presents information on the sample size and procedures.

**Table 3.2: Sample Size and Procedures**

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses</td>
<td>36</td>
<td>85.7</td>
</tr>
<tr>
<td>Non Responses</td>
<td>6</td>
<td>14.3</td>
</tr>
<tr>
<td><strong>Total Sample Size</strong></td>
<td><strong>42</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The sample size for this study was 42 risk managers from 42 banks. Simple random sampling method was used to select a sample that was to be used for this analysis. A central random sample is a subset of respondents drawn from a larger population. Every respondent is selected randomly and by chance, to such a degree, to the point that each section has a comparable likelihood of being selected (Mugenda & Mugenda, 2003). All people from the target population were given equal opportunities to be chosen in view of the fact that inspection was carried out randomly. In view of the survey, simple random analysis helps one to make potentially valid determinations about the entire populace. The beneficial circumstances are that it is free of errors in description and needs fewer knowledge from the population.
3.5 Data Collection Instrument

The study collected primary data. The primary data was collected from the respondents through a questionnaire. Each questionnaire was accompanied by a cover letter providing explanations and assurances that all individual responses were treated with confidentiality. The study questionnaire rationale is the gathering of primary data that is assembled and prepared specifically for the study (Zikmund, 2010). Questionnaire is preferred because it is efficient, cheap and easy to administer, they are relatively easy to analyse, and they are simple and quick for the respondent to complete and collect data in a standardised way (Kothari, 2008).

3.6 Pilot Study

A pilot study is used in preparation for a major study as a small scale prototype or sample trial (Hazzi & Maldaon, 2015). A pilot study of the questionnaire was conducted prior to the actual data collection to detect weakness in design and instrumentation. Winter and Dodou (2012) observe that pilot tests are often used to pretest or test a research tool to determine the reliability of the research instrument. A pilot test sample size of 1 percent to 10 percent is, according to Mugenda and Mugenda (2008), a reasonable number to suggest enrolling in a pilot study. Based on this argument, the pilot study sample size, was 5 bank staff which helped test the reliability of the questionnaire. The purpose of pre-testing was to fix the contradictions arising from the instruments that guaranteed that they calculated what was expected.
3.6.1. Validity of the Research Instrument

Validity is to what degree an instrument tests what it should be measuring and performing as it is designed to perform (Kimberlin & Winterstein, 2008). The validity of the instrument was established by the researcher by seeking opinions of experts in the field of study in particular the the supervisor, quality experts and lecturers. This encouraged the requisite revision and alteration of the research tool, thereby increasing its validity.

3.6.2 Reliability of the Research Instrument

Reliability of a research instrument concerns to what degree the machine produces the same performance in multiple experiments. Reliability can be described as accurate. One can think of reliability as continuity. This checks whether the system can accurately assess what it is supposed to measure (Kimberlin & Winterstein, 2008). Cronbach's alpha is one of the most common reliability statistics in use today (Cronbach, 1951).

The alpha check of the Cronbach was conducted using SPSS applications. The alpha of Cronbach specifies the internal consistency or average similarity of objects in a survey method to measure their reliability (Kothari, 2008). The alpha reliability coefficient at Cronbach usually varies from 0 to 1. George and Mallery (2003) provides the rule of thumb that reliability coefficient above 0.7 is acceptable. The results of reliability tests are presented in Table 3.3.
### Table 3.3: Reliability Tests Results

<table>
<thead>
<tr>
<th>Research Variable</th>
<th>Cronbach's Alpha Index (α)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet banking</td>
<td>0.798</td>
<td>Reliable</td>
</tr>
<tr>
<td>Mobile banking</td>
<td>0.803</td>
<td>Reliable</td>
</tr>
<tr>
<td>Agency banking</td>
<td>0.811</td>
<td>Reliable</td>
</tr>
<tr>
<td>Electronic cards</td>
<td>0.799</td>
<td>Reliable</td>
</tr>
<tr>
<td>Level of risks</td>
<td>0.786</td>
<td>Reliable</td>
</tr>
<tr>
<td><strong>Average Score</strong></td>
<td><strong>0.799</strong></td>
<td><strong>Reliable</strong></td>
</tr>
</tbody>
</table>

**Source:** Pilot Study (2019).

The result from reliability was given as follows; Internet banking, Mobile banking, Agency banking, Electronic cards and Level of risks with Cronbach alpha values as 0.798, 0.786, 0.811, 0.799 and 0.803 respectively produced using SPSS 21.0. The average alpha coefficient for every individual variable was way above 0.7 which satisfies the recommendation made by Mugenda and Mugenda (2003) that an alpha coefficient score of above 0.7 shows that the instruments are highly reliable. According to Punch (2015), who suggested that an alpha coefficient of 0.75 to 1.0 be sufficient for the tests to be collected. The average score of Cronbach's Alpha Index (α) rating of 0.799 was therefore appropriate, as it is within the range.

