

**IMPACT OF FINANCIAL INNOVATION ON EFFICIENCY OF
COMMERCIAL BANKS IN KENYA**

BY

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DEDICATION

Special dedication for this research project goes to the Lord my God for his guidance and to my family and friends for their support.

ABSTRACT

The advancement in technology and increased need to innovate has greatly led to restructuring of various organizations in a bid to create departments that support innovation to keep up with the customer's need for efficiency. This study objective was to determine the impact of financial innovation on the efficiency of commercial banks in Kenya. The study specifically looked at Bank Size/assets, Number of users of internet and mobile banking, Internet and mobile banking transactions as the variables. The study type used is descriptive study since it's adequately defined by the design of the study and incorporated a good association of the variables studied on the impact of financial innovation on operational efficiency. The target population of the study which informs the research topic was 39 commercial banks in Kenya. The study utilized secondary data from yearly published and audited financial statements of the financial institutions under the survey. The study utilized statistical package for social sciences (SPSS) in data analysis. The study findings indicate a positive relationship between financial innovation and efficiency of commercial banks with an r squared of 0.710. This indicates that financial innovation variables on the study accounts for 71%. The study concludes that Number of users of internet and mobile banking and bank size and assets, and Internet and mobile banking transactions had varying degrees of impact on the efficiency of commercial banks in Kenya in the period under study. The effects of Internet and mobile banking transactions and number of users of internet and mobile banking on the efficiency was a strong positive while effect of bank assets was a weak degree of association with the efficiency.

TABLE OF CONTENTS

DECLARATION	ii
ACKNOWLEDGEMENT	iii
DEDICATION	iv
ABSTRACT	v
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background of the Study.....	1
1.1.1 Financial Innovation.....	2
1.1.2 Commercial Banks in Kenya.....	4
1.2 Statement of the problem	5
1.3 Objective of the study	7
1.4 Significance of the study	7
CHAPTER TWO	9
LITERATURE REVIEW	9
2.1 Introduction	9
2.2 Theories of financial innovation	9
2.2.1 Disruptive innovation theory.....	9
2.2.2 The theory of constraints	10
2.2.3 Market Power and Efficiency Structure Theory.....	12
2.3 Determinants of Efficiency in Commercial Banks.	13
2.3.1 Product Innovation	13
2.3.2 Process Innovation.....	15
2.3.3 Service Innovation.....	16
2.3.4 Institutional Innovation.....	16
2.4 Empirical studies	17
2.5 Conceptual Framework	20
2.6 Chapter Summary.....	20

CHAPTER THREE	22
RESEARCH METHODOLOGY	22
3.1 Introduction	22
3.2 Research Design	22
3.3 Population of the study	22
3.4 Data Collection.....	23
3.5 Data Analysis	23
CHAPTER FOUR.....	25
DATA ANALYSIS, RESULTS AND DISCUSSION.....	25
4.1 Introduction	25
4.2 Descriptive Statistics	25
4.3 Trend analysis	26
4.4 Correlation Analysis.....	28
4.5 Regression Analysis	30
4.6 Discussion of Research Findings	33
CHAPTER FIVE	35
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	35
5.1 Introduction	35
5.2 Summary of Findings	35
5.3 Conclusion.....	36
5.4 Recommendations	36
5.5 Limitations of the Study	37
5.6 Suggestions for Further Research	38
REFERENCE	39
APPENDICES	42
Appendix I: List of Commercial Banks in Kenya.....	42
Appendix II: Average yearly transactions for all banks.....	44
Appendix III: Average yearly transactions per banks	44

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Financial innovation is the enabler of financial inclusion. With the growth and emergence of the financial services industry and increased competition due to the addition of new players and the quest to attract clients from the market, there has been a necessity to create financial innovation to improve efficiency of services by reducing turnaround time of service delivery to clients, reduce agency costs, increase profit margins, facilitate risk sharing and ultimately enhance economic growth.

Grundiche (2004) opined that for a firm to participate effectively in a competitive business environment and accomplish their objectives with regard to cost-effectiveness, improved sales and maintain competitive advantage, it should consistently invent products and services to satisfy the consistently varying demands of consumers.

The improved access to mobile phones, internet, credit cards, automated teller machines in the region has greatly enhanced and enabled financial innovation by allowing various financial institutions to link account holders to their accounts and other users and hence eliminating the traditional brick and mortar banking where account holders had to queue in banking halls to enable them access services offered by the institutions or access their funds. This has been made possible by mobile applications which enable one to transact in secured environments and also over the internet hence making it very convenient for users to transact from the comfort of their living rooms. This has had a two way positive effect to both financial institutions who are able to save on manpower costs, paper work hence increase their margins and

on end users who are able to conveniently transact hence save on time and additional costs incurred in commuting to their respective financial institutions. The overall effect on the economy has been improved access to funds, increased transactions hence improving financial inclusion.

Countries where financial institutions spend more on financial innovation are better able to translate growth opportunities into GDP per capita growth (Thorsten Beck). However, in countries where banks spend more on financial innovation, banks are also more fragile. This relationship is especially strong for banks with smaller market shares, banks with faster asset growth and banks with higher shares of non-traditional intermediation activities. This higher fragility is due to higher profit volatility of banks in countries with higher levels of financial innovation notwithstanding the increased cases of cyber crime associated with transacting over the internet and mobile telephony. Clayton Christensen (2013).

1.1.1 Financial Innovation

Financial innovation refers to the act of creating and then popularizing new financial instruments as well as new financial technologies, institutions and markets. It also includes institutional, product and process innovation.

It can also be defined as the widening and deepening to satisfy all stakeholders' needs. It's also an invention which lessens expenditures, decreases uncertainty and/or gives enhanced business commodities or device which fulfils consumers' wants, needs and expectations as ascertained by Frame and White (2004).

Banking services that have been re-invigorated by use of information communication technology are withdrawing and deposit of funds, payment of bills, transfer of funds, access to statements, standing order request, debit and credit cards requests, cheque requests has been made possible by filling in forms via an online platform.

1.1.1 Financial Innovation and Efficiency

Efficiency exists when participants can execute transactions and receive services at a price that equates fairly to the actual costs required to provide them. An operationally efficient market allows investors to make transactions that move the market further toward the overall goal of prudent capital allocation without being weighed down by frictional costs which would reduce the risk/reward profile of the transaction. Gopalakrishnan, S. (2001).

Tufano (1989) examines a variety of new securities to determine whether financial innovation results into major advantages. He discovers that over the period of study, investment banks that created new products did not charge higher prices before imitative products appear but eventually charged lower prices than its rivals in the long run. He also states that it's important to take a close look at the impacts of financial innovation, lessons, what it has achieved and at what cost. He also did a study of the Indian financial system and financial innovation.

