# IMPACT OF MOBILE MONEY ON ECONOMIC GROWTH IN KENYA

A Dissertation

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by

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## DECLARATION

I, Alex Wanjohi, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university. I authorise the University to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

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ALEX KARUIRU WANJOHI

## DEDICATION

I dedicate this work to God Almighty for giving me strength and ability during my studies at the University. As always, I am thankful for the overwhelming support from my family who have been nothing short of reassurance in this journey.

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## ABBREVIATIONS

**ADF:** Augmented Dickey-Fuller

**CAK**: Communication Authority of Kenya

**CBK**: Central Bank of Kenya

**ECM:** Error Correction Modelling

**ECT:** Error Correction Term

**FAS:** Financial Access Surveys

**GDP**: Gross Domestic Product

**GNP**: Gross National Product

**ICT:** Information and Communication Technology

**KNBS**: Kenya National Bureau of Statistics

**MFIs:** Micro- and Small-Sized Enterprises

**MMT:** Mobile Money Transfer

**OLS:** Ordinary Least Squares

**OTC**: Over the Counter

**SPSS**: Statistical Package of Social Sciences

**TAM:** Technology Acceptance Model

**TAM**: Technology Acceptance Model

**UNDP:** United Nations Development Programme

## ABSTRACT

*The purpose of this study was to establish the impact of mobile money on economic growth in Kenya.The strength of the financial sector has generally been found to promote economic growth by increasing economic efficiency, investment and growth. Banks play a vital role in an economy by mobilizing, pooling and channelling domestic savings into productive capital thereby contributing to the economic growth of a country. As such, a competitive and well-developed mobile banking system is an important contributor to economic growth of a nation that has adopted one. This study employed a descriptive survey research design with a correlational approach. This study used secondary data sources. Specifically, data was obtained from the Central Bank of Kenya (CBK) and the Kenya National Bureau of Statistics (KNBS) reports for a period of 11 years (2007 to 2017). The data was analysed using descriptive analysis and time series inferential statistics covering unit root and co-integration analysis as well as the long-run and short run regression estimates.*

*The study findings indicated that money transfer agents have been increasing over the period of the study. The number of transfer agents has also improved since 2007 and showed a great incline especially in 2017 which hit 1,766 thousand agents. Mobile money transfer during the period of study continued to increase progressively as more subscribers were onboarded. In addition, the number of companies providing the service of mobile money transfer has also grown tremendously during the period of the study from one firm in 2007 to several firms by the end of the 2017. The growth has been driven by the ease of the service as mobile money banking does not require an individual to have a bank account in order to transact. The number of customers tremendously increased over the period of the study. From the co-integration analysis, the study finds a long-run significant positive effect of number of customers on economic growth in Kenya over the study period.*

*From the study conclusions, the study recommends that policy makers should consider the role of mobile money transfers while formulating national policies on economic development. This is because despite there being a negligible relationship between mobile money transfers and economic growth, the impact could be pronounced if much change is recorded. Though the relationship may be direct, an indirect one may arise as a result of the convenience that the mobile money transfer services offer to the economy.*

## TABLE OF CONTENTS

## LIST OF FIGURES

## LIST OF TABLES

# CHAPTER ONE: INTRODUCTION

## 1.1 Background of the Study

The financial sector plays a vital role in the economic development and growth of a country. Financial sector deepening has generally been found to promote economic growth by increasing economic efficiency, investment and growth (Buchichi, 2013). Financial intermediaries play a significant role in an economy by mobilizing, pooling and channelling domestic savings into productive capital thereby contributing to economic growth of a country (Buchichi, 2013). As such, a competitive and well-developed mobile banking system is an important contributor to economic growth of a nation where one has been adopted (Valverde, Humphrey & Fernandez, 2003). Kenya is one of the few pioneering countries offering financial services to people via mobile network operators. A lot of effort is being channelled towards the development of mobile services as it greatly ropes in the people who are marginalised by the traditional banking system.

Kenya is one the countries in the world witnessing fastest mobile adoption rates. According to the financial deepening-Kenya website, aFinAccess study done in 2009 revealed that 47.5% of Kenyan population mainly adults owned a mobile phone. When counting those with ability to access a mobile phone through a friend, relative or agent, the access rate was 78.4%. In March 2007, Safaricom-Kenya's largest mobile operator-launched M-Pesa, a mobile platform-based payment service. After the M-Pesa launch, 111,000 people registered for the service within the first three months. Over the next year, the operator was able to record a further 1.6 million registered users and recruit a network of more than 1,200 agents that can offer the whole range of services including registration and Over the Counter (OTC) services (fsdkenya.org).

In August 2010 and M-Pesa was boasting over 20,000 agents and a staggering 13 million subscribers. Safaricom has since encountered some competition though largely muted by the success of M-Pesa. Other mobile money transfer services in Kenya include Airtel Money, which is offered by Airtel, Yu cash, Iko Pesa from Orange and Equity Bank's new Equitel product as well as Pesa Pap service offered by Family Bank. These movable currency conveyance services seem to solve the monetary related problems of loads of customers with regards to security of money, personal safety and

efficiency. Kenyans are now able to use mobile money transfer services to send money to relatives and also as a payroll settlement solution from anywhere and in different locations hence convenient. For instance, a taxi driver requesting payments via mobile money will minimize the risk of theft (fsdkenya.org).

Economic growth refers to increase in the ability of an economy to generate goods and services in a certain time period as compared to another time period. Economic growth is basically measured in nominal terms, and inflation adjusted or real terms, as a percentage rate of increase in the Gross Domestic Product (GDP). GDP or Gross National Product (GNP) per capita is used to compare different countries economic growth to another since it considers population differences between countries. Economic growth occurs whenever people acquire resources and use those resources in ways that are exceptionally valuable. Economic growth thus denotes to the quantity of goods and services manufactured at a particular point in time but it does not indicate how the goods and services are produced. Economic growth therefore measures growth in monetary value and looks at no other aspects of development (Ayres &Warr, 2006).

