“AN EXAMINATION OF RELATIONSHIP BETWEEN FINANCIAL INNOVATIONS AND FINANCIAL RISKS IN BANKING INDUSTRY”

BY

LETISIA MBAYAKI

UNITED STATES INTERNATIONAL UNIVERSITY

SPRING 2012
AN EXAMINATION OF THE RELATIONSHIP BETWEEN
FINANCIAL INNOVATIONS AND FINANCIAL RISKS IN
BANKING INDUSTRY

BY

LETISIA MBAYAKI

A project report submitted to Chandaria School of Business in
Partial Fulfilment of the Requirement for the Degree of
Master’s in Business Administration (MBA)

UNITED STATES INTERNATIONAL UNIVERSITY

SPRING 2012
DEDICATION

This study is dedicated to my parents, Severinus Mbayaki and Flora Mbayaki without whose caring supports it would not have been possible. I also dedicate this study to my supervisor, Dr. Okech who was abundantly helpful and offered invaluable assistance, support and guidance and most of all to the almighty God who gave me strength and good health during the research.
STUDENT'S DECLARATION

I, the undersigned, declare this as my original work and have not been submitted to any other college, institution, or university other than the United States International University in Nairobi for academic credit.

Signed: ___________________________  Date: 10/05/2012

Letisia Mbayaki (ID 631180)

This project has been presented for examination with my approval as the appointed supervisor.

Signed: ___________________________  Date: 12/5/2012

Dr. Timothy Okech

Signed: ___________________________  Date: 28/5/2012

Dean, Chandaria School of Business

Signed: ___________________________  Date: 10/06/2012

Deputy Vice Chancellor, Academic Affairs
ACKNOWLEDGEMENT

I would like to acknowledge my project supervisor Dr. Timothy Okech, for the encouragement and support.

I also acknowledge my manager, Mr. Charles Odawo for his understanding, unselfish and unfailing support in data collection for the study.

USIU for according me the opportunity to pursue my masters degree in Business Administration.

Last but not least, my family and friends and the one above all of us, the Omnipresent God, for answering my prayers and giving me strength to plod on despite my constitution wanting to give up and throw in the towel, Thank you so much Dear Lord.
ABSTRACT

The purpose of the study was to examine the relationship between financial innovations and financial risks in a banking industry. The specific objectives of the study were to identify the possible financial risks commercial banks are exposed to, to identify financial innovations commercial banks are to impress to mitigate their financial risks, and to examine the three basic types of financial innovations that commercial banks are to consider for achievement of competitive advantage over others.

The study used a descriptive research design where data for the survey was collected from respective commercial banks using questionnaires. This design gave a precise description in examining exactly how financial innovations impact on financial risks of commercial banks. The population of the study consisted of 50 respondents from the listed commercial banks. This was done for the reason of getting precise information to give accurate answers. The data was analyzed using descriptive statistics after entering it into Statistical Package for Social Sciences (SPSS). Analysis was undertaken and the findings were presented using tables and figures. Coefficient of variation was the statistical tool that was used to check the impact of financial innovations on financial risks.

The study revealed that there was a great impact of financial innovations on financial risks in terms of innovation to hinder new entrants in the current market, high rate of competition from other commercial banks, commercial banks use their predictive skills to time technology change and high rate of competition from other financial institutions such as insurance as the most factors that cause banks to venture into financial innovations. To enhance innovation, commercial banks seek information from their competitors, market information, changes in bank interest rates and quality of the products and services offered. These accord banks an opportunity to financially innovate and become unique in their businesses.

Commercial banks involve in financial innovations for many different purposes. The study reveals that innovations is for the purpose of restricting new entrants in the current market, curb high rate of competition from other commercial Banks, to coop with the dynamisms in technological change and to circumvent government rules and regulations. The study found out that financial innovation is very important to commercial banks in
reducing financial risks that proves to be dangerous to the organizations. There is high relationship between employees’ level of education, different commercial banks and different bank departments with the factors that instigate innovation. For the financial innovation to take place, commercial banks must develop strategies on how to get information about the financial risk. The researcher found out that these banks use information from competitors, markets, from the changing bank interest rates, and on the products and services offered. These information help the commercial banks develop appropriate risk mitigating tool.

The study reveals that commercial banks need to maximize their profit spreads and minimize their costs if possible to a very low level. This encourages more appropriate financial innovations that will mitigate the risks that are associated with financial services and products.

More new banks are coming up in the current market to compete the existing commercial banks in offering the same services the commercial banks are offering. This is a clear indication that commercial banks have not fully adopted new and unique technology to restrict the new entrants. The study therefore recommends commercial banks to engage in more innovation activities by motivating and supporting their staff to make it hard for new entrants to poach them.
# Table of Contents

DEDICATION........................................................................................................ ii
STUDENT’S DECLARATION................................................................. iii
ACKNOWLEDGEMENT ................................................................................ iv
ABSTRACT ........................................................................................................... v
Table of Contents ............................................................................................ vii
List of Tables ..................................................................................................... x

## CHAPTER ONE

1.0 INTRODUCTION ......................................................................................... 1
1.1 Background of the Study ........................................................................ 1
1.2 Statement of the Problem ...................................................................... 4
1.3 General Objective ................................................................................. 4
1.4 Specific Objective ................................................................................ 4
1.5 Justification of the Study ...................................................................... 5
1.6 Scope of the Study ................................................................................ 6
1.7 Definition of Terms .............................................................................. 6
1.8 Chapter Summary ................................................................................ 7

## CHAPTER TWO

2.0 LITERATURE REVIEW ............................................................................. 8
2.1 Introduction .......................................................................................... 8
2.2 Financial Risks ................................................................................... 8
2.3 Tools to Manage Financial Risk ......................................................... 12
2.4 Financial Innovation ........................................................................ 14
2.5 Chapter Summary .............................................................................. 19
List of Tables

Table 3.1: Commercial Banks ................................................................. 21
Table 3.2: Commercial Banks ................................................................. 23
Table 4.1: Sample size ........................................................................ 25
Table 4.2: Gender ................................................................................ 26
Table 4.3: Pair wise Correlation Tests ..................................................... 28
Table 4.4: Adjusted R-Square ................................................................ 29
Table: 4.5 Normality Test ...................................................................... 30
Table 4.6: Bank Departments ................................................................. 31
Table 4.7: Impact of Competition on Innovation ...................................... 32
Table 4.8: Innovation Factors ................................................................. 35
Table 4.9: Innovation Factors ................................................................. 36
Table 4.10: Risk and Innovation .............................................................. 38
Table 4.11: Risk Factors and Demographics ............................................ 39
Table 4.12: Risk Attributes ................................................................... 40
Table 4.13: Risk Factors and Demographics ............................................ 41
List of Figures
Figure 4.1: Age of Respondents .................................................. 26
Figure 4.2: Marital Status .......................................................... 27
Figure 4.3: Level of Education ..................................................... 27
Figure 4.4: Chances of Assets Earning less than Target .................. 33
Figure 4.5: Incentives from the Government .................................. 34
CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Of all financial-service professions, banking is the oldest as it is evident from the historical records (Rose and Hudgins, 2005). The banking industry gradually spread from the classical civilizations of Greece and Rome into northern and western Europe. It encountered religious opposition during the Middle Ages primarily because loans to the poor often carried high interest rates (). However, Rose and Hudgins (2005), discovered that as the Middle Ages drew to a close and Renaissance began in Europe, the bulk of bank loans and deposits involved wealth customers, which helped to reduce religious objections.

The development of new overland trade routes and improvement in navigation in the 15th, 16th, and 17th centuries gradually shifted the centre of world commerce from the Mediterranean region towards Europe and the British Isles, where banking became a leading industry. During this period, the seeds of the Industrial Revolution, which demanded a well-developed financial system, were planted. The adoption of mass production required an expansion in global trade to absorb industrial output, which in turn required new methods for making payments and obtaining credit. Banks that could deliver on these needs grew rapidly, led by such institutions as the Medici Bank in Italy and the Hochstetler Bank in Germany.

The early banks in Europe were placed for the safekeeping of valuables (such as gold and silver) as people came to fear loss of their assets due to war, theft, or expropriation by government. Merchants shipping goods across the seas found it safer to place their payments of gold and silver in the nearest bank rather than risking loss to pirates or storms at sea. In England government efforts to seize private holdings resulted in people depositing their valuables in goldsmiths, shops, which issued tokens or certificates indicating that the customer had made a deposit. Soon, goldsmith certificates began to circulate as money because they were more convenient and less risky to carry around than gold or other valuables. The goldsmiths also offered certificate of value services which is
contemporary called property appraisal. Customers would bring in their valuables to have an expert certify that these items were, indeed, real and not fakes.

Despite banking’s long history and its successes, tough financial-service competitors have emerged over the past century or two mostly from Europe to challenge bankers at every turn. Among the oldest were life insurance companies, and the first American company was chartered in Philadelphia in 1759. Property-casualty insurers emerged at roughly the same time, led by the famous Lloyds and London in 1688, underwriting a wide range of risks to persons and property.

The 19th century ushered in a rash of new financial competitors, led by savings bank setup in Scotland in 1810. These institutions offered small savings deposits to individuals at a time when most commercial banks largely ignored this market segment. A similar firm, the savings and loan association, appeared in the Midwestern United States during the 1830s, encouraging household saving and financing construction of new homes. Credit unions were first chartered in Germany during the same era, providing savings accounts and low cost credits to industrial workers, customers most banks avoided.

Mutual funds, one of the banking’s most successful competitors over the past decades, appeared in Belgium in 1822. The investment firms entered United States in significant numbers during the 1920s, but were devastated by the Great Depression of the 1930s, only to rise again and grow rapidly following World War II. A closely related institution, the money market fund, surfaced in the early 1970s to offer professional cash management services to households and institutions. These aggressive competitors attracted a huge volume of deposits away from banks and ultimately helped to bring about government deregulation of the banking industry.

In the good old day, when you took cash out of the bank or wanted to check your account balance, you got to inquire from a specified personnel working at the bank. Nowadays, you are more likely to interact with the automatic teller machine (ATM) when withdrawing cash, depositing cash and can get account balance from your home computer.
Starting in the 1960s, individuals and financial institutions operating in financial markets were confronted with drastic changes in the economic environment: inflation and interest rates climbed sharply and it became harder to predict, a situation that changed demand conditions in financial markets. The rapid advance in computer technology changed supply conditions. In addition, financial regulations became more burdensome. The evolved financial institutions found that many of the old ways of doing business were no longer profitable; the financial services and products they had been offering to the public were not selling. Many financial intermediaries found that they were unable to acquire funds with their traditional financial instruments, and without these funds, they would soon be out of business. To survive in the new economic environment, financial institutions had to research and develop new products and services that would meet customer needs and prove profitable, a process referred to as financial engineering. In this case, necessity was a mother of innovation.

Claessens and Glaessener (1997), concur that in the last a few decades, the world has experienced one of the most volatile periods in financial history. An international debt crisis, high and variable inflation and real interest rates, and banking crises created costly financial problems throughout the world and particularly in developing countries. East Asian countries with fiscal surpluses, high saving and investment rates, and some of the highest trade-to-Gross Domestic Product (GDP) ratios in the world, were not immune to the financial turbulence. According to DiBartolomeo (1999), the past years saw the emergence of new financial instruments and new types of institutions. To facilitate the development of financial institutions, restrictions on lenders were eliminated, and innovative ways of doing business were adopted. Financial deregulation and liberalization were attempted in parallel. Technological change made the global financial environment a very different place. This helped the volume of private international capital flows to grow at a precedent rates.