It consists of scale proficiency, a relationship between production and average cost, scope effectiveness, a relationship between average cost and generation of varied outputs and operational efficiency, a relationship between efficiency, checks on abnormality from the cost efficient that depicts achievable output in place of a

specified input measure. Inefficiency is therefore the state of not achieving maximum productivity based on the resources at hand. Gitau, R. (2011).

Commercial banks in Kenya are gearing up themselves in an effort to increase competitive advantage by automation of their products through leveraging on internet banking, mobile banking and generally creation of paperless offices and reducing human contact to enhance service delivery to the pool of clients in the market. Business process re-engineering, closing down of non-value addition branches, reduction of employees to boost efficiency and cut costs are some of the measures put in place to improve on efficiency and the bottom line of the business.

1.1.2 Commercial Banks in Kenya

Commercial banks in Kenya comprised of 43 commercial banks as at 31st December 2017 out of which three had been placed under receivership by the Central Bank of Kenya as a result of liquidity problems stemming from financial malpractices and a run on deposits which necessitated placement of a moratorium as a result of the same. The three affected banks were Imperial bank, Dubai bank and Chase bank Limited which were not in full operations. In addition to that, there were a total of thirteen microfinance banks, seventy nine forex bureaus and seven representative offices of foreign banks (CBK 2017).

In Kenya commercial banks dominate the financial sector in terms of services offered in savings, loan advancements, foreign exchange, advisory and taxation services which spurs economic growth and development by enabling investments by provision of capital for businesses and ultimate development in the region. The dominance of the commercial banks in the financial sector has led to decrease in credit

advancements to customers who are perceived as credit risky with high probabilities of default in the 2016 period following the interest rates cap at 14% by central bank as a result of a law enacted in parliament. Therefore many customers have been forced to approach deposit taking microfinance institutions and sacco's to seek loan advancements.

Financial transactions drive the investment agenda in the banking sector hence technological advancement and financial innovation has been a key investment by banks in a bid to improve efficiency in banking and create financial inclusion. Most recently the Kenya Bankers Association (KBA) through the Integrated Payments System Limited (IPSL) created a payments systems platform that links customers with several commercial banks hence enabling them to transact instantly, round the clock online and through mobile phones. The response was overwhelming with more than 2.5 million customers joining the platform and transactions with a value of more than Kes 4 billion having been processed within the first 4 months. This further cements the importance of financial innovation in efficiency of commercial banks.

1.2 Statement of the problem

The advancement in technology and increased need to innovate has greatly led to restructuring of various organizations in a bid to create departments that support innovation to keep up with the customer's need for efficiency. Access to financial services and financial inclusion has amassed numerous benefits since the advent of e-banking. One of the greatest impacts of the invention of the world wide web (www) in the 80's was the fact that it greatly changed the traditional way of banking (Furst et al 2002). Since then, several commercial banks have changed the way they conduct their business by continually adopting to technological advances (Gaitungu 2010).

Technological advancements draw various observations from researchers and examiners whose continuous research has led to special emphasis on the impact of disruptive technological advancement on various organizations (Owino 2013). Mwangi (2007) argued that global financial competition and integration had an impact on financial innovation and that the increased competition had an impact on increased uptake on financial innovation in financial institutions. It would later be held that banks that embraced innovation and automated its processes would have a competitive advantage over other banks that do not offer the services (comptrollers handbook 1999).

Financial innovation with the aid of technological advancement has made access to financial services easier globally. Christensen and Raynor (2003) argued that organizations need to continually engage in innovation to ensure their survival in the industry. Venansius (2014) also emphasized on the importance and use of technology to improve on service delivery and in business continuity. He opines that innovation should be exploited to enhance service delivery especially in financial institutions. There are a number of advantages that would accrue from both banks and customers from use of internet and mobile banking as opposed to the traditional brick and mortar banking methods. The main merit from a customer's opinion is that he/she is can transact at the comfort of their homes, accessibility to account statements, all bank products, access to their accounts and ability to transact throughout the day. The convenience afforded to the customer will result in increased customer satisfaction and loyalty to the bank. On the other hand, banks will be able to offer their services and products at a lower cost hence improving on efficiency and increasing profitability in the long run (Kurtas 2000).

Previous studies on e-banking examine the impact of mobile and internet investment on economic presentation in financial institutions (Okiro and Ndung'u, 2013). Despite all the advantages of financial innovation both to the bank and customers, several commercial banks in Kenya have not fully embraced technology in the advancement of services and in their business operations. Various studies reason out on the impact of financial innovation on financial performance but not on the efficiency that is harnessed as a result of financial innovation. Ongwen (2015) argued that it was incumbent upon financial institutions to determine the financial backgrounds of their customers before rolling out automated services to them. Therefore, the purpose of this study is to outline both the impact of financial innovation on efficiency of commercial banks and the challenges facing both banks and their customers in the quest to embrace financial innovation as a vital tool in enabling financial inclusion.

1.3 Objective of the study

The purpose of this study was to determine the impact of financial innovation on the efficiency of commercial banks in Kenya.

1.4 Significance of the study

The study would be of immense importance to the management of commercial banks on the merits of financial innovation on improving efficiency of service delivery, cutting operational costs and generally increasing financial inclusion. Therefore they would in turn ensure that they continuously embrace innovation based on these findings.

It would also be of critical value to consumers who would largely benefit from the findings of this study on the importance of financial innovation especially with regards to improved convenience when transacting and overall reduced transaction

costs as a result of moving away from the traditional methods of banking. Such innovation such as mobile banking and online banking in the form of equitel offered by equity bank and pesalink mooted by the Kenya bankers association via the integrated payments services platform which enables account holders from several integrated commercial banks to transact by sending and receiving money instantly without necessarily having to queue in banking halls and fill in manual instructions promote convenience and reduce overall costs of transactions hence increasing efficiency. This would in turn create a positive contribution to society and reduce the number of unbanked citizens in the country.

In addition, the findings of this study will provide more empirical discoveries on the relationship between financial innovation and efficiency of commercial banks hence providing scholars and researchers with more material and knowledge on financial innovation and its impact. It would also form a solid literature base upon which further studies, research and references would be drawn.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter outlines a review of the literature pertaining financial innovation and its impact on operation efficiency in commercial banks with a special emphasis on challenges associated with innovation of processes, products and services availed to customers. This chapter also shows a brief analysis of the conceptual framework, empirical evaluation and determinants of operational efficiency in commercial banks.

2.2 Theories of financial innovation

2.2.1 Disruptive innovation theory

Disruptive innovation theory by Clayton Christensen (2013) describes the process in which a product or service takes shape initially in form of simple applications at the bottom and then consistently ascends the market eventually displacing established rivals. As organizations tend to innovate faster than their customer's needs, most of them end up producing goods and services that are too complicated for their needs.

