DETERMINANTS OF MOBILE BANKING REVENUES: A CASE STUDY OF CO-OPERATIVE BANK OF KENYA

PAUL NYAKUNDI NYANDIKA

X50/76217/2012

RESEARCH PAPER SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF ARTS IN ECONOMICS OF THE UNIVERSITY OF NAIROBI

OCTOBER 2014

Declaration

This is my original work and to the best of my knowledge this paper has not been presented for award of a degree in any other university.

PAUL NYAKUNDI NYANDIKA

SIGNATURE ……. **DATE…….**

This paper has been submitted for the award of the degree of Master of Arts in Economics with our approval as university supervisors.

DR. SETH GOR

SIGNATURE ……. **DATE…….**

PROF. LEOPOLD P. MUREITHI

SIGNATURE ……. **DATE…….**

Dedication

I dedicate this paper to my family and friends for their undying support and for giving me ample time to study for the program. Finally, I dedicate the paper to my son Alvin so that it serves as encouragement for him to work extra hard in school.

Acknowledgement

My deepest gratitude goes to the Almighty God for giving me the strength to endure and complete this program. I also thank the University of Nairobi, School of Economics for giving me this invaluable chance to pursue a Masters of Arts Degree in Economics.

I wish to thank my supervisor Dr. Seth Gor for his unwavering guidance and support ever since my undergraduate days up to this point moulding me into who I am. A big thank you to Prof. Leopold P. Mureithi for his timely and precise counsel which was incomparable.

Special thanks goes to my classmates and colleagues for it's through teaming with them that we managed to accomplish a number of tasks. A vote of thanks is extended to my colleagues Abdullahi Hilal and David Muriithi who provided invaluable peer review during the entire project.

Despite all the valuable assistance, the viewpoints expressed herein are my own and do not represent the views of the person(s) and/or institution(s) mentioned in the study. I am solely responsible for any errors and/or omissions in this paper.

Abstract

This study investigated the determinants of mobile banking revenues in Kenya focusing on co-operative bank of Kenya as a case study. The study had four objectives namely; to determine the relationship between the number of uptime hours and mobile banking revenues; to determine the impact of transactional charge on mobile banking revenues; to determine the effect of the number of active subscribers on mobile banking revenues; to determine the impact of advertising budget on mobile banking revenues. The study used quarterly time series data for the period between 2004 and 2013.We employed Augmented Dickey Fuller test to test for stationarity, Johansen co-integration test to test for co-integration and the Vector Error Correction Model. The results of the research showed that one period lag in mobile banking revenue, advertisement expenditure and customer numbers had a positive and significant impact on mobile banking revenue. In conclusion we argue that for local banks to reap maximum mobile banking revenues they should focus on increasing the number of customers registered for the service, plough back previous period revenues in expansion of mobile banking infrastructure and spend more on advertisement and publicity of the service.

Table of contents

List of tables

List of figures

Abbreviations and acronyms

ABC	Activity Based Costing
ATM	Automated Teller Machine
IVR	Interactive Voice Response
EFT	Electronic Funds Transfer
ESQ	Electronic Service Quality
KBA	Kenya Bankers Association
Kes	Kenya Shillings
LAN	Local Area Network
MPI	Malmquist Productivity Index
PIN	Personal Identification Number
SACCO	Savings and Credit Co-operatives
SMS	Short Messaging Service
USSD	Unstructured Supplementary Service Data
WAP	Wireless Application Protocol

Operational definition of terms

Automated Teller Machine	An electronic device that allows customers of a financial institution to access financial transactions without need for a cashier.
Browser	A software for accessing data and information on the World Wide Web.
Electronic Banking	An umbrella term for all the media through which a customer can perform banking transaction without visiting the banking halls.
Interactive Voice Response	A computer based technology used to interact with a database via the use of voice and dual-tone multi-frequency signaling tones input via keypad.
Mobile Application Clients	Mobile hardware or software that has capabilities to access a service hosted by a server.
Mobile Banking	A platform that enables banks and financial institutions to carry out transactions through portable devices like mobile phones.
Personal Identification Number	A numeric password unique to an individual that is used to authenticate the individual to the system.
Short Messaging Service	A component of mobile telecommunication system with standardized protocol which enables mobile phones to exchange short text messages.
Uptime	Time counter since the last system reset
Wireless Application Protocol	The general standard used to access information over mobile networks.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the study

Financial innovation has been a hallmark of the ever developing financial industry. Allen (2011) defines innovation as the act of inventing new products and processes for economic usage through licenses, imitation or mere adoption. History of financial innovation can be traced to introduction of the coinage back in the 17th Century at the Greek state of Lydia. The 20th century saw a flurry of financial innovations from the mechanical devices to the operational procedures and contractual obligations such as future contracts on municipal bonds (Allen, 2011).

Appropriate banking set up has always been considered a key pillar of economic growth (Adeya, 2003). With the current wave of information driven economy, the banking industry in Kenya has found technological indulgence inevitable. Given the huge appetite for finance oriented services, banks and other non-bank financial institutions have joined the competition in an attempt to grab a piece of the perceived technology driven revenues within the banking industry. The need to provide convenient and affordable services to customers has prompted banks to come up with innovative and value adding services (Donner, 2005).

One innovation that is worth mentioning is mobile banking service. Mobile banking refers to the provision of conventional banking services via mobile telecommunication gadgets. It is meant to provide banking facilities to those with limited access to the banking halls. This platform is provided by financial institutions in collaboration with mobile telephony operators. It is mainly embedded amongst other services within the service menu of the mobile service providers.

Services provided under this platform include funds transfer, balance enquiries, payment of bills and accounts alerts (Mohr, 2001).

Technologies supporting mobile banking are mainly four. First is the Short Messaging Service (SMS) integration where the customer asks for information through an SMS with a command to a specified number. There is also the Interactive Voice Response (IVR) where a touch tone telephone is used to interact with a database and to get information. Mobile banking can as well be enabled through Standalone Mobile Application Clients which are easily customized according to the user interface on the mobile phone. Finally there is the Wireless Application Protocol (WAP) where the bank hosts WAP sites that customer's access using compatible browsers on their phones (KBA, 2014).

The banking industry in Kenya is well established with forty four commercial banks and one mortgage finance institution duly categorized as large, medium and small banks based on asset base. Further, these banks are classified as either retail or corporate depending on their client target. Regulation in this industry is done by the central bank through enforcement of prudential guidelines. Competition is stiff between banks and the demand for banking services is ever increasing in tandem with economic growth. There is urgent need to enhance service delivery for the customers so as to stay competitive in the industry (Adeya, 2003).

In recent times, commercial banks in Kenya have faced stiff competition from micro finance institutions and co-operative societies. This competition and high cost of deposits has eaten into much of the banks' incomes. Mobile banking platform has provided a key source of alternative income. Though it has not fully supplemented the lost interest incomes, mobile banking commissions have substantially boosted the revenues of commercial banks. Data from Banking Survey 2013 indicated that the banking industry revenues from mobile banking platform stood at

Kes. 2.46 billion by close of 2013. This revenue has been growing over time both as a proportion of the industry's total profit and in absolute terms as indicated in Table 1.1. The number of customers who have subscribed to this service has grown from 150,000 in 2004 to close to 11 million by end of 2013. Essentially 60% of the adult population with bank accounts have subscribed to this service (Think Business, 2014).