### 1.2 Statement of the Problem

The introduction of mobile money transfer services literally changed the thinking of the financial services sector in Kenya. In a bid to reach a larger client pool, commercial banks began teaming up with mobile service providers to net more customers through opening of accounts via the mobile platform (Muthiora, 2015). This effectively meant that the mobile service providers now became a major stakeholder in the financial services market. In Kenya, there is a distinct 'fight' developing between mobile services operators and commercial banks with both players accusing the other of infiltrating their respective markets (Mwangi, 2012). An administrative issue then arises as to whether mobile service providers should be regulated by the Central Bank of Kenya (CBK) as players in the financial market. Currently, Equity bank- the largest bank by account holders- has rolled out a SIM card to rival the M-Pesa service. Clearly from the events above, mobile telephony is now a key driver of business (Kenya Mobile Trends Report, 2016). The CBK statistics show that there were some 47.7 million mobile accounts in the country by the end of last year 2018, at least one for each Kenyan on average, compared to 37.39 million a year earlier by the end of 2017 (CBK, 2019). Furthermore, about 80 percent of the Kenyan adult population have

access to mobile money services. The CBK statistics also reveal that 72 percent of the banking population use their mobile phones to access their accounts (CBK, 2019).

There are several studies that have been done on mobile money banking and economic growth concepts in different contexts. For instance, Kigen (2011) studied the impact of mobile banking on transaction costs of microfinance institutions using a survey of microfinance institutions in Nairobi. Wambari (2009) studied mobile banking in developing countries - a case study on Kenya. He established that mobile banking had a positive impact on transfers, payments, deposits and withdrawals in financial transactions of small businesses. Otieno (2008) studied the challenges likely to be faced in the implementation of mobile banking information systems in commercial banks in Kenya. He established that the key challenges included high levels of online insecurity, fraud and low acceptance by the market.

From these studies it is evident that empirical studies within Kenya are limited and the few studies available failed to assess the effect of mobile money on economic growth in Kenya. The main focus of these studies is on impact of mobile banking on financial inclusion of individuals. Due to the paucity of empirical analysis on this subject matter the current study sought to assess the impact of mobile money on economic growth in Kenya.

## 1.3 Research Objectives and Questions

### 1.3.1 Research Questions

i) How do mobile money transfer agents affect economic growth in Kenya?
ii) Does mobile money transfer customer enrolment influence economic growth in Kenya?
iii) Does mobile money transfer transaction frequency influence economic growth in Kenya?

### 1.3.2 Research Objectives

The main purpose of the study was to establish the impact of mobile money on economic growth in Kenya.

The specific objectives were;

i. To assess the effect of mobile money transfer agents on economic growth in Kenya.
ii. To evaluate extent to which mobile money transfer customer enrolment influences economic growth in Kenya.
iii. To determine the impact of mobile money transfer transaction frequency on economic growth in Kenya.

### 1.4 Significance of the Study

This study is useful to the policy makers as they get insight on the relevant effects of mobile money transfer on economic growth of a country. The national treasury and CBK may use the findings of this study while formulating policies that regulate mobile money transfer services. The research findings provide information which may assist in making better decisions.

Scholars may use the findings of this study to get information on mobile money transfer and economic growth. Furthermore, this study may be used as a basis to carry out further research to gain more insight on the affiliation between mobile money and the economic growth of a country.

### 1.5 Scope of the Study

The scope of the study was to establish the impact of mobile money on economic growth in Kenya. Specifically, the study sought to answer three research questions namely: how do mobile money transfer agents affect economic growth in Kenya? does mobile money transfer customer enrolment influence economic growth in Kenya, and does mobile money transfer transaction frequency influence economic growth in Kenya?. The study used secondary data which was obtained from CBK and Kenya National Bureau of Statistics (KNBS) statistical reports for a span of 11 years from 2007 to 2017. The study relied on secondary data and the choice of 11 years was limited by availability of data.

The tested three hypotheses; mobile money transfer agents has no significant influence on economic growth in Kenya, mobile money transfer customer enrolment has no significant influence on economic growth in Kenya and mobile money transfer transaction frequency has no significant influenceon economic growth in Kenya. The study used inflation as a control variable.

### 1.6 Organization of the Study

This thesis is structured as follows: Chapter one provides the research background, research questions, research objectives, significance and scope of the study. Chapter two comprises theoretical review and literature studies on the impact of mobile money on economic growth in Kenya, overview of the banking system in Kenya, and summary of literature. Chapter three entails the methodology that was adopted in carrying out the study. The study adopted explanatory research design. Chapter four presents the results and findings of data analysis. Chapter five presents the summary, discussions, conclusions and policy recommendations of the study.

# CHAPTER TWO: LITERATURE REVIEW

## 2.1 Introduction

This chapter reviewed literature on mobile money and economic growth of Kenya. From this review, broad categories were derived which helped to identify the critical relationship between economic growth of a nation and mobile money. The literature review provided evidence of the connection between mobile money and economic growth. It also looked at empirical studies on the subject matter on what other authors and researchers have done.

## 2.2 Overview of the Banking System in Kenya

The Kenyan Banking sector has undergone substantial transformation in the last decade. Between 2005 and 2008 the number of deposit accounts in operation grew by 152%. Commercial banks branch networks expanded by 60%. With the rapid growth of mobile network operators-led agents, access to formal financial services has grown exponentially in the urban towns of Kenya (CBK, 2009).

M-Pesa has evolved now to offer loans and savings through its M-Shwari product and can be used to pay bills and disburse salaries. This saves a lot of administrative costs. Kenyan households that have adopted M-Pesa have increased their incomes by 5 and 30%. M-Pesa as a reliable payment platform has resulted in a spring of start-ups which rely mainly on the services provided by the platform (Njuguna, 2011). Other countries have faced difficulty penetrating the mobile money service as a result of resistance from the commercial banks and financial regulators who are averse to money laundering schemes. However, countries such as Tanzania are coming up well.

Mobile technology in Kenya, though highly innovative, is considered to be just another access channel. In an increasingly changing financial services arena, we are now seeing commercial banks ‘going mobile’ by opening agency outlets in the urban areas to offer their services as close as possible to the market through a mobile platform. As a result, the mainstream branches act like back offices while the mobile agents perform most of the ‘front office’ operations of the bank. Services such as account opening, deposit-taking and withdrawals can safely and readily be procured at the agency outlets. This increases their reach to the market whilst also creating investment opportunities for the

agency operators. This change however was a reaction to the entry of M-Pesa, which provides bank-like functions to the unbanked and offers short term unsecured lending.