Companies formulate and engage in continually innovating their products and services since this is what has been helping them succeed by giving them a competitive advantage over their competitors and at the same time charging the highest price to their highly demanding and sophisticated customers. However, by so doing, they eventually usher in disruptive innovation where they allow customers at the bottom of the market access to sophisticated products and services which were previously only accessible to the elite and highly skilled customers. This was later known as "The Innovator's Dilemma" as elaborated by Christensen (2013). Disruptive businesses exhibit characteristics such as lower profits, smaller target markets and inferior products which are not as sophisticated and attractive as existing

products when analyzed against performance metrics. The lower levels of the market are unattractive to upward moving firms hence offer an opportunity for new disruptive competitors to arise.

2.2.2 The theory of constraints

Silber (1975, 1983) considers innovation as a result of constraints placed on it. The various causes of innovation include but are not limited to the need to cut operating costs (McConnell and Shwarch 1992), reduce turnaround time on product and service delivery, improve efficiency, keep up with latest technology, reduction of risks and increase capital base. The advantages of financial innovation far outweigh the disadvantages but (Christensen 2013) sets to explain why several companies fail to innovate which eventually and in the long run lead to their lack of competitiveness in the market. A modern organization will crush disruptive new ideas since it represents a threat to management, careers, modus operandi, structure, operations and organization culture. The solution is therefore to create a separation between innovators and current management to ensure that the business unit thrives in an environment that is free from coercion, manipulation and disruption from its main mandate which is to innovate and come up with creative problem solving systems. Anthony and Christensen (2008) argue that organizations that fail to innovate are eventually sent to their death beds due to failure to match competition from their peers who embrace technology.

March (1991) describes the connection between the exploration of new possibilities and exploration of old certainties. He contends that firms balance between exploration and exploitation by the trade-off between the exploration costs of new investments and benefits of exploitation of existing investments. Therefore the dilemma exists on

the basis of the decision of whether to invest in the future capabilities or maximizing on current existing business infrastructure.

Rosenberg (1996) contends that the advent in new technology and the subsequent need to upgrade old and existing technology highlights the uncertainty facing management of organizations in terms of decision making in embracement of innovation. The economic and financial merits of existing firms in embracing uncertain innovative strategies has been critically examined in studies done in economies of technological innovation and organization strategy (Reinganum 1983). He argues that existing firms will see no benefits in uptake of new technological advancement at the expense of the existing old technologies since it will disrupt the current revenue stream. New industry entrants do not encounter this disincentive so they continually invest in new technological advancements to improve their services and to maintain competitive advantage (Reinganum 1983). This precarious situation where the existing organization needs to chose between listening to their existing customers by virtue of not making technological advancements and not listening to their existing customers by embracing new technology results to a scenario where they either stand to lose their current revenue stream or lose out to the new entrants who threaten to shrink their market share (Rosenberg 1996). This further cements the “innovators dilemma” where the existing firms will be more inclined to listening to their existing customers by not embracing new technology hence face the risk of losing on their market to new entrants. This is a sharp contrast to existing market dispensation which stipulates that market orientation results in good organization performance (Matsuno et al 2002). The practicality of the trade-off between satisfying

current customers and embracing innovation was further examined by (Im and Workman 2004).

2.2.3 Market Power and Efficiency Structure Theory

Market power theory states that increased externalities in the market results into market power which is the ability of a firm to inflate its prices without losing its existing customers. Banks do not exploit their customers as a result of the market power but are able to increase their market share and generate more profits while managing their risks as a result of product diversification. The study further analyzes the market power theory vis a vis the efficient structure theory basing the correlation between banking concentration and performance. Findings show that bank concentration leads to profitability supporting the market power rather than the efficient structure theory.

Demesetz (1973) states that according to the efficiency structure hypothesis, the more efficient companies will compete better and develop faster resulting in the increased degree of market concentration. This can be achieved by improving efficiency in service delivery and good management hence increasing profitability in the long run. He therefore contends that the more efficient companies have a greater competitive advantage compared to their peers. Firms with market power have the ability to adjust their prices without losing or interfering with their current market share and also possibly introduce new obstacles to new entrants. According to Mutua (2010) it is in order to conclude that bank performance and efficiency is determined by both internal and external factors. Internal factors in banking include the size, capital structure, uptake of technology, efficiency in management and external factors

like competition from their peers, macroeconomic factors such as the state of the economy, inflation and interest rates.

2.3 Determinants of Efficiency in Commercial Banks.

According to studies, financial innovation is driven by technological advancement and customer demand of improved efficiency (Nasri 2007). The development of various unique inventions leads to reduction of fees which frees up capital to be used in other expansion activities. Cohen (1989) argues that innovation has operated in significant stages to achieve improvement in processes, reduction of imbalance, reduction in turnaround time and reduction in operational costs. The key discussions will be skewed towards new product, new services, processes and techniques.

2.3.1 Product Innovation

Commercial banking has traditionally been the backbone of banking and financial services provision in Kenya. The core business of banks is deposit taking and provision of loan facilities. The loan product has played a critical role in informing the profitability of commercial banks since it's the core revenue generation activity. Therefore competition in attracting customers to take up the loans has led to increased innovation of the processes to make it easier and convenient to customers to access credit from the financial institutions.

Mobile banking: Products like mshwari offered by commercial bank of Africa link integrate the money transfer system offered by safaricom to customers and provide a platform for registered users of MPESA with a good credit history to borrow and save through use of their mobile phones at affordable interest rates round the clock. Other mobile banking products available for customers that provide access to credit are

Kenya commercial bank's KCB MPESA application which works in the same way as MSHWARI.

Equitel, a product offered by equity bank is a new innovative platform that helps in financial management, flexible communication, choice and control. It provides features that enable the user to perform all financial transactions, make calls, send text messages and browse the internet. It also enables account holders to access their accounts via mobile phone, pay utility bills free of charge, transfer money from bank to bank and access credit facilities twenty four hours a day.

Online banking: As individuals, firms and households increased access to the internet with its increased use and availability, financial institutions followed suit and established an online presence. The first websites for banks were launched in 1995 and by 2002, most of the banks in America had websites (De Young 2005). The primary objective of linking bank transactions to the internet was to improve on service delivery, reduce operational costs and in the long run increase profitability of financial institutions as was observed in US banks by De Young, Lang and Nolle (2007). In Spain, a related study on banks observed that internet banking improved on cost reduction and also increased profitability of the banks (Hernando and Nieto 2007). This further affirms the effects and importance of internet banking on not only increasing profitability but also operational efficiency of financial institutions. Both studies concluded the impact and importance of technological advancement in financial institutions on improving operational efficiency in commercial banks.

