EFFECT OF ELECTRONIC BANKING ON EFFICIENCY OF MICROFINANCE BANKS IN KENYA

BY

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DECLARATION

I, the undersigned, declare that this is my original work and has not been presented to any institution or university other than the University of Nairobi for examination.

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This research project has been submitted for examination with my approval as the University Supervisor.

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DEDICATION

I would like to dedicate this study to my loving family, whose continued support and encouragement enabled me to complete this process.
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<tr>
<td>ATM</td>
<td>Automated Teller Machine</td>
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<tr>
<td>CBK</td>
<td>Central Bank of Kenya</td>
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<td>CBS</td>
<td>Core Banking Solution</td>
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<td>CRM</td>
<td>Customer Relationship Management</td>
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<td>ICT</td>
<td>Information, Communication &amp; Technology</td>
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<td>IVR</td>
<td>Interactive Voice Response</td>
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<td>POS</td>
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<td>Resource Based View</td>
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ABSTRACT

Electronic banking is important to MFIs as it increases the efficiency of these institutions. Presently, innovation is a continuous process geared toward providing a wider range of financial products and financial intermediation which is a crucial factor in determining competitiveness and the progress of financial institutions. This study sought to determine the effect of electronic banking on efficiency of microfinance banks in Kenya. The study’s population was all the 13 microfinance banks operating in Kenya. Electronic banking in this study was the independent variable with four measures (value of mobile banking transactions per year, value of internet banking transactions per year, value of agency banking transactions per year and value of ATM transactions per year. Efficiency was the dependent variable which the study sought to explain and it was measured by the ratio of total revenue to total assets. Secondary data was collected for a period of 5 years (January 2013 to December 2017) on an annual basis. The study employed a descriptive cross-sectional research design and a multiple linear regression model was used to analyze the association between the variables. Data analysis was undertaken using the Statistical package for social sciences version 21. The results of the study produced R-square value of 0.763 which means that about 76.3 percent of the variation in the Kenyan microfinance banks’ efficiency can be explained by the four selected independent variables while 23.7 percent in the variation of efficiency of microfinance banks was associated with other factors not covered in this research. The study also found that the independent variables had a strong correlation with efficiency (R=0.874). ANOVA results show that the F statistic was significant at 5% level with a p=0.000. Therefore the model was fit to explain the relationship between the selected variables. The results further revealed that mobile banking, agency banking and ATMs produced positive and statistically significant values for this study while internet banking produced positive but non-statistically significant values for this study. This study recommends that measures should be put in place to enhance electronic banking and specifically mobile banking, agency banking and ATMs among microfinance banks as this will improve their efficiency.
CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Financial innovation is the act of creating and then popularizing new financial instruments as well as new financial technologies, institutions and markets Tufano (2002). Financial innovation is a process not confined to the last two decades, Tufano (1995, 2003) shows that financial innovation has been part of the economic landscapes for Centuries while Goetzmann and Rouwenhorst (2005) document 19 major financial innovations that span the past 4000 years ranging from creation of Eurobonds to the innovation of interest. Many organizations realize that to grow and remain competitive they need to come up with new ways and ideas of doing business. Those organizations that work as if their environment is still stable are not only losing competitive advantages, but are also facing huge financial losses (Mosoti & Masheka, 2010). Innovation is thus an important phenomenon in the financial sector since financial sectors of developing and developed countries are subjected to ongoing environmental change. Many leading scholars tout the importance of financial innovation with Miller (1986) and Merton (1992) characterizing financial innovations as an “engine to economic growth”.

Financial innovation arises where there are imperfections in a financial market and they arise to serve the players in the market and Tufano (2002) discusses how without market imperfections financial innovations would serve neither private parties nor society. In Kenya a major financial market imperfection has been financial inclusion and innovations have been stimulated as a result to increase financial inclusion a key innovation being the adoption of Micro finance within Kenya’s Economy.
Key financial innovations of the 20\textsuperscript{th} and 21\textsuperscript{st} century include electronic banking. Electronic banking has greatly impacted and changed the way banking is done in the Kenyan economy.

Microfinance is a sector of the financial market that serves low income earners and poor people by offering them services such as loans. Microfinance in Kenya began in the late 1960s with NGOs setting up pilot programs and evolved through time to a fully commercialized sector regulated by the Central bank of Kenya. Microfinance institutions like any other institutions in the economy have faced a number of challenges and stiff competition and have had to rely on electronic banking in order to be efficient and profitable.

1.1.1 Electronic banking

Electronic banking can be defined as the use of Information Communication Technology by banks to carry out banking and offer banking services. Electronic banking is viewed as one of the key financial innovations of the century. Innovations are new ideas, products, practices and behaviors that are substantially different from current existing ones. Frame and White (2002) define financial innovation as something new that reduces costs, reduces risks or provides an improved product, service or instrument that better satisfies the demand of participants within a financial system. Ho (2006) also defines financial innovation as being the emergence of financial products or services, new organizational forms or new processes for more developed and complete financial markets that reduce costs and risks or provide services that meet particular needs of players in a financial system.

Schrieder and Heidhues (1995) categorize financial innovation into four broad categories: 1) Financial systems innovations; 2) financial institution innovations; 3)
Processing innovation and 4) Product Innovation but still highlighted that strong linkages existed between these categories. Financial systems innovations relate to changes in the finance system as a whole that affect all participants involved in the intermediation process. Financial institution innovations relate to changes in structure, organization and legal form of institutions often seeking to overcome legal and economic constraints on extension of financial services to additional segments such as the poor. A good example of such an innovation being the transformation of an informal financial institution into a registered formally recognized financial institution. Processing innovations focus on improving efficiency and market share by increasing the organizational and service distribution aspects of financial institutions. Financial product innovations involve in the creations of new or modified financial services that have never existed before or differ substantially from existing services a good example being the introduction of flexible saving facilities in rural financial institutions.

Financial Innovation is not only important in reacting to increased competition but it is also important in addressing the financial demands of clients mostly affected by poverty and low income. These innovations help expand formal financial service coverage to widely spread and low income clientele and in the process of doing so reduce intermediary financial risks and costs.

The various forms of electronic banking in use by Micro Finance Banks in Kenya include; mobile banking, internet banking, agency banking and ATMs.