Mobile banking entails using mobile phones or other mobile devices to initiate different financial activities and transactions that are related to a client's account. M-banking is one of the newest ways of offering financial services through use of Information and Communication Technology (ICT), achieved on the backdrop of extensive uptake of mobile phones even in lower income countries like Kenya. It brings basic and electronic banking transaction services to the unbanked consumers in the comfort of their handheld mobile devices. Mobile phones allow consumers more flexibility as they provide a platform to perform more tasks in their lives. Financial institutions that adopt mobile services create a sustainable competitive advantage. Short Message Services (SMS) and mobile apps which convey useful information to customers such as the current account balance, and credit facilities available are not only reducing the operational expenses but also improving customer retention rates. Marlon (2010) argues that M-banking shields a bank from its competitors in a crowded market place. He goes on to cite a June 2009 Yankee Group report that mobile banking creates a bright spot within the struggling financial industry (Yankee as cited in Marlon, 2010). Marlon (2010) also argues that the introduction of these new mobile banking services is not resource-intensive.

According to Tubin (2010), mobility drives substantial changes within financial service. He reports that, since inception of mobile banking in barely sufficient three years or so, a lot of banks that provide the mobile banking services reported a positive effect on customer satisfaction and cost-effectiveness. Generally, success in delivery of financial services via mobile platforms depends on the understanding that mobile is a very unique channel with very well-defined characteristics and thus the potential for value propositions differ from that of say online banking. The mobile phone channel enables immediate and persistent communication which is not possible through traditional channels including some online methods. The mobile phone device is nearly always on and at the user's disposal at any time. Consequently, the mobile banking programs become more successful since they are supported by business and IT resources made available and dedicated to developing and supporting the growth of this money channel.

## 2.3 Theoretical Review

### 2.3.1 Financial Intermediation Theory

Financial intermediation is a procedure which involves deposition of excess units of funds with financial institutions who then at a later date or time lend out when there is shortage or scarcity of units. This theory builds on the opinion that intermediaries serve to reduce and eliminate high transaction costs and information asymmetries (Diamond, 1984). The author thus asserts that “as developments in information technology, deregulation, deepening of financial markets tend to reduce transaction costs and informational asymmetries, financial intermediation theory shall come to the conclusion that intermediation becomes useless. This contrasts with the practitioner’s view of financial intermediation as a value-creating economic process and also conflicts with the continuing and increasing economic importance of financial intermediaries”(Diamond, 1984; pg. 27).

The role of the financial intermediary is basically viewed as that of providing specialized financial commodities (Scholtens & Van Wensveen, 2003); the idea is to sell the commodity for a price that covers all costs of production and any opportunity costs. Financial intermediaries therefore exist due to market imperfections. This can be linked to different participants typically who have varying and different amounts of information regarding to, or differing capabilities to establish, the actual worth of securities existing in the market. In financial markets, information asymmetries are particularly pronounced. For example, “a firm issuing a security has more information about the potential cash flows associated with the security than the investors do; this means that some investors have more information about a security's value (or better ability to value the security) than other investors; that is, some investors are "informed" whereas others are uninformed” (Hirschleifer & Riley, 1979; pg. 96). This asymmetry information problem can also arise since borrowers in general know their security surety, productiveness, and moral integrity better than the lenders. On the other hand, “entrepreneurs possess inside information about their own projects for which they seek financing” (Leland & Pyle, 1977; pg. 67). Therefore, “moral hazard hampers the transfer of information between market participants; which is an important factor for projects of good quality to be financed” (Leland & Pyle, 1977; pg. 69)

This theory is considered relevant to the study in the sense that cash transfers can be implemented through various channels or financial intermediaries such as M-Pesa, or via the banking system. As a result, cash transfers to some extent use the relevant information available in ensuring that the transfers reach the recipients on time. This theory therefore supports the accessibility, technology and cost effectiveness in the citizens doing their transactions on the mobile phones.

### 2.3.2 Modern Development Theory

The modern development theory stipulates that the development and growth of relative income inequalities and their perseverance is unified in models (Galor & Zeira, 1993). In most of these models, "financial market imperfections play a major role in influencing key decisions regarding human and physical capital accumulation and occupational choices; Market imperfections determine the extent to which the poor can borrow to invest in schooling or physical capital and also affect their saving capacity and culture" (Galor & Zeira, 1993; pg. 13). Economic theories emphasize more on "entrepreneurship and financial market imperfections which determine the extent to which talented but poor individuals can raise external funds to initiate their projects". Consequently, "the evolution of financial development, growth and intergenerational income dynamics are closely intertwined" (pg. 20).

Haber (2004), Rajan and Zingales (2003) focused on how political factors outline the national policies toward financial development and influence the political strength of well-established incumbents. In accordance with their perspective, "closed political systems are more likely to hinder the development of financial systems that promote competition and threaten well established powers than open political systems" (Haber, 2004; pg. 85). "This is because centralized and powerful states are more responsive to and efficient at implementing policies that protect the interests of the elite than decentralized and competitive political systems with an assortment of checks and balances" (Rajan & Zingales, 2003; pg. 103).

According to Mehrotra, Puhazhendhi, Nair and Sahoo (2009), "the implication of modern development theories is that redistribution of wealth can foster growth, in sense that economic growth needs to be sufficiently inclusive if its benefits have to be shared among all or else the growth process itself shall be jeopardized and derailed" (pg. 57).

Modern development theory is therefore relevant in this study since it shows the evolution of economic growth which is recognized by the relative income inequalities between the rich and the poor. The theory thus highlights how money not only does influence resource allocation efficiency and effectiveness throughout the economy but also provides relative economic openings and chances to individuals both from the rich households and poor households.

### 2.3.3 Theory of Economic Growth

Economic growth is associated with the relationship between certain factors affecting output in the economy. This, as Lim (1996) puts it, can simply be highlighted by adopting a simple production function known as the Cobb-Douglas production function for ease of understanding of such a relationship. The Cobb-Douglas production function may be written as:

$$Qt = Tt\ Kt\ \alpha Lt^{\beta} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where Q is real output, T an index of technology, K an index of the capital stock measured in constant prices and L an index of labour for given period - t. The idea is that eventually for output to grow - it is determined by the level of increases in technology, capital and labour in the simplest form.

Later, Mankiw, Romer and Weil (1992), incorporated into the model human capital recognizing how different levels of labour exist regarding differences in levels of education and skills in general. Due to its flexibility as a model, incorporating various economic situations is possible and hence for this study, this can be a basis to input mobile money as one of the inputs.

