

**THE EFFECT OF MOBILE PHONE TECHNOLOGY
INNOVATIONS ON FINANCIAL DEEPENING WITHIN THE
BANKING INDUSTRY IN KENYA**

BY:

MICHAEL MULI NGII

**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE AWARD OF A MASTER OF
BUSINESS ADMINISTRATION DEGREE**

UNIVERSITY OF NAIROBI

OCTOBER, 2013

DECLARATION

This research project is my original work and has not been submitted to any university for award of a degree.

Signature.....Date.....

MICHAEL MULI NGII

D61/72466/2011

This project has been presented for examination with our approval as the University supervisor.

Signature.....Date.....

DR JOSEPHAT LISHENGA

LECTURER, UNIVERSITY OF NAIROBI

SCHOOL OF BUSINESS

DEDICATION

This work is dedicated to my lovely spouse Margaret and our two amazing daughters Diana and Joy without whose caring support it would not have been easy. Similarly to my parents Regina Wanza and Solomon Ngii who have been a constant source of inspiration, drive and discipline to tackle any task with enthusiasm and determination.

ACKNOWLEDGEMENT

First, I thank our almighty God who gave me good health and strong belief in this challenging undertaking. Secondly, I am deeply appreciative to my classmates for the moral and intellectual support they offered me in one way or the other throughout my study period.

I also acknowledge all the people whose assistance directly or indirectly contributed to the successful completion of this research project. A special word of thanks is extended to University of Nairobi and my supervisor Dr Josephat Lishenga and Mr Joseph Barasa who patiently and consistently guided me through the research.

LIST OF TABLES

Table 4.1: Model summary	19
Table 4.2: Anova.....	21
Table 4.3: Expected Model	23
Table 4.4: Model coefficients for 2008-2012	25

TABLE OF CONTENTS

DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
LIST OF TABLES	v
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background of the study	1
1.1.1 Mobile Phone Technology Innovations in Banking	2
1.1.2 Financial Deepening in the Banking Industry	3
1.1.3 The Banking Industry in Kenya	4
1.2 Research Problem	5
1.3 Research Objectives	5
1.4 Value of the study	6
CHAPTER TWO	7
LITERATURE REVIEW	7
2.1 Introduction	7
2.2 Theoretical Review	7
2.2.1 Innovation Theory	7
2.2.2 The Quantity Theory of Money	8
2.2.3 Financial Intermediation Theory	9
2.3 Mobile Technology Innovations	10
2.4 Financial Deepening in the banking industry	11
2.5 Empirical Review	13
CHAPTER THREE	16
RESEARCH METHODOLOGY	16
3.1 Introduction	16

3.2 Research Design.....	16
3.3 Population and Sampling	16
3.4 Data Collection	16
3.5 Data Analysis	17
CHAPTER FOUR.....	18
DATA ANALYSIS AND INTERPRETATION	18
4.1 Introduction.....	18
4.2 Summary statistics	18
CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	26
5.1 Introduction.....	26
5.2 Summary of Findings.....	26
5.3 Conclusions.....	27
5.4 Recommendations.....	27
5.5 Suggestions for Further Research	27
References.....	28

ABSTRACT

The main purpose of this study was to establish the effect of mobile phone technology innovations on financial deepening within the banking industry in Kenya. The study adopted a survey research design since it focused on commercial banks in Kenya. It made use of secondary data that was partly collected from the published financial statements of commercial banks in Kenya while the rest of the data was obtained from various departments of the said commercial banks. The researcher managed to collect data from 35 commercial banks in Kenya. Regression analysis was used to establish the effect of mobile phone technology innovations on financial deepening within the banking industry in Kenya. The study revealed that mobile phone technology innovation explains some variance in the financial deepening of the banking industry in Kenya. However the variance explained is not higher than the unexplained percentage since there are other variables that explain a greater percentage of financial deepening in the banking industry. As such, the results of the model indicate that none of the variables is significantly related to the dependent variable.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The global banking industry has gone through turbulent times in the last decade. This was mostly fueled by the global economic recession that originated from the collapse of US mortgage firms in the year 2008 and led to crumbling of most multinational banks. According to Stiglitz (2008) the global financial recession experienced in 2008 is the first one to happen in this age of globalization. The effects of this financial crisis affected the operations of most banks in the United States of America and the United Kingdom even though it did not have any documented and proven impact on most African banks.

Despite the 2008 financial meltdown, most Kenyan banks as well as others within the East African region have experienced impeccable growth during the same decade. When analyzing the bank competition in East Africa Sanya & Gaertne (2012) assert that the growth that has been experienced in the banking industry in the region can be attributed to the reforms that have recently been implemented. They further argue that most countries within the East African region have embraced liberalization of state owned commercial banks in the last decade and this has contributed to the impressive growth so far registered.

It is evident in Kenya that most of the banks are quickly moving out of their “traditional banking boundaries” in order to remain competitive. For instance most commercial banks in Kenya Such as Kenya Commercial Bank, Cooperative Bank, Equity Bank and a few others have established wholly owned subsidiaries within the East African region. The advent and expanded use of the mobile phone technology has also forced most of the Kenyan banks to expand their banking patterns and products (Njenga, nd). He further reiterates that the banking industry in Kenya has been modernized and expanded courtesy of the innovations that exist in the mobile phone industry.

1.1.1 Mobile Phone Technology Innovations in Banking

Technology is the application of scientific knowledge for practical purposes. It is the design, making and use of tools, machines, techniques and methods in order to solve a problem, improve a pre-existing solution or perform a specific function. Mobile Phone Technology is the utilization of cellular networks; radio links that allow wireless transmission of both voice and data across a limited geographical area. Sullivan (2008) defines innovation as the process of making changes to something that already exists by introducing something new. He further argues that the definition above does not restrict innovation to products or services but can also happen to processes within organizations. Arranz and Arroyabe (2009) define technological innovations as the changes in the existing technology that often lead to the unveiling of more superior forms of technology into the market. They further assert that development of technology is a very important aspect of business competitiveness in the 21st century.