1.1.2 Firm Efficiency

The efficient functioning of a financial system is dependent on the efficient operations of the financial intermediaries found within the system. Efficiency is defined as the
ratio of useful output in a process/system to the total input put in to produce output, the higher the efficiency of a system the lower the amount of input required for the same output. In the case of a microfinance institution being a profit driven entity efficiency is the relationship between income, profits and expenses. A producer is considered technically efficient if it is possible for them to produce more of any output without producing less of some other output or using more inputs, Koopmans (1951).

Efficiency measurement helps in analyzing an entity’s performance and it can be measured in three ways; output maximization, cost minimization or profit maximization.

Efficiency is important to Microfinance institutions as it is an element that deals with the problem of financial viability, Mersland and Strøm (2010). For microfinance institutions to operate and thrive in an economy they are required to be financially viable. For them to be financially viable MFIs need to be both operational self-sufficient (OSS) and financially self-sufficient (FSS). Operational Self-sufficiency is where an MFI succeeds in recovering all of its operating expenses from the services it offers to its clients while Financial Self-sufficiency is where the institution is able to recover all its operating costs and make a profit. Efficiency is thus important since for two MFIs subjected to the same factors micro and macro factors, the more efficient institution will be the more financially viable institution since it will either have more output or lower costs hence have higher margins and be more financially self-sufficient.

Efficiency is also important in interest rates offered by Microfinance institutions since it is a key driver for lower interest rates, Hug (2014). MFIs exists to provide financial
services to poor individuals, these services include provision of capital to microentrepreneurs and credit facilities to clients. In order for the poor to take up these loans and credit facilities the interest rates charged on them have to be low. In order to charge lower interest rates and remain financially viable MFIs need to be efficient hence maximize profit while minimizing costs. MFIs serve a sector of the economy that is largely poor and informal, thus compared to traditional banks are faced with an uphill task when assessing their clients to verify their feasibility and credit worthiness due to lack of proper documentation and they also give lower volume loans since the poor individually borrow small amounts, this factor increases the operating costs of MFIs compared to other financial intermediaries in the market due to the costs that go into issuing out one loan hence the great need for MFIs to become efficient in order to increase the interest yield of their loans.

1.1.3 Electronic banking and Firm Efficiency

Electronic banking–performance relationship is context dependent. Certain financial improvements mainly focus on enhancing the current products, processes and business models in an existing market while other financial developments disrupt the present markets as a consequence of introducing new products, processes and business models to a target on the new market. Various factors have a significant influence on the effect of electronic banking on the performance of firms and these include; type of electronic banking innovation, firm age and the cultural context of the firm (Tidd, 2001).

With reference to Harker and Zenios (2000), it’s stated that technological advancement encourages more competitive force. Primarily, it opens up new conveyance channels, keeping in mind that those are not more cost effective for the
organization; hence customers get the chance to rely on them and demand access. Nevertheless, before the bank branch was the main channel for the dispersion of financial services, we see today an assortment of channels eroding the branch's dominance. The economies of scale that lead to more incorporated automation cause more economies of scope effects. As financial establishments – in concurrence with all other retail services – understand that consumer satisfaction and loyalty lead to a fixed progression, they go for increasing the share of customers' wallets that they are servicing. With stage automation, a representative can get a single view of the whole customer relationship; economies of scope can be made when a firm offers appropriate product mix to support its customer base.

Gale and Allan (1994) opposed advancement to remain noticed by means of: presentation of original economic devices and/or services and/or repetition, launching of original fund expenditures, discovering new wellsprings of funds, launching of original developments and/or methods towards handling everyday processes, and/or setting up an innovative organization; with every one of respective modifications to be a piece of present economic organizations, rise of remarkable development of innovative economic organizations and marketplaces. Financial advancement refers to making before promoting innovative economic devices, also inclusive of first-hand economic know-hows, organizations and marketplaces (Lerner & Tufano, 2011). The advancements are in some cases separated into products and/or procedure variations, through merchandise advancements demonstrated through innovative unoriginal agreements, innovative commercial securities, or first-hand types of joint speculation goods, plus processes enhancements characterized via first-hand ways for disseminating securities, handling dealings, and/or valuing trades.
1.1.4 Microfinance Banks in Kenya

In the past decade, Kenya, being a developing nation, had high poverty incidences and high rates of financial exclusion. The financial sector had huge gaps in meeting the financial needs of the Kenyan populace and growth was stunted in the financial sector (Matu Mugo et al). In 2005, Kenya’s had a high poverty rate with approximately 40% of the population living on less than a dollar a day. According to Matu Magu and Evelyne Kilonzo (2017) low income and permanent lack of income was a barrier to financial inclusion mostly occasioned by the fact that most financial institutions in Kenya had a focus on high margin clients. Micro finance is an essential branch of the financial services that are offered in a low and middle income economy to reduce the negative impact of poverty in that economy.

The importance of microfinance is that it provides financial services to those that are financially excluded, these being mostly the lower income households in Kenya’s case. In its economic recovery strategy for wealth and employment creation that covered the period 2003 to 2007 the government of Kenya cites the importance of financial systems and improved access to financial services across the economy. In vision 2030 Kenya’s development blueprint covering the period 2008 to 2030, financial inclusion is one of the economic goals and Micro Finance institutions are highlighted as one of the institutions that will be used to achieve this. According to Decker Paye (2012) Micro finance institutions were effective in the financial inclusion process.

1.2 Research Problem

Electronic banking is important to MFIs as it increases the efficiency of these institutions. Presently, innovation is a continuous process geared toward providing a
wider range of financial products and financial intermediation which is a crucial factor in determining competitiveness and the progress of financial institutions (Mohanty & Panda, 2004). Research has been conducted locally on financial innovation and electronic banking; Gitau (2011) carried out a study on how financial innovation affected performance of banks regulated by the Central Bank of Kenya. Gitau argued that financial innovation positively affected financial performance of banks in Kenya, and competition among banks has led to continuous innovation and that financial performance improved as a result of cost reduction attributable to financial innovation. Kamotho (2009) studied mobile phone banking usage experiences in Kenya and observed that innovation was triggered by competition and noted that continuous innovation not only yielded new products but also promoted efficiency in the performance of activities. Mpate (2016) observed that mobile banking services which is a form of financial innovation had contributed positively to the development of the financial sector in Kenya and that numerous banks were experiencing tremendous growth in income and profitability due to adoption and utilization of cell phones in the provision of services. Ombati (2007) points out the critical link between technology (internet banking, mobile banking and automated teller machines) and service quality in the Kenyan banking industry, Njenga (2007) also observes that Mobile IT is an invaluable tool to provision of value to organizations which results in organization improvement, transformation and redefinition.