2.3.2 Process Innovation

There has been a tremendous improvement in bank processes over the last century especially with regard to electronic remittance being enhanced by both online and mobile banking systems which not only reduce costs to the customer but also offer an alternative mode which is more convenient than the traditional method which entails filling in manual instructions at the banking hall for processing. The evolution of electronic money transfer systems like electronic funds transfer (EFT) which is strictly for transfers below a million shillings and real time gross settlement (RTGS) system which means funds particularly above a million shillings are transferred as and when they are received and not batched with other transactions from bank to bank in less than two hours turnaround time. Most financial institutions have gone out of their way to automate the receipt of funds from other banks by creating a platform linking their systems to the swift module that channels funds to ensure that funds hit the beneficiary accounts directly without any manual intervention e.g. commercial bank of Africa.

Locally, pesalink, a digital payment platform was launched by the Kenya bankers association (KBA) and offered by Integrated payments services limited (IPSL). This is a peer to peer (P2P) product which enables customers to make payments between banks in real-time, in a secure environment, around the clock, without having to go through intermediaries. It has been developed as a complementary tool to existing banking tools, mobile money and existing wallets to reduce the cost of transactions and improve bank to bank money transfer. The only requirement to transact is a mobile phone or internet access.

2.3.3 Service Innovation

Service innovation essentially relates to technological advancement on ways customers access their accounts and modes of transfer of money from their accounts to various beneficiaries. Automated Teller Machines (ATMs) which were invented in the 1980's enhances access to accounts by customers and were mostly used to withdraw cash for various transactions instead of the traditional over the counter withdrawal technique(Rakesh 2006). The same has been enhanced to debit cards which have the capability to also deposit cash, pay utility bills at the ATM machine e.g. electricity bills and pay bills at various electronic points of sale like supermarkets and restaurants. The debit card is an electronic card issued by a bank to enable the holder to access their accounts and withdraw funds or pay for goods and services. They are linked to a checking account where they have the option of transacting online (PIN based) or offline (signature based). The online avenue allows the user to withdraw cash at the point of sale while the offline method provides float (Bencivenga and Smith, 1991).Of late various financial institutions have integrated the debit card into a visa card enabling the user to transact across different countries and still access their accounts.

2.3.4 Institutional Innovation

Intermediation by financial institutions and provision of credit facilities has led to creation of a supervisory and legal framework that creates a pool of information about the credit histories of customers which is then used by various financial institutions to assess the credit worthiness of a prospective borrower before extending credit to them. This was an innovation necessitated by the need for risk management among financial institutions to tame and reduce the rate of defaults. Through the credit reference bureau (CRB), various financial organizations share all information about

their account holders and their credit histories to enable other organizations to be able to make informed decisions before extending credit facilities. This form of innovation has greatly improved on efficiency of the process and stabilized the lending business.

2.4 Empirical studies

Locally, Gitau (2011) studied the relationship between financial innovation and financial performance of commercial banks. The objective was to find out the financial innovation strategies that had been used by commercial banks by interviewing 44 respondents on process innovation, product innovation and institutional innovations in their respective banks. He observed that the most adopted innovation strategy was process innovation which enabled banks to serve more customers within a shorter time hence improving on overall operational efficiency.

Owino (2016) carried out a study on the effects of financial innovation on operational efficiency of commercial banks. The objective was to investigate the consequences of economic invention on operational efficiency within commercial banks listed at the Nairobi securities exchange. She based her assessment on product innovation i.e. number of ATMs, number of agents and size of bank. She observed that commercial banks being controllers of their own innovations should consider strategies that not only benefit the bank in terms of population and popularity but also consider their profitability such that their operational efficiency is enhanced.

Gaitungu (2010) studied the analysis of the challenges facing internet banking in Kenya. The objective was to find out analyze challenges facing internet banking with commercial bank of Africa as a case study. He identified security as a major concern to users of internet banking and also the banks since loopholes in data security could

be used to defraud the bank or the customers. He also noted that lack of an adequate legal framework, complexity of internet banking terms and internet banking resolution were not the major bottlenecks to internet banking and that the same could be mitigated by effective training of users, investment in watertight controls to ensure a secure environment for users and investment in robust internet service providers to avoid frequent link disconnection which greatly inconveniences customers.

Frame and White (2002) observed that an efficient regulatory framework protecting investors was important in ensuring the success of financial innovation in organizations. His finding was based on financial innovation in the securities market and contended that it played a key role in ensuring stability in volatile markets which caused unstable forex rates. The absence of automated trading systems as a technological advancement strategy continually led to innovations in the sector. He concluded that stiff competition among financial institutions was a major factor influencing increased financial innovation both locally and globally.

Sullivan (2000) examined and compared banks in the USA notably in New Mexico, Oklahoma, Kansas, Missouri that used the internet as a platform to transact to banks that did not offer the service in the year 2000. The research established that internet use was more pronounced in areas with higher educated civilians between the age brackets of 18-64 years. These banks also recorded higher incomes hence higher profitability as compared to the banks that did not transact using the internet.

Tufano (1989) in his study on first mover advantages of financial innovation examined how banks are rewarded for their investment in development of new

products and services. He noted that the banks which engage in innovation do not charge higher prices in the brief 'monopoly' period before imitative products appear but ultimately charge lower prices than their competitors. He concludes by stating that innovators incur lower costs in provision of services, marketing and in trading.

Furst, Lang and Nolle (1998), observed that most banking analysts concur that technological advancements are key in performance of financial institutions. Their study in the United States highlighted a significant shift in electronic means of payments in retail transactions. It enabled banks to reduce geographical restrictions, cross sell their products, marketing their products, retain high valued customers and positioning themselves strategically for the future in terms of gaining a competitive advantage. However, they also observe that with banks facing increased competitive pressure to gain technological advancement, they also face increased risk exposures if they fail to implement effective risk management strategies.

According to the world economic forum (WEF) 2015, financial innovation is deliberate, predictable and has the greatest effect when they use business models that are based on platforms and are also data intensive. Collaboration between the incumbents, new entrants and regulators is required to ensure that the impact, effect of financial innovation and risk profile of the industry is examined. Further, the research showed that disruption will be a continuous process and not a one off as the pressure and need to innovate will shape customer behaviours, organizational alignments, business models and long term outlook of the financial services industry. It also asserts that financial innovations may result in organizations facing a new set of risks

in form of security, reputation risks and regulation issues as they endeavor to come up with creative ways to offer their services.