One of the notable sectors where technology is at its helm of affairs with respect to customer service is banking. Over the years, banking has transcended from a traditional brick-and mortar model of customers queuing for services in the banks to modern day banking where banks can be reached at any point for their services. In today's business, technology has been the predominant indicators of growth and competitiveness. The banking industry today is in the stage of its revolution (Anyasi and Otubu, 2009). The combinations of regulatory and competitive reasons have led to increasing importance of total banking automation in the banking industry. Information technology has basically been used under two different avenues in banking. One is communication and connectivity and other is business process. Reengineering both, basically focusing on increasing its customer reaches. Information technology enables sophisticated product development, better market infrastructures, implementation of reliable techniques for control of risks and helps the financial intermediaries to reach geographically distant and diversified markets. The latest revolution seems to happen with respect to mobile banking an attempt to leverage on the synergies of mobile banking technology in telecommunication (Anyasi and Otubu, 2009).

In the contemporary business environment, banks have welcomed wireless and mobile technologies that present the freedom to pay bills, plan payments while stuck in traffic jams, receive updates on the various marketing efforts while present at a party and to provide more personal and intimate relationships. Mobile banking can be classified as push vs. pull and transaction vs. enquiry. Some of the other features where mobile banking has lent its hand are fund transfer and bill payment where the customers have the freedom of maintaining account through mobile devices. Mobile banking also welcomed other financial services like share trading (Arumugam *et al.*, 2008).

The latest information technology revolution enables sophisticated enquiry based banking services for credit/debit alerts. Some of the other outcomes of the revolution in the banking industry are minimum balance alerts, account balance enquiry, account statement enquiry, cheque status enquiry, cheque book request and bill payment alerts. The last time that technology had a major impact in helping banks modernize services to their customers was with the introduction of the internet banking. However, the biggest limitation of internet banking is the requirement of a PC with an internet connection. This is not an obstacle in developed countries such as the US and UK but definitely a big barrier in most of the developing countries of Asia like china and India. Mobile banking is now able to address this gap brought by internet connectivity (Arumugam *et al.*, 2008).

1.1.2 Financial Deepening in the Banking Industry

Financial deepening involves the combination of several activities and institutions (Fritz, 1984). Cheng (1980) notes that in developing economies, the term is associated with increases in the activity of financial intermediaries, like commercial banks and savings institutions. Cheng suggests that the degree of financial intermediation be measured by the proportion of national wealth held through financial intermediaries. Financial deepening of the banking industry is understood to mean the expanding and the changing nature of the banking industry. Hawkins & Mihaljek (2000) assert that the financial deepening in the banking industry that has been experienced globally can be attributed to the need for transformation. They further state that there are various

drivers of deepening in the banking industry and they include: “Technological innovation; the deregulation of financial services at the national level and opening-up to international competition; changes in corporate behaviour, such as growing disintermediation and increased emphasis on shareholder value. In addition, recent banking crises in Asia and Latin America have accentuated these pressures. The banking industries in central Europe and Latin America have also been transformed as a result of privatizations of state-owned banks that had dominated their banking systems in the past.” (Hawkins & Mihaljek, 2000).

1.1.3 The Banking Industry in Kenya

The banking industry in Kenya is subject to three main Acts of parliament namely: The companies act; The Banking Act and the Central Bank of Kenya Act. These are the Acts that contain the regulations under which all commercial banks in Kenya must operate. However, there are other prudential guidelines that have been put in place by the central bank, which commercial banks must comply with. The central bank is the legal regulator of the banking industry in Kenya and has the responsibility of ensuring that commercial banks operate within the stated legal framework. Commercial banks in Kenya operate under an umbrella body called the Kenya Bankers Association which serves as the voice of all the banks (PWC Kenya, 2013).

The banking industry in Kenya comprises of 44 commercial banks. According to RSM (2012), the banking industry has experienced tremendous growth in terms of customer deposits, asset base and profitability. RSM further indicates that customer deposits increased by 20.3% in the year 2011; The collective total assets of the banking industry grew by 20.4% in the same year; average profit before tax increased by 16.1% whereas loans and other credit facilities advanced to customers increased by 31.5% in the year 2011. The above statistics are an indication that the banking industry has deepened over time due to various drivers. The main reason why Kenyan banks have managed to register growth is because of “crossing the boundaries of traditional banking” and embracing new innovations as well as adopting new banking models.

1.2 Research Problem

Globalization has made many firms including banks to think beyond conventional banking boundaries. The innovations in technology and more specifically in mobile banking have provided banks with an opportunity to reach out to many potential customers. The advent of investment banking has also redefined the role of banks in expanding capital market operations.

The Kenyan banking industry has registered significant expansion in the last decade. This is a decade that has also witnessed the use of mobile phone technology in banking, opening of subsidiaries among East African Community countries and creation of investment subsidiaries to address the capital market operations needs for banks. Researchers such as Ondiege (2010) have argued that the use of mobile technology has been significant in expanding banking services in Africa. Gera (2008) also indicates that it is a global trend for contemporary banks to prioritize cross border banking. Wangui (2011) carried out a study on the adoption of cloud computing in the Kenyan banking industry. The findings from the survey revealed that most of the commercial banks in Kenya had not adopted cloud computing and none of the banks involved in the study had allocated any financial resources to cloud projects in their 2011 budget. Another study was conducted by Wasilwa (2003) on computer security vulnerability in the banking industry in Kenya. The study established that most of the commercial banks in Kenya make averagely Kshs.109.84 Million as investment in Information Technology although they do not have an information technology professional at the Executive Board level.

