IMPACT OF MOBILE BANKING ON FINANCIAL INCLUSION IN KENYA

BY

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DECLARATION

This research project is my original work and has not been submitted for examination in any other University

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D61/77263/2015

This research project has been submitted for examination with my approval as the university supervisor.

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I would like to acknowledge my family members, friends and colleagues whose support made it possible for me to go through the academia process successfully.

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DEDICATION

I dedicate this work to the Almighty God and to my family for their encouragement and support throughout my studies.

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ABSTRACT

The objective of the study was to examine the impact of mobile banking on financial inclusion in Kenya.The study population was all the 8 banks in Kenya with mobile banking.The study used secondary data from audited statements from communications authority of Kenya, central bank of Kenya and Kenya national bureau of statistics of all the 8 banks in Kenya with mobile banking.The researcher used both descriptive and inferential statistics in the studywhich included Pearson correlation and regression coefficient.Findings from regression results showed that the number of users enrolled mobile money services had a positive and significant effect with financial inclusion.The results also revealed that number of mobile money agency distribution had a positive and significant effect with financial inclusion. The results also showed that number of mobile banking transactions performed using mobile phones had a positive and significant effect with financial inclusion. In addition the results depicted that log of value of mobile banking transactions had a positive and significant effect with financial inclusion. Further the results revealed that technology had a positive and significant effect with financial inclusion. The study concluded thatthe number of users enrolled to mobile money services,number of mobile money agency distribution,and number of mobile banking transactions performed using mobile phones, log of value of mobile banking transactions and technology had a positive and significant effect on financial inclusion.The study recommends that to enable lower fees, category of street-level sub-agents, characterized by lower costs and commissions than store-based agents should be created.Sub-agents would use normal retail outlets to rebalance their cash and stored value.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

M-banking (m-banking) is the access of banking financial services using mobile telecommunication gadgets. The services offered can include means to carry out bank and stock market operations, manage accounts and to allow personalized information (Kirui, 2013). Nevertheless, there isn't universal way of m- banking; but, reasons and structures change from nation to nation. A variety of financial functions are given by the systems. Some of these functions are; micro payments to traders, bill-payments, funds transferral between individuals as well as long-distance payments. Presently, diverse business models and institutions are delivering these systems.

M-banking has changed the path individuals in the growing nations exchange money and at present it is ready to give refined banking administrations that manufacture a genuine distinction to individuals' lives. Individuals get alerts on their telephones notifying them of their quick exchanges in their account. Further, they help in payments, deposits, withdrawals, buy airtime, ask for bank statement and perform thirteen diverse urgent banking, bushed constant over their mobile telephones.

This researchis based onby Theory of Financial Innovations by (Silber, 1983), Financial Intermediation Theory by (Gurley & Shaw, 1961) and Demand and Supply Side Twin Theory by (Chakrabarty, 2011). As per the hypothesis of financial innovations, financial related innovations can be new goals or just standard means whereby most recent part of advancement has been offered, improving firms' liquidity and growing amount of new candidates, because of their capabilities on the circumstance. Financial intermediation hypothesis states that financial mediators exist because they can lessen information and transaction costs that arisedue to a data asymmetry among borrowers and lenders. Financial mediators hence help the

productive working of business areas, and any components that dictate the measure of directed credit and can have critical macroeconomic impacts. Demand and Supply Side Twin Theory expresses that financial consideration acts from supply side.

1.1.1 Mobile Banking

M-banking is causing a whirlwind of action on the planet's financial services industry. Actually, it is jumping conventional banking and now many best banks are going with their very own M-banking arrangements, endeavouring to exploit innovation that accompanies mobile telephones and present the service as a methods for giving quick and productive services, and financial establishments of all sizes are caught up with surveying their place in the M-banking world. Thusly, it has made a playing field for contenders containing banks as well as media transmission organizations (Feig, 2007).

The M-banking stage enables one to get short alerts on their phones with latest information about most recent transactions on their records, and also information about new improvements on items and services offered (Zeinudeen, 2011). Customers can likewise ask for record articulations, order cheque books, stop cheque, exchange money, change their ATM pin numbers and exchange money from their cell phone cash records to their financial balances. As indicated by Laforet (2012) M-banking is said to involve the point of convergence of development methodologies in banking sector. Undoubtedly, the capacity to fit a financial organization on a phone in pockets of customers is an animating thought.

The banking area has needed to receive technological change to stay aggressive. Looking for upper hands in the technological financial service industry, banks have realized an incentive to be separate from others commercial organization using new service circulation channels (Silva, 2009). Banks bureaucratic procedure of account

opening cut out numerous rural people as they couldn't meet all requirements to possess accounts.

1.1.2 Financial Inclusion (FI)

Njenga (2016)characterize financial inclusion as referring the steps that function to keep off certain types and groups of people from gaining access toofficial financial system. It additionally alludes to the entrance and applying set of satisfactory financial services by families and firms fundamental for headway as it can help poor nuclear families upgrade their lives while in like manner inciting financial development (IDB, 2015).

Budgetary incorporation likewise implies that formal money related administrations, e.g,, store and bank accounts, instalment administrations, credits and protection are promptly accessible to purchasers and that they are effectively and successfully utilizing these services to meet their particular needs (Wright, 2011)). Financial developing then again is the augmentation in the pool of money related firms which are uniquely fitted to the need of all dimensions in the overall population (Bharat, 2014). The impact of extending financial inclusion (FI) goes well past financial developing and ranges over an extensive variety of improvement objectives.

A great many individuals over the developing world don't approach banking services. Looked with obstructions identified with cost, geography and training, these people have no chance to get of safely exchanging assets, saving cash, acquiring a loan or insurance (BASA, 2003). These services serve different necessities that every family experiences, and guaranteeing access to this item extend is an imperative aim of financial inclusion. Credit enables family units to utilize future pay to oversee current susceptibility or to benefit from venture openings. Savings give a safe and esteem

holding place where family units can store reserves, enabling them to take advantage of "past salary" as required. Insurance secures against defencelessness to stuns (e.g. passing, disease, or inability in the family). Instalments services enable individuals to complete financial transactions without being up close and personal.