2.5 Conceptual Framework

The theories have provided us with an outlook of the impacts of financial innovation on efficiency of commercial banks in Kenya. Financial innovations made by commercial banks with reference to process innovations, product innovations and bank size is expected to improve efficiency in these institutions.

2.6 Chapter Summary

The foregoing literature highlights the importance and impacts of financial innovation on financial performance of local commercial banks. Therefore the role of financial innovation in ensuring financial inclusion cannot be gainsaid hence the emphasis of the need to continue self innovating to ensure that commercial banks maintain advantage over their peers in provision of efficient products and services to their esteemed customers. This also allows the customers to transact conveniently hence play a crucial role in monetary policy and supply of credit in the economy. The role of regulation in the financial markets should also be considered during planning and implementation to forestall any financial disruptions in the market as a result of unwarranted system failures. This requires financial institutions to embrace and fulfill capital sufficiency, risk management capabilities and employ professional management to administer and sustain their systems. This is because due to technological advancement in the financial sector, there is danger of the legislative framework not evolving as fast to able to effectively regulate the sector. Concerns have been on the interoperability, transparency in costing and minimization of exposure to customers.

However most scholars have written and researched widely on effects of financial innovation on financial performance which in essence focuses on profitability without pointing out the role of the major technological advancements on operational efficiency in commercial banks by reducing operational costs, improving on convenience of customers and generally simplifying banking operations. Therefore, this still remains a significant area for research and further studies.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter illustrates the various techniques used and followed in conducting the study on the impacts of financial innovation on operational efficiency of Kenyan commercial banks. It shows the research design, population size, sample size, data and information gathering procedures, research models and data analysis.

3.2 Research Design

A research design refers to the methods and techniques used in collecting and analyzing measures of the variables in the study. It therefore specifies the direction of the subject study. The study type used is descriptive study since it's adequately defined by the design of the study and incorporated a good association of the variables studied on the impact of financial innovation on operational efficiency. Descriptive research design is a systematic, empirical inquiry where the researcher does not have direct control over the independent variable since it has already been established or cannot be manipulated (Mugenda and Mugenda, 2003). Descriptive study clearly outlined correlation among the variables used and formed a superior basis over all the other study design

3.3 Population of the study

A population is a well-defined set of elements, group of items, people, inhabitants, households, facilities or events under investigation (Ngechu 2004). The target population of the study which informs the research topic was 39 commercial banks in Kenya rather than the usual existing 42 commercial banks over a period of 5 years as at the end of December 2017. (CBK Report 2017). This is due to the reason that three commercial banks namely Imperial bank, Dubai bank and Chase bank were under

receivership during the period 2016 hence not under normal operations. The period under study is sufficient enough to present an adequate representation of the variables which is in line with the subject matter on effects of technological advancement on operational efficiency

3.4 Data Collection

The study utilized secondary data from yearly published and audited financial statements of the financial institutions under the survey. Data pertaining to operational efficiency specifically on operating cost was obtained from Central Bank of Kenya yearly investment firms reports and accounts covering the period under review i.e. 1st January 2013 to 31st December 2017.

3.5 Data Analysis

The study utilized statistical package for social sciences (SPSS) in data analysis. The t-test analysis was used as a test for significance for the research at 0.05 level of significance. The researcher carried out a multiple regression analysis using the model below to establish the impact of financial innovation on operational efficiency of commercial banks. The model is further reinforced by (Mutua 2011) in examining the effects of mobile banking on financial performance of commercial banks. Owino (2016) also examined the relationship between technological advancement on operational efficiency of banks and found the analysis to be adequate enough to explain the relationship. The relationship between the variables was also analyzed upon testing for multi-collinearity by applying the Pearson correlation analysis. The study used operating cost/income as the independent variable.

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + \varepsilon$$

Y = Efficiency (operating income/operational costs)

X1= Yearly value transacted through internet and mobile banking

X2= Number of users of internet and mobile banking.

X3= Bank size/Total Assets

B₀= Constant

ε = Error term

B₁ = Coefficient of X₁

B₂ = Coefficient of X₂

B₃ = Coefficient of X₃

To test for the significance of the model and the impact of financial innovation on operational efficiency of the commercial banks, an F-test at 5% significance level and 95% confidence level was conducted. Examination of variation analysis (ANOVA) was applied.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter discusses the findings and interpretations with regard to the study objective. The objective of this study was to determine the impact of financial innovation on the efficiency of commercial banks in Kenya. This chapter covers the descriptive statistics, inferential statistics and interpretation of findings. Data obtained was computed for independent variables of internet and mobile banking transactions, Number of users of internet and mobile banking and Bank size/Total Assets. The data was then coded and entered into the SPSS version 22. The subsections that follows illustrates the findings.

4.2 Descriptive Statistics

Table 4.1: Descriptive Statistics

	N	Min	Max	Mean	Std. Dev	Skewness		Kurtosis	
		Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Operational Efficiency	39	.21	1.64	.6573	.30116	1.132	.357	2.000	.702
Internet and mobile banking transactions	39	.00	.71	.2719	.23324	.408	.357	-1.201	.702
Number of users of internet and mobile banking	39	.02	16.45	5.9935	4.90497	.675	.357	-.472	.702

Bank Size/assets	39	4.26	8.62	7.1989	1.01852	-1.541	.357	2.671	.702
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Table 4.1 shows results for descriptive analysis for Operational Efficiency, Internet and mobile banking transactions, Number of users of internet and mobile banking and bank Size/assets. The study used mean, standard deviation, Kurtosis and Skewness to test respondent ideas where Standard deviation is the square root of the variance. The study found that the means of the variable were as follows: operational Efficiency (m=.6573); Internet and mobile banking transactions (m=.2719); Number of users of internet and mobile banking (m=5.9935) and bank Size/assets (m=1.01852). The standard deviation was found as follows: operational Efficiency (sd=.30116); Internet and mobile banking transactions (sd=.23324.); Number of users of internet and mobile banking (sd=4.90497.) and bank Size/assets (sd=1.01852).