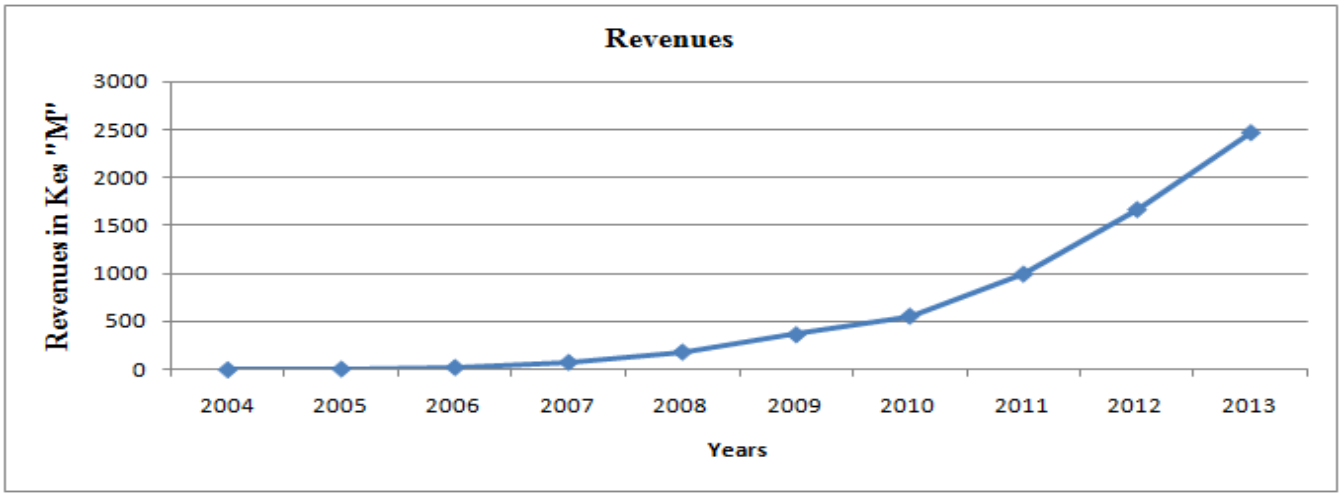
Table 1.1 Banking Industry Mobile Banking Revenues Vis a Vis Banks Profit

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Profit Before Tax (Kes in Millions)	13,312	13,982	18,394	25,629	34,274	44,066	48,758	73,495	92,346	117,292
Mobile banking revenues (Kes in Millions)	1	9	26	79	185	365	558	995	1,665	2,463
Percentage of profit from mobile banking	0.01%	0.06%	0.14%	0.31%	0.54%	0.83%	1.14%	1.35%	1.80%	2.10%

Source: Think Business (2014)

From Table 1.1 it is evident that mobile banking revenue commissions as a percentage of total profits in the banking industry has been on an upward trend. Revenues from this platform have equally risen from Kes 1M in 2004 to Kes 2.46B in 2013 as can be seen in Figure 1.1.

Figure 1.1 Mobile Banking Revenues



Source: Think Business (2014)

This study seeks to carry out a research on mobile banking revenue collection at Co-operative Bank of Kenya. Co-operative bank is a fully fledged commercial bank offering savings and lending services to retail, corporate and government clientele. It is the third largest bank in terms of asset base and third largest in terms of branch network. Co-operative bank has a network 120 branch outlets and 600 banking agents. It operates over 500 on-site and offsite automated teller machines across the country and in South Sudan that are strategically located to provide accessible financial services to its customers. The banks customer base stands at 3.5 million translating to 23% of 13 million Kenyans with bank accounts. The enrollment for mobile banking service at the bank stands at 1.8 million with the active ones being 950,000. It has branches and agencies in all the 47 counties thereby providing a good sample for the study of mobile banking revenues (www.co-opbank.co.ke).

Wanyama (2009) found out that there are about 12,000 registered cooperative societies in Kenya with a combined membership of 8 million and assets worth Kes 200 billion. The cooperative societies have a foot print in every village of the 47 counties in Kenya. His study further pointed out that 85% of these societies mobilize their member's savings through Cooperative Bank. Cooperative bank has made it possible for these members to remit their monthly contributions through the pay bill number 400200. With the 3.5 million customers and the 85% cooperatives movement members, cooperative bank can be construed as having the most used and all-encompassing mobile banking platform in Kenya.

Co-operative bank of Kenya embraced the concept of mobile banking in 2004. It was the pioneer bank for this service. The platform was received with mixed reactions from all quarters. It was initially run on SMS integration which was the only option available then. It was slightly cumbersome and unfriendly to the illiterate due to its multiple commands. In 2007 the bank

switched to Unstructured Supplementary Service Data (USSD) integration option with *667# as the unique dial number. The USSD integration has room for extra mobile banking applications. Security on the mobile banking platform is based on Personal Identification Number (PIN) with the bank's ATM switch as a support host of the PIN (www.co-opbank.co.ke).

Being the first of its kind, the platform initially facilitated balance enquiry only. It later developed more functionality such as alerts, transfers and payment of utility bills. This platform later got some auxiliary support from financial innovations such as M-pesa, Airtel money and YU cash. This support came with new functionalities such as accounts opening, airtime purchase and agency banking (www.co-opbank.co.ke).

Revenues associated with co-operative bank mobile banking have gradually grown over the years both in absolute terms and relative to the banks' profits as can be seen in Table 1.2.

Table 1.2 Cooperative Banks Mobile Banking Revenues Vis a Vis Banks Profit

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Profit Before Tax (Kes in Millions)	356	714	1,256	2,319	3,359	3,736	5,771	6,362	9,970	10,872
Mobile banking revenues (Kes in Millions)	2	5	12	45	74	108	169	215	354	417
Percentage of profit from mobile banking	0.56%	0.70%	0.96%	1.94%	2.20%	2.89%	2.93%	3.38%	3.55%	3.84%

Source: Co-operative Bank of Kenya Annual Financial Statements

Although most of the initial revenues were ploughed back as capital expenditure for roll out of the platform, the bank now enjoys the benefits of the service through increased net commissions. The number of registered mobile banking customers stood at 1.8 million generating commissions to the tune of 417 million as at end of year 2013 (www.co-opbank.co.ke). Within the bank, the department has grown from being a back office operational desk to a fully fledged revenue

generating department. Being the pioneer bank in embracing the mobile banking platform as well as having the highest number of mobile banking customers directly through its customers and indirectly through the SACCO members makes co-operative bank an ideal research point of mobile banking revenues in the industry (www.co-opbank.co.ke).

1.2 Statement of the problem

Banking industry plays a key role in the economy by providing financial support in the form of loans and advances as well as facilitating transactions to individuals, firms and the government. Over the years this industry has strived to ensure total financial inclusion of all economic agents while at the same time remaining profitable and has turned to technology so as to achieve these goals. Mobile banking is one technology that has assisted banks achieve these twin goals. Over 8 million bank customers can access their accounts anywhere any time through mobile banking thereby addressing the goal of financial inclusion. Revenues associated with mobile banking stood at 2.46 billion shillings at close of the year 2013 boosting the overall profitability of banks. The multiplier effect of mobile banking has been huge as can be attested to by the level of financial inclusion and revenues generated.

Despite the immense contribution that mobile banking has made to the economy, little research is available locally on what drives revenues associated with it which will eventually give a picture on the long term sustainability of the technology. This paper seeks to empirically assess what drives mobile banking revenues in co-operative bank thereby filling the knowledge gap on what drives revenues that banks generate from investing in this technology.

1.3 Research questions

The study will be guided by the following questions:

i) What is the influence of transactional charge on mobile banking revenues?

ii) What is the influence of the number of active subscribers on mobile banking revenues?

iii) What is the effect of the number of uptime hours on mobile banking revenues?

iv) What is the impact of the advertising budget on mobile banking revenues?

1.4 Objectives of the study

The main objective of this study is:-

i) To identify the factors determining mobile banking revenues at Co-operative bank of Kenya.

The specific objectives are:-

i) To determine the relationship between the number of uptime hours and mobile banking revenues.

ii) To determine the impact of transactional charge on mobile banking revenues.

iii) To determine the effect of the number of active subscribers on mobile banking revenues.

iv) To determine the impact of advertising budget on mobile banking revenues.

1.5 Significance of the study

The findings of this study will be useful to various segments of the population. Policy makers and revenue strategists in the banking industry will use the findings to estimate their anticipated revenues from the service. They will also know what level of service they should demand from the mobile banking platform providers by looking at the impact of uptime hours on the revenues.

Banks will get to understand how much of their advertising budget needs to be allocated to mobile banking.

The findings of this study will also give some insights on the amount of revenues government should anticipate from levying excise duty on mobile banking services. Information service providers as well as advertising agents will get to know what level of service is expected from them. Finally, the study will provide valuable information to other researchers planning to conduct further research on the topic of mobile banking services.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter presents the theoretical applications of technology in economics as presented by various generations of economists. It also reviews some previous works that have been done on mobile banking revenues as an alternate source of bank revenues in addition to discussing the overview of the chapter

2.2 Theoretical literature review

Theoretical link between financial innovation and economics is an area that has been extensively looked into from as early as the era of Adam Smith (Negishi, 1989). Not only did he emphasize the gains achieved from specialization through the process of division of labor, he also emphasized the gains from technological improvement to production process and capital equipment. Adam Smith went on to further recognize a version of technology transfer from suppliers to consumers and the role of a functional research and development unit in the economy (Kamesam, 2001).