1.1.3 Mobile Banking and Financial Inclusion (FI)

M-banking as the most widely recognized mobile cash idea allows bankers to execute banking transactions, e,g, checking of account balance, transferring funds, paying of bill by means of cell phones. Mobile saving services are an imaginative methodsof empowering a custom of saving with no requirement for least account adjusts and other conventional banking expenses (Gaurav, 2012).

Accomplishing financial inclusion requires crossing over any barrier among money and computerized payments (Medhi, 2013). Through computerized financial services, poor family units frequently need to amass totals of money to put resources into their smaller scale endeavours and to keep up prudent money to guarantee that startling stuns. Likewise, when clients are associated with an advanced instalment system, they can exchange cash right away and inexpensively to companions, family and business work together (Voorhies, 2012).

M-bankingmitigates the dangers and the expenses that come by dealing with cash (Kirui, 2013). Mobile airtime also acts as new market toolthrough which phone corporations have allowed individuals to purchase airtime and to wireit to other users. Recipient user hence can sell the acquired airtime to a local agent in return for cash or may be purchasing of commodities or even acquiring a service thus affecting a transfer of purchasing power from the incipient to the recipient.

1.1.4 Mobile Banking and Financial Inclusion in Kenya

The banking industry in Kenya has encountered a thorough procedure of huge change as of late. Beneath this change lies development in information and technology. Information and correspondence technology is at the focal point of this worldwide change curve of M-banking system in Kenya nowadays.Kirubi (2009) includes that players in the banking part have experienced strengthened rivalry in the course of the most recent couple of years coming about because of expanded innovations among the players and new participants into the market and in this manner, the main route for business banks to stay applicable in their tasks is by thinking of upper hand that is manageable. This structures a basic component in the banking division today. For an upper hand to accomplish this viewpoint, basic reasoning and time must be dedicated by the separate supervisors. In the present business world, numerous associations are wiped out by contenders since they can't make contributions and make feasible associations with their customers.

The banking industry in Kenya has witnessed turbulent times as a result of the death of many banks back in the '90s. Strategies have been adopted so as to try and bring down the operational costs. Such strategies include internet banking and M-banking where consumers have been able to access their accounts through their cell phones. In 2010, the CBK enabled directed commercial banks to work through outsider agents, subject to authorizing of agents. Mobile system administrators and financial organizations have reacted quickly to these new powers to embrace mobile and office banking. Somewhere in the range of 2007 and 2012, Safaricom took off in excess of forty thousand mobile instalment agents across the nation. Since 2010 a sum of ten banks have associated in excess of ten thousand six hundred bank agents. Be that as it may, of the 44 authorized banks, three banks specifically Equity Bank, KCB and

Cooperative Bank of Kenya have rushed to present organization arranges crosswise over Kenya, with a huge number of agents respectively (CCK, 2013). Alternate players in the market have attempted to execute cash exchange systems however are yet to blast their rise as far as M-banking (Gikenye, 2011). Every one of these models are outfitted towards utilizing the working expenses of commercial banks.

1.2 Research Problem

Around the world, different activities utilize the cell phone to give financial services, not exclusively to those without access to conventional banks yet additionally to the banked populace (Kirui, 2013).The banking industry in Kenya has progressed significantly in guaranteeing its survival having encountered expanded rivalry in the course of the most recent couple of years emerging from expanded innovations among the players and new contestants into the financial market, through the arrangement of M-banking services. Advancement in banking is turning into an ordinary marvel in Kenya (Ndungu, 2013). The huge number of banks authorized by CBK (44 moderately expansive in connection to the extent of Kenyan Economy) according to (CCK, 2013)and firm rivalry among existing players has left banks with no alternative however to discover approaches to accomplish an upper hand through development. The financial division is experiencing re-bundling of 3 banking and financial services to fulfill the consistently expanding necessities of clients and avoid rivalry from media transmission organizations. More banks are progressively offering new banking items (CBK [CBK], 2007).

A few researchers have investigated the ideas of M-banking and financial inclusion. Wansem (2015) led a Case-Study of Financial Inclusion and M-banking in Rwanda and discovered that M-banking services have contributed fundamentally to extending financial markets for the most part out of financial items identified with mobile cash

developed.Mavhiki (2015) completed an examination on the effect of M-banking on conventional banking rehearses in Zimbabwe. Results set up that however clients have stayed faithful to banks, the banks have not possessed the capacity to develop their organizations because of the coming of M-banking, and rather than them looking for joint effort with the telecoms they were angry, and campaigning for enactment that directs mobile administrators.

Waihenya (2012) examined the influence of agent banking on FI in Kenya. The investigation presumed that organization banking has effects of enlarged financial inclusion in the country significantly.Similarly, Midika (2016) completed an examination on the impact of advanced back on financial inclusion in the banking industry in Kenya. Discoveries of the investigation demonstrated that an irrelevant negative connection between office banking estimated in term of the quantity of agents, M-banking estimated by the quantity of M-banking transactions and web banking estimated in wording web banking transactions with financial inclusion in the banking industry in Kenya. What's more, Boniface (2015) led an examination on M-banking and financial execution of commercial banks. The examination discovered that M-Banking advanced proficiency and trust in the financial system along these lines winning open trust.

As the banks in Kenya receive mobile cash technology in their methods for working together, such key issues as expense of m-banking services, system security, speed of service and abilities prerequisite should be investigated with a perspective of building up their general impact on the execution of banks. This investigation in this manner tried to answer the question; what is the influence of M-banking on Financial Inclusion in Kenya?

1.3 Research Objective

The objective of the study was to examine the impact of M-banking on financial inclusion in Kenya.

1.4 Valueof the Study

The government will require this information to set up directions to either secure clients or regulate the banking segment by guaranteeing a reasonable playing ground. Banking among the significant backings of most economies and accordingly when the field is shifting so do the principles that oversee this area to stay aware of the changes. The banking emergencies of 2000s have just made it basic for more noteworthy control measures to be set up and this exploration will assist in this.