In all the above studies emphasis is on electronic banking and how it has had significant effects on the commercial banking sector and some of the electronic banking innovations considered are at an early stage of infancy such as mobile
banking. There is no emphasis on Microfinance Banking and the electronic banking innovations that were available during the studies have since developed further.

Kumar, McKay & Rotman (2010) looked at the effect of mobile banking on MFIs and observed that MFIs in a country without mobile banking should not develop their own systems since it would be too expensive, technical and time consuming, they also observed that mobile banking allowed MFIs to give their clients better service and that early evidence showed that it may have an effect on transaction costs which could translate to lower interest rates to clients. Kigen (2011) studied how transactional costs of MFIs based in Nairobi had been affected by mobile banking and found that the adoption would have to be combined with other efforts to reduce transactional costs and that adoption of mobile banking was as a service extension to customers as well as aimed at increasing the customer base. Ketere (2014) studied the effect of financial innovation on financial performance of eight microfinance institutions and observed that financial innovation had a positive impact on performance of MFIs. Mugo (2012) concluded that financial innovation contributed to expansion of MFI market share and number of clients.

The above scholars did not analyze how use of electronic banking by Microfinance banks registered by the Central Bank of Kenya relates to their efficiency and how these efficiencies affect their financial viability and the interest rates that they offer. As also seen above where innovation is a continuous process new electronic banking innovations have come up since the above studies were done creating a knowledge gap. This research therefore sought to fill the knowledge gap by answering the question; how does electronic banking affect the efficiency of MFIs in Kenya.
1.3 Objective of the Study

To determine the effect of electronic banking on the efficiency of Micro Finance banks registered by Central bank of Kenya

1.4 Value of the Study

The results of the research are of great importance to the future researchers, since it can be a point of reference. The findings might also be significant to scholars and researchers, in identifying the research gaps on the related topics of the study as well as reviewing of the empirical literature to institute further areas of research.

Microfinance Institutions; MFIs seek to be financially viable, reduce their costs, enhance their outreach and operate efficiently. This research will provide findings that will enable MFIs to make better informed decisions regarding electronic banking and efficiency. Microfinance clients; Clients of MFIs will benefit if the relationship is proved because they will receive services efficiently.

Policy Makers and regulators; Policy makers will benefit by gaining knowledge and understanding how MFIs work in a changing environment and what affects their efficiency, this knowledge will lead to better policies being implemented which will spur growth in the MFI sector.
CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction
This chapter covers information and studies from other researches that have carried out research in the same field of study. The specific areas covered are; theories of financial innovation, empirical review on studies done in the field of study, determinants of MFI efficiency and the conceptual framework of the study. The study will focus on the relationship between electronic banking and the efficiency of Microfinance banks that are regulated by central bank of Kenya.

2.2 Theoretical Framework
This presents review of the relevant theories that explains the relationship between electronic banking innovations and efficiency. The theoretical reviews covered are technology acceptance model, financial intermediation theory and diffusion of innovation theory.

2.2.1 Technology Acceptance Model
Technology Acceptance Model (TAM) as developed by Davis (1989) clarifies the way clients embrace/acknowledge and utilize an innovation. This model asserts that once a client is given an alternative innovation, some aspects influence their choices on the means and time of utilization. This incorporates its apparent convenience and seen helpfulness. TAM embraces settled causal chain of genuine conduct convictions, goal and disposition. This was produced by social clinicians from the hypothesis of contemplated activity. In Davis' study, two vital parts are recognized; seen convenience and seen helpfulness (Davis, Toxall & Pallister, 2002).
In other studies regarding technology, TAM is widely adopted and greatly contributes to the development of a prediction of how an individual will use technology (Fishbein & Ajzen, 2010). The level of ease of using a certain technology an individual perceives, influences the perceived usefulness and the intention for adoption (Davis, 1989). Despite TAM being an important source for theoretical framework in the study of adoption and use of technology it has many limitations which include the initial purpose designing the model which is parsimony and generality (Dishaw & Strong, 1999), not taking into consideration non-organizational setting of the organization (Davis & Venkatesh 2000), and ignoring the factors which moderate the adoption of ICT (Sun & Zhang, 2006). This theory has affected research in acceptance of technology. In this exploration, TAM will be utilized to discover how the utilization of technology enhances operational efficiency of commercial banks in Kenya and how the accessibility of technology impacts the utilization of technological innovations in among banks in Kenya.

### 2.2.2 Financial Intermediation Theory

The financial intermediation theory was advanced by Mises (1912) and postulates that financial institutions especially banks play a significant role in financial intermediation. The banks play the role of mobilizing customers with surplus money and availing them for lending to those with a shortage at a cost commonly referred to as interest. This association allows the banks to create a state of liquidity since money is taken from customers with short term maturity funds and lend to customers with long term maturity basis (Dewatripont, Tirole & Rochet, 2010). Mises (1912) argues that the banks’ role as credit negotiators is characterized by lending borrowed money.
Financial intermediation through borrowing and lending money can thus be described as the key role of the banks. According to Mises (1912), involvement in financial intermediation by banks denies them the role of creating money while retreating from the process presents them with a chance to create money. However, Allen and Santomero (2001) criticize the theory on grounds that it perceives risk management as an emerging factor in the financial sector and puts the concept of participation costs at the front line. This theory is applicable to the study since bank performance could be enhanced by improving customer deposits through development of channels that will facilitate easy and convenient undertaking of bank transactions by the customers.

### 2.2.3 Diffusion of Innovation Theory

According to Mahajan and Peterson (1985), an innovation is any idea, practice or object that is introduced into a social system for the first time whereas diffusion of innovation is the process through which the innovation is conveyed through specific channels over a period of time within a social system. In this context, diffusion of innovation theory seeks to describe the manner in which new inventions such as mobile banking and internet are adopted and used within a social system (Clarke 1995).