### The Harrod-Domar Growth Model

Evolving from the works of J.M Keynes focusing on the short run aspect of investment is the Harrod-Domar Growth Model. This model investigated the relationship between savings, investment, and output. The model argues that national savings rate had to be equal to the products of the capital-output ratio and the rate of the effective labour force if the economy was to keep its stock of plant and equipment in balance with its supply of labour so that the steady growth could occur.

**The Solow Growth Model**

This evolved from Robert Solow (1956) seminar paper on growth and development. It is basically built on two equations: a production function (2) and capital accumulation equation. (3)

Where if having

$$y = f(Ko) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

$$y = output \quad Ko - capital$$

$$\acute{K} = sy - (n + d)K \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

Eventually, with the interaction, growth is seen to be the result of such, by the observation of certain factors which affected the interaction.

It tries to explain growth mainly in terms of investments and assumes a fixed capital coefficient and constant marginal propensity to save. It set out to develop a long run growth model which was more flexible than the Harrod-Domar model.

**2.4 Empirical Literature**

Wilkison and Sundelelowotz (2007) argued that the growth rates seen in Sub-Saharan Africa in the recent past could potentially have both a direct and an indirect relationship with the mobile telephony growth witnessed recently. According to a report generated by the International Food Policy Research Institute (IFPRI), 13 different countries showed a positive correlation between ICT and GDP.

Strengthening such views, Madden, Savage, Coble-Neal and Bloxham (2000) had initially argued that mobile tech can improve the standard of living in a poor society or neighbourhood by providing important opportunities such as business-related opportunities, social welfare and learning opportunities. This school of thought was reinforced and supported by Scott, Batchelor, Ridley and Jorgensen (2004) and Tanburn and Singh (2001) who asserted that innovative and creative applications of

mobile phones had greatly improved the efficiency and effectiveness of service delivery to the poor and has also created opportunities for new services.

IWaverman, Meschi and Fuss (2005) had already established that for every new 10 mobile phones registered in service in developing countries; a per capita GDP growth of 0.59% was achieved between 1996 and 2003. Eagle (2005) affirms that this growth was a result of innovative mobile phone applications which sought to lower significantly the transaction costs of financial services as well easing information access.

The government of Kenya was quick to recognize the role played by mobile phones and their innovative technologies in economic growth and development (Republic of Kenya Sessional paper, 2005). As a result, jointly with other stakeholders and development partners, the Kenyan government continues to encourage the development of communication infrastructure via the Communications Authority (CAK), which regulates the ICT providers including mobile service providers.

Elsewhere, Jensen (2007) revealed that the introduction and adoption of mobile phones has greatly reduced the price diffusion in fish markets in reference to southern India. The mobile or cell phone skills and knowledge has improved information sharing and communication flows, which has led to reduction of price in carrying out various tasks as well as convenience. On the contrary, the evolution, growth and introduction of M-Pesa in Kenya has been seen as a "disruptive technology" (Bower & Christensen, 1995) or a case of "creative destruction" (Aghion & Howitt, 1992), where Mobile money (M-Pesa) revolutionized the money transfer industry. M-Pesa became the most popular and preferred money transfer method within two years of its introduction and launching.

Morawczynski, (2009) did an assessment on the adoption, usage and outcomes of mobile money services in reference to M-Pesa, a case study in Kenya. The study noted that since M-Pesa’s launch in the year 2007, cash transfer services have witnessed exceptional growth in Kenya. The study attributed the success of M-Pesa to the dedicated team that ensured that the strategies they employed enhanced user friendliness and compatibility. Majority of the Kenyan population embraced this technological change. The inception and growth of M-Pesa platform led to the evolution of mobile banking which has greatly improved access and ease to financial

services. It has been well adopted by most banks in Kenya leading to improved performance since more members of the society are included and catered for in the financial system. This, he notes contributes towards achieving the millennium development goals such as poverty eradication and accessibility to basic needs.

Morawczynski and Pickens (2009) did an assessment of economic and social impacts of M-Pesa in Kenya. The authors found tangible evidence that mobile money has altered the savings behaviour of general public, the pattern of remittances from different members of society, and has increased rural livelihoods due to easy and convenient access of funds through mobile money technology such as M-Pesa. Although these studies (Morawczynski & Pickens, 2009; Mas & Morawczynski, 2009) provided indicative proof of the effects of M-Pesa, they were however not able to quantify the effects of the system and were limited by the small sample sizes of their studies. The current study thus aimed at getting tangible evidence through the use of secondary data sources for a period of 11 years to show the effect of mobile money banking on economic growth. The use of secondary data was justifiable since data was easily available and was not based on public perceptions as compared to the study done above.

Jack and Suri's (2010) study on the risk sharing benefits of mobile money showed that mobile money improves the capability and capacity of households to smoothen risks. The authors asserted that “Mobile money appears to increase the effective size of, and number of active participants in, risk sharing networks, seemingly without exacerbating information, monitoring, and commitment costs” (Jack and Suri, 2010; pg. 125). Their study contributed to the literature “by providing quantitative estimates of the impact of mobile money in Kenya on a variety of economic and social outcomes including financial access and usage. They used both the 2006 and 2009 FinAccess surveys and created a balanced panel of the 190 sub-locations that were surveyed in both rounds in order to examine the economic impact of mobile money on various outcomes pertaining to remittances, financial access, and economic livelihood” (Jack and Suri, 2010; pg. 135). This study is in line with the current study as both looked at effect of mobile money on economic growth in Kenya. However, the studies were different in that the current study looked specifically at the effects of transfer agents, customer enrolment and transaction frequencies on economic growth.

Kimingi (2010) studied how innovation through technology affected performance of commercial banks. The study used a census survey to carry out the research on commercial banks in Kenya. Primary data was collected using a questionnaire while secondary data on financial data was obtained from annual reports of commercial banks. Results indicated that the banks had adapted to the new technology innovation such as mobile banking and ATM services. It thus concludes that technological innovations had brought about enhanced financial performance in Kenyan banks.

Masinge (2010) meanwhile carried out a study on factors that influence the adoption of mobile banking services at the bottom of the Pyramid in South Africa, and found that with the union or introduction of mobile banking services and mobile technologies, members of the public are able to conduct various banking services at any place and at any time through their mobile phones. He focused on several variables such as trust, perceived cost and perceived risk. Areas of perceived risks included: performance risk, privacy risk, time risk, social risk and financial risk. The research model of Masinge's study included the original factors of extended Technology Acceptance Model (TAM). However, the current study focused on different variables such as money transfer agents, customer enrolment and money transaction frequency and economic growth in Kenya. The current study was done in Kenya- a middle income developing country compared to South Africa which is a member of BRICS.