Like other multilateral financial institutions, the World Bank has had to adapt its financial operations to adjust to the changes. It developed a comprehensive approach on financial sector issues in developing countries and incorporated in findings in the bank’s operational manual. The financial sector Operation Directive (OD) 8.30 (World Bank 1992), which is now being recast as Operational Policy (OP) 8.30, includes major
elements of sector development strategy and recommendations on the use of lending instruments for both adjustment and financial intermediary lending. Recent developments in East Asia confirm the wisdom of a prudent and comprehensive approach to financial sector reform.

1.2 Statement of the Problem

There is evidently abundant literature on financial risk minimization and profit maximization of a banking sector, (Peter and Sylvia, 2008), but there have been few researches on which techniques or rather innovations should be done to overcome the financial risks and maximize profit margin for the industry.

Scholars who had an interest in banking industry over-dwelt on studying the banking processes and the risks they incur and avoided to advice on which mechanism to invent to help minimize these worrying risks and expand on the profit margin (Jean-Philippe and Marc, 2003). The banking system in the developing countries like Kenya has always been copying the system of the developed countries hence there has been no innovations to help curb the burden of financial risks.

This study explores on financial innovations in financial risk management and profit maximization in Kenya banking industry. This is a challenge to studies done by (Peter and Sylvia, 2008; Jean-Philippe & Marc 2003) that were done in united states of America which is a longtime developed nation and expect the same principles to apply to developing nations like Kenya.

1.3 General Objective

The purpose of the study was to examine the relationship between financial innovations and financial risks in a banking industry.

1.4 Specific Objective

The specific objective for this study were:
1.4.1 To establish the extent to which financial innovations have minimized financial risks of commercial banks hence maximize their profit margins.

1.4.2 To examine the three basic types of financial innovations that commercial banks are to consider for achievement of competitive advantage over others.

1.4.3 To explain how further innovations can be achieved for the good of the whole sector as well as the general public.

1.5 Justification of the Study

Kenya, like other countries, has some economic indicators that are common to other countries and some that are unique to it. The study will be of great benefits to the banks that have their operations in Kenya and its stakeholders. The study will help to realize the importance of financial innovations to all stakeholders. Basically the study will be of greater importance to stakeholders who are:

1.5.1 Bank Managers

Managers, who are capable of taking their business organizations from a lower level to a higher level, help the organization maintain a high investor confidence level. The ideas in this research paper will help these managers to aspire innovations that would bring positive changes in their organizations.

1.5.2 Investors

The major purpose of investing in a business organization is to create wealth. The research paper will help owners of the company to demand for innovation for their organizations to achieve competitive advantage and create wealth.

1.5.3 Scholars

Interested researchers in the area of financial innovations will have a base on which they will build their researches. This will build a foundation in an important area of study that will spill the benefits to all stakeholders.

1.5.4 Policy Regulators

This study is useful to all regulatory institutions that have the mandate to regulate the understudy companies. This will help regulators set the pace for financial innovations.
1.5.5 Contribute to the General Body of Knowledge

This study addresses the knowledge gap on application of corporate governance in a developing country since prior research has emphasized on the developed economies and markets.

1.6 Scope of the Study

The study focused on all developed and emerging banks that undertake their business operations in Kenya. Each and every bank is highly competing to be the first in offering the best quality products and services to its customers at a relatively low cost. To do that, they are highly investing in financial innovations.

1.7 Definition of Terms

The following terms have been considered worth defining:

1.7.1 Bank

According to Peter and Sylvia, (2008), a bank is an organization where people and businesses can invest or borrow money; change it to foreign money and many other functions.

1.7.2 Innovation

The use of new ideas and methods to come out with a formula that helps to solve a problem(s).

1.7.3 Risk

This is uncertainty about the returns investors will earn on assets invested in a certain projects (Frederic and Stanley, 2009).

1.7.4 Investor

An investor is a person who undertakes risk by investing his/her resources to in long-term or short-term projects both for future profits. Remember that an investor can be private individuals, companies or states (Jean and Marc, 2003).
1.7.5 Banking

This is a process saving money or other valuables, borrowing money, and exchanging foreign currencies (Peter and Sylvia, 2008).

1.7.6 Financial Risk

This is risk associated with financial transactions (Peter and Sylvia, 2008).

1.7.7 Profit

It is the gain made in processes of transactions (Jean and Marc, 2003).

1.8 Chapter Summary

Innovations are very important aspects of developments in the contemporary business world. Kenyan banks are working tirelessly to innovate their bank products and processes to achieve less costs and higher profit margins as well as competitive advantage. The background of the study and the research objectives been clearly stated in chapter one. The purpose as well as the scope of the study, which is limited to commercial banks listed on Nairobi Stock Exchange, has been identified. A definition of study as well as justification for the study has also been included. It has been justified that the study will be useful to management, investors, policy regulators, future researchers and will also contribute to the general body of knowledge.

Chapter two looks at literature review on financial risks and financial innovations. The research methodology is under chapter three but chapter four is about results and findings of the study. The last chapter, chapter five, is where summary, discussion and recommendations are discussed.
CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

Although extensive research has examined both risk and innovation, the idea of considering the two issues in tandem was, at the time, fairly novel. The chapter is about literatures written by finance researchers. Part 2.2 is about financial risk financial institutions experience. Part 2.3 is about tools for managing financial risks while part 2.4 is about the financial innovations that have helped reduce financial risks. The last part, part 2.5 is about the chapter summary.

2.2 Financial Risks

2.2.1 Credit Risk

According to Jun and Cain, (2001) the probability some of a financial institution’s asset, especially its loans, will decline in value and perhaps become worthless is known as credit risk. Because banks, for example, hold little owners’ capital relative to the aggregate value of their assets, only a relatively small percentage of total loans needs to turn bad to push any bank to the brink of failure. The following are four of the most widely used indicators of credit risk: the ratio of non-performing assets to total loans and leases, the ratio of net charge-offs of loans to total loans and leases, the ratio of the annual provision for loan losses to total loan and leases or to equity capital, the ratio of allowance for loan losses to total loans and leases or to equity capital and the ratio of nonperforming assets to equity capital.

Non-performing assets are income generating assets, including loans that are past due for 90 days or more. Charge-offs, on the other hand, is loans that have been declared worthless and written off the lender’s books. If some of these loans ultimately generate income for the lender, the amount recovered are deducted from gross charge-offs to yield net charge-offs. As both of the above ratios rise, exposure to credit risk grows, and failure of a bank or other lending institution may be just around the corner. The final two credit risk indicator ratios reveal the extent to which a bank or other lender is preparing for loan losses by building its loan losses reserves through annual charges against current income.
2.2.2 Liquidity Risk

Bankers and other financial firm managers are also concerned about the danger of not having sufficient cash and borrowing capacity to meet customer withdrawals, loan demand and other cash needs. Faced with liquidity risk, a financial institution may be forced to borrow emergency funds at excessive cost to cover its immediate cash needs, reducing its earnings. Very few banks ever actually run out of cash because of the ease with which liquid funds can be borrowed from other banks.

Somewhat more common is a shortage of liquidity due to unexpectedly heavy deposit withdrawals, which forces a bank to borrow funds at elevated interest rate, higher than the interest rates other institutions are paying for the similar borrowings. For instance, significant decline in its liquidity position often forces a bank to pay higher interest rates to attract negotiable money market CDs, which are sold in million dollar units therefore are largely unprotected by deposit insurance. One measure of liquidity risk exposure is the ratio of purchased funds (including Eurodollars, federal funds, security RPs, commercial paper and large CDs) to total assets (William, 2001).

Heavier use of purchased funds increases the chances of liquidity crunch in the event deposit withdrawals rise or loan quality declines. Other indicators of exposure to liquidity risk include the ratio of cash and due from balances held at other depository institutions to total assets, and cash assets and government securities to total assets.

Cash assets include vault cash held on the financial firm’s premises, deposits held at the Federal Reserve Bank in the region, deposits held with other depository institutions to compensate them for clearing checks and other interbank services, and cash items in the process of collection (mainly uncollected checks). Standard remedies for reducing a financial institution’s exposure to liquid risk include increasing the proportion of funds committed to cash and readily marketable assets, such as government securities, or using long-term liabilities to fund the institution’s operations (Jun and Cain, 2001).

2.2.3 Market Risk

In market oriented economies, where most of the world’s banks and other leading financial institutions offer their services today, the market values of assets, liabilities, and
net worth of banks and other financial service providers are constantly in a state of flux, creating market risk. Changes in market interest rates and currency prices, shifting public demands for bank services and the services offered by nonbank financial firms, sudden alterations in central bank monetary policies, and changing investor perceptions of riskiness of banks and nonbank financial firms cause the value of institutional assets, liabilities and equity to move up or down frequently, depending on the direction financial winds are blowing. Especially sensitive to these market value movements are bond portfolios and stockholders' equity (net worth), which can dive suddenly as market prices move against a bank or other financial firm (Frederic and Stanley, 2003).

Among the most important indicators of market risks in banking and financial institutions' management are: the ratio of book-value assets to the estimated market value of those same assets, the ratio of book-value equity capital to the market value of equity capital, the market value of bonds and other fixed income assets held relative to their values as recorded on a bank or other financial institution’s books and the market value of common and preferred stock per share, reflecting investor perceptions of a bank’s or other financial institution’s risk exposure and earnings potential.

2.2.4 Interest Rate Risk

William, (2001) observed that movements in market interest rates can also have potent effect on the margin of revenues over costs for both banks and their competitors. For example, rising interest rates can lower a bank’s margin of profit if the structure of the institution’s assets and liabilities is such that interest expenses on borrowed money increase more rapidly than interest revenues on loans and security investments. However, if a bank or other financial firm has an excess of flexible rate assets over flexible rate liabilities, falling interest rates will erode its profit margin. In this case, asset revenues will drop faster than borrowing costs.

The impact of changing interest rates on a bank’s or other financial institution’s margin of profit is usually called interest rate risk. Among the most widely used measures of interest rate risk exposure are:
2.2.4.1 Ratio of Interest-Sensitive Assets to Interest Sensitive Liabilities

When interest-sensitive assets exceed interest sensitive liabilities in a particular maturity range, a financial firm is vulnerable to losses from falling interest rates. In contrast, when rate-sensitive liabilities exceed rate-sensitive assets, losses are likely to be incurred if market interest rates rise.

2.2.4.2 Depository Institution

The ratio of uninsured deposit to total deposits, where uninsured deposits are usually government and corporate deposits that exceed the amount covered by insurance and are usually so highly sensitive to changing interest rates that they will be withdrawn if yields offered by competitors rise even slightly higher (Jun and Cain, 2001).

2.2.5 Earnings Risk

The risk to a financial institution’s bottom line, its net income after all expenses are covered, is known as earnings risk. Earnings may decline unexpectedly due to factors inside the financial firm or due to external factors, such as changes in economic conditions or in laws and regulations. For example, recent increases in banking competition have tended to narrow the spread between earnings on a bank’s assets and the cost of raising bank funds. Thus, a bank’s stockholders always face the possibility of a decline in their earnings per share of stock, which would cause the value of the bank’s stock to fall, eroding its resources for future growth (Emilie, 2006).

Among the more popular measures of earnings risks are; Standard deviation (σ) or variance (σ^2) of after tax net income and Standard deviation or variance of the return on equity (ROE) and return on assets (ROA).