This study will reveal insight into the present and future patterns of technology and development in the M-banking industry. With the numerous inventions being embraced day by day in the banking area, speculators will have the capacity to distinguish the specialty to put resources into for more prominent returns or which ones to drop with the end goal to stay away from losses.

The study will illuminate the banking industry in comprehending the job of M-banking in their service arrangement obligations. The banks will have the capacity to perceive how this influences their general productivity and can utilize this information with respect to any new controls that may be needed in banking because of technology and development.

To the analysts and academicians, the discoveries of the investigation will go about as reference for different specialists who may wish to do examine on a similar theme. The examination discoveries will give extra writing to researchers who mean to examine the influence of M-banking and FI in the rising banking sector in the nation.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The section reviews theories that form the foundation of this study. In addition, previous empirical studies that have been carried before on this research topic and related areas are also discussed.

2.2 Theoretical Framework

Detailed knowledge of what has been done is provided by the theoretical review and it forms a framework for interpreting research results so as to overcome the shortcomings of earlier studies. Different theories will be described and discussed in the following section. The theories are Theory of Financial Innovations, Financial Intermediation theory and Demand and Supply Side Twin Theory.

2.2.1 Theory of Financial Innovations

Silber (1983) displayed the hypothesis of constraint which is a standout amongst the most compelling speculations of financial advancement. This hypothesis considers item advancement as the reaction of an association to the requirements put upon it. Innovations have numerous causes. Firms may need to stop the loss of stores, enter new geographic or item showcases and convey services with less expensive and better technology. Likewise they might need to build their capital base, modify their tax position, lessen their risk profile or cut working.

Bhatt (1988) expressed that most innovations result from a compact, intentional research for development openings, which are just found in just a couple of circumstances four zones of such open doors exist inside an organization incorporate unforeseen events, incoherencies, process needs and industry and market changes.

Two wellsprings of chances outside an organization in its social and scholarly condition incorporate statistic and recognition changes.

Allen and Santomero (2000) contended that investment banks with more noteworthy market power and more secure associations with their clients are probably going to improve. Silber (1983) then again, contended that firms most obliged in their capacities to benefit in the item advertise which he suggested are the weakest and littlest firms will have the best motivators to present new items and services, and ought to be the most inventive. Alternate determinants of advancement talked about over the effect of financial constraints and learning overflow shave to a great extent been unexplored with regards to financial development.

2.2.2 Financial Intermediation Theory

The hypothesis in regards to financial intermediation was created beginning with the 60's, the beginning stage being crafted by Gurley and Shaw (1961). Monetary job of financial go-betweens which incorporate Investment banks, insurance, commercial banks and agency banking, expand on the economics of defective information that started to develop amid the 1970s with the fundamental commitments of (Akerlof&Spence, 1973). Financial delegates exist since they can decrease information and transaction costs that emerge from an information asymmetry among borrowers and lenders. Financial delegates in this way help the proficient working of business areas, and any variables that dictate the measure of diverted credit and can have huge macroeconomic influence.

There are two strands in the literature that formally clarify the presence of financial delegates. The principal strand underlines financial delegates' arrangement of liquidity. The second strand centers around financial go-betweens' capacity to change

the risk attributes of advantages (Fama,2010). In the two cases, financial intermediation can diminish the expense of directing funds among borrowers and lenders, prompting a more effective distribution of assets.

Precious stone (1984) broke down the arrangement of liquidity (turning of illiquid resources into liquid liabilities) by banks. In Diamonds show, speculators (investors) are risk cognizant and indeterminate about the planning of their future utilization requirements. With no mediator, all financial specialists are bolted into non-liquid long haul investments that produce high settlements just to the individuals who expend late. Banks may boost an aggressive market by giving better risk sharing among agents who require to expend at various and arbitrary periods. A middle person promising financial specialists a higher result for early utilization and a lower result for late utilization in respect to the non-intermediated case improves risk sharing and welfare.

2.2.3 Demand and Supply Side Twin Theory

This theory is in a two column form between FI and Financial Literacy, (Chakrabarty, 2011) While FIacts from supply side giving the financial services what peopleneed, financial education invigorates the demand side and the two viewpoints need to be present and coincide in a broadlygrowing economy. Peltzman,(1976)

Mehrotra (2009) suggests thatfor any comprehensive growth in financial economy, there has to be supply and demand side components. In spite of the risk, funding the first time business people is an unavoidable need for FIand development. Demand side variables, e.g,cut down on salary or property have a noteworthy bearing on FI. Attributable to troubles in accessing formal wellsprings of credit, poor people and little and full scale ventures for the most part rely on their personal savings or interior

sources to put resources into wellbeing, training, lodging, and innovative exercises to make utilization of development opportunities.Maijoor(2008) sees that whereas there is no uncertainty that it's nesessary to invigorate the demand for formal financial area items among the financially barred purchasers, proper andeffective supply side intercessions hold the way to expanding FI, particularly for the time being.

The current difficulties in the supply side incorporate items not redid to casual part, unbending procedures with complex and concentrated documentation stop a large portion of the financially barred populace, technology accessibility and acknowledgment, exceed by accessible financial establishments (Zins, 2016). While there are numerous methods of tending to the last mile conveyance of financial services including stands, rural ATM and so on., the greater part of the current FI conveyance models meet on the hand-held gadgets. These gadgets have remote network, bio-metric peruses for recipient confirmation and micro-printers. The account-holders confirm themselves normally via bio-metric approval dependent on their own data caught amid enrolment. The gadgets normally interface through remote GPRS/CDMA/GSM conventions. Close field correspondence technology is additionally getting to be prevalent.

2.3 Determinants of Financial Inclusion

The quintessence of financial inclusion is to attempt and guarantee that a scope of fitting financial services are accessible to each person, to comprehend and access those services. Aside from the standard type of financial intermediation, it might incorporate an essential 'straightforward's banking accounts for accepting payments (Abraham, 2007). In the meantime as financial inclusion in the restricted sense might be accomplished to some degree by offering any of these services. Financial inclusion is fundamental for guaranteeing access to convenient financial services and

satisfactory credit were given to helpless gatherings living in Kenya at a moderate expense.