The Schumpeterian trilogy provided a vital taxonomy in economics and technology (Stoneman, 1995). The first phase is the process of invention. This is the phase that encompasses creation or generation of new ideas. The second phase is innovation which is the introduction of the newly invented products into the markets. Finally there is the diffusion stage. According to Schumpeter, this is the spreading out of the new process or product into potential markets. The impact of any new innovation is assessed at the diffusion stage by measuring how much the economy changes

due to new technology. Further, Schumpeter looks at technological innovation as "creative destruction" because the whole process of innovation creates new units that continually replace the outdated units (Stoneman, 1995).

The link between economic growth and innovation was articulated at an intuitive level by Robert Solow. His works introduced innovations into formal economic growth models. Solow defined growth as the increase in gross domestic product per hour of labor per unit of time. His model measured the proportion of economic growth that was attributable to addition of capital such as investments in equipment and related machinery since economist of that time viewed capital accumulation as the primary determinant of growth. However, only a quarter of the calculated economic growth could be attributed to capital accumulation. Solow's views were driving to the point that the remaining three quarters of growth were as a result of technological change. The magnitude of his findings placed the role of innovation in economic growth and development at the center stage (Gundlach, 2005).

Solow's view of the relationship between innovation and growth has been modeled by various scholars in different ways. More recent advances on the Solow model were by Lucas and Romer who reiterated the need for human capital development and knowledge spillovers. Lucas's model viewed human capital as having constant returns rather than diminishing returns. This offered useful insights into the critical role of a highly skilled labor workforce in the long run. Romer's model endogenized innovation by introducing knowledge spillovers. He asserts that firms engage in research and development because they anticipate more profits. Firms will allocate funds to research and development for as long as the expected returns from this investment will be higher than any other allocation of the resources. Investment in research and development results into two types of knowledge. The first type is what Romer refers to as appropriable knowledge. This

is the type of knowledge that the firm can use alone and exclude others from using thereby generating profits from it. The other class is what Romer call non-appropriable knowledge. It has attributes of a public good and a firm cannot prevent others from using it. The more firms conduct research and development the more they apply human capital into knowledge stock. In the process, the firm contributes into increasing knowledge stock unintentionally. The unintentional increase of knowledge stock is what Romer calls knowledge spill over (Gundlach, 2005).

2.3 Empirical literature review

2.3.1 Studies on electronic banking technology

Manoharan (2007) studied various dimensions of electronic banking in private and public banks in India. The study focused on ten factors and five dimensions of electronic banking usage for private and nationalized banks respectively. The study concluded that systems uptime was an invaluable asset of the e-banking platform, providing unmatched competitive edge, long term relationship as well as brand loyalty. The study concluded that the best approach to sustained e-banking revenues was to deliver high level system uptime and reliability.

Suresh (2008) examined the impact of product and service quality on customer satisfaction. The research selected 149 respondents from a well-known café in Kuala Lumpur, Malaysia. To ascertain the validity and reliability of the questionnaire, psychometric tests were carried out. The study found a positive relationship between quality service and client satisfaction. The study proceeded to expound on the importance of quality of service in relation to customer satisfaction.

Qureshi et al. (2008) evaluated the extent of electronic banking adoption in Pakistan. The study found out that a huge number of bank customers were taking up electronic banking due to a number of factors such as reliability, usefulness, privacy and security. The other factor was amount of information provided to the customers by different means such as advertisement through print and electronic media about the benefits of electronic banking. These factors were found to have strong and positive effects on the customers to accept electronic banking. The study also found that electronic banking was getting appreciation in different parts of Pakistan and almost 50% of customers had shifted from traditional banking to electronic banking system.

Seelenatha (2007) studied changes in banking industry between 1989 and 2004 in terms of productivity, market structure and efficiency by employing Malmquist Productivity Index (MPI). The research indicated negative results during the first half of the research period and an improvement during the second half and concluded that financial deregulation did not improve efficiency. The study found out that technical efficiency had a positive relationship with operational risk, profitability and liquidity and negative with line of business and product quality. The study also concluded that a financial institution's technical efficiency and relative market power had huge influence on returns on asset.

Ramalingam (2009) studied the usage trend of electronic banking products in India. Questionnaires were administered to a sample of 400 residents. The outcome of the study revealed that high income group and married persons used electronic banking products largely due to convenience and Citibank's electronic products were most popular because of their aggressive advertising. The study also revealed that mass media advertisement improved the overall uptake of electronic banking products.

Raopun (2005) highlighted the level of electronic banking in Thailand while comparing the overall service quality of electronic banking. The author used eight variables namely, reliability, durability, performance, features, serviceability, aesthetics, conformance and perceived quality. Findings indicated that system's security, information accuracy and reliability were the most important aspects while perceived quality of the bank was found to be the least important.

Wenninger (2000) studied the concept of electronic banking highlighting the challenges encountered while implementing the platform. The study looked into the various electronic banking mediums such as ATM, electronic funds transfers (EFT), Mobile banking and internet banking. Various banks' websites were reviewed and it was found that private banks were providing better electronic banking platforms than the public banks. The research concluded that electronic banking is important for improving the quality of a banks product whilst marketing them at the same time.

Harris and Spence (2002) explored the ethical issues of e-commerce with a focus on the banking industry. The study specifically looked at the online foreign exchange in investment banks. The aspects keenly looked into were trust, transparency, freedom of choice and responsibility in regards to fraud events. The study found out that electronic banking had forced the financial institutions to reorganize their institutional arrangements. For electronic banking to be successful, it was necessary for ethical rules and regulations to be adhered to, fraudulent activities to be controlled and transparency to be maintained in all transactions.

Zeithaml (2002) researched on service delivery via electronic channels. The study highlighted the definition, measurement and conceptualization of the quality of electronic channels while offering suggestions on future research. While measuring quality of electronic services, the author developed an Electronic Service Quality (ESQ) scale which he divided into two sub

scales. The first sub scale was the core scale whose measurable attributes were reliability, efficiency and privacy. The second sub scale was the recovery scale with compensation, responsiveness and contact as the measurable qualities. The ESQ was initially described in terms of its dimensions then the qualities that made up each dimension. The study found out that attributes of the core scale were more important than those in the recovery scale. The author concluded that experience, demographic and behavior also affect the ESQ which were not included in the research but needed to be studied.

Joseph et al. (1999) studied the impact of electronic banking on service delivery by the banks. The study concluded that when clients were in direct contact with the technology like in internet banking they exercised better control than when there was absence of direct contact as in the case of telephone banking. Questionnaires were administered to a sample of 440 electronic banking customers. Six factors were chosen to review extent of service delivery by electronic banking. The factors chosen were accessibility, convenience, queue management, efficiency, accuracy and queue management. Accessibility and efficiency were found to be important to excellent service delivery.

Mantel (2000) proposed a framework for evaluating why customers take up electronic banking products such as e-cash, debit cards, electronic bill payment, stored value cards and credit cards. The study found out that customer behavior was in line with their preference which included control, privacy, convenience, personal involvement and security. The paper concluded that consumers constantly make rational decisions with regards to alternative electronic payments instruments. Further, the study found out that communication power, convenience and greater control were the notable reasons why consumers migrated to electronic payments products.

Gabriel et al. (2005) evaluated the quality of electronic banking services and the customer satisfaction thereof. The study surveyed 11,000 customers in Brazilian banks. The factors used in this survey were; business and financial transactions, relationship with the customers, image of the bank, brand and information technology. Out of these, the study concluded that relationship with customers and business and financial transactions impacted the most on the customer satisfaction. The researcher asserted that electronic banking evolves so fast and quality should be maintained at all times so as not to lose customers to competition.

Alu et al. (2002) evaluated the impact of advancement in information technology in Nigerian banks. The analysis was done through a structured questionnaire conducted on 1,256 respondents. The findings of the study revealed that 86% felt that information technology made their banking easier while 10% disapproved of information technology. The study revealed that information technology had considerable impact on bank service delivery, customer service, banks productivity and banks patronage.

2.3.2 Studies on banks' costs, revenues and profits

Ahasanul (2009) studied the effects of customer base on revenues of public banks in Malaysia. The study concluded that customer base has significant influence on deposits, advances and profitability. The study also found that with huge customer base these banks generated more incomes from fees and commissions. Electronic banking was found to be unreliable in these banks since it was based on mass production. The study concluded that the revenues from electronic banking were larger than the cost thereof due to the fact that these banks were enjoying economies of scale.