Around the same time Erikson (2010) did a study on reciprocity, nepotism or costly signalling evidence from mobile phone money transfers in Nairobi and established that the transfer is in many instances in local currency or mobile minutes. Mobile money has increased access of citizens or general members of public to monetary services especially through non-financial institutions such as MFIs who can gain advantage from the use of mobile money in remittances of their savings and getting loans and all other enquiries about their accounts. However, the regulatory laws and primary investment and savings barriers can put to a stop the widespread adoption of mobile money services by the public. According to Erikson (2010), mobile cash and funds can provide a better channel for reducing poverty among the poor households by increasing savings rates opportunities through the use of mobile banking. In addition it can create jobs among the youths in the non-financial institutions and in money transfer agencies.

Similarly, mobile banking has greatly improved access to financial services and products offered by microfinance institutions and other financial institutions without necessarily going to the institution in person. Due to these prospective benefits of mobile funds and money, the study recommends that government should promote and support financially the development of local mobile cash and funds infrastructure and implement policies that can support the formation of a decentralized network of trusted mobile money agents which will ensure safety and guarantee the public that there will be no security threat from fraudsters.

Bangens and Soderberg (2011) conducted a study on the use of Mobile Money Transfer (MMT) among Micro- and Small-Sized Enterprises (MSEs) in Tanzania. Their study focused on the transaction between customers and suppliers. The results were based on a non-randomized sample of 110 MSEs mainly located in Dar es Salaam. The study revealed that mobile money transfer use was high for business use than personal use. The study further concluded that there was positive attitude amongst the micro- and small-sized enterprises on the adoption of mobile money transfer.The current study relied on the use of secondary data sources for a period of 11 years free from subjective public perceptions as used in MSEs in Tanzania. The current study was also a geographical focus of Kenya as compared to the above study which was done in Tanzania. Though both countries are developing, the geopolitical environment of the two countries is different and Kenya is comparably the larger economy.

Kiptoo (2011) studied the influence of mobile based money transfer services on the activities of rural farmers in Kenya. Descriptive analysis was employed. Data was collected through personal interviews and questionnaires in Kirinyaga, Bungoma and Migori districts. The use of these distinct areas was ideal since they represented the diverse social, cultural and economic backgrounds and capture differences in agricultural potential of individual farmers. The results of the study showed that many smallholder farmers were well informed of the financial services available on the mobile platform. Regression analysis however indicated that education and distance were major factors that affected the adoption and use of the services in the selected areas.

Another study was done by Karu (2011) on the response of commercial banks with respect to the advent of mobile money transfer in Kenya. Survey research design was used to allow the researchers to gather information, summarize, present and interpret for the purpose of clarification. The study used primary data and questionnaires. It was found that banks have hugely adapted to the new philosophy of mobile money services so that they can be able to suit their customers' demands. It was also evident that banks agreed to mobile money services to please their customer demands, grow customer coverage and maintain their market share so as sustain profitability.

Adana (2012) conducted a study on the relationship between mobile money transfers and economic growth in Kenya. The study used descriptive research design. Adana used a population of sample of six mobile phone service providers who also provided mobile money transfer services. The total amounts transferred through the mobile for the past five years was collected and then correlated with the economic growth proxy, GDP (Adana 2012). Secondary data from the CBK, mobile phone companies and KNBS was used. Correlation analysis was conducted between mobile money transfer and economic growth. The correlation analysis conducted found that there was a weak positive insignificant correlation between economic growth and mobile money transfer in Kenya the p- value was greater than 0.05 (Adana 2012). Thus, the study concluded that money mobile transfers do not affect economic growth. The current study differs from Adana's work on account of time period of study. That is, Adana looked at 5 years while this study looks at 11 years. Further, Adana looked at the quantity of transactions against GDP while the current study also looks into the factors of agent and customer enrolment.

Kamau (2012) examined the relationship between agency banking and financial performance of the banks in Kenya using a regression analysis on secondary data collected. Regression results indicated that there was a negative relationship between agency banking and financial performance. The regression results led to the conclusion that agency banking does not add any financial profitability on the Kenyan banks. The findings of the current study are not in line with Kamau's findings since the current study found a positive and significant relationship between the study variables. This implied that as majority of the people embraced and adopted mobile banking the general economic growth of the country improved as well. Factors including the ease,

access and user friendliness of mobile banking make transactions easy and which in turn improves cash flows in the economy.

Elsewhere, Kithuka (2012) investigated issues that affect growth of agency banking in Kenya, a case study of Kwale County. The study addressed the distinctive features of agency banking, the customers, as well as the characteristics of the service providers. The study used stratified and simple random sampling and focused on a sample of 100 agencies. The findings of the study revealed that security, cost and support were the factors related to behavioural intention to use and actual usage of the payment services by the agency banking micro businesses to enhance their success and growth. The findings of the study also revealed that distance does not influence frequency of customer transactions, rather perceived usefulness and financial education enhanced knowledge, attitude and practice in agency bankinghence explaining the growth of agency in KwaleCounty. This study differs from the current study on account of focus. Kithuka concentrated on agency banking and financial performance of commercial banks specifically in Kwale County while the current study aimed at establishing tangible evidence through the use of secondary data sources for a period of eleven years to show the effect of mobile money banking on economic growth. The secondary data collected for the current study can be viewed as objective compared to data used for Kithuka's work which could have been influenced by public perceptions.

Murega (2012) examined the effect of mobile money transfer services on financial inclusion among citizens in Kenya. The study engaged a descriptive survey research method which was triggered by the fact that the author was concerned with the state of affairs at the time of research. The study used secondary data which basically focused on the number of mobile phone users and commercial banks accounts within a period of 6 years (2007 to 2012). Findings showed that when there is increase and constant improvement on the growth of the mobile money transfer services, the level of financial inclusion proportionately grows. The study further confirmed that an increase in customers using mobile phone services will lead to an automatic increase in the use of mobile transfer services and will also trigger an increase in mobile cash or funds agencies all over the country that then will facilitate access of monetary services to the public thereby raising the levelsof financial inclusion. The current study sought to find out solid evidence through the use of secondary data sources for a period of eleven

years as compared to six years in the above study to show the effect of mobile money banking on economic growth. Murega focused on the score of financial inclusion as a consequence of mobile transfer services while this study seeks to establish the general economic contribution of the mobile transfer services. Again Murega's work may have been influenced by subjective responses from the public compared to the data gathered for this study which is purely objective.