### 3.7 Data Analysis and Presentation

This part entails the methods used in data processing and analysis in which data was edited, coded, classified and tabulated for final data analysis. This data was further fed to the Statistical Package for Social Sciences (SPSS) Version 21 software which also aided in the data analysis. Nachmias and Nachmias (2009) stated that there
are basically two types of statistics which include descriptive and inferential statistics. Descriptive statistics enable the researcher to summarize and organize data in an effective and meaningful way. It involves the use of tables, charts, graphs, mean and standard deviation.

Inferential statistics is concerned with making inferences from a unit of a population. Inferential statistics allow the researcher to make decisions or inferences by interpreting data patterns. Researchers used inferential statistics to determine whether an expected pattern designated by the theory and hypotheses is actually found in the observations. In this study, a regression analysis was used to relationship between the variables. The regression analysis also helped test the hypothesis. The regression model was represented by the following equation:

\[
M= \lambda_0 + \lambda_1 S_1 + \lambda_2 S_2 + \lambda_3 S_3 + \lambda_4 S_4 + \epsilon
\]

Where: M = Level of Risks

\[
S_1 = \text{Internet banking}
\]

\[
S_2 = \text{Mobile banking}
\]

\[
S_3 = \text{Agency Banking}
\]

\[
S_4 = \text{Electronic cards}
\]

\[
\lambda_0 = \text{the constant}
\]

\[
\lambda_{1-n} = \text{coefficient of regressions}
\]

\[
\epsilon = \text{Assumed Error}
\]
In the regression analysis, the beta (β) values explain whether the relationship between the dependent and the independent variable was high or low, positive or negative. The ANOVA test evaluated the suitability of the regression model to provide reliable results. The p value helped measure the significance of the variables in the regression model; whereby, if the p-value of the variable is 0.05 (5%) and below, then the variable was deemed significant while where the p value co-efficient of the variable was above 0.05, then the relationship of the variables was deemed to be insignificant.

3.8 Ethical Considerations

The researcher maintained that while conducting the report, specific ethical considerations of the sample were pursued and observed. The following ethical considerations were used to structure this report. Firstly, the study subjects were able to make informed decisions about whether or not to engage in the research process. It meant that the study did not force or pressure the participant to participate in the process of testing. The researcher questioned the respondent first whether or not they wish to participate.

Second, the respondents' comments were considered confidential. This means that the respondents were not asked on the questionnaires they fill out to offer their names. The knowledge was widely regarded as private. This would discourage any individual from becoming abused by engaging in the research study. The respondents were also told that the information provided was only used for the academic study purposes.
Third, until commencing the data collection process, the researcher obtained approval and authorization from all the study stakeholders. The researcher obtained from the university, selected respondents (institutions) and from the National Commission for Science, Technology and Innovation (NACOSTI) all the necessary permits and letters for data collection. Using letters to seek permission. The researcher told all its research partners of the results of the research study.
CHAPTER FOUR
RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction
This chapter deals with the presentation, analysis, and interpretations of research data collected from the field. In collecting data questionnaires were used.

4.2 Response Rate
The study shows estimates of the respondents who responded to the survey in terms of response rate. A survey has to have a good response rate to yield accurate, useful results. Hence this was important in order to assess whether the response rate was high enough and reflective of the community. Table 4.1 points out the response rate for the sample.

Table 4.1: Response Rate

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses</td>
<td>36</td>
<td>85.7</td>
</tr>
<tr>
<td>Non Responses</td>
<td>6</td>
<td>14.3</td>
</tr>
<tr>
<td><strong>Total Sample Size</strong></td>
<td>42</td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The sample size for this study was 42 risk managers from 42 banks. The study targeted 42 participants in this study however, 36 responses were in time for purposes of analysis which is 85.7% response rate.

The study sought to get information from 42 respondents however only 36 of them responded on time representing a return rate of 85.7%. Mugenda and Mugenda (2003) argues that any response rate that is above 70% is excellent for further analysis. Therefore, an 85.7% rate of response was appropriate for purposes of deriving inferences on the study objectives.
4.3 Demographic Information

The respondents’ demographic information reflects the relevant attributes of the population which forms the basis under which the study can rightfully access the relevant information. The respondents’ information captured includes: gender, age, level of academic qualification and the number of years worked in the organization.

4.3.1 Gender of the Respondents

![Gender of the Respondents](image)

**Figure 4.1 : Gender of the Respondents**

The results in the Figure 4.1 show that a majority of the respondents (55.6%) were male while 44.4% were female. This shows that the majority of the commercial bank risk managers were male.
4.3.2 Age of the Respondents

Study findings show majority among the respondents representing (61.1%) are aged between 31-40 and 27.8% of the participants were between the ages of 41-50. The findings further show that 8.3% of the participants lie below 30 year mark while 2.8% of the respondents were aged above 50 years. The results show that majority of the risk manager in the banks aged 30 years and above. This implies that majority of the managers in the financial institutions were aged 40 years and below.