Uppal (2007) examined the effect of mobile banking in India from 2000 to 2007. While using a simple econometric model, the study concluded that of all electronic banking channels, mobile banking was the most effective. Further, the study shows that whilst mobile banking is not popular amongst the old private sector and public banks, it holds a strong position in the foreign as well as new private sector banks. From the study, it was evidenced that mobile banking customers form the highest proportion in the category of electronic banking clients and had the biggest positive impact on the net profits. Foreign banks were the best in provision of mobile banking due to the fact that their efficiency was better than the other groups. They were followed by those in the new private sector banks category.

Unnithan and Swatman (2001) described the impact of electronic banking adaptation in the Australian and Indian banking sectors with the aid of quantitative and qualitative analysis. The researcher found out that in Australia electronic banking usage was more with 37% of the population enrolled for electronic banking products. This was due to the fact that a huge proportion of the population was literate with stable incomes. On the other hand, the uptake in India was lower due to weak infrastructure and customer reluctance especially in the rural areas. However, in both countries electronic banking was found to be a strategic weapon for financial institutions to remain profitable in highly volatile economic times.

Nataraajan and Angur, (1999) evaluated consumers' reaction to changes in transactional cost of electronic banking. Data was collected from 150 retail banking customers of the Klang valley area, Malaysia. The respondents were divided into upper, middle and lower class income earners. Results showed that upper class income earners were not highly reactive to changes in the cost of electronic banking transactions. The middle class earners were found to be more reactive if the

changes in transaction costs crossed a particular threshold. Lower class income earners expressed a high degree of price sensitivity.

Siam (2006) studied the impact of electronic banking on the profitability of banks in Jordan. The study evaluated the benefits of providing electronic banking services via internet and its overall impact on bank profitability. The results of the study revealed that electronic banking services had a negative impact on profitability of banks in the short run because of increased capital costs involved in technical and electronic infrastructure, cost of training to employees and also the cost involved in creation of environment where the banks could operate smoothly. However, these services had a positive impact in the long run on the profitability of banks.

Eboli and Mazulla (2007) proposed a tool for assessing the impact of customer numbers on mobile banking revenue in, Italy. They developed a structural equation model to study the relationship between customer base and mobile banking revenues in five major banks. To calibrate the structural equation, some data was collected in a survey addressed to a group of bank customers. Results indicated that in retail banks high number of customers automatically led to higher banking revenues. However, for corporate banks the revenues were driven not by the number of customers but by the convenience of services.

Lustisik (2004) studied the impact of electronic banking revenues on the overall profitability of banks in Estonia. The study used activity based costing (ABC) to analyze the costs incurred in electronic and traditional banking models. The outcome showed that with the ABC technique of cost management banks could minimize on costs of doing business. Electronic banking was found to be more cost effective than traditional banking. However, cost savings gains from electronic banking were slower than expected since traditional banking avenues could not be

done away with at the same speed with which the newer electronic channels were being introduced.

Kasman and Kasman (2006) studied the impact of electronic banking on overall costs and revenues of banks in Europe using Fourier- Flexible cost function between 1995 and 2002. The study concluded that electronic banking reduced banks operating costs by 5 – 8 percent. Much of the reduced cost was through lower staff costs as banks hired less people to man the rather automated workstations. Findings from this study also indicated that revenues associated with electronic banking had been growing at 10 percent per annum.

Mukherjee and Nath (2003) studied the impact of technological innovation on Tunisian banks. Based on empirical analysis, the study revealed that a large number of factors affected uptake of mobile banking. Gender, reliability, price, age, publicity, and educational qualification appeared to be important and they divided the sample into traditional banking defenders and mobile banking adopters. Findings from the study showed that despite government's numerous support and the customers being fully aware of the benefits of mobile banking many customers were still using traditional banking. Persistent product down time and "hidden" transactional charges played a significant role in alienating customers from mobile banking.

Thulani, Tofara and Langton (2009) used simple econometric models to study the extent to which adoption and usage of electronic banking was affected by advertisement in Zimbabwe. The study concluded that a majority of banks in Zimbabwe who used mass media to popularize their electronic banking had higher enrolment levels than those who did not. Out of those who used mass media, it was found out that road shows and television were the most effective forms of advertisement. The conclusions of the study was that commercial banks in Zimbabwe should encourage usage of mobile banking through vigorous advertisements while the Reserve Bank of

Zimbabwe should increase investments in awareness programs aimed at encouraging banks and individuals to embrace electronic banking.

Agboola (2006) examined the cost of electronic payments systems in 36 banks within Nigeria. Data was collected through questionnaires from the banks customers. Findings revealed that customers were less reactive to price increases if and only if they were followed with improved service delivery. The study also found out that customers reacted negatively to charges levied on them without their knowledge. The study concluded that electronic payments systems and electronic banking services were capable of broadening customer relationship; retaining customer loyalty and assisting banks to obtain commanding heights of market share if the cost implications of the services were explained beforehand.

Kiweu (2012) examined whether diversification of income source from Kenyan banks led to better earnings and reduced individual banks and systemic risk. The study analyzed the extent to which observed shift towards non-interest income streams had improved bank performance and reduced volatility of revenue. The findings showed that there were some benefits to be expected from income diversification from traditional interest income and that there had been growing importance of non-interest incomes during the study period 2000-2010. A positive correlation between interest income and non-interest income seemed to exist; a finding that suggested that non-interest income could be used to supplement interest income and stabilize operating income. The study also revealed that commissions from electronic banking platform were gradually forming the largest portion of non-interest income.

2.4 Overview of literature

Several studies have been conducted on various aspects of mobile banking especially in the emerging markets of Asia and Europe. Both classical and neoclassical scholars seemed to concur that technological advancement is key to enhanced productivity. Studies on electronic banking technology have suggested that the reliability of the system is necessary for uptake of the service. However, most studies on this technology emphasized the infrastructural challenges facing electronic banking without linking them to overall banks' profitability. This has created a knowledge gap that is the motivation behind this study.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Introduction

This chapter presents the tools of analysis and the data as well as method of analysis that were employed. The procedures and methods used have been informed by both theoretical and empirical literature reviewed as well as the type of data available.

3.2 Theoretical framework

From the neoclassical theory of the firm, total revenue is taken as a function of price and quantity demanded (Hunt & Lautzenheiser, 2011). From this theory we were able to specify a relationship between total revenues, price and quantity as:

Total Revenue $TR = f(P,Q).....(i)$

Where; P is Price of commodity

Q is the Quantity demanded

The theory of demand gives us the demand function as highlighted below;

Quantity Demanded $(Q) = f(Ki).....(ii)$

Where; Ki is a vector of all factors affecting quantity demanded including price.

Substituting equations (ii) into our total revenue function (i), we get a total revenue function expressed as;

$TR = f(Ki).....(iii)$

Where: Ki is a vector of all factors affecting quantity demanded.

The theory of demand has shown price as one of the factors affecting the quantity demanded and therefore the two will have a correlation coefficient of unity. A commonly used method of addressing multicollinearity is to drop one of the variables. We therefore dropped the variable (P) from our total revenue function. This does not lead to model misspecification since the same variable comes back into the equation as one of the factors affecting quantity demanded.

The above total revenue representation gave us the theoretical starting point for our mobile banking revenues model. Literature reviewed revealed that the most notable factors affecting uptake of mobile banking services are system reliability, cost of the service, the level of publicity of the product and the ease of using the product. These variables from the literature reviewed formed the basis of the theoretical framework of the mobile banking revenues function as expressed below.

MBR = f(SR, CS, PB, CN)……(iv)

Where:

MBR is the mobile banking revenues.

SR is the uptime hours as a proxy for systems reliability.

CS is the average cost of mobile banking service.

PB is the actual advertising expenditure as a measure of the level of publicity.

CN is the number of active subscribers.