4.3 Trend analysis

Figure 4.1: Internet and mobile banking transactions

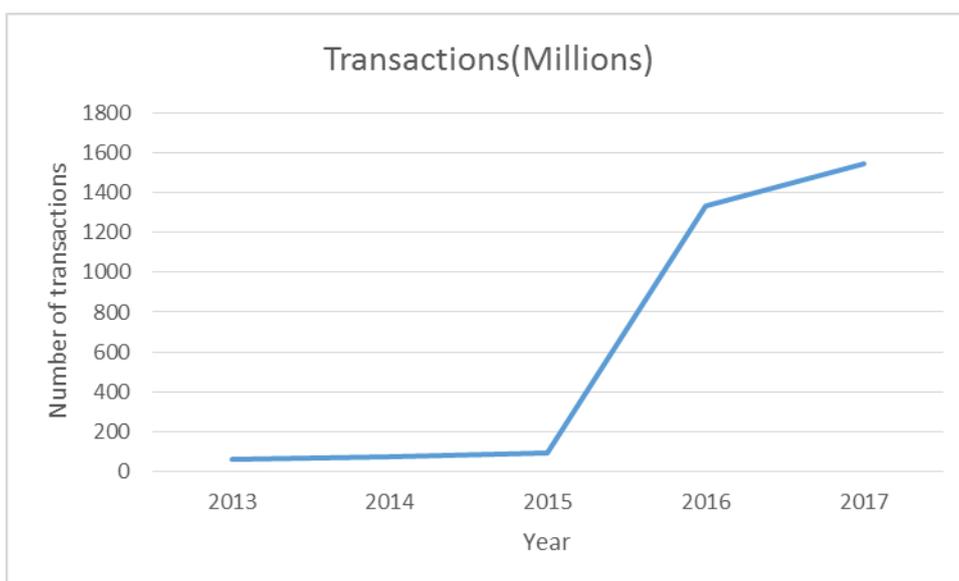
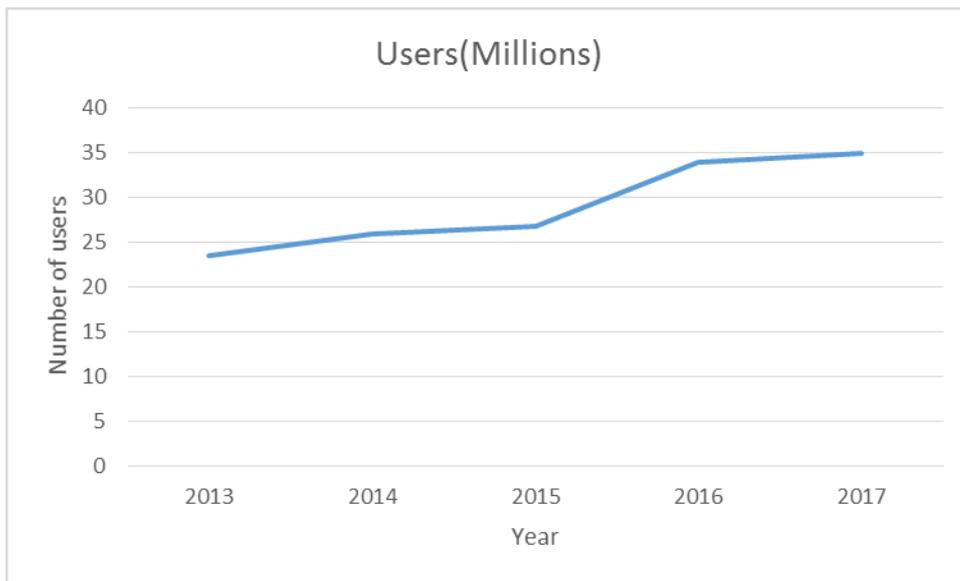


Figure 4.1 shows the average number of Internet and mobile banking transactions for each year from 2013 to 2017. The trend shows that there was a slow usage of internet

and mobile transactions in years 2013 and 2014. However a sharp increase in transactions was recorded in year 2015 and there was also a high increase in year 2016. There has been a progressive increase in Internet and mobile banking transactions.

Figure 4.2: Number of users of internet and mobile banking



The trend in figure 4.2 shows that there has been an increase in the number of users of internet and mobile banking. Each year recorded a slow increase though year 2015 recorded a sharp increase in the Number of users of internet and mobile banking.

Figure 4.3: Bank Size/assets

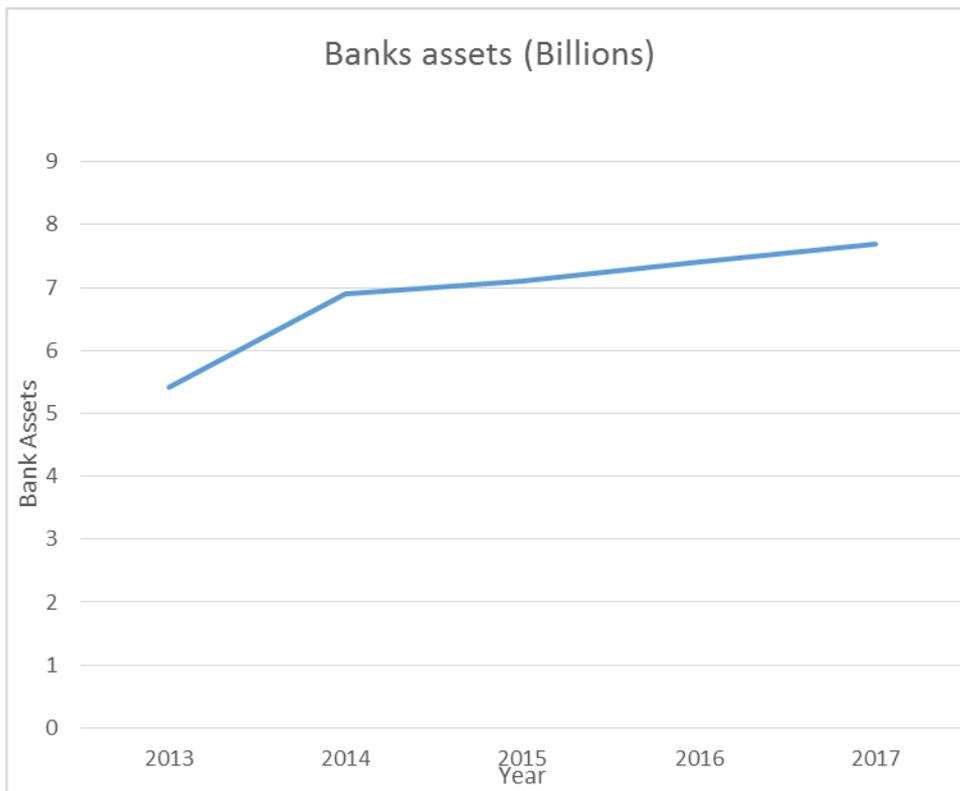


Figure 4.3 shows that bank assets have been on the rise. For year 2013, there was a high increase while year 2014 to 2017 recorded a slow increase in bank assets and size.

4.4 Correlation Analysis

Table 4.6 below shows the Pearson's correlation coefficient generated from the data. Pearson's correlation analysis is used to investigate the relationship between variables in the study.