4.3.3 Respondents’ Level of Academic Qualification

<table>
<thead>
<tr>
<th>Education level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelors Degree</td>
<td>27</td>
<td>75</td>
</tr>
<tr>
<td>Masters</td>
<td>9</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>36</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

This study results as shown in Table 4.2 indicate that most of the participants (75%) were Bachelors degree holders. On the other hand 25% of the participants indicated that their highest level of academic qualification was Masters. From the results, it shows that
majority of the respondents had reached university level as their highest level of education. This implies that majority of the risk managers were knowledgeable and qualified in their field, which improves the reliability of the information given.

4.3.4 Duration Worked in the Bank

Table 4.3: Number of Years Worked at the Bank

<table>
<thead>
<tr>
<th>Duration (in years)</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 years</td>
<td>5</td>
<td>13.9</td>
</tr>
<tr>
<td>5-10 years</td>
<td>20</td>
<td>55.6</td>
</tr>
<tr>
<td>11-15 years</td>
<td>8</td>
<td>22.2</td>
</tr>
<tr>
<td>16-20 years</td>
<td>3</td>
<td>8.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>36</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

The study findings show that majority of the respondents (55.6%) had worked at the their respective banks for a period between 5-10 years while 22.2% of the respondents had worked at the banks for a period between 11-15 years. Equally, 13.9% participants reported to have been employed by the banks for a period below 5 years and 8.3% participants stated they had been employed in their respective banks for period between 16-20 years. From the study results, it can be seen that most of the respondents had been in employement in respective banks for a period between 5–20 years. This is substantial time for one to clarify the Bank's activities and thus to boost the efficiency of the details received.

4.4 Internet Banking and the Level of Risks in Commercial Banks

This part focused on analysis of the first objective which aimed at determining how internet banking impacts the level of risks in commercial banks in Kenya.
4.4.1 Whether the Bank Offered Internet Banking

Table 4.4: Availability of Internet Banking

<table>
<thead>
<tr>
<th>Responses</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>33</td>
<td>91.7</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>8.3</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The results in Table 4.4 indicates that most of participants (91.7%) stated that their banks offered internet banking services. However, 8.3% of the respondents reported that their banks lacked the internet banking services.

4.4.2 Internet Banking on Level of Risks in Commercial Banks

The participants were requested to indicate the level to which they agree to statements given on internet banking in the commercial banks in Kenya. A five-point likert scale was used to measure the answers where a mean score of 1-2.5 would indicate that the respondents disagreed with the statement; a mean score of 2.6-3.5 would imply that the respondents were indifferent (did not accept or disagree), while a mean score of 3.6-5.0 would demonstrate that they agreed with the claims.

Table 4.5: Internet Banking on Level of Risks in Commercial Banks

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is high exposure to internet fraud in internet banking</td>
<td>4.00</td>
<td>0.535</td>
</tr>
<tr>
<td>There is high exposure to malware and viruses which help steal personal information, and defraud clients</td>
<td>4.08</td>
<td>0.439</td>
</tr>
<tr>
<td>The banks have put effective security measures to mitigate internet banking fraud (risks).</td>
<td>4.53</td>
<td>0.506</td>
</tr>
</tbody>
</table>
The average score of 4.20 indicates that internet banking was strongly agreed by the respondents as to effect the level of risks in commercial banks with a standard deviation of 0.493. Research by Marafon et al. (2018) study found that self-confidence and tolerance of risks mitigate the connection between perception of risk and desire to use internet banking.

The respondents agreed that the banks had put effective security measures to mitigate internet banking fraud (mean score = 4.53). It was also agreed that internet banking posed high exposure to malware and viruses which help steal personal information, and defraud clients (mean score = 4.08). Additionally, there existed high exposure to internet fraud in internet banking; as shown by a mean score of 4.00. A study by Sullivan (2010) observed that the profitability and risk of the non internet banks and internet banks in the sample are similar.

### 4.4.3 Extent to Which Internet Banking Expose the Bank to Financial Risks

It was established that most of the respondents (63.9%) indicated that internet banking exposed the banks to financial risks to a great extent. Equally, 22.2% participants stated that internet banking exposed the banks to financial risks to a moderate extent. However, 13.9% showed that internet banking exposed the banks to financial risks to small extent.

### 4.5 Mobile Banking and the Level of Risks in Commercial Banks

The objective sought in this section was to examine how mobile banking influences the level of risks in banking sector players in Kenya. The study therefor aimed at finding
out whether the banks offered mobile banking services, the extent of exposure to risks and the extent to which mobile banking exposed the banks to financial risks.