3.3 Empirical framework

The estimable model for this study combined the linear relationship between price and quantity in the total revenue function, the Dorfman-Steiner's theorem of linear relationship between advertisement and sales revenue and Epple's hedonic model of linear relationship between

quality and product uptake. These theorems and models have shown a linear relationship between the exogenous variables and our theoretical model of total revenues. Hence we estimated the following multiple linear regression model:

$$\mathbf{MBR = \alpha + \beta_1 SR_{1+} \beta_2 CS_{2+} \beta_3 PB_{3+} \beta_4 CN_{4+} \varepsilon} \ldots\ldots\ldots\ldots \text{(v)}$$

Where:

MBR is the mobile banking revenues.

SR is the uptime hours.

CS is the average cost of mobile banking service.

PB is the actual advertising expenditure

CN is the number of active subscribers.

Ɛ is the error term.

3.4 Research data

The study utilized secondary data on quarterly time period from 2005 to 2013. The many number quarters were instrumental in extrapolating and filling the data gaps due to the fact that mobile banking is not very old in Kenya.

3.5 Apriori expectations

It was hypothesized that there exist a relationship between revenues and macro-economic determinants used in this study. The hypothesis was drawn from the evidence from economic theory and the empirical literature reviewed. The specific hypotheses tested are as follows:

Variable	Expectation
Advertising expenditure	Dorfman-Steiners theorem has shown a positive relationship between advertising and sales revenue. By extrapolation we therefore expect a positive relationship between mobile banking revenues and advertising expenditure.
Cost of mobile banking service	From the theory of demand there is negative relationship between demand for a good and the cost of the good. From our total revenue function there was a positive relationship between total revenue and quantity demanded. Therefore we expect the relationship between total revenue and the cost of the service to be negative.
Uptime hours	Epples model shows a positive relationship between quality of a product and revenues generated from its sales. This relationship prompts us to anticipate a positive relationship between uptime hours and mobile banking revenues.
Active subscribers	Total revenue function is expressed as a function of price and quantity, both having a positive relationship with the total revenue. We thus expect a positive relationship between the "quantity of subscribers" and total mobile banking revenues.

3.6 Data analysis

This study used time series data for the economic analysis. Data analysis was done using multiple linear regression analysis. The standard errors of the parameters were used to determine whether they are reliable. The coefficient of determination (R^2) was used to find out how much of the variation in levels of revenues can be explained by variations in the explanatory variables. The correlation coefficient (r) was used to show the strength of relationship between revenues and the explanatory variables.

3.7 Pre-estimation tests

The study utilized time series data and therefore tests for stationarity and non-stationarity of the data was done. Augmented Dickey Fuller (ADF) test was used to test for stationary or order of integration of each series of the variables.

Cointegration analysis test was also conducted in case of non-stationarity of the series data to ensure long-run relationships. Residual diagnostic tests on the model results included testing for normality, serial correlation, heteroskedasticity and specification of the error. In addition the study combined error correction model and co-integration to provide tools to quantify both the long-run relationship and the short-run deviations from equilibrium.

3.8 Constructing of an Error Correction Model (ECM)

An error correction term was constructed to take care of the non-stationary error term. The error correction term was used together with the stationary variables in cointegration relationships to construct the Error Correction Model (ECM) which integrated short run and long run dynamics of the model.

3.9 Data sources

National and international sources of data were utilized while maintaining both accuracy and consistency. Some of the sources of data used include;

- Cooperative Bank of Kenya website and quarterly electronic banking reports
- Kenya Bankers Association (KBA) mobile banking survey 2013
- Kenya Bankers Association (KBA) Survey on Income Diversification in the Banking Sector and Earnings Volatility 2012
- Kenya Financial Sector Deepening (FSD) FinAccess report 2013.
- Central Bank Publications such as monthly economic reviews, research papers, statistical bulletin and annual reports.

CHAPTER FOUR

4.0 EMPIRICAL ESTIMATION RESULTS AND INTERPRETATION

4.1 Introduction.

This chapter presents the results of data analysis and interpretation of the results thereof. It includes the presentation of the descriptive data analysis, unit test, co-integration test and the vector error correction model.

4.2 Descriptive statistics

Descriptive data analysis was conducted to establish the statistical properties of the variables in the model. This was also necessary so as to give our model a mathematical form. Table 4.1 summarizes the following descriptive statistics of all the variables of the model; mean, standard deviation, skewness, kurtosis and Jarque-Bera (JB) statistics.

Table 4.1 Descriptive Statistics

Variable	Mobile Banking Revenue	Advert Expenditure	Average Charge	Customer Numbers	Uptime Hours
Mean	16.7034	14.246	3.7763	13.1438	4.2095
Std. Dev	1.5496	0.952	0.276	0.8668	0.1475
Skewness	-0.5432	-0.4244	-0.477	-1.0955	-0.2677
Kurtosis	2.1909	1.9591	1.3847	3.5225	3.571
JB Statistics	3.5602	2.7809	5.4258	7.8214	0.9446

Source: Authors computation from data collected

From Table 4.1 the variables are not significantly dispersed from their mean as can be seen from the relatively low standard deviations. A normally distributed data has skewness of zero. Our variables have negative skewness indicating that the left tail is longer relative to the right tail and

much of the distribution is concentrated to the left. Kurtosis for normal distribution should be three. Uptime hours and customer numbers have kurtosis greater than three indicating stronger peaks. Kurtosis for advertisement expenditure, average charge and mobile banking revenues are less than three, an indication of flat peaks. Jarque-Bera test was used to check whether the skewness or kurtosis of the sample data conformed to those of a normal distribution.

4.3 Unit-root test

It was necessary to carry out tests to ascertain the stationarity status of the variables. The Augmented Dickey Fuller (ADF) test was conducted to verify the order of integration of the variables. The unit root test results are shown in Table 4.2

Table 4.2 Unit root test

Variable	Level		At first difference	
	Calculated Value	Critical Value	Calculated Value	Critical Value
Banking Revenue	-2.5559	-3.6616 at 1%	-2.9658	-3.6463 at 1%
		-2.9604 at 5%		-2.9540 at 5%
Advert Expenditure	-2.7135	-3.6616 at 1%	-6.1383	-3.6463 at 1%
		-2.9604 at 5%		-2.9540 at 5%
Average Charge	-0.7113	-3.6616 at 1%	-6.1171	-3.6463 at 1%
		-2.9604 at 5%		-2.9540 at 5%
Customer Numbers	-11.6187	-3.6616 at 1%		-3.6463 at 1%
		-2.9604 at 5%		-2.9540 at 5%
Uptime Hours	-2.3379	-3.6616 at 1%	-8.0913	-3.6463 at 1%
		-2.9604 at 5%		-2.9540 at 5%

Source: Authors computation from data collected

Test results indicated that only customer numbers was stationary at level implying that it is integrated of order zero I (0). Upon first difference all the other variables turned out to be stationary implying they are integrated of order 1 (1)

4.4 Co-integration test

Having checked for stationarity of the data, Johansen co-integration test was then applied to determine whether there was long run relationship among the variables. Table 4.3 presents the findings from the Johansen test.

Table 4.3 Co-integration Test

Hypothesized Number of Co-integrating Equations	Eigen Value	Trace Statistics	0.05 Critical Value	Probability
None*	0.677817	90.19957	69.81889	0.0005
At Most 1*	0.56733	50.55731	47.85613	0.0273
At Most 2	0.278351	21.23503	29.79707	0.3432
At Most 3	0.183299	9.817436	15.49471	0.295
At Most 4	0.075051	2.730571	3.841466	0.0984

Source: Authors computation from data collected

* Denotes rejection of the null hypothesis at the 0.05 level.

From the test statistics we compared the trace statistics and the Eigen value against their corresponding probabilities. Probability value less than 5% (0.05) implies presence of a co-integrating equation. From the results we have two co-integrating equations which imply that there exists a long run relationship among the variables.

4.5 Long run relationship results

In this case, we used the Auto-Regressive (AR) model whereby we lagged the dependent variable once. The results were as shown in Table 4.4.

Table 4.4 Auto-Regressive Model results

Variable	Co-efficient	Std. Error	t-Statistic	Probability
C	0.576126	0.341478	1.68716	0.1023
Mobile banking Revenue (- 1)	0.508864	0.152723	3.331942	0.0024
Advert Expenditure	0.008166	0.04046	0.201835	0.8415
Average Charge	0.352914	0.197142	1.790147	0.0839
Customer Numbers	-0.037567	0.024916	-1.507726	0.1424
Uptime Hours	-0.413234	0.225925	-1.829075	0.0777
R- squared	0.502907			
Adjusted R-squared	0.417201			
Durbin Watson Statistic	1.654682			
F – statistic	5.867834			
Probability (F - statistic)	0.00073			

Source: Authors computation from data collected

From the AR model, 50% of the changes in dependent variable were attributable to the independent variables. Adjusting for the degrees of freedom, 42% of changes in dependent variable could be traced to the independent variable. The value of the F statistic was found to be 5.8 with a probability of less than 5% indicating that the group means are significantly different. The R^2 is less than the Durbin Watson statistics implying that there is no spurious regression problem.