The higher the standard deviation or variance of a bank’s or other financial institution’s income, the more risky the institution’s earnings picture. For example, if investors in the bank’s securities expect higher earnings risk persisting into the future, they will seek compensation for that added risk in the form of higher yield from the bank or go elsewhere with their money.
2.2.6 Capital Risk

Bankers and their competitors must be directly concerned about risks to their institution’s long-run survival, often called capital risk. For instance, if a bank takes on an excessive number of bad loans or if a large portion of its security portfolio declines in market value, generating serious capital losses when sold, then its equity capital account, which is design to absorb such losses, may be overwhelmed. If investors and depositors become aware of the problem and begins to withdraw their funds, regulators may have no choice but to declare the institution insolvent and close its doors (William, 2001).

2.3 Tools to Manage Financial Risk

2.3.1 Interest Sensitive Gap Management

The most popular interest rate hedging strategy in use today is often called interest sensitive gap management. Gap management techniques require management to perform an analysis of the maturities and repricing opportunities associated with interest bearing assets and with deposits and other borrowings. If the management feels its institution is excessively exposed to interest rate risk, it will try to match as closely as possible the volume of assets that can be repriced as interest rates change with the volume of deposits and other liabilities whose rates can also be adjusted with market conditions during the same time period (Avian, 1994).

For example, a bank can hedge itself against interest rate changes, no matter which way rates move, by making sure for each time period that the dollar amount of repriceable (interest sensitive) assets equal dollar amount of repriceable (interest sensitive) liabilities. In this case, the revenue from earning assets will change in the same direction and by approximately the same proportion as the interest cost of liabilities.

The most familiar examples of repriceable assets are loans that are about to mature or are coming up for renewal. If interest rates have risen since the loans were first made, the lender will renew them only if it can get an expected yield that approximates the higher yields currently expected on other financial instruments of comparable quality. Similarly, loans that are maturing will provide the lender with funds to reinvest in new loans at today’s interest rates, so they represent repriceable assets as well. Repriceable liabilities include a depository institution’s CDs about to mature or be renewed, where the financial
firm and its customers must negotiate a new deposit interest rate to capture current market conditions; floating rate deposits whose yields move automatically with market interest rates; and money market borrowings whose rates are often adjusted daily to reflect the latest market developments (Emilie, 2006).

What happens when the amount of repriceable assets does not equal the amount of repriceable liabilities? Clearly, a gap exists between these interest sensitive assets and interest sensitive liabilities. The gap is the portion of the balance sheet affected by interest rate risk:

\[ \text{Interest sensitive gap} = (\text{Interest sensitive assets} - \text{Interest sensitive liabilities}) \]

Interest sensitive gap management enables the managers of financial institutions to combat the possibility of louses to their institution’s net interest margin or spread due to changes in market interest rates. Unfortunately, changing interest rates can also do serious damage to another aspect of a financial firm’s performance, its net worth, the value of the stockholders’ investment in a financial institution. Just because the net interest margin is protected against interest rate risk doesn’t mean an institution’s net worth is also sheltered from loss. This requires the application of yet another managerial tool—duration gap management (Avian, 1994).

### 2.3.2 Duration Gap Management

Duration is a value and time weighted measure of maturity that considers the timing of all cash inflows from earning assets and all cash outflows associated with liabilities. It measures the average maturity of a promised stream of future cash payments, such as the payment a bank expects to receive from its loans and securities or the stream of interest payments it must pay out to its depositors. In effect, duration measures the average time needed to recover the funds committed to an investment (Jun and Cain, 2001).

Duration gap analysis examines the sensitivity of the market value of the banks and other financial institution’s net worth to changes in interest rates. Duration analysis is based on macaulay’s concept of duration, which measures the average lifetime of a security’s stream of payments. The analysis is useful because it provides a good approximation,
particularly when interest-rate changes are small, of the sensitivity of a security’s market value to a change in its interest rate using the following formula:

\[ \%\Delta = -DUR \times \Delta i / (1+i) \]

Where

\[ \% \Delta P = (P_{t+1} - P_t) / P_t \]

Percentage change in market value of the security

DUR = duration

\[ i \]

interest rate

After having determined the duration of all assets and liabilities on the bank’s balance sheet, the bank manager could use this formula to calculate how the market value of each asset and liability changes when there is a change in interest rates and then calculate the effect on net worth (Frederic and Stanley, 2003).

2.4 Financial Innovation

Like any other industries, the financial industry is in business to earn profits by selling its products. If a soap company, for instance, feel that there is a need in the in the market place for a laundry detergent with fabric softener, it develops a product to fit the need. Similarly in order to maximize their profits, financial innovation develop new product to satisfy their own needs as well as those of their customers; in other words, innovation ‘which can be extremely be beneficial to the economy’ is driven by the desire to get or stay rich (Avian, 1994).

Financial innovation occurs in three basic conditions: responses to changes in demand conditions, responses to changes in supply conditions, and avoidance of regulations.

2.4.1 Responses to Changes in Demand Conditions

The most significant change in the economic environment that altered the demand for financial products in recent years has been the dramatic increase in the volatility of interest rates. In the 1950s, the interest rate on three-month US Treasury Bills fluctuated between 1.0% and 3.5%; in the 1970s, it fluctuated between 4.0% and 11.5%. This
volatility became even more pronounced in the 1980s, during which the three months T-Bill rate ranged from 5% to over 15%. Large fluctuations in interest rates lead to substantial capital gains or losses and greater uncertainty about returns on investments. Recall that the risk that is related to the uncertainty about interest rate movements and returns is called interest rate risk, and high volatility of interest rates, like the one the world experienced in 1970s and 1980s, leading to higher level of interest rate risk (Emilie, 2006).

We would expect the increase in interest rate risk to increase the demand for financial products and services that could reduce that risk. This change in the economic environment would thus stimulate a search for profitable innovations by financial instruments that help lower interest rate risk. One financial innovation in the banking industry that appeared in the 1970s confirms this prediction: the development of adjustable-rate mortgages.

Like other investors, financial institutions find that lending is more attractive if interest rate risk is lower. Banks would not want to make a mortgage loan at 10% interest rate and two months later find that they could obtain a 12% interest rate on the same mortgage. To reduce interest risk, in 1975 savings and loans in California began to issue adjustable rate mortgages, mortgage loans on which interest rate changes when a market interest rate (Treasury bill rate) changes. Initially, an adjustable mortgage might have a 5% interest rate. In six months, this interest rate might increase or decrease by the amount of the increase in, say, six-month Treasury bill rate, and the mortgage payment would change. Because adjustable mortgages allow mortgage-issuing institutions to earn higher interest rates on mortgages when rates rise, profits are kept higher during this period (Avian, 1994).

2.4.2 Responses to changes in Supply Conditions

The most important source of the changes in supply conditions that stimulate financial innovation has been the improvement in computer and telecommunications technology. These changes have made it profitable for banking industry to create new financial products and services to supply to the public. When computer technology that substantially lowered the cost of processing financial transactions became available,
financial institutions conceived new financial products and instruments dependent on this technology that might appeal to the public, including the bank credit card and electronic banking facilities (William, 2001).

2.4.2.1 Bank Credit and Debit Cards

Credit cards have been around well before World War II. Many individual stores (Sears, Macy’s, Goldwater’s) institutionalized charge accounts by providing customers with credit cards that allowed them to make purchases at these stores without cash. Nationally credit cards were not established until after World War II, when Diners Club developed one to be used in restaurants all over the country and abroad. Similar credit programs were started by American Express and Carte Blanche, but because of the high cost of operating these programs, cards were issued only to selected persons and businesses who could afford expensive purchases (William, 2001).

Bankers saw the success of Diners Club, American Express, and Carte Blanche and wanted to share in the profitable credit card business. Several commercial banks attempted to expand the credit card business to a wider market in 1950s, but the cost per transaction when running these programs was so high that their early attempts failed.

In the late 1960s, improved computer technology, which lowered transaction cost for providing credit card services, made more likely that bank credit card programs would be profitable. The banks tried to enter this business again, and this time their efforts led to the creation of two successful bank credit card programs: BankAmerica, originally started by the Bank of America but now an independent organization called Visa and Master Charge, now MasterCard, run by the Interbank Card Association. These programs have become phenomenally successful; more than 200 million of their cards are in use. Indeed, bank credit cards have been so profitable than nonfinancial institutions such as Sears. Consumers have benefited because credit cards are more widely accepted than checks when paying for purchases, particularly abroad, and they allow consumers to take out loans more easily (Avian, 1994).

The success of credit cards has led these institutions to come up with a new financial innovation, debit cards. Debit cards often look just like credit cards and can be used to make purchases in an identical fashion. However, in contrast to credit cards, which
extend the purchaser a loan that does not have to be paid off immediately, a debit card purchase is immediately deducted from the card holder's bank account. Debit cards depend even more on cost of processing transactions, since their profits are generated entirely from the fees paid by merchants on debit card purchases at their stores. Debit cards have been growing increasingly popular in recent years (William, 2001).

2.4.2.2 Electronic Banking

The wonders of modern computer technology have also enabled banks to lower their cost of bank transactions by having the customer interact with an electronic banking facility rather than with a human being. One important form of an e-banking facility is the automated teller machine (ATM), an electronic machine that allows customers to get cash, make deposits, transfer fund from one account to another, and check balances. The ATM has the advantage that it does not have to be paid overtime and never sleeps, thus being available for use 24 hours a day. Not only does this result in cheaper transactions for the bank, but it provide more convenience for the customer. Furthermore, because of its low cost, ATMs can be put at locations other than a bank or its branches, further increasing customer convenience.

2.4.2.3 Electronic Payment

The development of inexpensive computers and the spread of the internet now make it very cheap for banks to allow their customers to make bill payments electronically. Where in the past you had to pay your bills by mailing a check, now banks provide a website in which you just log on, make a few clicks, and your payment is transmitted electronically.

2.4.3 Avoidance of Existing Regulations

Because the banking industry is more heavily regulated than other industries, government regulation is a much greater spur to innovation in this industry. Government regulation leads to financial innovation by creating incentives for firms to skirt regulations that restrict their ability to earn profits. Edward Kane describes this process of avoiding regulations as "loophole mining." The economic analysis of innovation suggests that when the economic environment change such that regulatory constraints are so
burdensome that large profits can be made by avoiding them, loophole mining and innovation are more likely to occur.

Because banking is one of the most heavily regulated industries in the world, loophole mining is likely to occur. The rise in inflation and interest rates from the late 1960s to 1980s made the regulatory constraints imposed on this industry even more burdensome. Under these circumstances, we would expect the pace of financial innovation in banking to be rapid, and, indeed, it has been.

Two sets of regulations have seriously restricted the ability of banks to make profits: reserve requirements that force the banks to keep a certain fraction of their deposits as reserves and restrictions on the interest rates that can be paid on deposits. For the following reasons, these regulations have been among the major forces behind financial innovations in recent years.

2.4.3.1 Reserve requirements

According to Frederic and Stanley, (2003) the key to understanding why reserve requirements affect financial innovation is to recognize that they act, in effect, as a tax on deposits. Because central banks do not pay interest on reserves, the opportunity cost of holding them is the interest that a bank could otherwise earn by lending the reserve out. For each dollar of deposits, reserve requirements therefore impose a cost on the bank equal to the interest rate \( \frac{r}{D} \) that could be earned if the reserves could be lent out times the fraction of deposits required as reserves \( \frac{r}{D} \). The cost of \( \frac{r}{D} \) imposed on the bank is just like a tax on the bank deposits of \( \frac{r}{D} \).