Mwai (2013) would later examine the extent to which the agency model contributes to the financial element of commercial banks in Kenya. Secondary data was collected from CBK. The study found that financial modernism such as agency banking is still the supreme element of growth in the banking sector. Thus the study recommends that the banks need to take advantage and utilize the use of advanced technology to enhance their returns. This study was different to the current study since the latter focused on the general effect of mobile money on the economic growth while the former looked at one aspect of agency banking on financial inclusion. The studies were also different in that the current study looked at the whole GDP of the country while Mwai only focused on financial inclusion aspect of agency banking among commercial banks in Kenya.

The effectiveness of agency banking and how it affected the overall performance of commercial banks in Kenya was then studied by Ndirangu (2013). The research design was census based covering 100% of the banks that are agency banking accredited. The population of the study was 44 commercial banks. Correlation analysis was conducted between agency banking and financial performance of commercial banks. The results from the correlation analysis established that there was a negative relationship between the two involved variables. From the correlation results it was possible to conclude that agency banking does not increase banks profitability.This study again was different from the current study on account of focus; which is on the general effect of mobile money on economic growth as opposed to one aspect of agency banking on financial performance. The studies were also different in terms of scope since the current study aimed at providing a macroeconomic insight whereas Ndirangu only focused on financial performance of commercial banks as measured by the activities of agency banking in Kenya, a more industry specific study. The current study utilized secondary data sources while the above study used questionnaires to gather perceptions of banks' employees and agencies representatives.

Meanwhile, Ndiem (2013) conducted a study on the impact of agency banking on financial performance of commercial banks in Kenya. This study employed descriptive survey research design to establish whether the use of agencies in banking has enhanced financial performance of Kenyan commercial banks. The results showed that agency banking has been employed by the commercial banks and has greatly enhanced the fiscal well-being of Kenyan commercial banks especially by tremendous growth of profits, reduction of employment and recruitment costs and reducing spread of bank branches since the customers can either access the financial services through the use of agents or through mobile banking.This study also differs from the current study in scope. Ndiem focused on the financial performance of commercial banks as a consequence of their agency products while this study focused on the overall economic impact based on the growth of mobile money transfers including activities of the commercial bank agencies which rely on the mobile platform.

Wang'oo (2013) also carried out a study to determine the relationship between financial inclusion and economic development in Kenya. The study employed a meta-analysis research design. The study further used secondary data which was obtained from International Monetary Fund (IMF), United Nations Development Programme (UNDP) and Financial Access Surveys (FAS). Descriptive statistical approach and inferential analysis especially regression analysis and Pearsons Correlation were adopted to analyse data. The finding of the study was that a positive and significant correlation between financial inclusion and economic development existed implying that an increase in financial inclusion led to a positive change in economic development. The current study sought to find out solid evidence through the use of secondary data sources for a period of 11 years as compared to the meta-analysis done in the above study to show the effect of mobile money banking on economic growth. The above study further focused on two variables, that is, financial inclusion and economic development as compared to the current study which looked at the effects of mobile money (transfer agents, customer enrolment and mobile money transaction) on economic growth.

Aron (2018) further examined the evolution of mobile money and its important role in widening financial inclusion. He explores the channels of economic influence of mobile money from a micro perspective, and critically reviews the empirical literature on the economic impact of mobile money. The findings suggest that mobile money can affect the economy through several channels. Some of the key channels include improved risk-sharing, food security, consumption, business profitability, saving, and use of cash transfers. He observes that demonstrating welfare and risk-sharing gains from mobile money across countries could bolster the case for significant government and donor support, as well as investment.

Several researchers have studied the concept of mobile money and economic growth. The studies look at economic development from different standpoints which can range from macro-economic to micro-economic. A well-known pioneer to the worldwide economic studies is Hardy (1980), who established a positive effect of fixed line telephones on economic growth. In this line of thought, Waverman et al. (2005) in addition found a positive and signficant effect of mobile phones and devices telecommunications on economic growth and emphasized that the effect may be twice as large in developing countries in relation to developed countries. Furthermore, Waverman et al. (2005) reported absolute price and income elasticity of mobile phone demand larger than one. Similarly, Kathuria, Uppal, and Mamta (2009) showed that Indian states with superior mobile phone adoption and penetration have a higher economic growth than the states with low mobile phones penetrations.

### 2.5 Summary of Literature

From the review of empirical literature, the evaluation and evolution of mobile banking has received considerable acclaim and critic. However, little attention has been directed towards impact of mobile money on economic growth in developing countries, especially in Kenya despite several money transfer programs being in place such as M-Pesa, Pesa Pap and M-Kesho and recently introduced the Equitel platform. The few studies that have been carried out in the developing countries have mainly examined the impact of mobile banking on financial inclusion (Murega, 2012; Adana, 2012; Karu, 2011; Mwai, 2013; Kandie, 2013; and Kigagah, 2012). The reviewed studies had contextual, methodological and conceptual gaps. This is because studies such as Murega (2012) and Adana (2012) had gaps in references to the study variables where

the studies looked at different variables other than those being studied in the current study. Karu (2011) revealed a methodological gap since his study used case survey research design whereas the current study used a descriptive correlation research design. It is due to these research gaps that the current study sought to fill the gaps by evaluating the impact of mobile money on economic growth of Kenya.

# CHAPTER THREE: RESEARCH METHODOLOGY

## 3.1 Introduction

Kothari (2004) asserts that the purpose of the research methodology is to give details regarding procedures used in conducting the study. This chapter details out the methodology used in the study. The sections presented herein include research design, sampling period and analytical techniques for secondary research data.

## 3.2 Research Design

This study employed the explanatory research design. Explanatory research attempts to clarify why and how there is a relationship between two or more aspects of a situation or phenomenon and effect, meaning researchers want to explain what is going on. Explanatory research focuses on why questions. Answering the `why' questions involved developing causal explanations (De Vaus, 2001). It aimed at establishing a cause and effect between variables (Mugenda & Mugenda, 2003). The study sought to find out the impact of mobile money on economic growth in Kenya for a period of 11 years (2007-2017). The dependent variable was economic growth and the independent variables were; mobile money transfer agents, mobile money transfer customer enrolments, and mobile money transfer transaction frequency.