Even though it is evident that these practices are credited to have brought deepening of the banking industry, it is not clear whether they have had the same effect on the Kenyan Banking Industry. It is on this basis that this study seeks to answer these question: To what extent has mobile banking technology aided financial deepening within the Banking industry in Kenya?

1.3 Research Objectives

To establish the effect of mobile phone technology innovations on financial deepening in the banking industry in Kenya.

1.4 Value of the study

The findings of this study will assist in confirming the theoretical foundations of financial sector deepening. It will assist the researchers in the field of financial deepening to confirm the various propositions that have been put forward on mobile phone technology and financial deepening.

The findings of the study will also assist policy makers in the banking industry to understand the effect of mobile phone innovations on financial deepening of the sector. This will enable them to develop appropriate policies that can enhance adoption of mobile phone innovations in the banking sector.

The government of Kenya will also be able to get information on the role of mobile phone innovations on financial deepening in the banking industry in Kenya. As the regulator of banks in Kenya the government will therefore be able to assist in coming up with legislation that can foster mobile phone innovations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a discussion on the relevant literature on mobile technology innovations and financial deepening in the banking industry. Among the issues discussed include the theoretical foundations; mobile technology innovations; financial deepening and a review of the empirical literature.

2.2 Theoretical Review

2.2.1 Innovation Theory

The common lens through which theorists study the adoption and development of technological innovations is through the innovation theory or diffusion theory. Diffusion is defined as the process by which an innovation is adopted and gains acceptance by individuals or members of a community. Diffusion Theory represents a complex number of sub-theories that collectively study the processes of adoption. Perhaps the first famous account of diffusion of innovations studies was done in 1903 by a French sociologist by the name Tarde (1903). Tarde plotted the original S-shaped innovation curve as he believed that most innovations have an S-shaped rate of adoption. Other researchers such as Ryan and Ross (1943) also carried out studies on diffusion of innovation. The most recent study on the theory is by Rodgers (2003) that has attempted to put together the views of the first researchers on innovation diffusion.

The diffusion of innovation theory has therefore been effectively reviewed by Rodgers (2003). The theory seeks to explain the process through which innovation is communicated over certain duration of time among members of a particular social system. He further argues that there are four main elements that make the diffusion of technology in society possible or successful. The first element of technology diffusion is the innovation which implies the idea, practice or object that is developed and is the focus of the adoption; the second element is the time within which the technological innovation is accepted within a social system; the third element is communication

channel, how the innovation is introduced or how it is marketed to an individual and the last element is a social system which refers to elements such as individuals, groups, organizations and/or subsystem that are involved in the adoption of the innovation and their impact on each other.

The four elements outlined by Rodgers (2003) are the fundamental foundations upon which adoption of mobile technology in banking is based. Successful adoption of a particular innovation should score higher in terms of its relative advantage over existing practices, compatibility to users' needs, trial ability and observability, and lower in its complexity to use. The relative advantage of one technology over another is a key determinant of the adoption of new technology. The issue of relative advantage has been shown to have a positive relationship with adoption of innovation (Teng, Grover, & Guttler, 2002). Users need to be shown that mobile technology offers considerable benefit compared to traditional offering. The mobile phone technology has proved that it has the potential to offer more benefits in banking than the traditional or conventional banking. This is the reason why the same has been adopted by most banks around the globe.

2.2.2 The Quantity Theory of Money

This is one of the theories that seek to explain the growth of the monetary economy. The theory asserts that if there is an increase in money, there will also be a general increase in the prices. The quantity theory of money is more applicable in the long run than in the short run in monetary economics. The theory assumes that $MV = PT$ where M = quantity of money in circulation; V = velocity that a unit of money is transacted; P = price level; T = real value of aggregate transactions. For this equation to hold true, three assumptions are made: The first one is that MV must cause PT rather than the opposite; changes in V and T cannot be due to monetary factors; and 3) the nominal stock of money must be determined by an exogenous force (such as a central bank) as opposed to public demand for money (Friedman, 2008).

The theory also assumes a stable value for V , which means that price levels (P) vary in exact proportion to changes in the money supply (M). If they are in disequilibrium, two transmission mechanisms exist to balance them: the direct mechanism- people

use additional money to buy more goods, which drive up prices; and the indirect mechanism- an increase in the money supply drives down interest rates, which increases consumption, which in turn drives up prices until interest rates return to equilibrium. Most classical economists acknowledged that changes in the money supply could impact economies in the short-run, classical economists emphasized the neutrality of money, implying that changes in the money supply have no influence on real economic variables such as output and employment in the long-run. This is what ultimately distinguished classical economists from neoclassical economists in terms of quantity theory. The quantity theory has however transformed from an explanation of changes in purchasing power to a theory of how the money supply influences aggregate demand represented by MV , prices, and output (Wennerlind, 2005).

2.2.3 Financial Intermediation Theory

The financial intermediation theory is one of the theories that seek to explain the reasons for existence of financial intermediaries in an economy. The main reason propagated by the theory in favour of the financial intermediaries is the informational asymmetries. The informational asymmetries generate market imperfections, that is, deviations from the neoclassical framework. Many of these imperfections lead to specific forms of transaction costs. Financial intermediaries appear to overcome these costs, at least partially. Diamond and Dybvig (1983) consider banks as coalitions of depositors that provide households with insurance against shocks that adversely affect their liquidity position. Diamond (1984) shows that these intermediary coalitions can achieve economies of scale. He further views that financial intermediaries act as delegated monitors on behalf of ultimate savers. Monitoring will involve increasing returns to scale, which implies that specializing may be attractive. Individual households will delegate the monitoring activity to such a specialist who in most cases is the financial intermediary. The households will put their deposits with the intermediary. They may withdraw the deposits in order to discipline the intermediary in his monitoring function. Furthermore, they will positively value the intermediary's involvement in the ultimate investment (Hart, 1995).