2.4.3.2 Restriction on interest paid on deposit

Until 1980, legislation prohibited banks in most states from paying interest on checking account deposits, and through Regulation Q, the Fed set maximum limits on the interest rate that could be paid on time deposits. The desire to avoid these deposit rate ceilings also led to financial innovations (Frederic and Stanley, 2003).
2.5 Chapter Summary

Financial innovation is a very important process that determines how far a company wants to prosper. Chapter two has discussed on the literature review of the subject matter. There is a clear definition of financial risks and financial innovations. The chapter has explained in details the relevant financial risks and the need to eliminate those risks through innovations.

Chapter three looks at methodology to be used to obtain and analyze the information under study. The results and findings of the study are presented in chapter four. Chapter five looks at the summary, discussion and recommendations of the study.
CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

The chapter explores the alternative methods and procedures the researcher used in exploring the study to find solutions to the research questions raised in chapter one. It discusses the research design with respect to the choice of the design, population of the study, sample and sampling techniques, methods of data collection, data analysis and data presentation methods applied in the research work. The structure of chapter is organized in the following: the research design, population and sample, data collection methods, sampling design and sample size, research procedures, data analysis methods and lastly the chapter summary.

3.2 Research Design

It can be thought of as the structure of the research. It is like glue that holds all the elements in a research project together. It must be specific and highly flexible. The research design that is applicable in this study is descriptive survey. According to Gay (1987) descriptive studies describe characteristics associated with the subject population. Survey design involves collecting data in order to answer question concerning the status of the subject of the study. Primary data was collected using a structured questionnaire. A survey was done on commercial banks listed on NSE.

Descriptive statistics discover and measure cause and effect relationships among variables (Cooper and Schindler, 2000). The study was guided by different variables like the elements of financial risks and the motive to develop or rather to innovate financial instruments.

The technique described above enabled the researcher to ascertain priorities in the definite areas under study thus saving on time and money. This approach helped the researcher to gain knowledge about the relationship between financial innovations and financial risks of Kenyan commercial banks sampled to be studied. To gather, measure, and analyze the data collected, structured methodology will be applied. This will also
help to reduce or rather minimize biasness. For this research, the dependent variables are the financial innovations and the independent variables are the financial risks.

3.3 Population and Sampling Design

3.3.1 Population

Cooper and Schindler (2000), define a population as the total collection of people or items of which inferences are made on. The population consists of eight (8) listed commercial banks focusing on financial statements and other economic events that took place in the last ten years, information from employees, and information from shareholders. The members of the 8 companies come from the same industry which is finance and investment.

Table 3.1: Commercial Banks

<table>
<thead>
<tr>
<th>No.</th>
<th>Commercial Banks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kenya Commercial Banks</td>
</tr>
<tr>
<td>2</td>
<td>Standard Chartered Bank</td>
</tr>
<tr>
<td>3</td>
<td>CFC Stanbick Bank</td>
</tr>
<tr>
<td>4</td>
<td>Barclays Bank</td>
</tr>
<tr>
<td>5</td>
<td>Commercial Bank of Africa</td>
</tr>
<tr>
<td>6</td>
<td>NIC Bank</td>
</tr>
<tr>
<td>7</td>
<td>Equity Bank</td>
</tr>
<tr>
<td>8</td>
<td>Co-operative Bank</td>
</tr>
</tbody>
</table>

CMA (2009)

3.3.2 Sample Design and Sample Size

3.3.2.1 Sampling Frame

According to (Saunders, Lewis and Thornhill, 2003) a sampling frame is a complete list of all the cases in the population from which the sample can be drawn from. In the case of simple random, all units from the sampling frame, for instance, have an equal chance to be picked and occur in the sample. The sampling frame should precisely reflect the
population of interest. The sample for this study was a list of commercial banks who are
registered with the Nairobi Stock Exchange.

3.3.2.2 Sampling Techniques

Sampling gives statistical increase efficiency on a sample, provides data for analyzing the
various sub-population and enable different methods and procedures to be used. In this
study, the purpose, stratified and convenience sampling techniques were used. The
population was stratified into two groups as depending on how big the organization is
interms of finance, mission, vision, strategies etc. The advantage of this method is that it
increases statistical efficiency and provides data for analysis of the various sub-
populations (Cooper and Schindler, 2003). The chosen sampling method ensured that the
respondents give precise information to respond to the specific research objectives
thereby enhancing the credibility and reliability of the findings of this study.

3.3.2.3 Sampling Size

There are many different ways or rather techniques of getting a good sample size. There
are probability and non probability ways. Depending on the kind of information the
researcher is seeking, he/she will choose on the appropriate method to use to get the
sample size. Therefore, a sample size is a clear representative of the larger population. It
is very convenient for researchers to work with a sample of items or people rather than
the full population in situations where the population is large. This helps in reducing cost
and enhancing precision. Sample size is a determined group of people or units that a
researcher would like to use in the study to represent the population. This sample size is
calculated depending on the size of the population. The sample must be selected in a keen
way to be representative of the population (Denscomb 1998).
Table 3.2: Commercial Banks

<table>
<thead>
<tr>
<th>No.</th>
<th>Commercial Banks</th>
<th>Sample size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kenya Commercial Banks</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>Standard Chartered Bank</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>CFC Stanbic Bank</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Barclays Bank</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Commercial Bank of Africa</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>NIC Bank</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>Equity Bank</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>8</td>
<td>Co-operative Bank</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50</td>
<td>100</td>
</tr>
</tbody>
</table>

3.4 Data Collection Methods

This describes the appropriate method to be used to collect the relevant data for the research purpose. Primary data and secondary data was used in this study. Since the study is relatively new especially in developing economy like Kenya therefore secondary data is not in abundant. Data was collected using research questionnaires which were developed using the three specific objectives. The questionnaire has four parts; the first section is demographic information about the respondent. The remaining parts are based on the three specific objectives in the order they appear in the study. The questionnaire is structured in a way that the respondents will have an easy time to read and understand the various questions.

3.5 Research Procedures

The researcher first of all engaged in a practical test to test the research instruments. A pilot test was the best to test the whole procedure. This test involved the focus group to check the completeness, accuracy, precision and clarity of the research tools. The reliability of the collected data is assured by this pilot test. Since it is a descriptive study, a questionnaire was designed and developed basing on research questions. Once it was ready, a pilot testing was carried out for ten respondents who were selected randomly.
from the sample size. This was done to enable the researcher to evaluate the questionnaire for adequacy, objectivity, clarity and efficiency of the process and questionnaire.

3.6 Data Analysis Methods

In this study, the researcher used both qualitative and quantitative methods of data analysis. For easy analysis, questionnaire was coded as per the variable of the study. As stated by (Denscombe, 1998), descriptive statistics entails the process of changing a large volume raw into tables and charts. Data was then analyzed using Statistical Package for Social Sciences (SPSS) program data on the other hand, confirmatory uses ideas from probability theory in attempt to answer specific question. The package helped to show if there is any relationship between financial innovations and financial risks in the kenyan commercial banks.

3.7 Chapter Summary

In the chapter, the research design and methodology that were used in conducting the study have been explained. The research design, population and sampling design and data collection methods have been explain in the chapter. Research procedures and data analysis methods have also been explained.

Chapter four is about results and findings of the study. The last chapter provides summary, discussion and recommendations based on the study findings.
CHAPTER FOUR

4.0 RESULTS AND FINDINGS

4.1 Introduction

The chapter presents the analyses and findings obtained as in the course of doing this study. Section 4.2 presents response rate and demographic presentation of the respondents. Section 4.3 is the diagnostic test. Section 4.4, 4.5 and 4.6 present factors that influence innovation, impact of risk on innovation and risk attributes respectively. The last section, section 4.7, presents the summary of the whole chapter.

4.2 Response Rate

Response rate is the total number of respondents participated in the study and it is presented in percentage. This study had a sample size of 50 respondents from banking industry of which the response rate was as presented in the table 4.1 below.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participated</td>
<td>38</td>
<td>76%</td>
</tr>
<tr>
<td>Non-participated</td>
<td>12</td>
<td>24%</td>
</tr>
<tr>
<td>Total Sample</td>
<td>50</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Research Data

From the table above, the total sample size was 50 respondents. It was reported that 38 individuals from the total sample size, which represented 76%, submitted their filled questionnaires while 12 individuals, which represented 24%, did not submit their questionnaires.

4.2.1 Gender

The table below presents the gender frequency and percentage that took part in the study.
Table 4.2: Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>26</td>
<td>68.4</td>
</tr>
<tr>
<td>Female</td>
<td>12</td>
<td>31.6</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Research Data

From the above analysis, 68.4% and 31% of males and females respectively participated in the study. It is clearly reported that the male gender dominated the female gender in this research by more than a half of the female population. The total sample is reported to be 38 individuals that actively represented the commercial banks community.

4.2.2 Age

The chart below represents how people of different age groups took part in the research.

![Figure 4.1: Age of Respondents](image)

The above figure, figure 1, represents the percentage of different respondents' age categories that participated in the research to determine the impact of financial innovation on financial risks. The largest percentage of the respondents was from the age category of 25 to 30 years. This was followed by the respondents from the age group of 31 to 35 years. Respondents from age group less than 25 years and over 40 years had a percentage tie of 2.6% and this represented the lowest number of respondents of all the categories.
4.2.3 Marital Status

Marital status is the state of either being married, single, separated, divorced or widowed. To ascertain the number of individuals from different marital status categories, the analysis in the table 4.3 below was performed.

The results as presented in the above figure recorded only two marital status categories; single and married even though all categories were tested. It was found out that 65.8% of the individuals that participated in the study were single while 34.2% were married. Other categories did not record any statistics.

Three levels of education; secondary, college and university were among the variables that were used to check the understanding of the respondents on impact on financial
innovation on financial risks. From the above figure, the highest percentage (74.7%) of respondents had university education. This was followed by college and secondary that had a tie of 2.6%. This clearly explains the kind of people being employed in the banking sector.

4.3 Diagnostic Test

Diagnostic tests are tests done to check the viability of the data to be analyzed. There are numerous tests done to check the viability of data but for the case of this study, reliability and T-test (paired sample statistics) were done.

4.3.1 Pair Wise Correlation Test

This kind of test is done to check the strength of relationship between pairs of variables.

Table 4.3: Pair wise Correlation Tests

<table>
<thead>
<tr>
<th></th>
<th>Financial Risks</th>
<th>Financial Innovation</th>
<th>Mitigation Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Risks</td>
<td>Pearson Correlation</td>
<td>.482**</td>
<td>.522**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.002</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Financial Innovation</td>
<td>Pearson Correlation</td>
<td>1</td>
<td>.927**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.002</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Mitigation Strategies</td>
<td>Pearson Correlation</td>
<td>.522**</td>
<td>.927**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.001</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>38</td>
<td>38</td>
</tr>
</tbody>
</table>

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

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

From the test above, it was found out that the variables have strong relationships at a significant level of 0.01.
4.3.2 Adjusted R-Squared Test

This is the measure of strength of association between variables.

Table 4.4: Adjusted R-Square

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.522(^a)</td>
<td>.273</td>
<td>.231</td>
<td>1.52618</td>
<td>R Square Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.273</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Mitigation Strategies, Financial Innovation

R is the square root of R-Squared and is the correlation between the observed and predicted values of dependent variable. The adjusted R-square is low meaning that the variables and especially predictor variables are few.