## 3.3 Data source and period

A population is a “large collection of individuals or objects that is the main focus of a scientific query or research and to whose benefit the study is done” (Cooper & Schindler, 2011; pg. 37). The study used quarterly data for a period of 11 years from 2007 to 2017, resulting in 44 observation count for the analysis. This implied that a census methodology was used because the number of years when mobile money transfer has been in existence was short.

This study used secondary data sources to gather information on different variables so as to address the research objectives. The secondary data was obtained from CBK statistical and annual reports and KNBS. The study used secondary data since the data on study variables was readily available in the CBK and KNBS websites. The period covers the entire period within which the phenomena have been in existence.

### 3.4 Empirical Model

A multivariate regression analysis was employed to examine the impact of the independent variables on the dependent variable. The regression model used took the following form:

$$EG_t = \beta_0 + \beta_1 TA_t + \beta_2 CE_t + \beta_3 TF_t + \beta_4 X_t + \varepsilon_t$$

Where EG represents economic growth in quarter$t$; $TA_t$ denotes the number of transfer agents in quarter$t$; $CE_t$ represents customer enrolment in quarter$t$; $TF_t$ refers to transaction frequency in quarter$t$. $X_t$ is a vector of control variables which affected economic growth, that is; inflation rate, $e$ = is the error term which captures the unexplained variations in the model.

### 3.5 Description and Measurement of Variables

The study sought to establish the impact of mobile money transfer and economic growth. The study is anchored on financial intermediation theory and modern development theory. Financial intermediation theory brings out the role played by mobile money transfer systems in the wider financial system by enabling the transfer of funds from across individuals; While the modern development theory puts into perspective the changing times and adaptation to the environment. The study variables (mobile money transfer agents, mobile money transfer customer enrolment and mobile money transfer transaction frequency) were expected to have a positive and significant relationship with the dependent variable (economic growth).

**Table 3.1: Operationalization of Variables**

| Variables | Measurements | Level of measurements |
|---|---|---|
| **Dependent variable** | | |
| Economic growth | Gross Domestic product(GDP) | Nominal |
| **Independent variable** | | |
| Mobile Money Transfer Agents | Number of Mobile Transfer Agents registered annually | Nominal |
| Mobile Money Transfer Customer Enrolment | Number of Mobile Transfer Customers registered annually | Nominal |
| Mobile Money Transfer Transaction Frequency | Number of annual transactions | Nominal |
| **Control variable** | | |
| Inflation | Consumer price index | Nominal |

### 3.6 Estimation Technique

This study used a time series regression model to evaluate the effect of mobile money on economic growth in Kenya. Applying the standard Ordinary Least Squares (OLS) method to non-stationary data series can produce 'nonsense correlation' or 'spurious regression' (Inder, 1993). That is, the OLS regression can give high R-squared and significant t-values of the estimated coefficients suggesting a significant relationship between dependent and explanatory variables when in fact they are completely unrelated. A time series approach was therefore preferred.

#### 3.6.1 Unit roots

Unit root tests were conducted on each variable. Where variables had a mixture of stationary and non-stationary series, then the first step was to conduct differences for the non-stationary series until a stationary state was achieved (Hendry, 1995). The Augmented Dickey-Fuller (ADF) test was employed in the study to test the time-series properties of the data series. The ADF tests the null hypothesis of non-stationary against the alternative hypothesis of stationary (Hendry, 1995).

The ADF test assumed the following null hypothesis;

*Ho: The variable is non- stationary (i.e. it has a unit root)*
*Ha: The variable is stationary (i.e. it has no unit root*)

It was at this stage that first and second differences were conducted if necessary

#### 3.6.2 Co-integration Analysis

This involved the testing of the existence of co-integrating equations. The long run relationship was established by conducting co integration tests for the mixture of stationary and non-stationary series. The study used two step Engel granger method. Co-integration using the two step Engel granger method involved generating residuals from the long run equation of the non-stationary variables. To establish whether variables were co integrated, the stationary of the residuals was established by applying the ADF. If the residuals were stationary at levels, then it concluded that there was both a short run and a long run relationship among the variables.

### 3.6.3 Error Correction Modelling

This helped to establish the short run relationship between the variables. However, the short run relationship is only established (a) after converting all non-stationary series into stationary series (either by differencing or by de trending) (b) after successfully testing for co integration and after using the residuals from the co-integration model to generate an Error Correction Term (ECT), (c) which is inserted into the short run model.

This study employed the Error Correction Modelling (ECM) procedure of Hendry (1995). This approach minimized the possibility of estimating spurious relationships while retaining long-run information without arbitrarily restricting the lag structure (Hendry, 1995). The ECM also provides estimates with valid t-statistics even in the presence of endogenous explanatory variables (Inder, 1993).

# CHAPTER FOUR: STUDY FINDINGS

## 4.1 Introduction

This chapter presents the results and findings of the study guided by the research objectives using techniques mentioned in chapter three. Specifically, the data analysis was based on specific objectives where patterns were investigated, interpreted and implications drawn on them. The descriptive statistics were presented first followed by the inferential statistics.

## 4.2 Descriptive Results

Table 4.1 shows the descriptive statistics of the variables used in the study. In case of mobile money transactions, the mean value increased steadily from 36.65 in 2007 to 1285.98 in 2017 with a minimum and maximum value of 10.025 and 1352.9 respectively. Mobile money transfer agents attracted a mean of 1037.5 in the year 2007 and a mean of 1657.57 in 2017. The findings indicate that mobile money transfer during the period of study continued to increase progressively as more subscribers were on boarded. Further, the number of companies providing the service of mobile money transfer has also grown tremendously during the period of the study from one firm in 2007 to several firms by the end of the study period. The number of customers tremendously increased over the period of 11 years. This is because customers are now able to transact business through the mobile money transfer platform from anywhere thus offering convenience.