Table 4.2: Correlation Analysis

Correlations		Operational Efficiency	Internet and mobile banking transactions	Number of users of internet and mobile banking	Bank Size/assets
Operational Efficiency	Pearson Correlation	1			
Internet and mobile banking transactions	Pearson Correlation	.849	1		
Number of users of internet and mobile banking	Pearson Correlation	.528	0.14	1	
Bank Size/assets	Pearson Correlation	.240	0.117	0.003	1
**. Correlation is significant at the 0.01 level (2-tailed).					

The study found that there is a strong positive correlation between Internet and mobile banking transactions and operational efficiency as shown by a Pearson Correlation of .849. Also Number of users of internet and mobile banking has a strong positive correlation with operational efficiency as shown by a Pearson Correlation .528 while

Bank Size/assets had a weak positive correlation of .240. A correlation value of 1 indicates a presence of a perfect association between the variables. The magnitude of the association (+ or -) indicates the nature of association (positive or negative association).

4.5 Regression Analysis

The research study was to determine the impact of financial innovation on the efficiency of commercial banks in Kenya. This section brings out the regression analysis using the model, ANOVA and determining the coefficient.

Table 4.3: Model Summary
Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.731 ^a	.710	.683	.29459	2.408

a. Predictors: (Constant), Bank Size/assets , Number of users of internet and mobile banking, Internet and mobile banking transactions

b. Dependent Variable: Operational Efficiency

From the analysis in Table 4.2, the coefficient of determination (R^2) equals 0.710. Coefficient of determination elucidates the percentage of variation in the dependent variable that is explained by the independent variables. It is used to explain the extent to which changes in the dependent variable can be explained by the change in the independent variables. In this study, coefficient of determination (R^2) indicated that the independents variables (Bank Size/assets, Number of users of internet and mobile banking, Internet and mobile banking transactions) contributed to 71% of the

variation in operational efficiency. This therefore means that other factors that were not included in this study explained 29%.

Table 4.4: ANOVA
ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	.428	3	.143	1.646	.001 ^b
Residual	3.471	35	.087		
Total	3.900	38			

a. Dependent Variable: Operational Efficiency

b. Predictors: (Constant), Bank Size/assets , Number of users of internet and mobile banking, Internet and mobile banking transactions

Analysis of Variance was used to test the significance of the regression model as pertains to significance in the differences in means of the dependent and independent variables. The ANOVA test produced an f-value of 1.646 which was significant at 0.05 significance level ($p = 0.001$). This depicts that the regression model is significant at 95% confidence level; that is, has 0.01% probability of misrepresentation.

**Table 4.5: Coefficients
Coefficients^a**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.096	.387		.249	.000
Internet and mobile banking transactions	.525	.171	.181	3.070	.000
Number of users of internet and mobile banking	.078	.055	1.273	1.428	.003
Bank Size/assets	.070	.050	.238	1.416	.002

a. Dependent Variable: Operational Efficiency

The model was used to establish of the relationship between financial innovations on the efficiency of commercial banks in Kenya.

$$Y = 0.096 + .525X_1 + 0.078X_2 + 0.070X_3$$

The study reported a positive relationship for the Number of users of internet and mobile banking and bank size and assets, and Internet and mobile banking transactions. The constant which is 0.096 implies that if all the determinant variables were rated zero, Number of users of internet and mobile banking of the commercial banks in Kenya would be .078. A unit increase in Bank Size/assets, would lead to

increase in efficiency by .070 while a unit increase in Internet and mobile banking transactions would lead to an increase in efficiency by 0.525.

4.6 Discussion of Research Findings

The study findings indicate a positive relationship between financial innovation and efficiency of commercial banks with an r squared of 0.710. This indicates that financial innovation variables on the study accounts for 71%. This finding concur with Nyathira (2012) who concluded that financial innovation indeed contributes to and is positively correlated to profitability in the banking sector.

The study by Saleem and Rashid (2011) had indicated mobile banking Apps downloaded to users' mobile phones had made it easier for customers to transact with commercial banks. Further, they had argued that mobile innovation systems allowed customers to access financial services without having to physically visit commercial banks. As such, the convenience associated with mobile banking innovations had enhanced customer's propensity to conduct more banking transactions, at less operational management costs to the banks.

This study found that financial innovation technologies had significantly impacted commercial banks clients' transactions, since mobile banking and internet banking had a wider reach of customers as opposed to the traditional banking hall clients. This finding confirms study by Bhvnani et al., (2008) that had indicated that developing countries had benefited massively by adoption of financial innovations, as commercial banks were not obliged to open physical banks for clients to access commercial banks services. Building of physical structures is capital intensive and

involves more logical and operational costs that are otherwise eliminated by the adoption of mobile banking innovation technologies.

The study indicated that there was an increase in transactions every year. This indicates that branchless banking has been facilitated by introduction and adoption of mobile and internet innovation technologies. The study by Morawczynski and Krepp (2011) had indicated that mobile and internet banking innovations in Kenya had enhanced commercial banks outreach to million bankless clients across the country. This had been made possible by commercial banks integrating mobile money innovative platforms such as M-Pesa mobile money transfer services. Through mobile and internet banking applications, millions can open bank accounts, transfer money to these accounts, withdraw money and conduct saving activities without having to travel long distances in search of a banking hall.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings, discussions, conclusions from the study and suggestions for further study and recommendations for practice. The purpose of this chapter is to present summary, draw conclusions and recommendations on the findings of the main objective of the study which was to establish the determine the impact of financial innovation on the efficiency of commercial banks in Kenya.

5.2 Summary of Findings

The study found that there is a strong positive correlation between Internet and mobile banking transactions and operational efficiency as shown by a Pearson Correlation of .849. Also Number of users of internet and mobile banking has a strong positive correlation with operational efficiency as shown by a Pearson Correlation .528 while Bank Size/assets had a weak positive correlation of .240.

The study found that coefficient of determination (R^2) indicated that the independents variables (Bank Size/assets, Number of users of internet and mobile banking, Internet and mobile banking transactions) contributed to 71% of the variation in operational efficiency. The ANOVA revealed that the regression model is significant at 95% confidence level. The test produced an f-value of 1.646 which was significant at 0.05 significance level ($p = 0.001$).

The study found that there is a positive relationship for the number of users of internet and mobile banking and bank size and assets, and Internet and mobile banking transactions. The constant found was 0.096 implying that if all the determinant variables were rated zero, Number of users of internet and mobile banking of the commercial banks in Kenya would be .078. A unit increase in Bank Size/assets, would lead to increase in efficiency by .070 while a unit increase in Internet and mobile banking transactions would lead to an increase in efficiency by 0.525.

5.3 Conclusion

From the analysis, the study concludes that Number of users of internet and mobile banking and bank size and assets, and Internet and mobile banking transactions had varying degrees of impact on the efficiency of commercial banks in Kenya in the period under study. The effects of internet and mobile banking transactions and number of users of internet and mobile banking on the efficiency was a strong positive relation while effect of bank assets was a weak degree of association with the efficiency. This study therefore concluded that all the variables under study had influenced efficiency of commercial banks in Kenya.