According to Sevcik (2004), the innovation adoption process is not instant but takes time. He further argues that diffusion of innovation is influenced by resistance to change since it slows down the innovation adoption process. Innovation adoption process is influenced by five major attributes namely relative advantage, compatibility, complexity, observability and triability (Rogers 1995). Rogers argues that the level of new innovations adoption depends on the manner in which new organization perceives its relative advantage, triability, compatibility, complexity and
observability. If a Kenyan organization observes the benefits of alternative banking channels, then these innovations will be adopted when other prerequisite tools are available. Innovation adoption is faster in organizations with information technology departments and internet access as opposed to those without.

2.3 Determinants of Firm Efficiency

Mbogo and Ashika (2011) sought to identify factors that determined innovation for Micro finance institutions and their findings suggest that innovation is stimulated by a variety of different Micro and macro factors.

2.3.1 Competition

In the last decade competition between microfinance institutions in developing countries has increased dramatically, McIntosh and Wydick (2005). Competition has contributed to the willingness of financial institutions to supply new instruments. MFIs have had to innovate to counter competition within the markets they operate, competition has been a factor that has triggered innovation among MFIs as different institutions seek to gain and retain clients. These innovations include offering new services, modifying existing products or providing easier processes to access funds and loans all with the aim of giving the MFI a competitive edge. This agrees with Llanto and Fukui (2003) proposal that MFIs innovate to counter competition in the market.

2.3.2 Market Demand

Greater bank penetration in the economy has also been associated with micro finance institutions increasing their outreach in poorer markets which is reflected in smaller average loan sizes and greater outreach to women Cull, et al (2009). Micro finance institutions are profit oriented while at the same time they are focused on increasing
outreach to the poor hence are market driven, this means that they cater to the needs of low income earners which increases their risk, low income clientele also means that the average size of loans will be small and the number of loans will be high. MFI innovation is driven by market demand to enable MFI cater to the needs of present and target clients in order to increase outreach MFIs have adopted mobile banking and which according to Kigen(2011) has led to MFI client base increasing. MFI innovation is also caused by the need to manage risk, Frank and White (2004) observed that financial innovations are based on older ones with the innovations helping in risk sharing and reduction.

2.3.3 Technological advances
Technological advances in information technology and computing are a major factor underlying the growth of financial innovation in MFIs. Technological advancements have led to reduced costs and diverse products and services that can be used in the Financial sector and adopted by all the intermediaries within the financial markets, this has allowed MFIs to employ technology and innovate to better serve clientele. Advancements in technology has also led to technologies that are easy to use by clientele of MFIs which ensures better reception when MFIs introduce new innovations. This agrees with Cohen, Wesley and Levine (1989) who propose that improvements in computing and information processing have made it possible for market makers to design and price new instruments with relatively complex financial structures.

2.3.4 Regulation
Regulation and Financial innovation are highly correlated, Financial innovation can lead to new innovation and regulation is a major cause of innovation. Miller (1986)
observed that strict regulatory environment raise constraints within the financial system therefore MFIs innovate as a response to government taxes and regulations in order to overcome the constraints to operations. According to Miller these regulations and constraints push MFIs towards innovation. Kane (1982) describes the process of avoiding regulations as Loophole mining.

2.3.5 Transaction Costs

MFIs innovate to minimize transaction costs and time, this can be seen through the adoption of services such as group loans which has significantly reduced transaction times and costs by consolidating many would be small loans and reducing the need of offices in every locality. This agrees with Grinblatt and Francis (2000) that the role of financial innovation in financial markets is to reduce frictions and transaction costs.

2.4 Empirical Review

Lerner (2003) studied the origins of financial innovations and in his paper examined which institutions were key financial innovators, and the effect of financial innovation on depressed profitability of firms and determinants of patenting. The findings showed less profitable firms innovate more and that profitability increased significantly in the subsequent years after innovation. He also finds that smaller firms account for a disproportionate share of innovations and that older firms located in regions with more innovations innovate more.

Kigen (2011) did a research on mobile banking and transaction costs of micro finance institutions. The objective of the study was to determine whether mobile banking which as a form of financial innovation had an effect on transaction costs of Micro finance institutions, data was collected from 15 MFIs registered by the Association of Microfinance institutions of Kenya and analyzed to see if the transaction costs
decreased for MFIs that had adopted mobile banking. Kigen concluded that the adoption of mobile technology to conduct financial services alone was not enough to reduce transaction costs and that it would take more concerted efforts. The study however was done on MFIs which do not have readily available information and at a period of time when integration of mobile banking services to financial institution systems was still very limited.

Mugo (2012) studied how financial innovation affects the growth of Kenyan microfinance institutions. Mugo studied 34 MFIs listed in the central Bank of Kenya finance directory in the year 2012. The research findings showed that many MFI had embraced financial innovation by developing new products, opening new branches, offering mobile banking services and innovating new products. The findings also showed a strong positive correlation between financial innovation and customer satisfaction, customer retention and growth of MFIs and a weak correlation between innovation and reducing transaction time. These findings concur with Frame and White (2004) findings that state financial innovation spurs growth among banks.

Ketere (2014) studied the effect of financial innovation on financial performance of Micro finance institutions in Kenya. Ketere proposes that financial innovations have a strong positive correlation with financial performance of MFIs and that innovation presented higher convenience, greater security and efficiency to MFIs leading to more demand for new innovations. Ketere however studies MFIs that are not regulated hence they do not make their financial information public, the reliance on primary data from multiple sources that are not willing to share internal information may have an impact on the findings of the study.
A study by Munywoki (2016) on the effects of innovation on financial performance of commercial banks in Kenya indicated that innovation positively impacted financial performance of Kenyan lending institutions. Munywoki found that innovations usefulness increases the degree of acceptance both in the banks and among their clients and that performance in the Kenyan financial industry is not fully dependent on financial innovations. Nyathira (2012) also carried out research to study the effect that financial innovation has on commercial banks performance in Kenya and the study results suggest that financial performance of banks had a positive correlation to financial innovation. Mugane (2015) looked into the financial innovations effects on Kenyan commercial banks performance. The study results contradict the previous findings of Munywoki (2016) and Nyathira (2012) since they suggest that product innovation and financial performance had a significant negative correlation.