4.5.1 Exposure of Banks to Risks Through Mobile Banking in Kenya

The participants were requested to state the rate of exposure to risks through mobile banking. The results show that most of the respondents (44.4%) rated the exposure to risks through mobile banking as moderate. On the other hand, 36.1% of the respondents rated the exposure to risks through mobile banking as high while 19.4% of the respondents rated the exposure to risks through mobile banking as low.

4.5.2 Mobile Banking on Level of Risks in Commercial Banks in Kenya

The respondents were asked to indicate their level of agreement with the various statements regarding mobile banking at the banks.

Table 4.6: Mobile Banking on Level of Risks in Commercial Banks in Kenya

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of mobile banking exposes customers to malware which fraudsters can use to defraud bank customer.</td>
<td>3.86</td>
<td>0.543</td>
</tr>
<tr>
<td>Transaction errors arising from mobile banking expose the customers and the banks to financial risks.</td>
<td>4.14</td>
<td>0.487</td>
</tr>
<tr>
<td>User behavior greatly exposes the customers to risks.</td>
<td>4.00</td>
<td>0.414</td>
</tr>
<tr>
<td><strong>Average Score</strong></td>
<td><strong>4.00</strong></td>
<td><strong>0.481</strong></td>
</tr>
</tbody>
</table>

The average score of 4.00 indicates that mobile banking was agreed by the respondents as to effect the level of risks in commercial banks with a standard deviation of 0.481.

Research by Ibrahim, Ahmad, Shahid, and Akbar (2015) revealed an insignificant relationship with ethics and a substantial relationship with danger was identified.
The respondents agreed with a mean score of 4.14 and 4.00 respectively that transaction errors arising from mobile banking exposed the customers and the banks to financial risks and that the user behavior greatly exposed the customers to risks. The participants were in agreement that the use of mobile banking exposed customers to malware which fraudsters could use to defraud bank customer; as shown by a mean score of 3.86. Beck et al. (2012) study found out that a higher level of financial innovation is associated with higher bank risk taking and fragility, especially among banks with smaller market shares, lower loan-asset ratios and higher growth rates. 

4.5.4 Extent to Which Mobile Banking Exposed the Banks to Financial Risks

It was revealed that most of the respondents (55.6%) indicated that mobile banking exposed the banks to financial risks to a great extent. Equally, 33.3% participants stated that mobile banking subjected the banks to financial risks to a moderate extent and 11.1% participants stated that the mobile banking exposed banks to risks to a small extent.

4.6 Agency Banking and the Level of Risks in Commercial Banks

4.6.1 Banks’ Exposure to Risks Through Agency Banking

The respondents were asked to rate the banks’ exposure to risk through agency banking. The study indicates that most of the respondents (55.6%) indicated banks’ exposure to risks through agency banking was moderate. Equally, 16.7% of the participants indicate that the banks’ exposure to risks through agency banking was low. Only 27.8% of the respondents rated that banks’ exposure to risks through agency banking as high.
4.6.2 Agency Banking on Level of Risks in Commercial Banks in Kenya

The participants were requested to state the extent they agree with statements provided on agency banking at the banks.

Table 4.9: Agency Banking on Level of Risks in Commercial Banks in Kenya

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The information of customers transacting through agency banking is kept confidential for any fraud activity to take place.</td>
<td>4.31</td>
<td>0.467</td>
</tr>
<tr>
<td>System malfunction exposes the bank and the customers to risks.</td>
<td>4.25</td>
<td>0.439</td>
</tr>
<tr>
<td>Transaction errors arising from agency banking expose the customers and the banks to financial risks.</td>
<td>4.11</td>
<td>0.575</td>
</tr>
<tr>
<td>Average Score</td>
<td>4.22</td>
<td>0.494</td>
</tr>
</tbody>
</table>

The average score of 4.22 indicates that agency banking was agreed by the respondents as to effect the level of risks in commercial banks with a standard deviation of 0.494. A study conducted by Argamo (2015) concludes that a favorable and important relationship exists between quality of banking services, low service costs and consumer transactions arising from Chase Bank's agency banking and financial results.

The respondents agreed that the information of customers transacting through agency banking was kept confidential for any fraud activity to take place (mean score = 4.31). The respondents also agreed with a mean score of 4.31 and 4.25 respectively that system malfunction exposed the bank and the customers to risks. The participants stated with a mean score of 4.11 that the transaction errors arising from agency banking exposed the customers and the banks to risks of financial in nature.
4.7 Use of Electronic Cards and the Level of Risks in Commercial Banks

4.7.1 Electronic Cards on Level of Risks in Commercial Banks in Kenya

The participants were requested to state the level to which they agree with statements provided on the use of the banks’ electronic cards. Table 4.8 shows the findings.