5.4 Recommendations

This study strongly recommends the adoption of innovation strategies by the various commercial banks operating in Kenya so as to enhance efficiency in operations, boost profitability and attract more public attention. The commercial banks should also invest more capital so as to guarantee the going concern aspect and thus win the confidence of potential clients.

To retain clients and attract more clients, commercial banks should come up with more innovative products and services. This should include enhanced use of mobile money transfers using multiple mobile technology platforms, and Apps. Commercial banks should also invest in mobile insurances products, and mobile credit facility products as a way of enhancing value to existing customers, and reducing operational costs associated with traditional banking systems.

5.5 Limitations of the Study

The data used for this study was secondary data generated from the commercial banks financial statements. The measures and accounting policies were not uniform in all the commercial banks. The researcher had to standardize the data gathered so as to ensure similarity in comparison and computation. Some commercial banks were also unwilling to disclose amounts in profits earned as a direct result of innovations embraced. The researcher assured them that the information was to be used purely for academic purposes only and that it would not be disclosed to any third party whatsoever.

The research was limited only to the three determinants of financial innovation while there are other factors that significantly affect operational efficiency of banks. This limited the results as without studying the other factors; the findings assume that these are the only innovation determinants of efficiency.

5.6 Suggestions for Further Research

This study examined the relationship between financial innovation and efficiency of commercial banks in Kenya. To allow thorough comparison, this study recommended that future studies be conducted taking into account the effects of innovation and various competitive strategies on the financial performance of commercial banks in Kenya.

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APPENDICES

Appendix I: List of Commercial Banks in Kenya

Imperial bank, Dubai bank and Chase bank

1. ABC Bank
2. Bank of Africa
3. Bank of Baroda
4. Bank of India
5. Barclays Bank of Kenya
6. Chase Bank
7. Citibank
8. Commercial Bank of Africa
9. Consolidated Bank of Kenya
10. Cooperative Bank of Kenya
11. Credit Bank
12. Development Bank of Kenya
13. Diamond Trust Bank
14. Dubai Bank Kenya
15. Dubai Islamic Bank
16. Ecobank
17. Equity Bank
18. Family Bank
19. Fidelity Commercial Bank Limited
20. First Community Bank
21. Giro Commercial Bank
22. Guaranty Trust Bank
23. Guardian Bank
24. Gulf African Bank
25. Habib Bank
26. Habib Bank AG Zurich
27. I&M Bank
28. Imperial Bank Kenya
29. Jamii Bora Bank
30. Kenya Commercial Bank
31. Mayfair Bank
32. Middle East Bank Kenya
33. National Bank of Kenya
34. NIC Bank
35. Oriental Commercial Bank
36. Paramount Universal Bank
37. Prime Bank
38. Sidian Bank
39. Spire Bank
40. Stanbic Bank
41. Standard Chartered Bank

- 42. Trans National Bank Kenya
- 43. United Bank for Africa
- 44. Victoria Commercial Bank

Appendix II: Secondary Data Collection Form

Bank Name.....

	2013	2014	2015	2016	2017
Operating Income/Costs					
BBK					
I&M Bank					
Bank size/Total Assets					
Yearly value transacted through internet and mobile banking					
Number of users of internet and mobile banking					

Appendix II: Average yearly transactions for all banks

Average yearly transactions for all banks	2013	2014	2015	2016	2017
Transactions	61.049	75.944	92.848	1331.014	1543.175
users	23.546	25.917	26.749	33.893	34.870
Banks assets	5.422	6.907	7.102	7.412	7.696

Appendix III: Average yearly transactions per banks

Name of bank	Avg Mobile and internet transaction Total transactions Average (millions)	Avg Mobile and internet accounts in millions	Avg Bank Size/assets	Avg Operational Efficiency
Kenya Commercial Bank	0.028957	1.34527	8.62	0.5755
Equity Bank	0.027767	1.1332	8.49	0.6197
Cooperative Bank of Kenya	0.021793	0.875962	8.43	0.5766
Barclays Bank of Kenya	0.01522	0.635761	8.32	0.6477
Family Bank	0.011733	0.432555	8	0.7514
National Bank of Kenya	0.008052	0.268499	7.7	1.0235
Diamond Trust Bank	0.00531	0.175652	8.23	0.4648
Standard Chartered Bank	0.003409	0.107733	8.13	0.6266
Bank of Africa	0.001591	0.054944	4.67	0.3348
Sidian Bank	0.000494	0.020992	8.12	0.8011
NIC Bank	0.231934	5.08247	8.15	0.5363
Ecobank	0.1947	4.75139	7.62	1.6376
Commercial Bank of Africa	0.188719	4.42028	8.16	0.388
I&M Bank	0.162543	4.14304	7.18	0.5471
Stanbic Bank	0.144146	3.72618	6.97	0.6011
Trans National Bank Kenya	0.122525	3.36719	7.75	0.9777
Prime Bank	0.095487	3.03852	7.74	0.7327

First Community Bank	0.091393	2.71813	7.6	0.3954
Consolidated Bank of Kenya	0.069838	2.37346	7.22	1.0096
Gulf African Bank	0.054489	2.07553	6.98	1.0576
Guaranty Trust Bank	0.039543	1.82153	7.29	0.6768
Spire Bank	0.03061	1.5891	7.47	0.7621
Credit Bank	0.492934	8.88258	4.3	0.3014
Bank of Baroda	0.453977	8.61529	7.77	0.9691
ABC Bank	0.452727	8.36803	7.31	0.2897
Guardian Bank	0.417507	8.01624	6.96	0.7094
Mayfair Bank	0.3866	7.7141	6.94	0.2517
Giro Commercial Bank	0.384059	7.42641	6.78	0.7727
Paramount Universal Bank	0.363286	7.19062	6.89	0.4199
Bank of India	0.342018	6.8427	4.26	0.5692
Habib Bank AG Zurich	0.313173	6.53192	7.16	0.2117
Habib Bank	0.308048	6.28952	7.54	0.4272
Middle East Bank Kenya	0.251802	5.81602	6.77	0.2752
United Bank for Africa	0.231605	5.47828	7.54	0.7163
Victoria Commercial Bank	0.66178	16.4463	7.11	0.8876
Citibank	0.682695	16.075	6.96	1.4658
Development Bank of Kenya	0.711786	15.7346	6.93	0.3835
Oriental Commercial Bank	0.66922	15.2239	4.77	0.3742
Dubai Islamic Bank	0.60962	14.5893	7.1	0.5695