As indicated by Zins and Weill (2016), the fundamental determinants of financial inclusion are information accessibility, pay levels and infrastructure, and additionally the controls administering the financial segment. Administrative components that obstruct financial access for SMEs incorporates capital sufficiency and supervisory tenets that make it less alluring to get stores and give little loans to numerous SMEs. Strict necessities with respect to the establishment of ATMs and opening bank offices may confine banks from stretching out their services to remote regions (Chithra, 2013).Thus, troublesome techniques and prerequisites by banks is another repressing component to financial inclusion (Zins, 2016). It was likewise noticed that attributes of the banking division decide the degree of financial inclusion. Higher expenses of opening accounts prompt stifled financial inclusion. Moreover, longer separations to nearest banking offices, numerous exposure prerequisites lessen formal inclusion.

2.4 Empirical Studies

Chinike (2015) studied on influence of cell phone banking on performance of Nigerian banks. The population of the study was 25 banks operating in Nigeria as at 31st December 2014 with the sample being 10 in number. The sample size was 200 respondents. Results demonstrated that capacity of monies for safety's sake and exchange of monies starting with one proprietor then onto the next was not a noteworthy indicator of execution of banks.

Akter (2014) researched on Financial Inclusion through M-banking: A Case of SMEs Bangladesh. The population for the examination was the Bangladesh SMEs area that contained 50 SMEs that had been in task from 2010 to 2015. The outcomes demonstrated that all demand-side, supply side and infrastructural factors were

altogether identified with the financial inclusion of SMEs. The littler administrators referred to low earnings and the inaccessibility of savings as another impediment.

Mago (2014) researched on the influence of M-banking on FIin Zimbabwe.The outcomes uncovered that the low salary individuals will embrace M-banking and since it's effectively accessible, advantageous, less expensive, simple to utilize and secure. Suggestions made are that there is requirement for the Central bank to oversee non-bank driven M-banking models and deal with their money holding breaking points and cost structures.

Kathuria, Uppal and Mamta (2009) survey the effect of mobile infiltration on monetary development crosswise over Indian states. They assessed a basic model with three conditions for 19 Indian states from 2000 to 2008. They particularly inspected the connections through which cell phones influence development and the constraints, assuming any, that limit their effect. They discovered that Indian states with higher mobile entrance rates can be relied upon to become quicker, and that there is a minimum amount, at an infiltration rate of 25 percent, past which the effect of cell phones on development is intensified by system impacts. Telecom systems, more than some other infrastructure, are liable to organize impacts: the development affect is bigger when a huge edge arrange estimate is accomplished.

Locally, Wamaitha (2016) researched on the connection between M-banking and savings of micro and little undertakings in Gikomba market of Nairobi city province, Kenya. The descriptive structure was utilized to contemplate and break down the factors while the investigation population comprised of MSEs in Gikomba advertise. The investigation built up that M-banking was a sheltered place to spare; transaction time was quick and fast and M-banking had the ability to spare without others'

information. The investigation reasoned that there was a positive connection between M-banking and MSEs" savings.

Simiyu (2015) considered on mobile cash exchange and the development of little and medium estimated endeavors in Kenya a case of Kisumu city. The Study population comprised of arbitrarily chosen SME proprietors or directors in Kisumu City and the unit of examinations was the SMEs in Kisumu City. The testing outline was the rundown of organizations enlisted by the Kisumu Municipal Council. The research utilized polls to gather predominantly quantitative data. The investigation built up that mobile cash had made a noteworthy commitment to the SME area. Larger part of the dealers depend on it instead of the formal banking division for their everyday transactions.

Kihara (2015) considered the influence of M-banking on the upper hand of Kenyan commercial banks. The researcher used the descriptive examination plan in an offer to help in the clarification of marvels or attributes related with the subject population who in this case were the 31 commercial banks. The exact proof uncovered that there are at present an extensive variety of M-banking services offered by commercial banks in Kenya to guarantee that they stay aggressive and significant in the market.

Waihenya (2012) investigated on the influence of agent banking on Financial Inclusion. Optional data was adopted for this investigation because it's effectively obtainable, cheaper and precisehere due to the controls on entries by CBK. The investigation reasoned that agency banking has the influence of expanded FIin the nation. The research discovered that the levels of FIare low and an eminent gap not crossed over by formal banking system exists. It also noted that agency banking is facing challenges from the increasinginflux of mobilesin the country and mobile cash transactions rising at a similar rate.

2.5 Conceptual Framework

In a given research, a conceptual framework is used to describe the association existing between variables. The independent variables include Number of users registered to mobile money services, Number of mobile money agency distribution, Number of M-banking transactions performed using cell phones, value of M-banking transactions and Technology will be a control variable in this study and the dependent variable is the Financial inclusion. The association between the independent and dependent variables are represented in the figure below:

Number of users enrolled to mobile money services

Number of mobile money agency distribution

Number of M-banking transactions performed using cell phones

Value of M-banking transactions

Financial inclusion

Technology
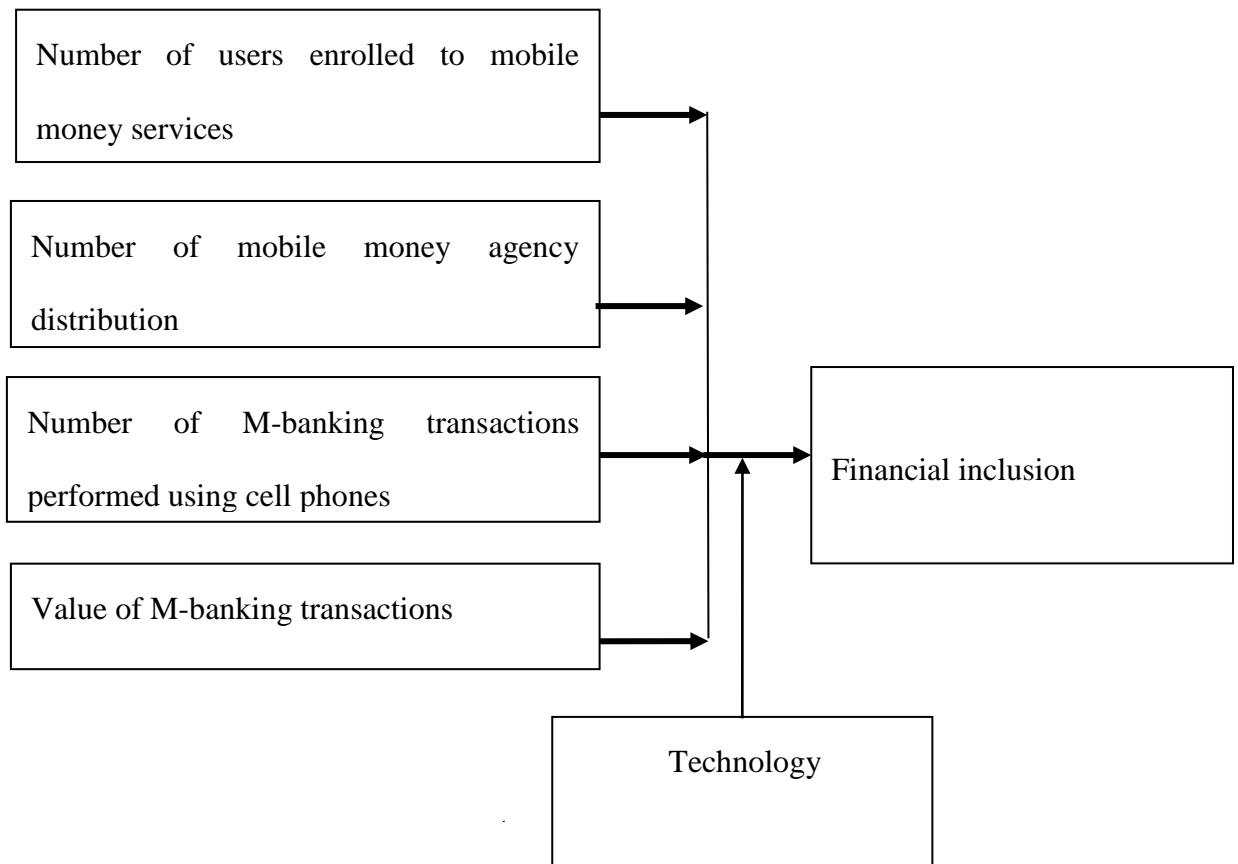
Control Variable

Source: Researcher (2018)

2.6 Summary of Literature Review

The section begun by looking at the hypothetical framework and it examined the theories that form the foundation of this research: Theory of Financial Innovations, Financial Intermediation hypothesis and Demand and Supply Side Twin Theory. As indicated by financial intermediation hypothesis, financial corporations' existence help in arbitrating between the excesses and deficiency units in an economy by motivating assets exchange. Nevertheless, this ought to be carried out along a financial path so as to regulate the running cost and expand the revenues for these banks

Based on the dialog above of the hypothetical and exact literature, restricted study has been steered on the link between M-banking and FI. Normally, a desirable interrelationship ought to exist between M-banking and FI, anyway no realized investigationhas ever been carried out to evaluate the connection between the two,and consequently the study gap arises. Recent researches have been carried out in diverse economies having distinctworking condition from that in Kenya. This examination subsequently looked to fill this research gap.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

In order to ascertain the influence of M banking on financial inclusion, a research methodology was necessary to outline how the research was carried out. This chapter has four sections namely; research design, data collection, diagnostic tests and analysis of data

3.2 Research Design

As indicated by Tromp (2008), a research design may beseen as a structure of standards for data accumulation and analysis of the equivalent in a manner that joins significance with the point of the study. Explanatory research designwas applied. An explanatory survey design was applied to demonstrate how variables interelate with one another. Explanatory research revolves around why questions.

3.3 Data Collection

Secondary data was obtained from CAK, whereasthat on number of banks with M-banking services and the number of transactions via the same was obtained from CBK and KNBS respectively. Publications containing data that was relevant were used as well.

3.4 Data Analysisand Presentation

The collected data was organized, put in tabular form and it's analyses was done using SPSS version 22 by both descriptive statistics that entailed standard deviation and meanso as to obtain the traits of the parametersstudied and inferential statistics was applied in analyzing the interrelationshipbetween the dependent and the independent variables. Tabular and graphical presentation of data was done

3.4.1 Diagnostic Tests

The analytical model adopted in the study was the multiple linear regression analysis which seeks to develop an adequate predictive model that shows the connection between the dependent and independent variables. To validate this relationship regression diagnostics test play a pertinent role by assessing whether the assumption of regression have been violated. A violation of any assumption affected the adequacy of the model. A regression model is usually fitted under the assumption that the observations are independent and identically distributed, residuals should be normally distributed and the observations have the equal variance. Diagnostics was therefore conducted to ensure that the assumptions of regression have been met and the sampled data appear to have come from a population that meets the regression assumptions.

3.4.1.1 Tests of Normality

Normality of residuals is a necessary assumption for building a regression model. This test helps to assess whether the random error in the association between the dependent and independent variable in a regression model follow a normal distribution. Violation of normality of residuals does not significantly influence the efficiency or bias of the model but it affects the computation of significant values that are used to test model adequacy when the sample size is very small. There are a number of statistics available to test for the violation of the normality assumption including skewness and kurtosis. The assumption was also tested by assessing graphical depictions of the error terms in normal probability plots. In this study Shapiro-Wilk and Kolmogorov Smirnov test were used to assess the violation of the normality assumptions. To make a conclusion using this test compared the computed significant value with the study's level of significance (0.05). If the computed

significant value is greater that the studies level of significance concluded that the residuals are normally distributed. If the computed significant value is greater that the studies level of significance inferred that the data considerably departs from a normal distribution.