Table 4.8: Electronic Cards

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is high rate of electronic cards fraud in the banking sector</td>
<td>3.97</td>
<td>0.446</td>
</tr>
<tr>
<td>Technical failures on electronic cards expose clients and banks to financial risks.</td>
<td>4.08</td>
<td>0.500</td>
</tr>
<tr>
<td>Setting transaction amount limits on electronic cards helps to manage effectively financial risks that may arise from use of cards.</td>
<td>4.39</td>
<td>0.494</td>
</tr>
<tr>
<td><strong>Average Score</strong></td>
<td>4.15</td>
<td>0.480</td>
</tr>
</tbody>
</table>

The average score of 4.15 indicates that electronic cards was agreed by the respondents as to effect the level of risks in commercial banks with a standard deviation of 0.494. Study by Adud and Kingoo (2012) revealed that while the rapid development of IT has rendered certain banking tasks more effective and cheaper, there are problems associated with this financial advancement plastic card fraud, particularly on missing and stolen cards and counterfeit card fraud.

The respondents agreed that setting transaction amount limits on electronic cards helped manage financial risks that would arise from use of the cards (mean score = 4.39). It was agreed that there was high rate of electronic cards fraud in the banking sector; as shown by the mean score of 4.39 respectively. It was also agreed that technical failures on electronic cards exposed clients and banks to financial risks and that of 4.08 and 3.97.
Muiruri and Ngari (2014) study found out that banks have been motivated by the different interests to pursue different financial innovations.

4.7.2 Extent to Which Electronic Cards Expose Banks to Financial Risks

The participants were requested to state the level they agree electronic cards expose banks to financial risks. Majority of the respondents (66.7%) indicated that the use of electronic cards exposed the banks to financial risk in a great extent while 25% reported that the use of electronic cards exposed the banks to financial risk in a moderate extent. However, 8.3% indicated that the use of electronic cards exposed the banks to financial risk in a small extent.

4.8 Financial Innovations and the Level of Risks in Commercial Banks in Kenya

The respondents were requested to state the level of extent they agree that financial innovations expose the banks to the various levels of risks in commercial banks. A likert scale of five points was used in interpreting responses where a mean of 1 represented “Not at all”, 2 was to a “Small extent”, 3 was “neutral” 4 was to a “great extent” while a mean score of 5 implied to a “Very great extent”.

Table 4.9: Influence of Financial Innovations

<table>
<thead>
<tr>
<th>Type of Risk</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of credit risk</td>
<td>4.31</td>
<td>0.467</td>
</tr>
<tr>
<td>Level of liquidity risk</td>
<td>4.00</td>
<td>0.632</td>
</tr>
<tr>
<td>Level of market risk</td>
<td>3.58</td>
<td>0.806</td>
</tr>
<tr>
<td><strong>Average Score</strong></td>
<td><strong>3.96</strong></td>
<td><strong>0.635</strong></td>
</tr>
</tbody>
</table>

The average score of 3.96 indicates that financial innovations was agreed by the respondents as to effect the level of risks in commercial banks with a standard deviation of 0.635. Ariffin, Archer and Karim (2019) argue that the task of risk management is to establish a trade-off between risk and return. In fact, risk management in the banking sector is a key issue contributing to the integrity of the financial system.

The respondents reported that financial innovations influence the level of credit risk to a great extent (mean score = 4.31). The financial innovations also influenced level liquidity risk to a great extent (mean score = 4.00). However, the financial innovations influenced the level of market risk in commercial banks to a moderate extent as shown by a mean score of 3.58. Goderis et al. (2007) also argues that in recent years a new set of financial instruments has been developed that allow banks to be more active in the management of their loan portfolios.
4.9 Inferential Statistics

4.9.1 Correlation Analysis

Table 4.10: Correlation Analysis

<table>
<thead>
<tr>
<th></th>
<th>Internet Banking</th>
<th>Mobile Banking</th>
<th>Agency Banking</th>
<th>Electronic Cards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet Banking</td>
<td>1</td>
<td>.630*</td>
<td>.396*</td>
<td>.182</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.017</td>
<td>.288</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Mobile Banking</td>
<td>.630*</td>
<td>1</td>
<td>.377*</td>
<td>.430**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.023</td>
<td>.009</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Agency Banking</td>
<td>.396*</td>
<td>.377*</td>
<td>1</td>
<td>.597**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.017</td>
<td>.023</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Electronic Cards</td>
<td>.182</td>
<td>.430**</td>
<td>.597**</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.288</td>
<td>.009</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
</tr>
</tbody>
</table>

The results in Table 4.10 show that the Pearson’s r for the correlation between internet banking and mobile banking variables is 0.630 and vice versa which is close to 1 with a significant value of 0.00 which is less than 0.05. It shows a strong association which implies improvements are strongly correlated with changes in the second variable in one field. Agency banking is strongly related to electronic cards (r=0.597, p<0.05) which means that increase in agency banking leads to increase in electronic cards and vice versa.
4.9.2 Regression Analysis

A regression was used to determine the relative significance of financial innovations (internet banking, mobile banking, agency banking, electronic cards) on levels of risks in commercial banks in Kenya.