R-Square is the proportional of variance in the dependent variable (financial risk) which can be explained by the independent variables (financial innovations and risk mitigation strategies). This is of the strength of association and does not reflect the extent to which any particular independent variable is associated with the dependent variable.

This is an adjustment of the R-squared that penalizes the addition of extraneous predictors to the model. Adjusted R-squared is computed using the formula \(1 - ((1 - Rsq)((N - 1)/(N - k - 1)))\) where \(k\) is the number of predictors.
4.3.3 Normality Test

To test how data is distributed from the mean, the below normality test was performed

Table: 4.5 Normality Test

<table>
<thead>
<tr>
<th>The banks' skills to time the performance of markets</th>
<th>Statistic</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>High rate of competition from other financial institutions e.g. insurance companies</td>
<td>Mean</td>
<td>1.58</td>
</tr>
<tr>
<td>High Impact</td>
<td>Lower Bound</td>
<td>1.26</td>
</tr>
<tr>
<td></td>
<td>Upper Bound</td>
<td>1.91</td>
</tr>
<tr>
<td>95% Confidence Interval for Mean</td>
<td>5% Trimmed Mean</td>
<td>1.59</td>
</tr>
<tr>
<td></td>
<td>Median</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>Variance</td>
<td>.265</td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
<td>.515</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Maximum</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Interquartile Range</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Skewness</td>
<td>-.388</td>
</tr>
<tr>
<td></td>
<td>Kurtosis</td>
<td>-2.263</td>
</tr>
</tbody>
</table>

a. High rate of competition from other financial institutions e.g. insurance companies is constant when The banks' skills to time the performance of markets = No Impact. It has been omitted.

b. High rate of competition from other financial institutions e.g. insurance companies is constant when The banks' skills to time the performance of markets = Undefined. It has been omitted.

From the table above, the data is negatively skewed. This means that the variables are few and to correct this, more variables should be added.

4.3.3 Analysis of Gender and Bank Departments

To understand the gender preferences in different departments, a gender and bank department analysis was done. The results are as presented in the table 4.9 below.
Table 4.6: Bank Departments

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Finance</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>IT</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Operations</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Credit</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Marketing</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Administration</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Fixed income trading</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Company secretary</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>R and D</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Undefined</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>26</td>
</tr>
</tbody>
</table>

| Female | Operations | 11 | 91.7 |
|        | Credit     | 1  | 8.3  |
|        | Total      | 12 | 100.0|

Source: research data

From the analysis above, men prefer working in many different departments than women. The highest percentage (26.9%) of men work in marketing department whiles the highest percentage of women (91.7) work in operations department. The remaining percentage (8.3%) of women work in credit department. 7.7% of men work in IT and R&D department and 3.8% work in the other remaining departments. 15.4% of men did not disclose their respective departments hence affecting the analysis.

4.4 Impact of Competition on Innovation

To assess the impact of high competition from other financial institutions on innovation basing on different banks, the results were as follows:
From the above presentation, 83% from KCB, 75% from Equity bank, 25% from Barclays bank, 33% from national bank, 50 percent from Co-operative bank and 100% from CFC Stanbic agreed that high rate of completion has an impact on financial innovation. From Sterling Investment Company, 100% disagreed that high rate of competition has an impact on financial innovation.

Respondents from Standard Chartered bank moderately agreed by 100% that high rate of competition among financial institutions contributes to financial innovations. Even though some respondents did not disclose their institutions, 50% from those respondents...
moderately agreed with the statement. Generally, the highest percentage of respondents (44.7%) agreed with the above statement and 13.2% did not agree.

4.4.1 Impact of Risk on Investment Decision

The graph below assesses the perception on chances of asset earning less than target.

![Chances of Asset Earning less than target](image)

*Figure 4.4: Chances of Assets Earning less than Target*

From the figure above, it is indicated that as the level of experience of the respondents increases, their views on the impact of risk on investment decision increase. People with less than 2 years are 60% sure that risk on assets' earnings influences decision making. On the other side, people with experience of 9 years and above in the same company are 100% sure that risk in business causes decision making process.
4.4.2 Incentives from the Government for Innovation

To test on the government responsibilities in financial innovation, the below chart was done.

![Incentives from the government](image)

**Figure 4.5: Incentives from the Government**

From the figure above, Sterling Investment Company and NIC bank agree 100% that government of Kenya is doing a lot by providing incentives for financial innovation. Co-operative bank, CFC Stanbic and Standard Chartered bank had no comment on whether government offer incentive for financial innovation of not. Equity bank and Kenya Commercial bank don’t agree in the above statement by 55% and 30 % respectively.

4.5 Factors that Influence Innovations

To ascertain on the level of impact the following factors had on financial innovations in commercial banks, the below table was developed. The main aim of the table was to rank on the level of impact the factors had on innovations.
Table 4.8: Innovation Factors

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean</th>
<th>Std. D</th>
<th>CfVar</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Banks innovate to hinder new entrants in the current market</td>
<td>2.37</td>
<td>0.71</td>
<td>0.30</td>
<td>High</td>
</tr>
<tr>
<td>High rate of competition from other commercial Banks</td>
<td>1.16</td>
<td>0.37</td>
<td>0.32</td>
<td>High</td>
</tr>
<tr>
<td>Commercial banks use their predictive skills to time technology change</td>
<td>1.79</td>
<td>0.58</td>
<td>0.32</td>
<td>High</td>
</tr>
<tr>
<td>High rate of competition from other financial institutions e.g. insurance companies</td>
<td>1.68</td>
<td>0.70</td>
<td>0.42</td>
<td>High</td>
</tr>
<tr>
<td>Financial innovation is caused by the kind of risks an organization is exposed to</td>
<td>3.08</td>
<td>2.29</td>
<td>0.74</td>
<td>High</td>
</tr>
<tr>
<td>Commercial banks do innovation when their values and customer base are reducing</td>
<td>3.09</td>
<td>2.47</td>
<td>0.80</td>
<td>Moderate</td>
</tr>
<tr>
<td>Banks are risk seekers hence innovation help in reducing risks</td>
<td>3.08</td>
<td>2.50</td>
<td>0.81</td>
<td>Moderate</td>
</tr>
<tr>
<td>Changes of business activities in the global arena forces the commercial banks in Kenya to change their system</td>
<td>2.26</td>
<td>1.87</td>
<td>0.83</td>
<td>Moderate</td>
</tr>
<tr>
<td>Regulations force commercial banks to innovate</td>
<td>3.04</td>
<td>2.63</td>
<td>0.87</td>
<td>Moderate</td>
</tr>
<tr>
<td>Innovation is done to make the products affordable</td>
<td>3.04</td>
<td>2.66</td>
<td>0.87</td>
<td>Moderate</td>
</tr>
<tr>
<td>Do commercial banks give freedom to employees to invent and innovate the banking system</td>
<td>3.02</td>
<td>2.68</td>
<td>0.89</td>
<td>Low</td>
</tr>
<tr>
<td>Banks receive incentives from the Government for innovation</td>
<td>3.74</td>
<td>3.38</td>
<td>0.90</td>
<td>Low</td>
</tr>
<tr>
<td>The culture of your bank allows and adapt faster to changes technology</td>
<td>2.27</td>
<td>2.08</td>
<td>0.92</td>
<td>Low</td>
</tr>
<tr>
<td>Innovation is caused by past experience of the institution</td>
<td>2.25</td>
<td>2.08</td>
<td>0.93</td>
<td>Low</td>
</tr>
</tbody>
</table>

From the analyses in the table above, the following factors were rated the highest; Banks innovate to hinder new entrants in the current market, High rate of competition from other commercial Banks, Commercial banks use their predictive skills to time technology change and High rate of competition from other financial institutions e.g. insurance companies recorded the highest.

Banks receive incentives from the Government for innovation, Innovation is caused by past experience of the institution, the culture of your bank allows and adapt faster to changes technology, Do commercial banks give freedom to employees to invent and innovate the banking system and Innovation is done to make the products affordable were factors that have low impact on the financial innovation process.
The above analysis show that the following factors; Regulations force commercial banks to innovate, Changes of business activities in the global arena forces the commercial banks in Kenya to change their system, Banks are risk seekers hence innovation help in reducing risks, Commercial banks do innovation when their values and customer base are reducing and Financial innovation is caused by the kind of risks an organization is exposed to have moderate impact on financial innovations.

The analyses suggest that it is very important to concentrate on the high and moderate factors when making financial innovation decisions. The low impact factors, according to the analyses, can be regarded as time wasters and they ought not to be considered during decision making.

4.5.1 Innovation Factors and Demographics

To check on the relationship between demographic and innovation factors, the following table was designed.

<table>
<thead>
<tr>
<th>Factors influencing innovation</th>
<th>Age</th>
<th>Marital status</th>
<th>Level of education</th>
<th>Bank department</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>P</td>
<td>N</td>
<td>r</td>
</tr>
<tr>
<td>High rate of competition from other financial institutions e.g. insurance companies</td>
<td>-0.11</td>
<td>0.51</td>
<td>38</td>
<td>-0.329*</td>
</tr>
<tr>
<td>Banks innovate to hinder new entrants in the current market</td>
<td>0.136</td>
<td>0.415</td>
<td>38</td>
<td>0.332*</td>
</tr>
<tr>
<td>Commercial banks use their predictive skills to time technology change</td>
<td>0.008</td>
<td>0.964</td>
<td>38</td>
<td>0.169</td>
</tr>
<tr>
<td>The culture of your bank allows and adopt faster to changes technology</td>
<td>-</td>
<td>0.597</td>
<td>38</td>
<td>0.197</td>
</tr>
<tr>
<td>Regulations force commercial banks to innovate</td>
<td>0.424**</td>
<td>0.008</td>
<td>38</td>
<td>0.126</td>
</tr>
<tr>
<td>Commercial banks do innovation when their values and customer base are reducing</td>
<td>0.078</td>
<td>0.642</td>
<td>38</td>
<td>0.124</td>
</tr>
<tr>
<td>Banks receive incentives from the Government for innovation</td>
<td>0.368*</td>
<td>0.023</td>
<td>38</td>
<td>0.19</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
From the above correlation table, it was found out that there exist nine relationships between factors that influence financial innovations and the demographic information of the respondents. The Pearson correlation indicates that there exists a moderate relationship at one asterisk (*). Correlation is significant at the 0.05 level (2-tailed)) and a high relationship at two asterisks (**). Correlation is significant at the 0.01 level (2-tailed)).

High rate of competition from other financial institutions e.g. insurance companies, Banks innovate to hinder new entrants in the current market. Commercial banks do innovation when their values and customer base are reducing and Banks receive incentives from the Government for innovation are the factors that recorded moderate relationships with age marital status, level of education and bank department. Their relationship values were significant at the 0.05 level but above 0.01 levels.

Level of education was highly significant at 0.01 with the following factors; the culture of your bank allows and adapt faster to changes technology, Regulations force commercial banks to innovate and Banks receive incentives from the Government for innovation. This means that the banks use level of education in predicting technological change, faster adapting to new technology and in knowing the kind of benefits arising from the government for financial innovation purpose. The analysis showed that age was highly related to the government regulations. This means that people from different age groups believe that commercial banks innovate as a resulting of government regulations.