2.5 Conceptual Framework
The conceptual model developed below portrays the expected relationship between the study variables. Independent variables will be mobile banking as measured by percentage change in value of mobile banking transactions per year, internet banking given as percentage change in value of internet banking transactions per year, agency banking given by percentage change in value of agency banking transactions per year and ATM as measured by percentage change in value of ATM transactions per year. Firm efficiency will be the dependent variable that the study will seek to explain and it will be measured by total revenue divided by operating expenses.
2.6 Summary of the Literature Review

A number of theoretical frameworks have explained the theoretically expected relationship between electronic banking and efficiency of microfinance banks. The theories covered in this review are; technology acceptance model, financial intermediation theory and diffusion of innovation theory. Some of the key influencers of firm efficiency have also been explored in this section. A number of empirical studies have been conducted both internationally and locally on electronic banking innovation and efficiency of firms. The findings of these studies have also been explored in this chapter.

The lack of consensus among international studies on the effect of electronic banking innovations on efficiency of microfinance banks is an enough reason to conduct further studies. The reviewed studies in the Kenyan context have either failed to show how the Kenyan microfinance bank’s efficiency is affected by electronic banking innovations or consider just one electronic banking innovation. The current study intended to fill this research gap by investigating the effect of electronic banking on
efficiency of microfinance banks in Kenya. The electronic banking innovations covered included internet banking, agency banking, mobile banking and ATMs.
CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction
In order to determine the effect that electronic banking has on the efficiency of Microfinance Banks, a research methodology is necessary to outline how the research was carried out. This chapter has four sections namely; research design, data collection, diagnostic tests and data analysis.

3.2 Research Design
A descriptive cross-sectional research design was employed in this study to investigate the relationship between financial innovation and efficiency of Microfinance banks. Descriptive design was utilized as the researcher was interested in finding out the state of affairs as they exist (Khan, 2008). This research design was appropriate for the study as the researcher was familiar with the phenomenon under investigation but want to know more in terms of the nature of relationships between the study variables. In addition, a descriptive research aims at providing a valid and accurate representation of the study variables and this helps in responding to the research question (Cooper & Schindler, 2008).

3.3 Population
Population refers to all observations of interest in an entire collection like people or events as defined by a researcher (Burns & Burns, 2008). The population for this study included all the 13 Microfinance banks that were in operation during the study period (See Appendix I).

3.4 Data Collection
Secondary data was obtained solely from the published annual financial reports of the
microfinance banks operating in Kenya between January 2013 and December 2017 and captured in a data collection sheet. The reports were obtained from the Central Bank Website and banks annual reports. The end result was annual information detailing the independent variables and dependent variable for the 13 microfinance banks in Kenya.

3.5 Diagnostic Tests

Linearity show that two variables X and Y are related by a mathematical equation Y=bX where c is a constant number. The linearity test was obtained through the scatterplot testing or F-statistic in ANOVA. Stationarity test is a process where the statistical properties such as mean, variance and autocorrelation structure do not change with time. Stationarity was obtained from the run sequence plot. Normality is a test for the assumption that the residual of the response variable are normally distributed around the mean. This was determined by Shapiro-walk test or Kolmogorov-Smirnov test. Autocorrelation is the measurement of the similarity between a certain time series and a lagged value of the same time series over successive time intervals. It was tested using Durbin-Watson statistic (Khan, 2008).

Multicollinearity is said to occur when there is a nearly exact or exact linear relation among two or more of the independent variables. This was tested by the determinant of the correlation matrices, which varies from zero to one. Orthogonal independent variable is an indication that the determinant is one while it is zero if there is a complete linear dependence between them and as it approaches to zero then the multicollinearity becomes more intense. Variance Inflation Factors (VIF) and tolerance levels were also carried out to show the degree of multicollinearity (Burns & Burns, 2008).
3.6 Data Analysis

The SPSS software version 21 was used in the analysis of the data. The researcher quantitatively presented the findings using graphs and tables. Descriptive statistics were used to summarize and explain the study variables as observed in the banks. The results were presented using frequencies, percentages, measures of central tendencies and dispersion displayed in tables. Inferential statistics included Pearson correlation and multiple regressions.

3.6.1 Analytical Model

The regression model below was used:

\[ Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon. \]

Where:

- \( Y \) = Efficiency of microfinance banks as measured by total revenue divided by operating expenses on an annual basis.
- \( \alpha \) = y intercept of the regression equation.
- \( \beta_1, \beta_2, \beta_3, \beta_4 \) = are the slope of the regression
- \( X_1 \) = Mobile banking as measured by percentage change in value of mobile banking transactions per year
- \( X_2 \) = Internet banking as measured by percentage change in value of internet banking transactions per year
- \( X_3 \) = Agency banking as measured by percentage change in value of agency banking transactions per year
- \( X_4 \) = ATM as measured by percentage change in value of ATM transactions per year
- \( \varepsilon \) = error term
3.6.2 Tests of Significance

The researcher carried out parametric tests to establish the statistical significance of both the overall model and individual parameters. The F-test was used to determine the significance of the overall model and it was obtained from Analysis of Variance (ANOVA) while a t-test was used to establish statistical significance of individual variables.
CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND INTERPRETATION

4.1 Introduction
The chapter focused on the analysis of the collected data to establish the influence of electronic banking on efficiency of the Kenyan microfinance banks. Using descriptive statistics, correlation analysis and regression analysis, the results of the study were presented in table forms as shown in the following sections.

4.2 Diagnostic Tests
The researcher carried out diagnostic tests on the collected data. The research assumed a 95 percent confidence interval or 5 percent significance level (both leading to identical conclusions) for the data used. These values helped to verify the truth or the falsity of the data. Thus, the closer to 100 percent the confidence interval (and thus, the closer to 0 percent the significance level), the higher the accuracy of the data used and analyzed is assumed to be. To test for normality, the null hypothesis for the test was that the secondary data was not normal. If the p-value recorded was more than 0.05, the researcher would reject it.