**Table 4.11: Model Summary**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R$^2$</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.812(a)</td>
<td>0.660</td>
<td>0.642</td>
<td>.24619</td>
</tr>
</tbody>
</table>

The regression results in Table 4.11 shows an R-value of 0.812 which implies that there is a high relationship between the variables. The Value of R square (coefficient of determination) was 0.642. This implies that financial innovations (internet banking, mobile banking, agency banking, electronic cards) explained 64.2% of risks in commercial banks in Kenya. Other variables / predictors not included in the analysis could be used to clarify the remaining percentage.

**Table 4.12: ANOVA**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regression</td>
<td>9.062</td>
<td>4</td>
<td>2.265</td>
<td>37.378</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>4.667</td>
<td>77</td>
<td>.061</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>13.729</td>
<td>81</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ANOVA results show the significance of the regression model from which an F-value (F=37.378) and significance p-value=0.000 (p<0.001) were
established. This shows that the regression model has a 0.001 (0.1%) probability of giving a wrong prediction. This therefore means that the regression model has a confidence level of over 95% hence high reliability of the results.

Table 3: Table 4.13: Regression Coefficients(a)

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>0.564</td>
<td>0.408</td>
<td>1.382</td>
</tr>
<tr>
<td>Internet Banking</td>
<td>0.449</td>
<td>0.094</td>
<td>0.359</td>
<td>4.763</td>
</tr>
<tr>
<td>Mobile Banking</td>
<td>0.465</td>
<td>0.097</td>
<td>0.372</td>
<td>4.794</td>
</tr>
<tr>
<td>Agency Banking</td>
<td>0.404</td>
<td>0.056</td>
<td>0.568</td>
<td>7.203</td>
</tr>
<tr>
<td>Electronic Cards</td>
<td>0.115</td>
<td>0.047</td>
<td>0.172</td>
<td>2.475</td>
</tr>
</tbody>
</table>

a  Dependent Variable: Level of Risks

The co-efficient regression results show that there is a strong and meaningful association between internet banking and level of risks in commercial banks in Kenya as shown by $\beta = 0.449$, $p= 0.001<0.05$. The results further shows that there is a positive and a statistically significant association between mobile banking and level of risks in commercial banks in Kenya as shown by $\beta = 0.465$, $p=0.001<0.05$. In addition, the results show a statistically significant relationship between level of risks and two forms of financial innovations - agency banking ($\beta =0.404$ and $p=0.001<0.05$), electronic cards ($\beta=0.115$, $p=0.016<0.05$). From the results, it can be deduced that all the four forms of financial innovations in the commercial banks, that is, internet banking, mobile banking, agency banking, and electronic cards have a positive influence on the level of risks in commercial banks in Kenya. This implies that they may increase risks in the banks.
CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction
This chapter provides a summary of key findings and it outlines the conclusions made based on the objectives of the study. The chapter further highlights the policy recommendations and recommendations for further research.

5.2 Summary of Finding
The investigation was guided by the following particular objectives whose specific end goals were to establish financial innovation and risk level on commercial banks of Kenya. The first objective of the study was to determine the effect of internet banking on level of risks in commercial banks in Kenya. The study found out that the banks had put effective security measures to mitigate internet banking fraud (risks). The finding also revealed that internet banking posed high exposure to malware and viruses which help steal personal information, and defraud clients. The study further established that there was high exposure to internet fraud in internet banking. The regression results established that there is a positive and significant relationship between internet banking and level of risks in commercial banks in Kenya.

The second objective of the study was to examine the impact of mobile banking on level of risks in commercial banks in Kenya. The study established that the transaction errors arising from mobile banking exposed the customers and the banks to financial risks and that the user behavior greatly exposed the customers to risks. The Findings further revealed that the use of mobile banking exposed customers to malware which fraudsters could use to defraud bank customer. The regression results also confirmed that there is a
positive and statistically significant association between mobile banking and level of risks in commercial banks in Kenya.

The third objective of the study was to establish the effect of agency banking on level of risks in commercial banks in Kenya. The study found out that the information of customers transacting through agency banking was kept confidential for any fraud activity to take place and that system malfunction exposed the bank and the customers to risks. The study also found out that the transaction errors arising from agency banking exposed the customers and the banks to financial risks. The finding also established that there is a positive and significant relationship between agency banking and level of risks in commercial banks in Kenya.