Hart and Moore (1995) assert that there can be assigned a positive incentive effect of short-term debt, and in particular deposits, on bankers. Diamond and Rajan (2001) show that deposit finance can create the right incentives for a bank's management.

Illiquid assets of the bank result in a fragile financial structure that is essential for disciplining the bank manager. In the case households that do not turn to intermediated finance but prefer direct finance, there is still a brokerage role for financial intermediaries, such as investment banks. In financing, both the reputation of the borrower and that of the financier are relevant (Hart and Moore, 1998). Dinc (2000) argue that the incentive for the bank to keep its commitment is derived from its reputation, the number of competing banks and their reputation, and the competition from bond markets.

2.3 Mobile Technology Innovations

Technology has been viewed as one of the most important drivers of expansion of the banking industry around the globe. New innovations in technology may appear to be a cost that banks need to avoid in the era of cost cutting but it should be approached from a different perspective. Technological innovations are more likely to enable banks to provide a variety of products to customers. It may also be the reason why some banks will be far much ahead of the rest. The ability of most banks providing affordable and competitive banking services across geographical boundaries largely depends on the technology adopted. Technology will therefore form the thin line between most successful and less successful banks (Lewis, 2012).

Ondiege (2010) argues that mobile technology has a very huge potential of availing financial and banking services to majority of unbanked populations. He asserts that Sub Saharan Africa has the highest percentage of penetration by deposit taking banking institutions when compared to other regions in the developing world. In order for banks to improve their revenue and performance, they have embraced the use of mobile banking technology to reach many customers in areas where conventional banking never existed. Example of countries where mobile banking has been a success story include; South Africa, the DRC, Zambia and Kenya where mobile phone banking is taking services to remote areas where conventional banks have been physically absent. Subscribers can now open accounts, check their balances, pay their bills, transfer money, and cater for their daily basic needs.” (Ondiege, 2010).

Ondiege (2010) further argues that banks in Africa have realized the potential of mobile banking in reaching prospective customers who are mostly located in rural Africa. He estimates that most of the people in Africa live in the rural areas and have limited access to banking services. The use of mobile banking will therefore reach potential bank customers and this is likely to assist banks in expanding their services and growing their revenues. Mobile is perhaps the most convenient way of providing a bank account to most people who have no access to banking facilities. It is also one of the competitive ways of mobilizing deposits and savings from customers.

2.4 Financial Deepening in the banking industry

Financial depth is often understood to carry three different meanings: The first meaning refers to a situation where sectors and agents are able to use a range of financial markets for savings and investment decisions, including at long securities. The second means that financial intermediaries and markets are able to deploy larger volumes of capital and handle larger turnover, without necessitating large corresponding movements in asset prices and the last one reflects that the financial sector can create a broad menu of assets for risk-sharing purposes. In simple terms, deep markets allow savers to invest in a broad range of quality investment and risk sharing instruments and allow borrowers to likewise tap a broad range of financing and risk management instruments (Goswami and Sharma, 2011).

It is becoming evident that the global banking industry is going through a transformation phase. Berger (nd) argues that the global banking industry will experience major expansion due to various reasons such as the mobile technological innovations that have found expansive application in banking. He further asserts that most countries around the globe have reviewed or removed barriers hence allowing most banks to move beyond some geographical boundaries. Berger (nd) further indicates that the reduction of cost of providing banking services across boundaries due to technological innovations is playing a very significant role in making it possible for banks to handle larger information. These developments are very important in driving the expansion of the banking industry globally.

The mobile technology innovations have enabled most banks to expand their operations beyond national boundaries and this has enabled them to increase their profitability. Gera (2008) indicates that banks across the globe are moving towards the provision of cross border banking services in order to improve their performance. He further confirms that the factor that has made this possible is the removal of most international banking regulatory requirements by most countries as well as the presence of mobile phone technology that has wider applications in banking. Expanding banking services across geographical boundaries is considered to be a priority dream for most banks regardless of whether they are from a developed or developing economy since it plays a significant role in the financial deepening of the industry. For banks to succeed in cross border banking, they need to establish the value adding opportunities and come up with appropriate models such as use of mobile technology that can steer this success. They must also put in place appropriate technology to support and manage cross border operations (Gera, 2008).

According to Berger et al. (2000) cross border banking operations may take the form of mergers and acquisitions. There is however a benefit of cross border banking operations such as improving the cost efficiency of the banks involved through adoption of mobile technology. They further indicate that banks that operate with high efficiency by adopting mobile banking technology enjoy successful expansion of their banking services across the borders. Cross border banking in parts of Europe and United States of America have largely taken the form of mergers and acquisitions whereas in East Africa most banks opt for wholly owned subsidiaries.