A Multicollinearity test was done. The VIF value used were values lower than 10 while the variable tolerance was values higher that 0.2, meaning that there is no Multicollinearity. Multiple regressions is applicable if strong relationship among variables doesn’t exist. The findings showed that tolerance values for all the variables were >0.2 and VIF values <10 as shown in table 4.1 This shows that there is no Mulicollinearity between the independent variables.
Table 4.1: Multicollinearity Test for Tolerance and VIF

<table>
<thead>
<tr>
<th>Variable</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet banking</td>
<td>0.646</td>
<td>1.434</td>
</tr>
<tr>
<td>Mobile banking</td>
<td>0.398</td>
<td>1.982</td>
</tr>
<tr>
<td>Agency banking</td>
<td>0.388</td>
<td>1.422</td>
</tr>
<tr>
<td>ATMs</td>
<td>0.376</td>
<td>1.398</td>
</tr>
</tbody>
</table>

Source: Research Findings (2018)

Shapiro-wilk test and Kolmogorov-Smirnov test was used to test for normality. The null hypothesis for the test was that the secondary data was not normal. If the p-value recorded was more than 0.05, the researcher would reject it. The results of the test are as shown below

Table 4.2: Normality Test

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>Kolmogorov-Smirnov&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statistic</td>
<td>Df</td>
</tr>
<tr>
<td>Internet banking</td>
<td>.173</td>
<td>65</td>
</tr>
<tr>
<td>Mobile banking</td>
<td>.180</td>
<td>65</td>
</tr>
<tr>
<td>Agency banking</td>
<td>.176</td>
<td>65</td>
</tr>
<tr>
<td>ATMs</td>
<td>.181</td>
<td>65</td>
</tr>
</tbody>
</table>

<sup>a</sup> Lilliefors Significance Correction

Source: Research Findings (2018)

The tests both recorded greater 0-values than 0.05 which implies that research data was normally distributed, meaning rejection of the null hypothesis.
This meant that the data could be used in parametric tests, these tests are Pearson’s correlation, regression analysis and variance analysis.

To check for error term correlation across time periods tests for Auto-corrleation were run. These were tested using the Durbin Watson test, A statistic of 1.935 showed there was no serial correlation between the variable residuals, since the value was within the 1.5 and 2.5 range which is acceptable.

**Table 4.3: Autocorrelation Test**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R</th>
<th>Std. Error of the Estimate</th>
<th>Durbin-Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.874(^a)</td>
<td>.763</td>
<td>.748</td>
<td>.026022</td>
<td>1.935</td>
</tr>
</tbody>
</table>

\(^a\) Predictors: (Constant), ATMs, Mobile banking, Agency banking, Internet banking

b. Dependent Variable: Efficiency

**Source: Research Findings (2018)**

**4.3 Descriptive Analysis**

Descriptive statistics gives a presentation of the average, maximum and minimum values of variables applied together with their standard deviations in this study. Table 4.4 shows the descriptive statistics for the variables applied in the study. An analysis of all the variables was acquired using SPSS software for the period of five years (2013 to 2017) for all the 13 microfinance banks that provided data for this study. The mean, standard deviation, minimum and maximum for all the variables selected for this study are as shown in the table below.
Table 4.4: Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency</td>
<td>65</td>
<td>.089</td>
<td>.325</td>
<td>.19728</td>
<td>.051801</td>
</tr>
<tr>
<td>Mobile banking</td>
<td>65</td>
<td>4.323</td>
<td>5.588</td>
<td>5.01351</td>
<td>.335316</td>
</tr>
<tr>
<td>Internet banking</td>
<td>65</td>
<td>6.605</td>
<td>9.712</td>
<td>8.68123</td>
<td>1.114196</td>
</tr>
<tr>
<td>Agency banking</td>
<td>65</td>
<td>5.656</td>
<td>6.908</td>
<td>6.49991</td>
<td>.289449</td>
</tr>
<tr>
<td>ATMs</td>
<td>65</td>
<td>8.340</td>
<td>9.513</td>
<td>8.75391</td>
<td>.323990</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source: Research Findings (2018)**

4.4 Correlation Analysis

The association between any two variables used in the study is established using correlation analysis. This relationship ranges between (-) strong negative correlation and (+) perfect positive correlation. Pearson correlation was employed to analyze the level of association between the commercial banks’ efficiency and the independent variables for this study (internet banking, mobile banking, agency banking and ATMs). The study found out that internet banking, agency banking and ATMs have a positive and statistically significant correlation with the microfinance banks’ efficiency as shown by \( r = .427, p = .000; r = .768, p = .000 \) and \( r = .719, p = .000 \) respectively. Mobile banking exhibited a positive but statistically insignificant correlation with bank efficiency as shown by \( r = .175, p = .164 \).
Table 4.5: Correlation Analysis

<table>
<thead>
<tr>
<th></th>
<th>Efficiency</th>
<th>Mobile banking</th>
<th>Internet banking</th>
<th>Agency banking</th>
<th>ATMs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td></td>
<td>.175</td>
<td>.427**</td>
<td>.768**</td>
<td>.719**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.164</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.175</td>
<td>1</td>
<td>.672**</td>
<td>.259*</td>
<td>-.072</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.164</td>
<td>.000</td>
<td>.037</td>
<td>.569</td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.427**</td>
<td>.672**</td>
<td>1</td>
<td>.131</td>
<td>.438**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
<td>.296</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.768**</td>
<td>.259*</td>
<td>.131</td>
<td>1</td>
<td>.675**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.037</td>
<td>.296</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.719**</td>
<td>.072</td>
<td>.438**</td>
<td>.675**</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.569</td>
<td>.000</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>

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

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

c. Listwise N=65

Source: Research Findings (2018)
4.5 Regression Analysis

Efficiency was regressed against four predictor variables; internet banking, mobile banking, agency banking and microfinance bank ATMs. The regression analysis was executed at a significance level of 5%. The critical value obtained from the F – table was measured against the one acquired from the regression analysis.

The study obtained the model summary statistics as shown in table 4.6 below.