3.4.1.2 Test for Multicollinearity

Whenever two or more of the independent variables in a multiple regression model are highly or moderately correlated, we can infer that Multicollinearity exists. The effect of Multicollinearity is that it skews the results in a multiple regression model. Another crucial impact of severe Multicollinearity is that it can raise the variance of the coefficients estimates and make them very sensitive to minute changes in the model. It arises from poor design of experiments with inadequate data collection techniques. It can also arise from using insufficient sample sizes or the inclusion of a variable in the model that is a blend of two other variables of interest in the study. To determine the severity of Multicollinearity, we used the Variance Inflation Factor (VIF). (VIF) determines the degree to which the variance of the coefficients estimates will increase if the independent variables are correlated. If there is no Multicollinearity, then the Variance Inflation Factor (VIF) was 1. A VIF above will be an indication that the independent variable are moderately correlated while a VIF between 5 and 10 indicates severe Multicollinearity which is problematic.

3.4.1.3 Heteroscedasticity

Heteroscedasticity implies the case where the variation of the error term is not similar for all observations. The basic assumption of multiple regression analysis is the variation of the error term is similar for all observations. If the residuals violate the assumption that requires equality of variance, the model coefficients from the model neither wasones of minimum variance nor was it unbiased. The test for equality of

variance was tested using graphical representation by plotting the model residuals against the predictor variables. A well-fitted model shows no conceivable patterns of the fitted values. Scatter plots are a valuable method assessing the variance of a data and are the first step in gauging Heteroscedasticity. The study also used the Breusch-Pagan test which tests the null hypothesis that the residuals have a constant variation for all observations. A p-value that is less than the study's level of significance (0.05) would lead the researcher to make an inference the assumption of equality of variance is violated.

3.4.2 Analytical Model

ANOVAwas carried out to show the general model significance. Particularly, the calculated f statistic will be compared with the tabulated f statistic. A critical p value of 5% significance level was also applied in determining if the overall model was significant or otherwise. A multivariate regression model wasapplied in linking the independent to the dependent variable as shown:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon$$

In which,

Y= Financial inclusion − Accessibility in terms of number of deposit bank accounts

X_1 = Number of users enrolled to mobile money services

X_2 = Number of mobile money agency distribution (Number of mobile money agents who exchange mobile money for real cash)

X_3 = Number of M-banking transactions performed using cell phones

X_4 = natural log (Ln) of value of M-banking transactions (amount of money transacted via mobile money services)

X_5 = Technology (control variable)

Є = Error term

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND INTERPRETATION

4.1 Introduction

Thesectionencompasses data analysis, findings and interpretation. Outcomes were shown in tabular and diagrammatical forms.

4.2 Descriptive Statistics

Descriptive measures that were used include mean, maximum, minimum and standard error of estimate. Results were depicted in Table 4.1

Table 4.1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Dev
Financial Inclusion	80	90.6577	936.3	394.79	202.006
Number of users enrolled to mobile money services	80	80.6854	833.307	348.891	169.686
Number of mobile money agency distribution	80	69.2343	926.937	365.98	208.649
Number of M-banking transactions performed using cell phones	80	35.717	955.026	387.519	221.283
value of M-banking transactions	80	3.0114	9.7611	7.44213	0.71095
Technology	80	5.6491	9.0536	7.17891	0.71811

The results revealed that the mean of Financial Inclusion was 394.79. The maximum was 936.3while minimum was 90.6577. The standard deviation was 202.006. This implied that Financial Inclusion was widely spread from the mean.

The results revealed that the mean of the number of users enrolled to mobile money services was 348.891. The maximum was 833.307while minimum was 80.6854. The

standard deviation was 169.686. This implied that the number of users enrolledto mobile money services was widely spread from the mean.

The results revealed that the mean of Number of mobile money agency distribution was 365.98. The maximum was 926.937while minimum was 69.2343. The standard deviation was 208.649. This implied that Number of mobile money agency distribution was widely spread from the mean.

The results revealed that the mean of Number of M-banking transactions performed using cell phones was 387.519. The maximum was 955.026while minimum was 35.717. The standard deviation was 221.283. This implied that Number of M-banking transactions performed using cell phones was widely spread from the mean.

The results revealed that the mean of value of M-banking transactionswas 7.44213. The maximum was 9.7611while minimum was 3.0114. The standard deviation was 0.71095. This implied that value of M-banking transactionswas not widely spread from the mean

The results revealed that the mean of Technologywas 7.17891. The maximum was 9.0536while minimum was 5.6491. The standard deviation was 0.71811. This implied that Technologywas not widely spread from the mean

4.3 Diagnostic Tests

Diagnostic tests were conducted before the regression analysis. This included Normality and multicollinearity.

4.3.1 Normality Test

This test was carried out using graphs as presented below. The findings in the figure depicted that the residuals of financial inclusion are normally distributed.