The fourth objective of the study sought to determine the impact of electronic cards on the level of risks in commercial banks in Kenya. The study also found out that technical failures on electronic cards exposed clients and banks to financial risks and that there was high rate of electronic cards fraud in the banking sector. The study found out that setting transaction amount limits on electronic cards helped manage financial risks that would arise from use of the cards. The results found out that there was a positive and statistically significant association between electronic cards and level of risks in commercial banks.
5.3 Conclusions

5.3.1 The effect of internet banking on level of risks in commercial banks in Kenya.
Findings from the collected data discovered that internet banking in commercial banks had a favorable as well as negative and significant effect on risk level. From these results, it is obvious that the disruptive aspect of commercial banks and the risk levels of the banking sector in Kenya exist. The findings suggest an increase in the use of internet banking leads to higher risk rates. These results are in line with the study's findings on Developments and Risk Levels which showed that bank developments had a statistically significant impact on commercial banks' profits, return on assets, and productivity and customer deposits. This was the case from the findings as the use of internet banking in banks was assessed to be significantly linked to the level of risk of commercial banks which determines the profitability and valuation of the banks' assets. In particular, the findings of the study give the importance of the invention built in.

5.3.2 The impact of mobile banking on level of risks in commercial banks in Kenya.
The study concludes that for example, mobile banking among Kenya's commercial banks face technological costs such as network vulnerabilities, system failure, software defects and operating mistakes, system failure, transaction errors and data loss due to virus thus exposed the customers to risks.

5.3.3 The effect of agency banking on level of risks in commercial banks in Kenya.
The study concludes that most banks in Kenya had however made attempts to manage the risks by ensuring that the information of customers transacting through agency and mobile banking was kept confidential for any fraud activities.
5.3.4 The impact of electronic cards on level of risks in commercial banks in Kenya.

The study concludes that the use of electronic cards in the banking sector in Kenya has both a negative and a positive influence on the level of risk in commercial banks. This has a significant effect on commercial bank competitiveness which also affects their competitive advantage. This is in line with several studies' statement including: Walker (2004); Damanpour (1991); AtuaheneGima (1996) and Subramanian & Nilakanta (1996). Which show in their results that advances had positive effects on performance indicators. Our reports further affirm the positive impact advances have on bank results and operational efficiency.

5.4 Recommendations

The main concerns raised by the respondents on challenges in the adoption of financial innovations included lack of customer trust and confidence, fraud, security, network failure and lack of knowledge among customers. The study therefore recommends that the banks should come up with innovative ways of measuring how agency/mobile banking impacts different operations and develop the necessary contingency plans. The regulator should also closely monitor the banking sector and strictly enforces compliance with the agent/ mobile banking guidelines, while the banks continuously ensure careful vetting of agents.

The study recommends that more stringent risk mitigation activities and procedures that the banks should be implemented to protect the threats resulting from the use of this financial innovations are significantly reduced/managed.
5.5 Recommendations for further study

This study was concerned with the influence of financial innovation on level of risks in commercial banks in Kenya. As a result of the above results, the study recommends that future studies should be conducted on other industries that have adopted financial innovation such as insurance companies and micro finance institutions and also mobile banking yet agency finance, which are new growth routes in the banking sector.
REFERENCES


Coyle, B. (2000): Framework for Credit Risk Management; Chartered Institute of Bankers, United Kingdom.


APPENDICES
APPENDIX I: INTRODUCTION LETTER
Dear Sir/Madam,

RE: FILLING OF QUESTIONNAIRE

I am a postgraduate student of Kenyatta University perusing a Master of Business Administration (Finance Option). The title of the research is to determine the influence of financial innovations on level of risks in commercial banks in Kenya.

I request for your participation by completing the questions in all sections regarding your business as provided in the questionnaire to facilitate the research study. Your information confidentiality will be highly guaranteed. The identity of your response will be treated anonymous and will be used only for academic purposes and thereby do not include your name anywhere.

Your Faithfully,

Hassan Abdullahi Maalim
APPENDIX II: QUESTIONNAIRE

Instructions: Please as carefully as practicable read the answer to the questions. It is advised that you respond or fill in each section as given. Tick (✓) if necessary.

Section I: Demographic Information

1. Indicate your gender. Male [ ] Female [ ]

2. Show your age bracket as indicated below.
   - Below 30 years [ ]
   - 31-40 Yrs [ ]
   - 41-50 Yrs [ ]
   - Above 50 Yrs [ ]

3. Kindly indicate your highest level of academic qualification.
   - Diploma [ ]
   - Undergraduate Degree [ ]
   - Post Graduate Degree [ ]
   - PhD. [ ]
   - Other (specify)………………………………………………………………

4. How many years have you worked in this bank?
   a) 5 and below [ ]
   b) Between 5 to 10 [ ]
   c) Between 11 to 15 [ ]
   d) Between 16 to 20 [ ]
   d) More than 20 [ ]

Section II: Internet Banking

5. Does your bank offer internet banking services?
   - Yes [ ]
   - No [ ]

6. Indicate the extent your are in agreement with statements on internet banking and financial risks in the banking sector in Kenya? Using a scale of a scale of 1 to 5

68
where 1 is strongly disagree, 2 is disagree, 3 is Neutral, 4 is agree and 5 is Strongly agree

<table>
<thead>
<tr>
<th>Statements on Internet Banking</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is high exposure to internet fraud in internet banking</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>There is high exposure to malware and viruses which help steal personal information, and defraud clients</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>The banks have put effective security measures to mitigate internet banking fraud (risks).</td>
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<td></td>
</tr>
</tbody>
</table>

**Section III: Mobile Banking**

7. How would you rate the exposure to risks through mobile banking?

High [ ] Moderate [ ] Low [ ]

8. Indicate the extent you are in agreement with statements on mobile banking and financial risks in the banking sector in Kenya?