4.6 Impact of Risk on Innovation

To ascertain the rate of impact the below risk factors had on the rate on innovation, a descriptive analysis was developed and emphasis put on the coefficient of variation (CV). The factors were divided into three; most critical, critical and less critical depending on the value of coefficient of variation.
Table 4.10: Risk and Innovation

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>CV</th>
<th>IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information from their competitors</td>
<td>3.26</td>
<td>0.72</td>
<td>0.22</td>
<td>Most Critical</td>
</tr>
<tr>
<td>Market information</td>
<td>3.37</td>
<td>0.82</td>
<td>0.24</td>
<td>Most Critical</td>
</tr>
<tr>
<td>Changes in bank interest rates</td>
<td>3.26</td>
<td>1.03</td>
<td>0.32</td>
<td>Most Critical</td>
</tr>
<tr>
<td>The quality of the products and services offered</td>
<td>3.92</td>
<td>1.91</td>
<td>0.49</td>
<td>Most Critical</td>
</tr>
<tr>
<td>Number of customers in relation to competitors</td>
<td>3.89</td>
<td>1.94</td>
<td>0.50</td>
<td>Critical</td>
</tr>
<tr>
<td>Anticipate end of poor or good returns</td>
<td>3.61</td>
<td>2.01</td>
<td>0.56</td>
<td>Critical</td>
</tr>
<tr>
<td>Performance of the shares on stock market</td>
<td>2.92</td>
<td>2.17</td>
<td>0.74</td>
<td>Critical</td>
</tr>
<tr>
<td>The banks’ skills to time the performance of markets</td>
<td>3.74</td>
<td>2.80</td>
<td>0.75</td>
<td>Critical</td>
</tr>
<tr>
<td>Treat each unit of investment category separate</td>
<td>2.82</td>
<td>2.13</td>
<td>0.76</td>
<td>Less Critical</td>
</tr>
<tr>
<td>Fundamentals of underlying stocks</td>
<td>2.84</td>
<td>2.16</td>
<td>0.76</td>
<td>Less Critical</td>
</tr>
<tr>
<td>The company’s underlying belief and avoid interpretations which contradict previous belief</td>
<td>2.84</td>
<td>2.19</td>
<td>0.77</td>
<td>Less Critical</td>
</tr>
</tbody>
</table>

To check on the magnitude of impact of risk on the financial innovation, the above analysis was done and the findings were that; Information from their competitors, Market information, Changes in bank interest rates and quality of the products and services offered are the most risk critical factors to consider during financial innovation decision.

The critical factors were; Number of customers in relation to competitors, Anticipate end of poor or good returns, Performance of the shares on stock market and banks’ skills to time the performance of markets. They are also to be considered during the same decision making processes.

The less critical factors, according to the analysis, are factors that the management and decision making team should not think about and are; Treat each unit of investment category separate, Fundamentals of underlying stocks and company’s underlying belief and avoid interpretations which contradict previous belief.

4.6.1 Correlation of Risk Factors and Innovation

The below analyses were done to check the significance of the relationships between the risk factors and the demographics of respondents. Age, marital status, level of education...
and bank departments are some of the demographic. It is very important for example to understand how level of education and different bank departments are working on innovation to mitigate some of the risk factors.

Table 4.11: Risk Factors and Demographics

<table>
<thead>
<tr>
<th>Factors</th>
<th>Anticipate end of poor or good returns</th>
<th>The bank's skills to time the performance of markets</th>
<th>The company's underlying belief and avoid interpretations which contradict previous belief</th>
<th>Number of customers in relation to competitors</th>
<th>The quality of the products and services offered</th>
<th>Performance of the shares on stock market</th>
<th>Fundamentals of underlying stocks</th>
<th>Treat each unit of investment category separate</th>
<th>Market information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>p -0.008</td>
<td>-0.14</td>
<td>-0.081</td>
<td>-0.002</td>
<td>-0.001</td>
<td>0.024</td>
<td>0.004</td>
<td>0.383</td>
<td>0.391</td>
</tr>
<tr>
<td></td>
<td>r 0.964</td>
<td>0.401</td>
<td>0.627</td>
<td>0.76</td>
<td>0.992</td>
<td>0.993</td>
<td>0.888</td>
<td>0.018</td>
<td>0.015</td>
</tr>
<tr>
<td></td>
<td>N 38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Age</td>
<td>p -0.126</td>
<td>-0.081</td>
<td>-0.085</td>
<td>-0.02</td>
<td>-0.049</td>
<td>-0.023</td>
<td>-0.047</td>
<td>-0.338</td>
<td>0.086</td>
</tr>
<tr>
<td></td>
<td>r 0.449</td>
<td>0.631</td>
<td>0.613</td>
<td>0.903</td>
<td>0.772</td>
<td>0.889</td>
<td>0.78</td>
<td>0.038</td>
<td>0.607</td>
</tr>
<tr>
<td></td>
<td>N 38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Marital status</td>
<td>p 0.284</td>
<td>0.390*</td>
<td>0.335*</td>
<td>0.271</td>
<td>0.207</td>
<td>0.13</td>
<td>0.183</td>
<td>-0.122</td>
<td>0.014</td>
</tr>
<tr>
<td></td>
<td>r 0.084</td>
<td>0.015</td>
<td>0.04</td>
<td>0.1</td>
<td>0.212</td>
<td>0.437</td>
<td>0.271</td>
<td>0.467</td>
<td>0.931</td>
</tr>
<tr>
<td></td>
<td>N 38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Level of education</td>
<td>p -0.382*</td>
<td>0.06</td>
<td>-0.361*</td>
<td>-0.365</td>
<td>-0.355</td>
<td>0.051</td>
<td>-</td>
<td></td>
<td>0.082</td>
</tr>
<tr>
<td></td>
<td>r 0.018</td>
<td>0.723</td>
<td>0.026</td>
<td>0.006</td>
<td>0.024</td>
<td>0.029</td>
<td>0.024</td>
<td>0.76</td>
<td>0.623</td>
</tr>
<tr>
<td></td>
<td>N 38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Bank name</td>
<td>p 0.216</td>
<td>0.315</td>
<td>0.252</td>
<td>0.234</td>
<td>0.262</td>
<td>0.296</td>
<td>0.355</td>
<td>-0.03</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>r 0.192</td>
<td>0.054</td>
<td>0.126</td>
<td>0.158</td>
<td>0.112</td>
<td>0.071</td>
<td>0.029</td>
<td>0.86</td>
<td>0.991</td>
</tr>
<tr>
<td></td>
<td>N 38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Bank department</td>
<td>p 0.232</td>
<td>0.021</td>
<td>0.457**</td>
<td>0.432**</td>
<td>0.461**</td>
<td>0.398</td>
<td>0.410**</td>
<td>0.14</td>
<td>-0.474*</td>
</tr>
<tr>
<td></td>
<td>r 0.161</td>
<td>0.899</td>
<td>0.004</td>
<td>0.007</td>
<td>0.004</td>
<td>0.013</td>
<td>0.01</td>
<td>0.403</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>N 38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>38</td>
</tr>
</tbody>
</table>

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

** Correlation is significant at the 0.01 level (2-tailed).
From the above analyses, sex recorded significant relationships at 0.05 levels with; Treat each unit of investment category separate and Market information risk factors. This means that there is high regard of investment decisions and market information as far as sex or rather gender is concerned. Age recorded the same relationship with the risk factor of; treating each unit of investment category separate.

Marital status had two significant relationships with the risk factors; banks’ skills to time the performance of markets and company’s underlying belief and avoid interpretations which contradict previous belief at a level of 0.05. Level of education recorded quite a number of significant relationships and this was with; Anticipate end of poor or good returns, company’s underlying belief and avoid interpretations which contradict previous belief, Number of customers in relation to competitors, quality of the products and services offered, Performance of the shares on stock market, Fundamentals of underlying stocks, Treat each unit of investment category separate and Market information and 0.05 and 0.01 levels.

4.7 Risk Attributes and Investment Decisions

The researcher was interested in assessing how risk expected affect investment decision and this led to the descriptive analysis presented in the table 4.15 below. Coefficient of variation (CV) was the main statistical analysis tool that was use to rank the level of impact.

Table 4.12: Risk Attributes

<table>
<thead>
<tr>
<th>Impact of risks on investment decisions</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>CfVar</th>
<th>IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chances of incurring a large loss relative to expectations</td>
<td>2.76</td>
<td>0.43</td>
<td>0.16</td>
<td>High</td>
</tr>
<tr>
<td>Chances of asset earning less than target</td>
<td>2.61</td>
<td>0.55</td>
<td>0.21</td>
<td>High</td>
</tr>
<tr>
<td>Degree of ambiguity (uncertainty) about future distribution of possible returns</td>
<td>2.66</td>
<td>2.13</td>
<td>0.80</td>
<td>Medium</td>
</tr>
<tr>
<td>Chance of realizing a large gain relative to expectations</td>
<td>2.70</td>
<td>2.21</td>
<td>0.82</td>
<td>Low</td>
</tr>
</tbody>
</table>
From the analyses above, risk on; Chances of incurring a large loss relative to expectations and Chances of asset earning less than target recorded high impact on investment decision. The management and investment officers highly value these factors during investment decision making process. Degree of ambiguity (uncertainty) about future distribution of possible returns recorded a medium impact on investment decision making. Chance of realizing a large gain relative to expectations was the factor that had low impact on decision making hence is not as important as the first two risk factors.

4.7.1 Correlation on Demographic and Risk Factors

It is very important to test the strength of relationship between general variable like (Level of education, bank names, different departments in the banks) with the main factors of the research (financial innovation, risks and mitigation strategies). It helped to understand how for instance, level of education has minimized financial risk by instituting innovation.

Table 4.13: Risk Factors and Demographics

<table>
<thead>
<tr>
<th>Level of education</th>
<th>Chances of incurring a large loss relative to expectations</th>
<th>Chances of asset earning less than target</th>
<th>Degree of ambiguity (uncertainty) about future distribution of possible returns</th>
<th>Chance of realizing a large gain relative to expectations</th>
<th>Overall variability in return over time</th>
</tr>
</thead>
<tbody>
<tr>
<td>r</td>
<td>0.051</td>
<td>-0.163</td>
<td>-0.460**</td>
<td>-0.377</td>
<td>-0.449**</td>
</tr>
<tr>
<td>p</td>
<td>0.763</td>
<td>0.328</td>
<td>0.004</td>
<td>0.022</td>
<td>0.005</td>
</tr>
<tr>
<td>N</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>37</td>
<td>38</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of bank</th>
<th>Chances of incurring a large loss relative to expectations</th>
<th>Chances of asset earning less than target</th>
<th>Degree of ambiguity (uncertainty) about future distribution of possible returns</th>
<th>Chance of realizing a large gain relative to expectations</th>
<th>Overall variability in return over time</th>
</tr>
</thead>
<tbody>
<tr>
<td>r</td>
<td>0.325*</td>
<td>0.593**</td>
<td>0.276</td>
<td>0.154</td>
<td>0.221</td>
</tr>
<tr>
<td>p</td>
<td>0.046</td>
<td>0.093</td>
<td>0.363</td>
<td>0.183</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>37</td>
<td>38</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bank department</th>
<th>Chances of incurring a large loss relative to expectations</th>
<th>Chances of asset earning less than target</th>
<th>Degree of ambiguity (uncertainty) about future distribution of possible returns</th>
<th>Chance of realizing a large gain relative to expectations</th>
<th>Overall variability in return over time</th>
</tr>
</thead>
<tbody>
<tr>
<td>r</td>
<td>-0.106</td>
<td>0.099</td>
<td>0.476**</td>
<td>0.29</td>
<td>0.353*</td>
</tr>
<tr>
<td>p</td>
<td>0.528</td>
<td>0.553</td>
<td>0.003</td>
<td>0.081</td>
<td>0.03</td>
</tr>
<tr>
<td>N</td>
<td>38</td>
<td>38</td>
<td>38</td>
<td>37</td>
<td>38</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The level of education is significantly related to the following risk factors; Degree of ambiguity (uncertainty) about future distribution of possible returns, Chance of realizing a large gain relative to expectations and Overall variability in return over time. Degree of
ambiguity (uncertainty) about future distribution of possible returns and Overall variability in return over time were related to the respondents' level of education at 0.01 level while Chance of realizing a large gain relative to expectations at 0.05 level. This means that education helps worker calculate the degree of uncertainty about future distribution of returns, the gains to be realized and the variability in return over time.