According to Oya and Damar (2006) the size of the financial sector, or financial depth can be defined as commercial bank deposits divided by GDP. Such a definition of financial intermediary development is very much in line with the traditional view that the financial sector can contribute to economic activity by mobilizing savings and channeling them towards productive capital investment. However, the traditional view implicitly assumes reasonably well functioning financial intermediaries. The very limited amount of available evidence suggests that the link between financial

development and economic growth may be different under adverse financial sector conditions compared to a case of well-functioning financial intermediaries

2.5 Empirical Review

Several studies have been carried out on financial deepening of the banking industry. Caruana (2005) carried out a study on monetary policy, financial stability and asset prices. The aim of the study was to offer some insights on the relationship between asset price developments, the conduct of monetary policy and the role of financial regulation, in a low inflation environment. It also reviews some recent episodes of financial stress and the experience of asset inflation in the Spanish housing market. The findings from the study revealed that macroeconomic stability and financial stability tend to reinforce each other. However, experience shows that reaching a high degree of macroeconomic stability is necessary but not a sufficient condition for guaranteeing financial stability within a particular economy. This therefore implies that any improvements witnessed in macroeconomic performance may be posing new challenges for financial stability, in particular as regards the role of asset prices. This study did not actually address fully the aspect of financial deepening in the banking industry.

In order to bridge the gap left by Caruana (2005), a study was carried out by Soo (n.d) on the financial sector deepening and economic growth. The study focused on evidence from Turkey. The study based its argument on the fact that despite the fundamental structural changes that had been made in the banking industry, resource mobilization and allocation by the banking sector are still limited. The study came up with a number of observations such as the restructuring of state owned commercial banks; restructuring of commercial banks which has to be designed and implemented comprehensively and promptly. Regarding comprehensiveness, reforms on governance, accounting, legal and regulatory framework, and supervision the study recommended that they have to be carried out simultaneously so that they can cover all issues on stock and flow improvement as well as operational efficiency. These changes have the ability to enhance financial deepening within the banking sector.

According to Ondiege (2010) Improving access to financial services can contribute to transforming peoples' lives in developing countries. However, the majority of the

ordinary people in these countries still have limited access to these services. He further argues that the new technology-based financial services, such as mobile phone banking and the use of smartcards, have the potential to substantially increase people's access to finance. In South Africa, the DRC, Zambia and Kenya for instance, mobile phone banking is taking services to remote areas where conventional banks have been physically absent. Subscribers can now open accounts, check their balances, pay their bills, transfer money, and cater for their daily basic needs. Mobile phones are also being used now for other public services such as monitoring elections and delivering public health messages.

Chan and Jia (2011) also conducted a study on the role of mobile banking in facilitating rural finance. The study hypothesized that mobile banking has the potential of reducing financial inequality between the urban and the rural areas. The study focused on the efforts made by financial regulators in China in order to change the situation as far as rural finance services are concerned. It was established that mobile service providers are entering into strategic alliances with banks to provide banking services to the rural majority. It was also revealed that this strategic partnership enables commercial banks to achieve financial deepening. However, the study confirmed that the financial deepening in the banking industry enhanced by mobile technology cannot be successful without proper cooperation from the regulators.

Ongore and Kusa (2013) conducted a study to establish the determinants of financial performance of commercial banks in Kenya. The study mainly focused on the effect of bank ownership structure on the financial performance of commercial banks in Kenya. It was evident from the findings of the study that bank specific factors significantly affect the performance of commercial banks in Kenya, except for liquidity variable. The study also revealed that the overall effect of macroeconomic variables did not have a significant impact on the financial performance of commercial banks in Kenya since it has a significance level of 5%. It was also clear from the finding that the moderating role of ownership identity on the financial performance of commercial banks was insignificant to the financial performance of commercial banks in Kenya. The study therefore concluded that the financial

performance of commercial banks in Kenya is driven mainly by board and management decisions, while macroeconomic factors have insignificant contribution.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter highlights the research methodology the researcher employed in conducting this study. Among the issues discussed herein include the research design that was employed, the population targeted by the study, the sample size and how it was selected, the data collection methodology and instruments as well as the data analysis and presentation techniques used in analyzing the data that was collected.

3.2 Research Design

This study adopted descriptive research of cross sectional type since it was a survey of all commercial banks in Kenya. Tanur (1982) asserts that a survey is a means of collecting information about a large group of elements referred to as a population. A survey has three characteristics: to produce quantitative descriptions of some aspects of the study population in which case it is concerned either with relationships between variables, or with projecting findings descriptively to a predefined population; data collection is done by asking people structured and predefined questions and data is collected from a fraction of the target population (Pinsonneault and Kraemer, 1992).

3.3 Population and Sampling

The population of the study in this research included all the commercial banking institutions operating in Kenya. Central Bank of Kenya (2012) indicates that there were 43 licensed and operational commercial banks as at December 2012. The 43 banks therefore formed the target population of the study. The study involved a census of all the commercial banks in Kenya.

3.4 Data Collection

The study made use of secondary data on the deposits and other transactions of the banking industry for the last five years from 2008 to 2012. The data collected specifically related to number of customers registered in the mobile banking networks of the commercial banks; the volume of transactions the commercial banks handle based on mobile phone banking technology and the deposits mobilized through

mobile banking. The researcher relied on several sources for the data; audited and published financial statements of the target banks, the Central Bank of Kenya, the Kenya National Bureau of Statistics and some directly from the banks.

3.5 Data Analysis

This study sought to establish the relationship between mobile banking innovations and the financial performance of commercial banks in Kenya. In order to achieve this objective, the researcher used regression analysis to establish the relationship. The study adopted the following analytical equation in conducting regression analysis.

$$\mathbf{BI_D} = \mathbf{a} + \mathbf{b_1 X_1} + \mathbf{b_2 X_2} + \mathbf{b_3 X_3} + \mathbf{e}$$

Where : **BI_D** represents Banking Industry Financial Deepening which was measured through total commercial bank deposits as a percentage of GDP in the last five years; **a** represents the **BI_D** intercept when the independent variables assume a value of zero; **X₁** represented the number of customers reached through Mobile Banking Technology; **X₂** represented the volume of transactions that are handled through mobile banking annually while **X₃** represented the deposits that have been mobilized through mobile banking innovations. The findings of the study were presented by tables.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

The main purpose of this study was to establish the effect of mobile phone technology innovations on financial deepening within the banking industry in Kenya. The study made use of secondary data. The researcher managed to collect data on 35 commercial banks in Kenya. This translates to a response rate of 81% that was considered sufficient for this study for the purpose of generalization of findings.