<table>
<thead>
<tr>
<th>Statements on Mobile Banking</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of mobile banking exposes customers to malware which fraudsters can use to defraud bank customer.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Transaction errors arising from mobile banking expose the customers and the banks to financial risks.</td>
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<td></td>
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</tr>
<tr>
<td>User behavior greatly exposes the customers to risks.</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Section IV: Agency Banking

9. Does your bank offer agency banking services?
   Yes [ ]    No [ ]

10. To what extent do you agree with the following statements on agency banking and financial risks in the banking sector in Kenya?

<table>
<thead>
<tr>
<th>Statements on Agency Banking</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The information of customers transacting through agency banking is kept confidential for any fraud activity to take place.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>System malfunction exposes the bank and the customers to risks.</td>
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</tr>
<tr>
<td>Transaction errors arising from agency banking expose the customers and the banks to financial risks.</td>
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</tbody>
</table>

Section V: Electronic Cards

11. To what extent do you agree with the following statements on use of electronic cards and financial risks in the banking sector in Kenya?

<table>
<thead>
<tr>
<th>Statements on electronic cards and financial risks</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is high rate of electronic cards fraud in the banking sector</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical failures on electronic cards expose clients and banks to financial risks.</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Setting transaction amount limits on electronic cards helps to manage</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
effectively financial risks that may arise from use of cards.

Section VI: Financial Risks

12. To what extent do the financial innovations expose the banks to the following level of risks?

<table>
<thead>
<tr>
<th>Financial Risks</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of credit risk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of liquidity risk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of market risk</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

THE END- THANK YOU
APPENDIX III: LIST OF COMMERCIAL BANKS IN KENYA

1. African Banking Corporation Limited
2. Bank of Africa Kenya Limited
3. Bank of Baroda (K) Limited
4. Bank of India
5. Barclays Bank of Kenya Limited
6. Stanbic Bank Kenya Limited
7. Charterhouse Bank Limited (Under - Statutory Management)
8. Chase Bank (K) Limited (In Receivership)
9. Citibank N.A Kenya
10. Commercial Bank of Africa Limited
11. Consolidated Bank of Kenya Limited
13. Credit Bank Limited
15. Diamond Trust Bank Kenya Limited
16. Ecobank Kenya Limited
17. Spire Bank Limited (Formerly Equatorial Commercial Bank Limited)
18. Equity Bank Limited
19. Family Bank Limited
20. Fidelity Commercial Bank Limited
21. Guaranty Trust Bank (K) Ltd
22. First Community Bank Limited
<table>
<thead>
<tr>
<th>Bank Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. Giro Commercial Bank Limited</td>
</tr>
<tr>
<td>24. Guardian Bank Limited</td>
</tr>
<tr>
<td>25. Gulf African Bank Limited</td>
</tr>
<tr>
<td>26. Habib Bank A.G Zurich</td>
</tr>
<tr>
<td>27. Habib Bank Limited</td>
</tr>
<tr>
<td>28. Imperial Bank Limited (In – Receivership)</td>
</tr>
<tr>
<td>29. I &amp; M Bank Limited</td>
</tr>
<tr>
<td>30. Jamii Bora Bank Limited</td>
</tr>
<tr>
<td>31. KCB Bank Kenya Limited</td>
</tr>
<tr>
<td>32. Sidian Bank Limited (Formerly K-Rep Bank)</td>
</tr>
<tr>
<td>33. Middle East Bank (K) Limited</td>
</tr>
<tr>
<td>34. National Bank of Kenya Limited</td>
</tr>
<tr>
<td>35. NIC Bank Limited</td>
</tr>
<tr>
<td>36. M-Oriental Commercial Bank Limited</td>
</tr>
<tr>
<td>37. Paramount Bank Limited</td>
</tr>
<tr>
<td>38. Prime Bank Limited</td>
</tr>
<tr>
<td>39. Standard Chartered Bank Kenya Limited</td>
</tr>
<tr>
<td>40. Transnational Bank Limited</td>
</tr>
<tr>
<td>41. UBA Kenya Bank Limited</td>
</tr>
<tr>
<td>42. Victoria Commercial Bank Limited</td>
</tr>
</tbody>
</table>