However, the variables were found to be non-stationary except for the customer numbers. This called for the estimation of the Vector Error Correction Model (VECM)

4.6 Vector Error Correction Model (VECM).

Due to non-stationarity of our data, we risked ending up with inconsistency in our regression since variables were not of the same order of integration. The variables were integrated of order

one except customer numbers and they were co-integrated which qualified the use of Vector Error Correction Model (VECM). Upon running the VECM, the solutions for the system are given by Tables 4.5, 4.6, 4.7, 4.8 (a) and 4.8 (b). From the results, previous quarter mobile banking revenue, advertisement expenditure and customer numbers exert a significant and positive effect on current period mobile banking revenue. Co-integrating equation one is significant in explaining mobile banking revenue. Mobile banking revenue has a long run relationship with variables in co-integrating equation one. There is also a long run relationship between co-integrating equations one and two and the advertising expenditure.

Table 4.5 VECM Results

Cointegrating Equation:	**Cointegrating Equation1**	**Cointegrating Equation2**
LN MOBILE REVENUE (-1)	1.000000	0.000000
LN ADVERT EXPENDITURE (-1)	0.000000	1.000000
LN AVERAGE CHARGES (-1)	-0.260328	0.032118
	(0.24353)	(0.11466)
	[-1.06896]	[0.28012]
LN CUSTOMER NUMBERS (-1)	-2.376615	-1.6716
	(0.26747)	(0.12593)
	[-8.88541]	[-13.2739]
LN UPTIME HOURS (-1)	1.428952	1.916820
	(1.24601)	(0.58664)
	[1.14682]	[3.26743]
C	9.609665	-0.389912

Source: Authors computation from data collected

Table 4.6 VECM Results

Error Correction:	D (LN MOBILE REVENUE)	D (LN ADVERT EXPENDITURE)	D (LN AVERAGE CHARGES)	D (LN CUSTOMER NUMBERS)	D (LN UPTIME HOURS)
Cointegrating Equation1	-0.236659	1.064122	0.009254	0.035875	0.062779
	(0.10192)	(0.29896)	(0.09591)	(0.04470)	(0.08432)
	[-2.32197]	[3.55939]	[0.09648]	[0.80263]	[0.74452]
Cointegrating Equation2	0.002165	-2.177296	0.192110	0.032280	-0.096047
	(0.16422)	(0.48171)	(0.15453)	(0.07202)	(0.13587)
	[0.01318]	[-4.51992]	[1.24316]	[0.44821]	[-0.70693]
D (LN MOBILE REVENUE (-1))	0.563646	-1.116103	0.275535	-0.007773	-0.002503
	(0.23979)	(0.70335)	(0.22564)	(0.10516)	(0.19838)
	[2.35062]	[-1.58683]	[1.22115]	[-0.07392]	[-0.01262]
D(LN MOBILE REVENUE(-2))	-0.060946	-0.142086	-0.082385	0.019648	-0.014966
	(0.19549)	(0.57344)	(0.18396)	(0.08573)	(0.16174)
	[-0.31175]	[-0.24778]	[-0.44785]	[0.22918]	[-0.09253]
D (LN ADVERT EXPENDITURE (-1))	0.004950	0.769196	-0.147666	-0.037142	0.074215
	(0.12000)	(0.35199)	(0.11292)	(0.05262)	(0.09928)
	[0.04125]	[2.18529]	[-1.30773]	[-0.70579]	[0.74755]
D (LN ADVERT EXPENDITURE(-2))	-0.000935	0.319691	-0.006028	-0.013569	0.063341
	(0.07738)	(0.22697)	(0.07281)	(0.03393)	(0.06402)
	[-0.01208]	[1.40854]	[-0.08279]	[-0.39988]	[0.98947]
D (LN AVERAGE CHARGES(-1))	-0.109124	0.812705	-0.287025	-0.093911	0.284760
	(0.27796)	(0.81533)	(0.26156)	(0.12190)	(0.22996)
	[-0.39259]	[0.99678]	[-1.09736]	[-0.77040]	[1.23829]
D(LN AVERAGE CHARGES(-2))	0.050600	0.468636	-0.127113	-0.018216	0.026005
	(0.23911)	(0.70137)	(0.22500)	(0.10486)	(0.19782)
	[0.21162]	[0.66818]	[-0.56495]	[-0.17372]	[0.13146]
D (LN CUSTOMER NUMBERS(-1))	0.648067	1.213671	-0.072992	0.509330	0.096470
	(0.44940)	(1.31821)	(0.42288)	(0.19708)	(0.37180)
	[1.44206]	[0.92069]	[-0.17261]	[2.58433]	[0.25947]
D (LN CUSTOMER NUMBERS (-2))	-0.178426	2.189402	-0.19065	0.105021	-0.074089
	(0.43271)	(1.26924)	(0.40717)	(0.18976)	(0.35799)
	[-0.41235]	[1.72497]	[-0.46823]	[0.55344]	[-0.20696]
D (LN UPTIME HOURS (-1))	0.584995	0.316274	-0.298075	-0.0618	-0.387202
	(0.30900)	(0.90638)	(0.29077)	(0.13551)	(0.25564)
	[1.89317]	[0.34894]	[-1.02513]	[-0.45605]	[-1.51462]
D (LN UPTIME HOURS (-2))	0.378800	0.633548	-0.138462	0.000383	-0.152513
	(0.30128)	(0.88372)	(0.28350)	(0.13212)	(0.24925)
	[1.25732]	[0.71691]	[-0.48841]	[0.00290]	[-0.61189]
C	0.010163	-0.151338	-0.004029	0.024503	0.017073
	(0.03586)	(0.10520)	(0.03375)	(0.01573)	(0.02967)
	[0.28339]	[-1.43862]	[-0.11939]	[1.55793]	[0.57542]

Source: Authors computation from data collected

Table 4.7 VECM Results

Error Correction:	D (LN MOBILE REVENUE)	D (LN ADVERT EXPENDITURE)	D (LN AVERAGE CHARGES)	D (LN CUSTOMER NUMBERS)	D (LN UPTIME HOURS)
R-squared	0.627793	0.702044	0.270214	0.804502	0.287793
Adj. R-squared	0.415103	0.531783	-0.146807	0.692789	-0.119182
Sum sq. resids	0.167930	1.444864	0.148695	0.032297	0.114940
S.E. equation	0.089424	0.262303	0.084147	0.039216	0.073982
F-statistic	2.951683	4.123347	0.647962	7.201504	0.707151
Log likelihood	42.03579	5.447963	44.10383	70.06172	48.48107
Akaike AIC	-1.707988	0.444237	-1.829637	-3.356572	-2.087122
Schwarz SC	-1.124379	1.027846	-1.246029	-2.772963	-1.503513
Mean dependent	0.137668	0.074999	-0.015024	0.077043	0.012923
S.D. dependent	0.116927	0.383337	0.078577	0.070754	0.069932
Determinant resid covariance (dof adj.)		1.18E-11			
Determinant resid covariance		1.06E-12			
Log likelihood		227.4850			
Akaike information criterion		-8.969704			
Schwarz criterion		-5.602732			