Name of banks were significantly related to Chances of incurring a large loss relative to expectations and Chances of asset earning less than target with the first factor relating at 0.05 and the second at 0.01 levels. Bank departments also recorded significant relation with; Degree of ambiguity (uncertainty) about future distribution of possible returns and Overall variability in return over time. Degree of ambiguity (uncertainty) about future distribution of possible returns related at 0.01 level while Overall variability in return over time at 0.05 level.

4.8 Chapter Summary

The results and findings in this chapter were as to the guideline provided. The three research objectives were tackled by the research and the results and findings reported as above. The researcher started by analyzing the background information of the respondents and reported the findings in tabula form. Factors that influence innovation in commercial banks, Impact of Risks on the Rate of Innovation and Company’s Risk Attribute Affect Investment Decision was the three objectives effectively analyzed in this chapter.

The next chapter, chapter five, is about reporting the findings, concluding and recommending for policy implementation and further research.
CHAPTER FIVE

5.0 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of findings. Section 5.2 is about summary of the whole project. Section 5.3, 5.4 and 5.5 are about discussions, conclusions and recommendations respectively.

5.2 Summary

The purpose of the study was to examine the relationship between financial innovations and financial risks in a banking industry. The specific objectives of the study was to identify the possible financial risks commercial banks listed on Nairobi Stock Exchange (NSE) are exposed to, to identify financial innovations commercial banks listed on NSE are to impress to mitigate their financial risks, and to examine the three basic types of financial innovations that commercial banks listed on NSE are to consider for achievement of competitive advantage over others.

The research design was a descriptive form focusing on banks listed on Nairobi Stock Exchange, which have experienced intensive competition in the 21st century forcing them to strategically position themselves. This design gave a precise description in examining exactly how financial risks affect the process of financial innovations of commercial banks listed on NSE. The population of the study consisted of all listed commercial banks. The sampling frame was drawn from a list of commercial quoted banks obtained from Nairobi Stock Exchange. The study adopted a simple random technique, which is a probability sampling technique. This technique was of significance to the study because all the firms had equal chances of being selected. The simple random sampling technique obtained a sample size of 50 firms from the accessible population. The researcher used questionnaires as tool for collecting data. This was the best way of collecting primary data required for this study.

In the analyses, the researcher tested different economic and market factors that influence innovation in commercial banks. The analyses led to the understanding of how far
financial innovations have minimized financial risks. From the paired sample analyses, people from different bank departments highly believe that financial innovations have significantly reduced financial risks and that the innovations were instigated by tough competition from banks and other financial institutions. Credit risk is an example of financial risks that need innovations to minimize. Faced with liquidity risk, a financial institution may be forced to borrow emergency funds at excessive cost to cover its immediate cash needs, reducing its earnings. For instance, significant decline in its liquidity position often forces a bank to pay higher interest rates to attract negotiable money market CDs, which are sold in million dollar units therefore are largely unprotected by deposit insurance. One measure of liquidity risk exposure is the ratio of purchased funds (including Eurodollars, federal funds, security RPs, commercial paper and large CDs) to total assets (William, 2001).

The findings in the analyses proved that commercial banks get more information from their competitors, markets, other banks and financial institutions, and the products and services offered by the competitors to develop strategies to mitigate risks. They look at the different ways competitors are operating, how customers and the general market is responding to their products and services and how different economic factors are moving. The interest rate is one of the economic factors that commercial banks use to develop strategies of mitigating risks. According to Avian (1994), the most popular interest rate hedging strategy in use today is often called interest sensitive gap management. Gap management techniques require management to perform an analysis of the maturities and re-pricing opportunities associated with interest bearing assets and with deposits and other borrowings. If the management feels its institution is excessively exposed to interest rate risk, it will try to match as closely as possible the volume of assets that can be re-priced as interest rates change with the volume of deposits and other liabilities whose rates can also be adjusted with market conditions during the same time period.

Market and economic factors heavily affect the operation of financial sector. Analyses showed that these factors make financial innovations to occur. For instance, interest rate is an economic factor that was tested and the results were that its volatility is highly significant to the development of financial innovations. The factor affects the response to changes to in demand conditions hence the innovation process initiates. This conforms to
the research done by Emilie, (2006). He argued that the most significant change in the economic environment that altered the demand for financial products in recent years has been the dramatic increase in the volatility of interest rates. In the 1950s, the interest rate on three-month US Treasury Bills fluctuated between 1.0% and 3.5%; in the 1970s, it fluctuated between 4.0% and 11.5%. This volatility became even more pronounced in the 1980s, during which the three months T-Bill rate ranged from 5% to over 15%. Large fluctuations in interest rates lead to substantial capital gains or losses and greater uncertainty about returns on investments. Recall that the risk that is related to the uncertainty about interest rate movements and returns is called interest rate risk, and high volatility of interest rates, like the one the world experienced in 1970s and 1980s, leading to higher level of interest rate risk (Emilie, 2006)

5.3 Discussion

5.3.1 Financial Innovations have minimize Financial Risks

Financial innovations are caused by different multiple economic and market factors. Factors like; rate of competition, new entrants, technological change, incentives, employees' knowledge, regulations and changes in the business activities are causing commercial banks to innovate. It is deemed that these factors posses threats of causing financial risks. William (2001); Jun and Cain (2001), and Frederic and Stanley (2003) confirm that credit risk, market risk, liquidity risk, interest risk, earnings risk and capital risk are some of the financial risks caused by the latter named factors.

Financial innovations are done for different purposes. Commercial banks hold the opinion that when new entrants come into the market they pose a risk of increasing competition and reducing profit margins. From the study, it was found out that commercial banks innovate to hinder new entrants in the current market. The commercial banks do these by being very unique in every product and service they offer so that it become difficult to copy by new entrants. They use expensive technology that creates cost barrier to the new competitors. This conforms to the research done by Emilie (2006) that the risk to a financial institution's bottom line, its net income after all expenses are covered, is known as earnings risk. Earnings may decline unexpectedly due to factors inside the financial firm or due to external factors, such as changes in economic conditions or in laws and
regulations. For example, recent increases in banking competition have tended to narrow the spread between earnings on a bank’s assets and the cost of raising bank funds. Thus, a bank’s stockholders always face the possibility of a decline in their earnings per share of stock, which would cause the value of the bank’s stock to fall, eroding its resources for future growth. Due to this, banks are investing in expensive technology to stop new entrants from coming to the market (Emilie, 2006).

High competition from other existing banks is also a factor that causes risk on the operation of commercial banks. The analyses showed that there is high relationship between innovation and rate of competition from existing commercial banks. It is deemed that high rate of competition from the listed commercial banks on the value of their assets and hence capital structure. William (2001), argue that bankers and their competitors must be directly concerned about risks to their institution’s long-run survival, often called capital risk. For instance, if a bank takes on an excessive number of bad loans or if a large portion of its security portfolio declines in market value due to high competition, generating serious capital losses when sold, then its equity capital account, which is design to absorb such losses, may be overwhelmed. If investors and depositors become aware of the problem and begins to withdraw their funds, regulators may have no choice but to declare the institution insolvent and close its doors.

From the findings, it was noted that innovation in the financial institutions is due to the past experience the commercial banks have gone through. According to the analyses, this caused a moderate impact to the financial innovation decision making process. Market risk is one of the risks that many commercial banks experience. In market oriented economies, where most of the world’s banks and other leading financial institutions offer their services today, the market values of assets, liabilities, and net worth of banks and other financial service providers are constantly in a state of flux, creating market risk. Changes in market interest rates and currency prices, shifting public demands for bank services and the services offered by nonbank financial firms, sudden alterations in central bank monetary policies, and changing investor perceptions of riskiness of banks and nonbank financial firms cause the value of institutional assets, liabilities and equity to move up or down frequently, depending on the direction financial winds are blowing (Frederic and Stanley, 2003).
5.3.2 Financial Innovations for Competitive Advantage

To achieve competitive advantage over other banks, commercial banks invent financial tools that help to mitigate financial risks. For the financial innovation to take place, commercial banks must develop strategies on how to get information about the financial risk. The researcher found out that these banks use information from competitors, markets, from the changing bank interest rates, and on the products and services offered. These information help the commercial banks develop appropriate risk mitigating tools. Avian (1994) found out that the most popular interest rate hedging strategy in use today is often called interest sensitive gap management. Gap management techniques require management to perform an analysis of the maturities and re-pricing opportunities associated with interest bearing assets and with deposits and other borrowings. If the management feels its institution is excessively exposed to interest rate risk, it will try to match as closely as possible the volume of assets that can be re-priced as interest rates change with the volume of deposits and other liabilities whose rates can also be adjusted with market conditions during the same time period.

The information from the market about interest rate helps the commercial banks to develop good hedging techniques that cushion them from losses. From the findings of the study, it was noted that information about interest rates is more critical in financial innovation process. For example, a bank can hedge itself against interest rate changes, no matter which way rates move, by making sure for each time period that the dollar amount of re-priceable (interest sensitive) assets equal dollar amount of re-priceable (interest sensitive) liabilities. In this case, the revenue from earning assets will change in the same direction and by approximately the same proportion as the interest cost of liabilities.

Emilie (2006), confirms that the most familiar examples of re-priceable assets are loans that are about to mature or are coming up for renewal. If interest rates have risen since the loans were first made, the lender will renew them only if it can get an expected yield that approximates the higher yields currently expected on other financial instruments of comparable quality. Similarly, loans that are maturing will provide the lender with funds to reinvest in new loans at today’s interest rates, so they represent repriceable assets as
Repriceable liabilities include a depository institution's CDs about to mature or be renewed, where the financial firm and its customers must negotiate a new deposit interest rate to capture current market conditions; floating rate deposits whose yields move automatically with market interest rates; and money market borrowings whose rates are often adjusted daily to reflect the latest market developments.

The commercial banks use information from the product and services offered to develop financial innovations that mitigate risks. The performance of the product in the market helps the banks to make appropriate tool for evaluating and increasing performance. For instance, duration gap management was as a result of the product or service performance. Duration is a value and time weighted measure of maturity that considers the timing of all cash inflows from earning assets and all cash outflows associated with liabilities. It measures the average maturity of a promised stream of future cash payments, such as the payment a bank expects to receive from its loans and securities or the stream of interest payments it must pay out to its depositors. In effect, duration measures the average time needed to recover the funds committed to an investment (Jun and Cain, 2001).