4.2 Summary statistics

Multivariate regression analysis was conducted where the total deposits of commercial banks as a percentage of the GDP was the dependent variable and number of customers reached through Mobile Banking Technology as a percentage of the total number of customers; volume of transactions that are handled through mobile banking annually as a percentage of the total volume of transactions and deposits mobilized through mobile banking innovations as a percentage of the total deposits were the dependent variables. The results are presented next.

Table 4.1: Model summary

Year	R	R Square	Adjusted R Square	Std. Error of the Estimate	Adjusted R Square
2008	.568 ^a	.291	.273	.365	.568 ^a
2009	.574 ^a	.320	.285	.375	.584 ^a
2010	.621 ^a	.370	.321	.485	.611 ^a
2011	.632 ^a	.391	.334	.491	.622
2012	.633 ^a	.396	.336	.436	.624 ^a
2008-2012	.594 ^a	.354	.292	.382	.586 ^a

- a. Predictors: (Constant), number of registered customers on mobile banking, total number of transactions executed through mobile banking, total deposits made through mobile banking

The study sought to establish the effect of mobile phone technology innovations on financial deepening within the banking industry in Kenya. From the results tabulated above, the study reveals that the r square value for the year 2008 was 0.291. This implies that total deposits of commercial banks; number of customers reached through Mobile Banking Technology and volume of transactions that are handled through mobile banking annually account for 29.1% of the deepening in the banking industry. This is an indication that in the year 2008 the unexplained variance in financial deepening was 70.9 that is not explained by mobile technology innovations.

In the year 2009, the study established that the r square value for the year was 0.320. This is a reflection that the three independent variables of the study explain a total of 32.0% of the variance in financial deepening in the banking industry. The unexplained variance for the year was 68% which is attributed to other variables not included in this study. Equally in the year 2010, the findings reveal that mobile phone

innovations accounted for 32.1% of the financial deepening in the banking industry in Kenya. This left an unexplained variance of 67.9%. In the years 2011, the results in the table above confirm that the r square value for the year was 0.391. This confirms that total deposits of commercial banks; number of customers reached through Mobile Banking Technology and volume of transactions that are handled through mobile banking annually explain 39.1% of the financial deepening that was experienced in the banking industry.

In the year 2012 mobile phone innovation accounted for 39.6% of the deepening in the banking industry in Kenya. The overall regression results for the five years indicate that mobile phone innovations accounted for 35.4% of the financial deepening in the banking industry in Kenya. This is an indication that financial deepening in the banking industry for the duration between 2008 and 2012 was partly explained by innovations in the mobile phone sector and other variables that also accounted for 64.6% of the remaining variance in financial deepening in the industry. It was also clear from the study that the variance of financial deepening in the banking industry explained by mobile phone innovations increased steadily from the year 2008 to 2012. This is an indication that this sector has the potential to account for even higher variance in financial deepening of the banking industry in Kenya.

Table 4.2: Anova

Year	Model	Sum of Squares	Df	Mean Square	F	Sig.
2008	Regression	4.854	7	.524	2.147	.212
	Residual	8.454	36	.235		
	Total	13.298	45			
2009	Regression	3.758	5	.423	2.004	.198
	Residual	6.439	25	.348		
	Total	10.188	30			
2010	Regression	4.652	8	.462	2.214	.204
	Residual	7.322	28	.143		
	Total	11.974	36			
2011	Regression	3.654	8	.398	1.985	.186
	Residual	6.411	28	.134		
	Total	10.065	31			
2012	Regression	3.245	6	.324	1.874	.174
	Residual	6.214	22	.132		
	Total	9.459	28			
2008-2012	Regression	4.168	6	.354	2.312	.154
	Residual	6.111	26	.121		
	Total	10.279	32			

From Table 4.2 above it is evident that the in the year 2008 the significance of the regression model was 0.212; in 2009 the significance of the regression model was 0.198; in 2010; the significance of the model was 0.204; in 2011 the significance of the model was 0.186; in 2012 the significance was 0.174 whereas the significance of the model for the overall regression model for the five years from 2008 to 2012 was 0.154. All the above values observed from the above table indicate the variation in the financial deepening within banks in Kenya explained by the three independent variables was not significant.

Table 4.3: Expected Model

Year	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error			
2008	(Constant)	12.542	.208		3.151	.003
	Total deposits	.621	.247	.457	3.484	.004
	No. of customers	.453	.198	.314	2.947	.009
	Vol. of transactions	.741	.283	.521	3.629	.002
2009	(Constant)	13.574	.232		3.248	.006
	Total deposits	.672	.259	.462	3.578	.005
	No. of customers	.466	.212	.322	3.002	.008
	Vol. of transactions	.759	.302	.543	3.541	.001
2010	(Constant)	13.581	.248		3.389	.007
	Total deposits	.672	.262	.474	3.674	.003
	No. of customers	.478	.224	.336	3.112	.009
	Vol. of transactions	.786	.312	.567	3.614	.001
2011	(Constant)	14.246	.252		3.421	.006
	Total deposits	.672	.271	.487	3.773	.002
	No. of customers	.491	.236	.341	3.121	.008

	Vol. of transactions	.797	.341	.567	3.721	.000
2012	(Constant)	14.542	.271		3.523	.005
	Total deposits	.692	.284	.498	3.823	.001
	No. of customers	.503	.241	.354	3.129	.003
	Vol. of transactions	.812	.374	.612	3.541	.000

From the model coefficients above, it is evident that the three independent variables had positive coefficients from the year 2008 to the year 2012. It can also be observed from the findings illustrated in Table 4.3 above that the total deposits in commercial banks and the volume of transactions through mobile innovations had the highest positive coefficients for all the years from 2008 to 2012. Even though the magnitude of effect of the independent variables on the dependent variable is insignificant over the period under review, it is evident that the values of the coefficients continue to increase each year which is a confirmation that mobile phone innovations' effect on financial deepening in the banking industry continues to increase each year. This confirms that mobile phone innovations technology has the potential to significantly enhance the financial deepening of the banking industry in Kenya.