Source: Authors computation from data collected

Table 4.8 (a) VECM Results

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.236659	0.101922	-2.321971	0.0222
C(2)	0.002165	0.164224	0.013184	0.9895
C(3)	0.563646	0.239786	2.350622	0.0206
C(4)	-0.060946	0.195495	-0.311753	0.7558
C(5)	0.00495	0.119999	0.041248	0.9672
C(6)	-0.000935	0.077377	-0.012077	0.9904
C(7)	-0.109124	0.277962	-0.392588	0.6954
C(8)	0.0506	0.239109	0.211621	0.8328
C(9)	0.648067	0.449404	1.44206	0.1523
C(10)	-0.178426	0.432706	-0.412348	0.6809
C(11)	0.584995	0.309003	1.893171	0.0611
C(12)	0.3788	0.301277	1.257318	0.2114
C(13)	0.010163	0.035863	0.283386	0.7774
C(14)	1.064122	0.298962	3.55939	0.0006
C(15)	-2.177296	0.481711	-4.519924	0
C(16)	-1.116103	0.703353	-1.586832	0.1156
C(17)	-0.142086	0.573436	-0.24778	0.8048
C(18)	0.769196	0.351987	2.185293	0.0311
C(19)	0.319691	0.226966	1.40854	0.1619
C(20)	0.812705	0.815333	0.996777	0.3212
C(21)	0.468636	0.701367	0.668175	0.5055
C(22)	1.213671	1.318215	0.920693	0.3593
C(23)	2.189402	1.269238	1.724974	0.0875
C(24)	0.316274	0.906384	0.34894	0.7278
C(25)	0.633548	0.883721	0.71691	0.475
C(26)	-0.151338	0.105197	-1.438625	0.1532
C(27)	0.009254	0.095907	0.096484	0.9233
C(28)	0.19211	0.154533	1.243164	0.2166
C(29)	0.275535	0.225636	1.221148	0.2248
C(30)	-0.082385	0.183958	-0.447846	0.6552

Source: Authors computation from data collected

Table 4.8 (b) VECM Results

	Coefficient	Std. Error	t-Statistic	Prob.
C(31)	-0.147666	0.112918	-1.307733	0.1938
C(32)	-0.006028	0.072811	-0.082787	0.9342
C(33)	-0.287025	0.261559	-1.097363	0.275
C(34)	-0.127113	0.224998	-0.564949	0.5733
C(35)	-0.072992	0.422883	-0.172607	0.8633
C(36)	-0.19065	0.407172	-0.46823	0.6406
C(37)	-0.298075	0.290768	-1.025131	0.3077
C(38)	-0.138462	0.283498	-0.488407	0.6263
C(39)	-0.004029	0.033747	-0.119388	0.9052
C(40)	0.035875	0.044697	0.802631	0.424
C(41)	0.03228	0.07202	0.448214	0.6549
C(42)	-0.007773	0.105157	-0.073919	0.9412
C(43)	0.019648	0.085733	0.229176	0.8192
C(44)	-0.037142	0.052625	-0.705792	0.4819
C(45)	-0.013569	0.033933	-0.399881	0.6901
C(46)	-0.093911	0.121899	-0.770402	0.4428
C(47)	-0.018216	0.10486	-0.173717	0.8624
C(48)	0.50933	0.197084	2.584331	0.0111
C(49)	0.105021	0.189761	0.553436	0.5811
C(50)	-0.0618	0.135512	-0.456048	0.6493
C(51)	0.000383	0.132123	0.002898	0.9977
C(52)	0.024503	0.015728	1.557926	0.1223
C(53)	0.062779	0.084321	0.744524	0.4582
C(54)	-0.096047	0.135865	-0.706928	0.4812
C(55)	-0.002503	0.198379	-0.012617	0.99
C(56)	-0.014966	0.161736	-0.092533	0.9265
C(57)	0.074215	0.099277	0.747554	0.4564
C(58)	0.063341	0.064015	0.989472	0.3247
C(59)	0.28476	0.229963	1.238288	0.2184
C(60)	0.026005	0.197819	0.131459	0.8957
C(61)	0.09647	0.371799	0.259467	0.7958
C(62)	-0.074089	0.357985	-0.206961	0.8364
C(63)	-0.387202	0.255643	-1.514618	0.1329
C(64)	-0.152513	0.249251	-0.611886	0.5419
C(65)	0.017073	0.02967	0.575421	0.5662

Source: Authors computation from data collected

CHAPTER FIVE

5.0 SUMMARY CONCLUSION AND POLICY RECOMMENDATION

5.1 Introduction

This chapter highlights summary of the study, the conclusion, policy recommendations and areas of further research.

5.2 Summary

The study examined the determinants of mobile banking revenues in Kenya with a focus on Co-operative bank of Kenya using quarterly data for the period 2004 to 2013. To examine determinants of mobile banking, average advertising expenditure, customer numbers, average mobile banking cost and average uptime hours were the selected variables. The study used Augmented Dickey Fuller test to check whether the data contained a unit root and Johansen co-integration test to check for co-integration. The Augmented Dickey Fuller test showed that only customer numbers was integrated of order one.

Test for co-integration indicated that the variables were integrated of order one except customer numbers which was integrated of order zero. With the variables non stationary and co-integrated the model was estimated using the Vector Error Correction Model (VECM). The results showed that one period lag in mobile banking revenue, advertisement expenditure and customer numbers had a positive and significant impact on mobile banking revenue.

5.3 Conclusion

Financial innovation plays an integral part in nurturing and refining financial instruments as well as improving financial access. Financial institutions usually dedicate a lot of resources in trying to get innovative ways of conducting financial transaction with the hope of reaping maximum revenues from the innovation. However, many innovations either fail to generate the much anticipated revenues or even to sustain their running costs largely due to a lack of understanding as to what will be the key drivers for the innovation.

Given these challenges, the study sought to examine the determinants of mobile banking revenue. The empirical results of the study show that there is a positive and significant relationship between mobile banking revenues and customer numbers as well as advertisement expenditure. Put in another way, advertisement expenditure and customer numbers are key to driving mobile banking revenues.

5.4 Policy recommendations

The number of mobile banking customers has been found to play a statistically significant role in determining mobile banking revenues. Hence, the important question that arises is: what policy can banks adopt to drive customer numbers. Aggressive recruitment of existing and new customers into the mobile banking platform is the basic way to get the customer numbers. With the high competition in the banking industry, policy actions should focus on how to go out and recruit more customers rather than wait for customers to come to the financial institutions.

It is imperative for banks to spend more on advertisements through mass media in order to create awareness of their mobile banking services. The advertisement need to be through

various diversified media platform. Banks may consider outsourcing of advertising services so as to maximize on the expertise of marketing agencies.

There is need for banks to strategize on how well to plough back previous period's mobile banking revenues. Previous period mobile banking revenues have been found to be empirically significant in determining current period's mobile banking revenues. The policy actions should focus on how well to re-invest the revenues into either more customer recruitment or advertising; areas that have more impact on mobile banking revenues.

Mobile banking prices were found to be statistically insignificant in determining mobile banking revenues. This is largely attributable to the fact that the prices for mobile banking are relatively lower compared to alternative means of banking. This insignificance makes mobile banking revenues inelastic to the prices. Government policy actions should be on how to maximize tax revenues from mobile banking revenues since this will have minimal impact on the revenues earned by the bank.

It is important to consider policy initiatives that will deepen financial inclusion. A higher level of financial inclusiveness is expected to translate to higher customer numbers. The policy initiatives to deepen financial inclusion should encompass recruiting new bankable customers on to the mobile banking platform.

5.5 Limitations of the study

The use of quarterly data presented a unique set of challenges in terms of gathering and processing the data. There were instances of missing data especially quarterly advertising expenditure for advertising contracts or agreements that span more than one quarter and whose

overhead for each quarter could not be ascertained. Approximate figures were employed in such cases which may have compromised the accuracy of the data used.

There was the challenge of bureaucracy in getting approval to access the much needed data. This was attributable to the fact that much of the data sought was considered company secret and for internal use only. This led to delays in data analysis.

5.6 Areas of further research

The topic of mobile banking get dynamic by the day as banks and telephone service providers coin new products. As a result, drawing a clear line between mobile banking and other forms of electronic banking becomes virtually impossible. In this regard, further studies should include other electronic banking channels such as internet banking and mobile money transfers. There is also need for further research on the impact of technological advancements on banking revenues from electronic channels.