Histogram

Mean = 394.7897
Std. Dev. = 202.0056
N = 80
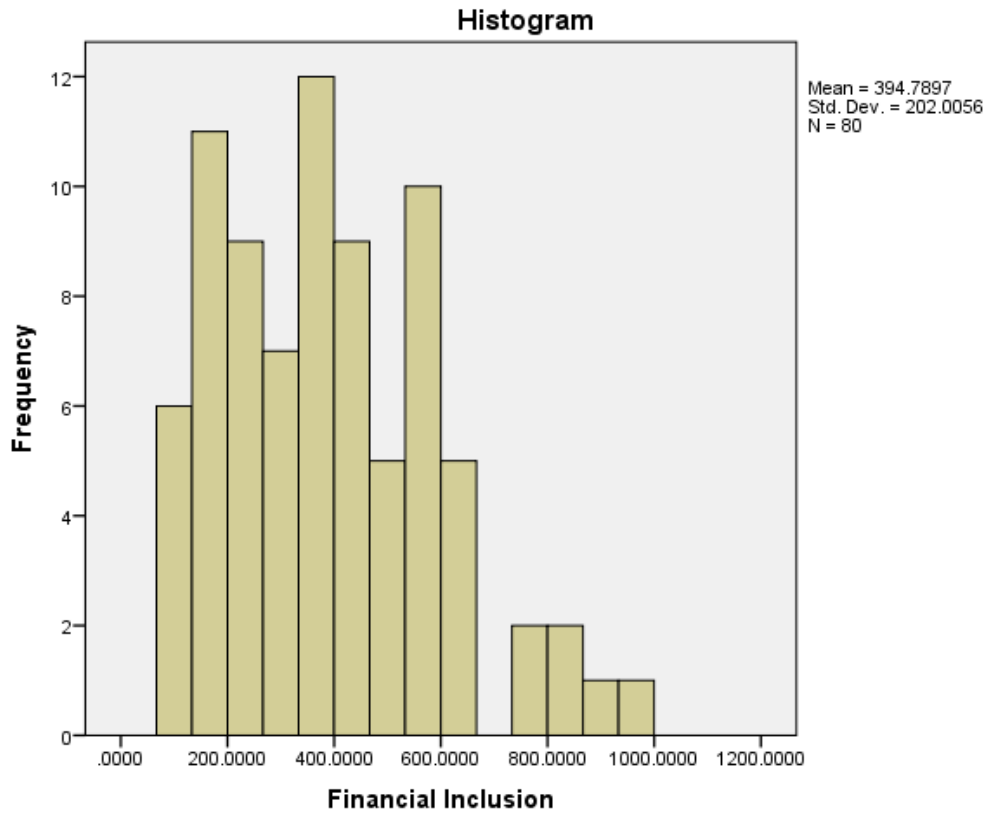
Figure 4.1: Normality

4.3.2 Multicollinearity

Multicollinearity was evaluated using the factors (VIF). In line with Field (2009) VIF values in excess of 10 shows that it exists.

Table 4.2: Multicollinearity

	Tolerance	VIF
Number of users enrolled to mobile Money services	0.117	8.513
Number of mobile money agency distribution	0.202	4.959
Number of M-banking transactions performed using cell phones	0.137	7.276
log of value of M-banking transactions	0.819	1.221
Technology	0.858	1.166

		Mean					**4.627**

The results in Table 4.2 depicted that VIF was 4.627 which is less than 10 and thus no

Multicollinearity.

4.4 Analytical Model

This section presented the correlation and regression analysis results.

4.4.1 Correlation Analysis

Correlation results were presented in Table 4.3.

Table 4.3: Correlation Results

		FI	mobile money services	money agency	No. of banking transactions	value of mobile transactions	Technology
FI	Pearson Correlation	1.000					
	Sig. (2-tailed)						
mobile money services	Pearson Correlation	.968*	1.000				
	Sig. (2-tailed)	0.000					
money agency	Pearson Correlation	.916*	.881**	1.000			
	Sig. (2-tailed)	0.000	0.000				
banking transactions	Pearson Correlation	.952*	.922**	.861**	1.000		
	Sig. (2-tailed)	0.000	0.000	0.000			
value of mobile transactions	Pearson Correlation	.323*	.318**	0.215	.323**	1.000	
	Sig. (2-tailed)	0.003	0.004	0.055	0.003		
Technology	Pearson Correlation	.276*	.300**	.292**	.281*	-0.119	1.000
	Sig. (2-tailed)	0.013	0.007	0.009	0.012	0.293	

The results showed that the number of users enrolledto mobile money services had a desirable and notable correlation with FI (r=0.968, p=0.000).Findings also revealed that number of mobile money agency distributionhad a positive and notable correlation with FI (r=0.916, p=0.000).It was also showed that number of M-banking transactions performed using cell phones had a positive and notable correlation with FI (r=0.952, p=0.000). In addition the results depicted that value of M-banking transactions had a positive and insignificant correlation with FI (r=0.323, p=0.003).Further the results depicted that technologyhad a desirable and notable correlation with FI (r=0.276, p=0.013).

4.4.2 Regression Analysis

Table 4.4reveals that the number of users registeredfor mobile money services,number of mobile money agency distribution,number of M-banking transactions performed using cell phones, value of M-banking transactions and technology were discovered to be sufficient in explaininginfluence ofM-banking on financial inclusion.This means that enrollment to mobile money services,number of mobile money agency distribution,number of M-banking transactions performed using cell phones, value of M-banking transactions and technologyexplain 97.1% of the deviations in the influence of M-banking on financial inclusion. The adjusted R was 0.971.

Table 4.4: Model Fitness

R	R^2	Adjusted R^2	Std. Error of the Estimate
.985a	0.971	0.969	35.6804

Table 4.5 provides the results on the ANOVA. Findings reveal that the overall model was statistically significant as reinforced by a p value of 0.000 which is lesser than the

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critical p value of 0.05. It was confirmed by an F statistic of 491.636which imply that enrollment to mobile money services,number of mobile money agency distribution,number of M-banking transactions performed using cell phones, log of value of M-banking transactions and technology are good predictor ofthe significanceof M-banking on financial inclusion.

Table 4.5: ANOVA

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	3129487	5	625897	491.636	.000b
Residual	94208.8	74	1273.09		
Total	3223696	79			

The results showed that the number of usersenrolled to mobile money serviceshad a positive and notable connection with FI (β=0.476, p=0.000).It was also revealed that number of mobile money agency distribution had a positive and notable connection with FI (β=0.114, p=0.005). Findings also showed that number of M-banking transactions performed using cell phoneshad a positive and notable connection with FI (β=0.223, p=0.002). In addition the results depicted that value of M-banking transactions had a desirable and notable connection with FI (β=0.310, p=0.000).Further the results revealed that technology had a positive and notable connection with FI (β=3.397, p=0.008).