Table 4.4: Model coefficients for 2008-2012

Year	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error			
2008-2012	(Constant)	13.697	.264		3.151	.003
	Total deposits	.616	.247	.444	3.774	.003
	No. of customers	.464	.201	.314	2.864	.008
	Vol. of transactions	.768	.294	.546	3.524	.001

The overall average regression results for the five years from 2008 to 2012 indicate that the three independent variables associated with mobile phone innovations technology have positive coefficients. The total deposits realized from use of mobile phone technology had a coefficient of 0.616; the number of customers who access banking through mobile phone technology had a coefficient of 0.464 and volume of transactions through mobile had a coefficient of 0.768. The constant for the overall regression results is 13.697. From the above values the study obtained a model that explains the relationship between mobile phone technology innovations and financial deepening of the banking industry in Kenya. The model takes the form of $BI_D = 13.697 + 0.616 X_1 + 0.464 X_2 + 0.768 X_3 + 0.264$. The constant indicates that even without mobile phone technology innovations there was some level of financial deepening within the banking industry. The model obtained indicates that though mobile phone technology innovations have contributed to the financial deepening in the banking industry, it does not account for a larger percentage of the same. There are some other variables that account for the larger portion of the percentage in financial deepening in the banking industry.

CHAPTER FIVE:

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings on the effect of mobile phone technology innovations on financial deepening within the banking industry in Kenya. Presented in the chapter also are the conclusions, recommendations and the suggestions for further research.

5.2 Summary of Findings

The purpose of the study was to establish the effect of mobile phone technology innovations on financial deepening within the banking industry in Kenya. The study utilized secondary data. The total deposits of commercial banks as a percentage of the GDP was the dependent variable and number of customers reached through Mobile Banking Technology as a percentage of the total number of customers; volume of transactions that are handled through mobile banking annually as a percentage of the total volume of transactions and deposits mobilized through mobile banking innovations as a percentage of the total deposits. The findings from the study reveal that mobile technology innovations account for some insignificant level of the financial deepening of the banking industry in Kenya. The percentage of the variance in financial deepening explained by mobile technology innovations was 29.1% in the year 2008 but kept on increasing to 39.6% in the year 2012. The average regression results revealed that on average for the five years covered by this study, mobile technology innovations account for 35.4% of the variance in financial deepening in the banking industry. This implies that for the entire duration of five years the variance in financial deepening not explained by mobile phone technology was 64.6%.

The study also established that the coefficients of deposits through mobile technology, customer number and the volume of transactions had positive coefficients for all the five years from 2008 to 2012. It was also clear that total deposits mobilized through

mobile phone technology and the volume of transactions done through mobile phone technology had high positive coefficients throughout the entire duration of the study. This is an indication that they account for the greatest variance on financial deepening of the banking industry as far as mobile phone technology innovations are concerned. The study finally established that mobile phone technology innovations do not account for the greatest percentage of the financial deepening in the banking industry but it has the potential to account for even greater variance with time due to the trend observed from the study.

5.3 Conclusions

Mobile phone technology innovation currently explains only an insignificant level of variance in the financial deepening of the banking industry in Kenya. The variance explained is not higher than the unexplained percentage indicating there are other variables that explain a greater percentage of financial deepening in the banking industry. There is however an increasing trend in the variance of financial deepening explained by mobile phone technology an indication that it has greater potential of accounting for even higher variance on financial deepening.

5.4 Recommendations

The study has established that mobile phone technology has a potential of enhancing the financial deepening in the banking industry. It will be important for banks in Kenya to invest in mobile phone technology innovations in order to enhance their financial deepening.

5.5 Suggestions for Further Research

Mobile technology innovations are very dynamic. It will be important to repeat this study after another five years and establish whether there are any significant changes in the effect of mobile technology innovation on financial deepening.

References

- Anyasi, F.I., Otubu, P.A. (2009). Mobile phone technology in banking system: Its economic effect. *Research Journal of Information, Maxwell Scientific Organization Technology*, 1(1), 1-5
- Arranz, N. and Arroyabe, J. (2009) Technological Cooperation: A New Type of Relations in the Progress of National Innovation Systems. *The Innovation Journal*, 14 (2)
- Arumugam, S., Jebarajam, T. and Joy, W. (2008) Congestion Control Algorithm In Computer Communication Network. *Journal of Mobile Communication*, 2:93-98, *Pakistan*
- Berger, A. and Smith, D. (nd) Global Integration in the Banking Industry. Jennifer Judge Provided Research Assistance.
- Berger, et al. (2000) Globalization of Financial Institutions: Evidence from Cross Border Banking Performance. *Brookings Wharton Papers on Financial Services*, Vol.3.
- Caruana, J. (2005) Monetary Policy, Financial Stability and Asset Prices. Bank of Spain Occasional Paper Series.
- Chan, A. and Jia, T. (2011) The Role of Mobile Banking in Facilitating Rural Finance: Reducing inequality in Financial Services between urban and rural areas. Accenture Institute for High Performance Series.
- Cheng, H. (1980). Financial deepening in pacific basin countries, *San Francisco Federal Reserve bulletin*, summer 1980, pp. 43-56
- Diamond, D.W.(1984). Financial intermediation and delegated monitoring, *Review of Economic Studies* 51, 393-414.
- Diamond, D.W., and Dybvig, P. (1983). Bank runs, deposit insurance, and liquidity, *Journal of Political Economy* 91, 401-419.