Table 4.6: Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R</th>
<th>Std. Error of Estimate</th>
<th>Durbin-Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.874a</td>
<td>.763</td>
<td>.748</td>
<td>.026022</td>
<td>1.935</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), ATMs, Mobile banking, Agency banking, Internet banking

b. Dependent Variable: Efficiency

Source: Research Findings (2018)

R squared, being the coefficient of determination shows the deviations in the response variable that’s as a result of changes in the predictor variables. From the outcome in table 4.6 above, the value of R square was 0.763, a discovery that 76.3 percent of the deviations in efficiency of microfinance banks efficiency is caused by changes in internet banking, mobile banking, agency banking and bank ATMs. Variables that are not part of the model account for 23.7 percent of efficiency variations of the Kenyan microfinance banks. Also, the results revealed that there exists a strong relationship among the selected independent variables and the efficiency as shown by the
correlation coefficient (R) equal to 0.874. A durbin-watson statistic of 1.935 indicated that there was no serial correlation between the variable residuals since the value was higher than 1.5.

**Table 4.7: Analysis of Variance**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>.131</td>
<td>4</td>
<td>.033</td>
<td>48.402</td>
<td>.000</td>
</tr>
<tr>
<td>1</td>
<td>.041</td>
<td>60</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>.172</td>
<td>64</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: Efficiency
b. Predictors: (Constant), ATMs, Mobile banking, Agency banking, Internet banking

**Source: Research Findings (2018)**

The value of significance is 0.000 lower than p=0.05. This means the model was statistically significant in predicting how internet banking, mobile banking, agency banking and bank ATMs affects the Kenyan microfinance banks’ efficiency.

Coefficients of determination were used as indicators of the direction of the association between the independent variables and the microfinance banks’ efficiency. The p-value under sig. column was used as an indicator of the significance of the association between the dependent and the independent variables. At 95% confidence level, a p-value of less than 0.05 was interpreted as a measure of statistical significance. As such, a p-value above 0.05 indicates that the dependent variables
have a statistically insignificant association with the independent variables. The results are indicated in table 4.8

Table 4.8: Model Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-.618</td>
<td>.118</td>
<td>-5.226</td>
<td>.000</td>
</tr>
<tr>
<td>Mobile banking</td>
<td>.066</td>
<td>.019</td>
<td>.425</td>
<td>.001</td>
</tr>
<tr>
<td>Internet banking</td>
<td>.005</td>
<td>.006</td>
<td>.102</td>
<td>.812</td>
</tr>
<tr>
<td>Agency banking</td>
<td>.130</td>
<td>.017</td>
<td>.727</td>
<td>.000</td>
</tr>
<tr>
<td>ATMs</td>
<td>.039</td>
<td>.016</td>
<td>.243</td>
<td>.016</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Efficiency

Source: Research Findings (2018)

The above results show that apart from internet banking that produced positive but statistically insignificant values for this study, the other three independent variables produced statistically significant values for this study (high t-values, p < 0.05).

The estimated regression equation was:

\[ Y = -0.618 + 0.066X_1 + 0.130X_2 + 0.039X_3 \]

Where,
Y = Efficiency
X₁ = Mobile banking
X₂ = Agency banking
X₃ = ATM

On the estimated regression model above, the constant = -0.618 shows that if selected dependent variables (internet banking, mobile banking, agency banking and ATMs) were rated zero, the microfinance banks’ efficiency would be -0.618. A unit increase in mobile banking, agency banking and ATMs will result in an increase in efficiency by 0.066, 0.130 and 0.039 respectively while internet banking was found to be an insignificant determinant of efficiency.

4.6 Discussion of Research Findings
The aim of the study was to determine the association between electronic banking and efficiency of the Kenyan microfinance banks. Electronic banking in this study was the independent variable with four measures (value of mobile banking transactions per year, value of internet banking transactions per year, value of agency banking transactions per year and value of ATM transactions per year. Efficiency was the dependent variable which the study sought to explain and it was measured by the ratio of total revenue to total assets.

The Pearson correlation coefficients between the variables revealed that internet banking, agency banking and ATMs have a positive and statistically significant correlation with the microfinance banks’ efficiency. It also revealed that a positive and statistically insignificant correlation exists between mobile banking and efficiency of microfinance banks.
The model summary revealed that the independent variables: internet banking, mobile banking, agency banking and ATMs explains 76.3% of changes in the dependent variable as depicted by $R^2$ value meaning this model does not include other factors that account for 23.7% of changes in the microfinance banks’ efficiency. The model is fit at 95% level of confidence since the F-value is 48.402. This shows that the overall multiple regression model is statistically significant and is an adequate model for predicting and explaining the influence of the selected independent variables on the Kenyan microfinance banks’ efficiency.

The results concur with Mugo (2012) who studied how financial innovation affects the growth of Kenyan microfinance institutions. Mugo studied 34 MFIs listed in the central Bank of Kenya finance directory in the year 2012. The research findings showed that many MFI had embraced financial innovation by developing new products, opening new branches, offering mobile banking services and innovating new products. The findings also showed a strong positive correlation between financial innovation and customer satisfaction, customer retention and growth of MFIs and a weak correlation between innovation and reducing transaction time. These findings concur with Frame and White (2004) findings that state financial innovation spurs growth among banks.

The results also concur with Ketere (2014) who studied the effect of financial innovation on financial performance of Micro finance institutions in Kenya. Ketere proposes that financial innovations have a strong positive correlation with financial performance of MFIs and that innovation presented higher convenience, greater security and efficiency to MFIs leading to more demand for new innovations. Ketere
however studies MFIs that are not regulated hence they do not make their financial information public, the reliance on primary data from multiple sources that are not willing to share internal information may have an impact on the findings of the study.
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction
This chapter shows the summary of research findings, the conclusions made from the results, and the recommendations for policy and practice. The chapter also discusses a few limitations encountered as well as suggestions for future research.

5.2 Summary of Findings
The aim of the study was to examine the impact of electronic banking on the Kenyan financial bank’s efficiency. The independent variables for the study were internet banking, mobile banking, agency banking and ATMs. The research design employed in the study was descriptive and cross-sectional. Secondary data was obtained from CBK and SPSS software used in analyzing it. The study used annual data for 13 microfinance banks covering a period of five years from January 2013 to December 2017.

From the results of correlation analysis, internet banking, agency banking and ATMs were found to have a positive and statistically significant correlation with the microfinance banks’ efficiency. The study also found out that a positive and statistically insignificant correlation exists between mobile banking and efficiency of microfinance banks.