After having determined the duration of all assets and liabilities on the bank's balance sheet, the bank manager can easily know how the market value of each asset and liability changes when there is a change in interest rates and then calculate the effect on net worth (Frederic and Stanley, 2003).

The results of this study indicated that the level of education was so important in the development of financial innovations depending on market and economic factors. For instance, the anticipation end of poor or good returns, knowledge of company's underlying belief and interpretations, knowledge of the number of customers in relation to competitors, the understanding of the quality of the products and services offered in the markets, knowledge on the performance of the shares on stock market, knowledge on the investments and understanding of the market information need education.

5.3.3 Achieving Financial Innovations

The study findings suggest that to achieve more financial innovations, it is important to understand the risk attributes and the performance of commercial banks. Chances of
incurring a large loss relative to expectations, chances of asset earning less than target, degree of ambiguity (uncertainty) about future distribution of possible returns and chance of realizing a large gain relative to expectations were the variables that were tested with respect of achieving more appropriate financial risk. For commercial banks to maximize their profits, more financial innovation need to be develop basing on the chances of incurring profits and assets earning more than expected. This is done by developing new products that satisfy both needs, needs of customers and that of the organization (Avian, 1994).

Chances of incurring a large loss relative to expectations, chances of asset earning less than target, degree of ambiguity (uncertainty) about future distribution of possible returns and chance of realizing a large gain relative to expectations are variables that were tested basing on market and economic conditions. Interest rate, for instance, has an impact on the earning of the asset. From the analysis, chances of incurring a large loss relative to expectations and chances of asset earning less than target recorded high impact meaning that they are highly affected by market interest rate. In confirmation of this, Emilie (2006) argue that the most significant change in the economic environment that altered the demand for financial products in recent years has been the dramatic increase in the volatility of interest rates. In the 1950s, the interest rate on three-month US Treasury Bills fluctuated between 1.0% and 3.5%; in the 1970s, it fluctuated between 4.0% and 11.5%. This volatility became even more pronounced in the 1980s, during which the three months T-Bill rate ranged from 5% to over 15%. Large fluctuations in interest rates lead to substantial capital gains or losses and greater uncertainty about returns on investments. Recall that the risk that is related to the uncertainty about interest rate movements and returns is called interest rate risk, and high volatility of interest rates, like the one the world experienced in 1970s and 1980s, leading to higher level of interest rate risk (Emilie, 2006)

Mortgages and other loans are assets that commercial banks invest in. Interest rate fluctuations highly affect these types of investments hence the banks either earn less or more than the expected returns. This is caused by uncertainties that are hard to predict and avoid. The findings showed that the uncertainties had an impact on management decision making in regard of developing more financial innovations. Avian (1994),
confirms that financial institutions find that lending is more attractive if interest rate risk is lower. But he suggests that banks would not want to make a mortgage loan at 10% interest rate and two months later find that they could obtain a 12% interest rate on the same mortgage. To reduce interest risk, banks began to issue adjustable rate mortgages, mortgage loans on which interest rate changes when a market interest rate (Treasury bill rate) changes. Initially, an adjustable mortgage might have a 5% interest rate. In six months, this interest rate might increase or decrease by the amount of the increase in, say, six-month Treasury bill rate, and the mortgage payment would change. Because adjustable mortgages allow mortgage-issuing institutions to earn higher interest rates on mortgages when rates rise, profits are kept higher during this period.

The findings showed that bank departments supported the development of more financial innovations. Information and Technology department develop financial innovation to sort out the risk of ambiguity (uncertainty) about future distribution of possible returns and overall variability in returns over time. William (2001) argues that the most important source of the changes in supply conditions that stimulate financial innovation has been the improvement in computer and telecommunications technology. These changes have made it profitable for banking industry to create new financial products and services to supply to the public. When computer technology that substantially lowered the cost of processing financial transactions became available, financial institutions conceived new financial products and instruments dependent on this technology that might appeal to the public, including the bank credit card and electronic banking facilities.

The findings revealed that commercial banks use employees' educational capabilities to mitigate different risks like; ambiguity (uncertainty) about future distribution of possible returns, chance of realizing a large gain relative to expectations and overall variability in return over time. It also reveal that different banks are more concerned on risks like; chances of incurring a large loss relative to expectations and chances of asset earning less than target.
5.4 Conclusions

5.4.1 Financial Innovations have minimize Financial Risks

Commercial banks involve in financial innovations for many different purposes. The findings reveals that innovations is for the purpose of hindering new entrants in the current market, to curb high rate of competition from other commercial Banks, to time technological change and to avoid strict government rules and regulations. This is supported by researchers like William (2001); Jun and Cain (2001), and Frederic and Stanley (2003) that credit risk, market risk, liquidity risk, interest risk, earnings risk and capital risk are some of the financial risks caused by economic and market factors.

5.4.2 Financial Innovations for Competitive Advantage

Financial innovation is very important to commercial banks in reducing financial risks that proves to be dangerous to the organizations. There is high relationship between employees’ level of education, different commercial banks and different bank departments with the factors that instigate innovation. For the financial innovation to take place, commercial banks must develop strategies on how to get information about the financial risk. The researcher found out that these banks use information from competitors, markets, from the changing bank interest rates, and on the products and services offered. These information help the commercial banks develop appropriate risk mitigating tool.

Jun and Cain, (2001) confirm that banks use the above mention information to mitigate credit, liquidity, market, interest rate, earnings and capita risks.

5.4.3 Achieving Financial Innovations

It is important to understand the risk attributes and the performance of commercial banks. Chances of incurring a large loss relative to expectations, chances of asset earning less than target, degree of ambiguity (uncertainty) about future distribution of possible returns and chance of realizing a large gain relative to expectations were the variables that were tested with respect of achieving more appropriate financial risk. For commercial banks to maximize their profits, more financial innovation need to be develop basing on the
chances of incurring profits and assets earning more than expected. This is done by developing new products that satisfy both needs, needs of customers and that of the organization (Avian, 1994).

5.5 Recommendation
5.5.1 Recommendation for improvement
5.5.1.1 Financial Innovations have minimize Financial Risks

Financial innovations have played a great deal in mitigating risks that are associated with financial instruments. More concrete factors need to be taken into consideration when assessing the extent financial innovation has minimized risks. To improve the effectiveness of the tools that mitigate financial risks, management must make decisions basing on the market and economic trends.

5.5.1.2 Financial Innovations for Competitive Advantage

The researcher found out that commercial banks use information from competitors, markets, from the changing bank interest rates, and on the products and services offered to develop financial innovation strategies. These banks should well equip their research departments with the modern tools for research. This would help the department to source for the appropriate information from competitors, markets, customers and the performance of their products and services for analysis and improvement.

5.5.1.3 Achieving Financial Innovations

It is important to understand the risk attributes and the performance of commercial banks. Commercial banks depend more on analyzing chances of incurring a large loss relative to expectations, chances of asset earning less than target, degree of ambiguity (uncertainty) about future distribution of possible returns and chance of realizing a large gain relative to expectations to achieving more appropriate financial risk. For commercial banks to maximize their profits, more financial innovation need to be develop basing on the chances of incurring profits and assets earning more than expected. These is done by developing new products that is very unique and satisfy both needs, needs of customers and that of the organization.
5.5.2 Recommendation for further research

The study is very important to the prosperity of the financial sector. The researcher experienced limitations in pursuing the objectives of this study. The time that the study was scheduled to be over was limited bearing in mind that the financial sector is very sensitive sector that people working in it don't easily release information to interested parties. I therefore recommend future researchers to take more of their time in determining the impact of financial innovations in mitigating financial risks.

Banking sector does not fully represent all industries in financial sector. I therefore recommend future interested researchers to covers other sectors like insurance firms and mortgage firms.
References


54


IJBM 29,3 244


William A.L., (2001), Banking and financial institutions law, West Group, St. Paul, Minnesota
APPENDIX I: QUESTIONNAIRE

This study is a requirement for the partial fulfillment of Master of Business Administration program at the United States International University- Africa (USIU-A). The purpose of the study is to examine the relationship between financial innovations and financial risks in the banking industry.

The insights provided by this study could be used by investors, bank managers and the bank regulatory bodies as a base to develop innovation pace strategies to minimize financial risks.

Kindly answer the questions by ticking or filling on the space provided.

Part 1: Common Information

a. State your gender:
   - Female
   - Male

b. In which age bracket do you belong?
   - Less the 25 years
   - 25 – 30 years
   - 31 – 35 years
   - 35 – 40 years
   - Over 40 years

c. What is your marital status?
   - Single
   - Married

d. What is your economic activity?
   - Employed
   - Not Employed
   - Family Business
   - Self Employed
   - Student
e. What is your level of education?
   • Up to secondary □
   • College □
   • University □
   • Others Specify ..........................................

f. Which company do you work for?
   • Kenya Commercial Bank □
   • Equity Bank □
   • Barclays Bank □
   • Standard Chartered Bank □
   • Commercial Bank of Africa □

Part II:

(II-a) Factors that influence innovation in commercial banks

On a rate of three point's scale of: (1) Most likely, (2) likely and (3) Not likely; indicate whether these factors influence commercial banks to innovate.

<table>
<thead>
<tr>
<th>Factors</th>
<th>(1) Most likely</th>
<th>(2) likely</th>
<th>(3) Not likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>High rate of competition from other financial institutions e.g. insurance companies,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High rate of competition from other commercial Banks</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Commercial banks use their predictive skills to time technology change

Banks innovate to hinder new entrants in the current market

Changes of business activities in the global arena forces the commercial banks in Kenya to change their system

Do commercial banks give freedom to employees to invent and innovate the banking system

The culture of your bank allows and adopt faster to changes technology

Innovation is caused by past experience of the institution

Regulations force commercial banks to innovate

Financial innovation is caused by the kind of risks an organization is exposed to

Innovation is done to make the products affordable

Commercial banks do innovation when their values are reducing

Banks are risk seekers hence innovation help in reducing risks

Banks receive incentives from the Government for innovation

| (II-b) The Impact of Efficiency on Individual Investment Decision making process |
|---------------------------------------------------------------|----------------|----------------|----------------|----------------|
| On a rate of four point scale, rate the impact of the following factors on financial innovation decision making process. |

| (1) No Impact (2) Low Impact (3) Moderate Impact (4) High Impact |
|---------------------------------------------------------------|----------------|----------------|----------------|----------------|
| Changes in bank interest rates |
| Anticipate end of poor or good returns |
| Your skills to time the performance of markets |
| The company’s underlying belief and avoid interpretations which contradict previous belief |
| Number of customers in relation to competitors |
| The quality of the products and services offered |
| Performance of the shares on stock market |
| Fundamentals of underlying stocks |
| Information from your competitors |
| Treat each unit of investment category |

61
PART 3: How a Company Performance Affect Investment Decision

a. Respondent’s Perceived Investment Risk Taking

In a three point scale, rate the influences of the following attributes to risks when making investment decisions.

<table>
<thead>
<tr>
<th>ATTRIBUTES</th>
<th>SCORES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chances of incurring a large loss relative to expectations</td>
<td>Not Important</td>
</tr>
<tr>
<td>Chances of asset earning less than target</td>
<td></td>
</tr>
<tr>
<td>Degree of ambiguity (uncertainty) about future distribution of possible returns</td>
<td></td>
</tr>
<tr>
<td>Chance of realizing a large gain relative to expectations</td>
<td></td>
</tr>
<tr>
<td>Overall variability in return over time</td>
<td></td>
</tr>
</tbody>
</table>