- Diamond, D.W., and Rajan R.G.(2001). Liquidity risk, liquidity creation, and financial fragility: A theory of banking, *Journal of Political Economy* 109, 287-327.
- Dinc, I.S.(2000). Bank reputation, bank commitment and the effects of completion in credit markets: Review of financial studies, *society for financial studies*, vol. 13(3), pp. 781-812
- Friedman, M. (2008) “quantity theory of money”, *The New Palgrave: A Dictionary of Economics*, v. 4, pp. 3–20.
- Fritz, R. (1984). Time Series evidence of the causal relationship between Financial Deepening and Economic Development, *journal of Economic Development*, v. 9, pp. 91-111
- Gera, P. (2008) Finding the New El Dorado: High-performance geographic expansion in banking hinges on the right operating model. *The Point* 8 (9).
- Goswami, M. and Sharma, S. (2011) The Development of Local Debt Markets in Asia,|| IMF Working Paper No. WP/11/132 (Washington: International Monetary Fund, June).
- Hart, O.(1995). Firms, Contracts, and Financial Structure, Oxford: Clarendon Press.
- Hart, O., and Moore, J. (1995). Debt and seniority: An analysis of the role of hard claims in constraining management, *American Economic Review* 85, 567-585.
- Hart, O., and Moore, J.(1998). Default and renegotiation: A dynamic model of debts, *Quarterly Journal of Economics* 113, 1-41.
- Hawkins, J & Mihaljek, D. (2000) The banking industry in the emerging market economies:
- <http://www.pwc.com/ke/en/industries/banking.jhtml> accessed on 11th March 2013

Karim Dahou, K., Omar, H. and Pfister, M. (2009) Deepening African Financial Markets for Growth and Investment. A paper presented to the Ministerial and Expert Roundtable of the NEPAD-OECD Africa Investment Initiative on 11-12 November.

Lewis, S. (2012) Making the right moves: Global banking outlook 2012-2013:

[http://www.ey.com/Publication/vwLUAssets/Making_the_right_moves_-_Global_banking_outlook_2012-2013/\\$FILE/Making-the-right-moves_Global-banking-outlook-2012-13.pdf](http://www.ey.com/Publication/vwLUAssets/Making_the_right_moves_-_Global_banking_outlook_2012-2013/$FILE/Making-the-right-moves_Global-banking-outlook-2012-13.pdf) accessed on 12th June 2013

Njenga, A. (nd) Mobile Phone Banking: Usage Experiences in Kenya. Catholic University of Eastern Africa.

Ondiege, P. (2010) Mobile Banking in Africa: Taking the Bank to the People . *Africa Economic Brief*, 1 (8).

Ongore, V. and Kusa, J. (2013) The determinants of financial performance of commercial banks in Kenya. *International Journal of Economics and Financial Issues*, 3 (1): 237-252

Oya, P. and Damar, H. (2006) Financial Sector Deepening and Economic Growth: Evidence from Turkey. Pacific Lutheran University.

Pinsonneault, A. and Kraemer, K (1992) Survey Research Methodology in Management Information Systems: An Assessment, Working Paper #URB-022

PwC Industry survey. (n.d). Retrieved from

<http://www.pwc.com/ke/en/industries/banking.jhtml> on 11th March 2013

Rogers, E. M. (2003). Diffusion of innovations(5th ed.). New York, NY: Free Press.

RSM (2012) Kenya's Banking Sector Performance in 2011. RSM Ashvir Communique Newsletter.

- Ryan, B., & Gross, N. (1943). The diffusion of hybrid seed corn in two Iowa communities. *Rural Sociology*, 8(1), 15-24.
- Sanya, S. and Gaertne, M. (2012) Assessing Bank Competition within the East African Community . International Monetary Fund Working Paper Series WP/12/32.
- Soo, N. (2006) Financial Deepening in the Banking Sector—Viet Nam. *Financial Markets Review*.
- Stiglitz, J. (2008) Crises Today and the Future of Capitalism. The 10th D. T. Lakdawala Memorial Lecture. Institute of Social Sciences, New Delhi 20 December.
- Sullivan, O. (2008) Defining Innovation . Available at http://www.sagepub.com/upm-data/23137_Chapter_1.pdf. Accessed on 4/8/2013.
- Tanur, J.M. (1982) Advances in methods for large-scale surveys and experiments, in R. Mcadams, N.J. Smelser, & D.J. Treiman (eds.), *Behavioral and Social Science Research: A National Resource, Part II*. Washington, D.C.:National Academy Press.
- Tarde, G. d., & Parsons, E. W. C. (1903). *The laws of imitation*. New York,: H. Holt and company.
- Teng, J.T.C., Grover, V., & Guttler W. (2002). Information technology innovations: General diffusion patterns and its relationships to innovation characteristics. *IEEE Transactions on Engineering Management*, 49(1), 13-27.
- Wangui, E. (2011) A survey on cloud computing adoption in Kenya's banking Industry. An MBA project submitted to the University of Nairobi.
- Wasilwa, M. (2003) A survey of computer security vulnerability in the banking industry in Kenya. An MBA project submitted to the University of Nairobi.
- Wennerlind, C. (2005), "David Hume's monetary theory revisited", *Journal of Political Economy* **113** (1): 233–237