Annexures

6.1 Annexure 1: Natural log of data used

PERIOD	LN Mobile Banking Revenue	LN Advert Expenditure	LN Customer Numbers	LN Uptake Hours	LN Average Charges
Q4 2004	13.59049	12.42922	10.72766	3.80666	4.00733
Q1 2005	13.76485	12.34757	11.10195	3.98898	4.00733
Q2 2005	13.96823	12.76740	11.49984	4.06044	4.00733
Q3 2005	14.11606	12.90097	11.82701	4.02535	4.00733
Q4 2005	14.19737	13.01834	12.10349	4.12713	4.00733
Q1 2006	14.54103	12.96055	12.30002	3.97029	4.00733
Q2 2006	14.84356	13.29632	12.34757	4.00733	4.00733
Q3 2006	14.99284	13.14217	12.46767	4.07754	4.00733
Q4 2006	15.13743	13.14217	12.58997	4.11087	3.91202
Q1 2007	15.67659	13.61706	12.72457	4.06044	4.00733
Q2 2007	16.10304	13.50080	12.83361	4.23411	4.00733
Q3 2007	16.37240	13.86430	12.87493	4.18965	4.00733
Q4 2007	16.55316	14.25396	12.92805	4.17439	4.00733
Q1 2008	16.61890	13.86430	13.00560	4.14313	4.00733
Q2 2008	16.66336	14.15227	13.09388	4.24850	4.00733
Q3 2008	16.80374	13.89247	13.14383	4.21951	4.00733
Q4 2008	16.83352	14.73180	13.25146	4.18965	4.00733
Q1 2009	16.94949	14.73180	13.31422	4.23411	4.00733
Q2 2009	17.06021	14.75160	13.37786	4.20469	4.00733
Q3 2009	17.14362	13.85953	13.45181	4.23411	4.00733
Q4 2009	17.26441	14.50866	13.52027	4.26268	4.00733
Q1 2010	17.36107	14.75160	13.58798	4.18965	3.68888
Q2 2010	17.49623	14.93078	13.67083	4.27667	3.68888
Q3 2010	17.63653	14.64855	13.69838	4.29046	3.68888
Q4 2010	17.70223	14.71160	13.72723	4.33073	3.68888
Q1 2011	17.72314	14.86283	13.74903	4.34381	3.40120
Q2 2011	17.76426	14.73206	13.78557	4.23411	3.40120
Q3 2011	17.82049	15.31959	13.82586	4.26268	3.40120
Q4 2011	17.88949	15.31959	13.84555	4.30407	3.40120
Q1 2012	18.04600	14.60397	13.86301	4.33073	3.40120
Q2 2012	18.24157	15.52931	13.94267	4.23411	3.40120
Q3 2012	18.37412	15.59062	13.96892	4.26268	3.40120
Q4 2012	18.48319	15.20928	13.99658	4.30407	3.40120
Q1 2013	18.52378	15.20180	14.00187	4.31749	3.40120
Q2 2013	18.54688	15.37378	14.01927	4.47734	3.40120
Q3 2013	18.57470	15.26478	14.03465	4.52179	3.40120
Q4 2013	18.64894	15.31736	14.11931	4.49981	3.49651

Source: Authors computation from data collected

References

Adeya, C. (2003). *Potential Uses of ICTs by Small and Micro Enterprises in Ghana and Kenya.* Dar es Salaam: University of Dar es Salaam.

Agboola, A. (2006). Electronic Payment Systems and Telebanking Services in Nigeria. *Journal of Internet Banking and Commerce , 11* (3).

Ahasanul, H. (2009). Issues of E – Banking transaction: An Empirical Investigation on Malaysian Customers perception. *Journal of Applied Sciences , 9* (10), 1870 - 1879.

Ali, S. S., & Murty, T. N. (2014). Information Technology Services to the Bank Customers in Indian Banking Industry. *International Journal of Business and Administration Research Review , 1* (5), 206 - 209.

Allen, F. (2011). *Trends in Financial Innovation and Their Welfare Impact.* Chicago: John Wiley and Sons.

Alu, A., Idowu, P., & Adagunodo, E. (2002). The Effect of Information Technology on the Growth of Banking Industry in Nigeria. *Electronic Journal on Information , 10* (2), 1 - 8.

Donner, J. (2005). Micro Entrepreneurs and Mobiles: An Exploration of the Uses of Mobile Phones by Small Business Owners in Rwanda. *Information Technologies for International Development* .

Eboli, L., & Mazzulla, G. (2007). Service Quality Attributes Affecting Customer Satisfaction for Bus Transit. *Journal of Public Transportation , 10* (3), 21 - 34.

Gabriel, C., Bellini, P., & Henrique, L. (2005). Service Quality in Banks: Brazilian Experience. *Journal of Internet Banking and Commerce , 10* (3).

Gundalach, E. (2005). Notes on Identification and Interpretation in the Empirics of Growth and Development. *Review of World Economics, 141* (3), 541 - 556.

Harris, L., & Spence, J. (2002). The Ethics of E-Banking. *Journal of Electronic Commerce , 3* (2), 59 - 66.

Hunt, E. K., & Lautzenheiser, M. (2011). *History of Economic Thought; A critical Perspective.* New York: M.E Sharpe.

Joseph, M., McClure, C., & Joseph, B. (1999). Service Quality in Banking Sector: The Impact of Technology on Service Delivery. *International Journal of Bank Marketing , 17* (4), 182 - 191.

Kamesam, V. (2001). Information Technology Challenges to Banks. *RBI Bulletin , 55* (11), 1225 - 1228.

Kasman, A., & Kasman, S. (2006). Technical Change in Banking: Evidence from Transition Countries. *International Journal of the Economics of Business , 13* (1), 129 - 144.

Kenya Bankers Association. (2014). *The Mobile Banking Survey.* Nairobi: Kenya Bankers Association (KBA) .

Kiweu, J. (2012). Income Diversification in the Banking sector and Earnings Volatility: Evidence from Kenyan Commercial Banks. *Kenya Bankers Association (KBA) Centre for Research on Financial Markets and Policy* (02/12), 2 - 25.

Lustisik, O. (2003). *Can E-Banking Services Be Profitable.* Tartu: University of Tartu.

Manoharan, B. (2007). Indian E-payment System and its Performance. *Professional Banker , 7* (3), 61 - 69.

Mantel, B. (2000). Why Don't Customers Use E-banking Products: Towards a Theory of Obstacles, Incentives and Opportunities. *FRB Chicago Working Paper* (EPS - 2000 - 1).

Mohr, J. (2001). *Marketing of high-technology products and innovations.* New York: Prentice Hall.

Mukherjee, A., & Nath, P. (2003). A model of Trust in Online Relationship Banking. *International Journal of Bank Marketing , 21* (1), 5 - 15.

Nataraajan, R., & Angur, G. (1999). Service Quality in the Banking Industry: An Assessment in a Developing Economy. *International Journal of Bank Marketing , 16* (2), 90 - 97.

Negishi, T. (1989). *History of Economic Theory.* Amsterdam: North Holland.

Qureishi, T., Zafar, M., & Khan, M. (2008). Customer Acceptance of Online Banking in Developing Economies. *Journal of Internet Banking and Commerce , 13* (1).

Ramalingam, P. (2009). Usage Pattern of Credit Card Holders. *Indian Journal of Finance , 3* (4), 7 - 18.

Seelanatha, S. (2007). *An analysis of efficiency and productivity changes of the banking industry in Sri Lanka.* Queensland: University of Southern Queensland.

Siam, A. (2006). Role of E-banking Services on Profits of Jordanian Banks. *American Journal of Applied Sciences , 9*, 1999 - 2004.

Stoneman, P. (1995). *Handbook of the Economics of Innovation and Technological Change.* Oxford: Blackwell.

Suresh, R. (2008). E-banking: The Core Capabilities to Exploit. *The Management Accountant , 43* (6), 49 - 53.

Think Business. (2014). *Banking Survey 2014.* Nairobi: Think Business publication.

Thulani, D., Tofara, C., & Langton, R. (2009). Adoption and Use of Internet Banking in Zimbabwe: An Exploratory Study. *Journal of Internet Banking and Commerce , 14* (1), 1 - 13.

Unnithan, C. R., & Swatman, P. (2001). Ebanking Adaptation and Dot.Com Viability – A Comparison of Australian and Indian Experiences in the Banking Sector. *School of Management Information Systems Deakin University Working Paper* (14).

Uppal, R. (2007). Indian Banking Industry: Comparative Performance Evaluation in the Liberalized & Globalized Era. *Global Journal of Business Research , 1*.

Wanyama, O. (2009). Surviving Liberalization: The Cooperative Movement in Kenya. *Journal of International Labor Organization' , 1*, 19 -55.

Wenninger, J. (2000). Emerging Role of Banks in E-commerce. *Federal Reserve Bank of New York Current Issues in Economics and Finance , 6* (3).

Zeithaml, J. (2002). *Service Marketing – Integrating Customer Focus Across the Firm* (4th ed.). New Delhi: Tata McGraw Hill Publishing Co.