Table 4.6: Regression of Coefficients

	B	Std. Error	T	Sig.
(Constant)	19.11	63.249	0.302	0.763
Number of users enrolled to mobile money services	0.476	0.071	6.704	0.000
Number of mobile agency distribution	0.114	0.035	3.257	0.005

Number of mobile transactions	0.223	0.071	3.159	0.002
value of mobile banking transactions	0.31	0.055	5.664	0.000
Technology	3.397	1.51	2.249	0.008

$Y = 19.11 + 0.476X_1 + 0.114 X_2 + 0.223 X_3 + 0.31X_4 + 3.397X_5$

Where,

Y = Financial inclusion

X_1 = No. of users enrolled to mobile money services

X_2 = No. of mobile money agency distribution

X_3 = Number of mobile banking transactions performed using mobile phones

X_4 = value of mobile banking transactions

X_5 = Technology

4.5 Interpretation of Findings

The results showed that the number of users enrolledto mobile money services had a positive and notable connection with FI. This means that an increase in enrollment to mobile money services by one unit will result in an increase in financial inclusion by 0.476units. It was also revealed that number of mobile money agency distribution had a positive and notable connection with financial inclusion implying that a rise in the number of mobile money agency distribution by one unit will cause an increase in financial inclusion by 0.114units.

The results also showed that number of M-banking transactions performed using cell phones had a positive and notable connection with FI meaning that a rise in number of M-banking transactions performed using cell phones by one unit will cause an increase in financial inclusion by 0.223units. In addition the results depicted that value of M-banking transactions had a positive and notable connection with financial

inclusion meaning that a rise in log of value of M-banking transactions performed using cell phones by one unit will cause a rise in FI by 0.310 units.Further the results revealed that technology had a positive and notable connection with FI.This means that an increase in technology by one unit will result in an increase in financial inclusion by 3.397units.

Theresults concurred withMago (2014) who argued thatM-bankinghas a positive and notable influence onFIin Zimbabwe. The findings also agreed with that of Waihenya (2012) who found that agent banking positively affects Financial Inclusion in Kenya

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMENDATIONS

5.1 Introduction

Thesection gives a presentation of a summary and a discussion of the findings in according to the research problem and research objectives.

5.2 Summary of Findings

The researcher aimed at examining the influence of M-banking on financial inclusion.The dependent variable wasfinancial inclusion.No. of users registeredfor mobile money services, No. of mobile money agency distribution, Number of M-banking transactions performed using cell phones and value of M-banking transactions wereused as the independent variable, whileTechnology was used as a control variable in this study.The study population was all the 8 banks with M-banking.The study used secondary data from audited statements from communications authority of Kenya, CBK and KNBS of all the 8 banks in Kenya with M-banking.The researcher used both descriptive and inferential statistics in the studywhich included Pearson correlation and regression coefficient.

Findings from regression results showed that enrollment to mobile money services had a desirable and notable influence with FI. The results also revealed that number of mobile money agency distribution had a desirable and notable influence with FI. The results also showed that number of M-banking transactions performed using cell phones had a positive and notable influence withFI. In addition the results depicted that value of M-banking transactions had a desirable and notable influence withFI. Further the results revealed that technology had a positive and notable influence withFI.

5.3 Conclusion

Findings from regression results showed that the number of users enrolled to mobile money servicesby users had a positive and notable influence with FI.The study therefore concluded that enrollment to mobile money services and financial inclusions in banks are positively and significantly related.

The results also revealed that number of mobile money agency distribution had a desirable and notable influence with FI. The study therefore concluded that number of mobile money agency distribution and financial inclusions in banks are positively and significantly related.

The results also showed that number of M-banking transactions performed using cell phones had a desirable and notable influence with FI. The study therefore concluded that number of M-banking transactions performed using cell phones and financial inclusions in banks are positively and significantly related.

In addition the results depicted that value of M-banking transactions had a desirable and notable influence with FI.The study therefore concluded that log of value of M-banking transactions and financial inclusions in banks are positively and significantly related.

Further the results revealed that technology had a positive and notable influence with FI.The study therefore concluded that technology and financial inclusions in banks are positively and significantly related.

5.4 Recommendations

Findings showed that the number of users enrolledto mobile money servicesby users had a positive and notable influence with financial inclusion.Banks should come up

with strategies to reach out to more number of customers to enrollfor mobile money services.

In addition number of mobile money agency distribution had a positive and notable influence with FI.The study recommends that to enable lower fees, category of street-level sub-agents, identified by lower costs and commissions than store-based agents should be created.

The results also showed that number of M-banking transactions performed using cell phones had a positive and notable influence with FI.Banks should come up with strategies to raise awareness and reach out to more customers so as to increase the number of M-banking transactions

In addition the results depicted that value of M-banking transactions had a positive and notable influence with financial inclusion. Banks should come up with strategies to raise awareness and reach out to more customers so as to increase the value of M-banking transactions

The study findings revealed that technology had a positive and notable influence with financial inclusion.The study recommends that it's necessary to hiremorally upright, competent and well salaried ICT staff in the bank as the mobile operator so as to mitigate losses from fraudulent access of customers' accounts from hacking

5.5 Limitations of Study

The data collected was secondary in nature. However, the researcher is not conscious of how it was composed and the various alterations and assumptions that were used in order to formulate and present the data.

The analytical procedure was also scientific. The study failed to extract qualitative data that would have clarified the soft and unseen issues that affect the association

between M-banking and financial inclusion of banks. An open ended questionnaire, an interview guide or a focus group discussion would have yielded qualitative data and hence support this results.

The study only concentrated on 10 years (year 2008 to year 2017). Using a longer period of around 20 – 30 years would probably have yielded different results.

5.6 Areas for Further Study

The study proposes that further studies ought to involve a qualitative analysis of the relationship between M-banking and financial inclusion. Such a study would encompass interview of key informants in the commercial banks and would giveunseen insights into the intricate relationship between M-banking and financial inclusion.

In addition, the current study focused on banks in Kenya only. Further study should focus on banks in other East African nations for purposes of making comparisons with the current study.

Since the R2 was not 100% it seems there are other determinants of financial inclusion that were not addressed by the study. Other studies should therefore focus on other determinants of financial inclusion.

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