The co-efficient of determination R-square value was 0.763 which means that about 76.3 percent of the variation in efficiency of the Kenyan microfinance banks can be explained by the four selected independent variables while 23.7 percent in the
variation of efficiency was associated with other factors not covered in this research. The study also found a strong correlation between the independent variables and the microfinance banks’ efficiency (R=0.874). ANOVA results indicate that the F statistic was at 5% significance level with a p=0.000. Therefore the model was fit in explaining the association between the selected variables.

The results of the regression show that when all independent values in the study have a zero value, the efficiency of microfinance banks will be -0.618. A unit increase in mobile banking, agency banking and ATMs will result in an increase in efficiency by 0.066, 0.130 and 0.039 respectively while internet banking was found to be an insignificant determinant of efficiency.

5.3 Conclusion
It can be concluded from the findings that the Kenyan microfinance banks’ efficiency is significantly affected by mobile banking, ATMs and agency banking. The study therefore concludes that a unit increase in mobile banking, agency banking and ATMs causes a significant increase in efficiency. The study found that internet banking has a positive and statistically insignificant effect on efficiency and therefore this study concludes that an increase in internet banking will lead to a statistically insignificant increase in Kenyan microfinance bank’s efficiency.

This study concludes that independent variables selected for this study internet banking, mobile banking, agency banking and ATMs influence to a large extent efficiency of microfinance banks in Kenya. Thus, it can be concluded that these variables greatly influence efficiency of microfinance banks as revealed by the p value in anova summary. The fact that the four variables that are independent explain
76.3% of changes in efficiency, implies that variables not included in the model explain 23.7% of changes in Kenyan microfinance banks’ efficiency.

Results agree with Mugo (2012) who studied how financial innovation affects the growth of Kenyan microfinance institutions. Mugo studied 34 MFIs listed in the central Bank of Kenya finance directory in the year 2012. The research findings showed that many MFI had embraced financial innovation by developing new products, opening new branches, offering mobile banking services and innovating new products. The findings also showed a strong positive correlation between financial innovation and customer satisfaction, customer retention and growth of MFIs and a weak correlation between innovation and reducing transaction time. These findings concur with Frame and White (2004) findings that state financial innovation spurs growth among banks.

5.4 Recommendations
The study established that electronic banking have a positive and significant influence on efficiency. Thus the study wishes to make the following recommendations for policy change: Microfinance banks in Kenya should invest heavily in electronic banking since this will cause improvement in the efficiency of the microfinance banks. The Kenyan Government through the Central bank should come up with policies that generate a conducive environment for microfinance banks to operate in since it will translate to economic growth of the country.

The study found out that a positive and significant effect of mobile banking on efficiency of microfinance banks in Kenya. This study recommends that regulators and policy makers in the banking industry should come with measures of ensuring
that micro-finance banks invest their resources on mobile banking and this will lead to a significant increase in microfinance banks’ overall efficiency.

The study concluded that there is positive effect of agency banking and ATMs on efficiency of microfinance banks. This study recommends that banks’ management and directors should aim at increasing their investments in agency banking and ATMs as this will significantly improve their efficiency which will translate to improved performance and finally an increase in shareholder’s wealth which is the main goal of a firm.

5.5 Limitations of the Study
The research scope was five years 2013-2017. It is not determined whether a longer period of study would yield the same results. It is also uncertain if similar findings would result in the period after 2017.. A longer study period would be more reliable to account for major economic conditions such as booms and recessions.

Data quality is one of the study limitations. From this research, it is hard to conclude whether the results present the true facts about the situation. Data that has been used is only assumed to be accurate. There is also a great inconsistency in the measures used depending on the prevailing conditions. Secondary data was employed in the study which was already in existent as opposed to primary data which was raw information free from organizational bias . The study also considered selected determinants of and not all the factors affecting efficiency of microfinance banks mainly due to limitation of data availability.

For data analysis purposes, the researcher applied a multiple linear regression model. Due to the shortcomings involved when using regression models such as erroneous
and misleading results when the variable values change, the researcher cannot be able to generalize the findings with certainty. If more and more data is added to the functional regression model, the hypothesized relationship between two or more variables may not hold.

5.6 Suggestions for Further Research
This study focused on electronic banking and efficiency of microfinance banks in Kenya and depended on secondary data. A research study where data collection depends on primary data i.e. in depth questionnaires and interviews covering all the 13 microfinance banks registered with the Central Bank of Kenya is recommended so as to compliment this research.

The study was not exhaustive of the independent variables affecting efficiency of microfinance banks in Kenya and it’s recommended that further studies be carried out to incorporate other variables like liquidity, capital adequacy, management efficiency, firm size, growth opportunities, industry practices, age of the firm, political stability and other macro-economic variables. Establishing the effect of each variable on efficiency will enable policy makers know what tool to use when controlling the efficiency.

The study concentrated on the last five years since it was the most recent data available. Future studies may use a range of many years e.g. from 2000 to date and this can be help confirm or disapprove this study’s results. The study limited itself by focusing on microfinance banks. The recommendations of this study are that further studies be conducted on other microfinance institutions operating in Kenya. Finally, due to the inadequacies of the regression models, other models like the Vector Error
Correction Model (VECM) can be applied in explaining the different associations between the variables.
REFERENCES


Sun H. & Zhang P. (2006). The role of moderating factors in user technology acceptance, Journal of Human-Computer Studies, 64(1), 53-78.


APPENDICES

Appendix I: List of Microfinance Banks in Kenya

1. Kenya Women Microfinance Bank
2. Rafiki Microfinance Bank Ltd
3. Faulu Kenya Microfinance Bank
4. SMEP Microfinance Bank Ltd
5. Remu Microfinance Bank Ltd
6. Century Microfinance Bank Ltd
7. Sumac Microfinance Bank Ltd
8. U&I Microfinance Bank Ltd
9. Caritas Microfinance Bank Ltd
10. Daraja Microfinance Bank
11. Maisha Microfinance Bank
12. Choice Microfinance Bank Ltd
13. Uwezo Microfinance Bank Ltd

Source: CBK (2018)
Appendix II: Research Data

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>Year</th>
<th>Mobile banking</th>
<th>Internet banking</th>
<th>Agency banking</th>
<th>ATMs</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kenya Women Microfinance Bank</td>
<td>2013</td>
<td>4.692</td>
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