**Table 4.1: Descriptive Statistics**

| *Variable* | *Obs* | *Mean* | *Std. Dev.* | *Min* | *Max* |
|---|---|---|---|---|---|
| GDPmn. | 44 | 603964.5 | 328554.8 | 319289 | 1148446 |
| Agents000 | 44 | 1448.364 | 386.5125 | 318 | 2211 |
| Transaction | 44 | 507.2487 | 434.5544 | 10.025 | 1352.9 |
| Customers | 44 | 116.0641 | 125.0969 | 3.49 | 365.9273 |
| Inflation | 44 | 8.273636 | 4.625143 | 2.19 | 18.9 |

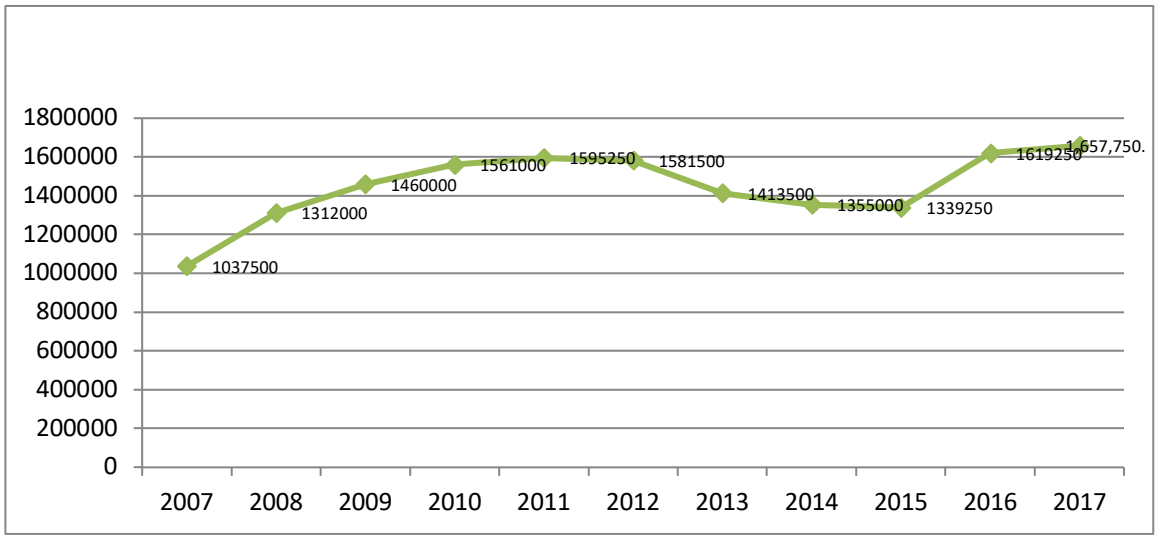
Source: Author (2019)

### 4.2.1 Mobile transfer Agents

The first objective of the study was to establish the influence of mobile money transfer agents on economic growth based over the period of 2007 to 2017. Results in Figure 4.1 revealed that the average number of mobile transfer agents was 1037500 in 2007, 1312000 in 2008, 1460000 in 2009, 1561000 in 2010, 1595250 in 2011, 1581500 in 2012, 1413500 in 2013, and 1355000 in 2014. The number mean decreased to 1339250 in 2015 and later increased gradually to 1657750 in 2017. The mean increased gradually from 2007 to 2017.

The findings implied that since the launch of mobile money the number of mobile money transfer agents had consistently increased over the period of the study. This could have been attributed to the several campaigns that banks are carrying out and the technological advancements and innovativeness being experienced in the whole world, Kenya not being left out. The transition can also be linked to the government in place since their manifesto was mostly relying on transformation of the country to a digital platform where any member of the public can access any type of service online. This was to ensure efficient and effective service delivery not only in public institutions but also in private institutions and parastatals as well.

**Figure 4.1: Mobile Transfer Agents**



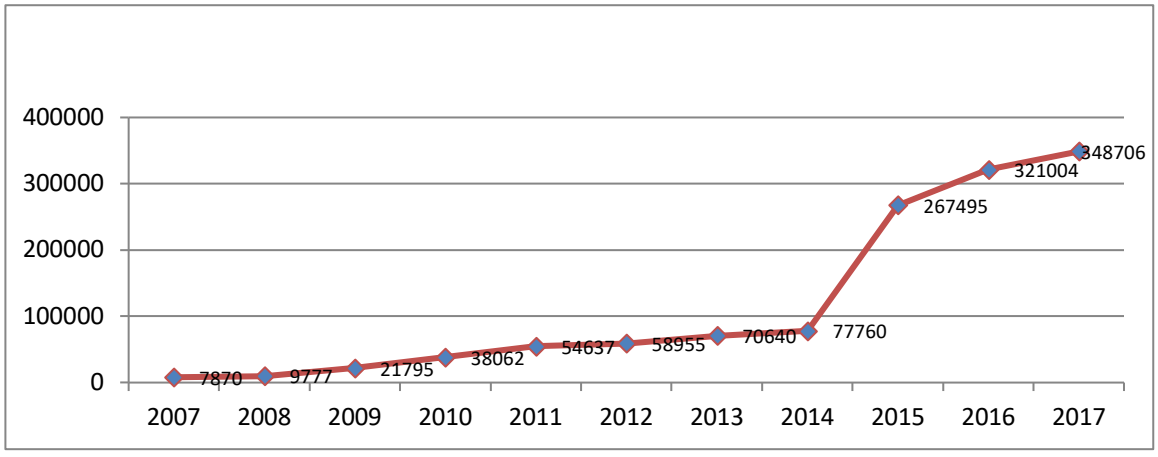

Source: Author (2019)

### 4.2.2 Mobile Money Transfer Customer Enrolment

The study sought to establish the impact of mobile money transfer customer enrolment on economic growth based over the period of 2007 to 2017. Results in Figure 4.2 revealed that on average, 7870 customers enrolled in 2007, 9777 in 2008, 21795 in 2009 and 38062 in 2010. Results further indicated that the customer transfer enrolment increased consistently from 54637 in 2011 to 348706 in the year 2017.

The findings implied that since the launch in 2007 customer enrolment had consistently increased over the period of the 11 years. The gradual increase in the customer enrolment to mobile money transfer can be partly explained by the need of people to transact online which has also led to the evolution of e-commerce, online buying and selling of goods which is made possible by the use of this mobile money transfers channel. The government of Kenya too made it a requirement for each individual that owns a cellular phone to be registered so that all sim cards can be associated with a certain individual and to curb the security threats which had spread rapidly since an individual could own as many sim cards as possible. Ever since the inception and introduction of sim card registration, this vice has gone down and each individual can now enjoy the luxury of receiving and sending money from one person to the other as well as accessing different bank financial services through the mobile banking which has been made possible by several banks in Kenya.

**Figure 4.2: Customer Enrolment**



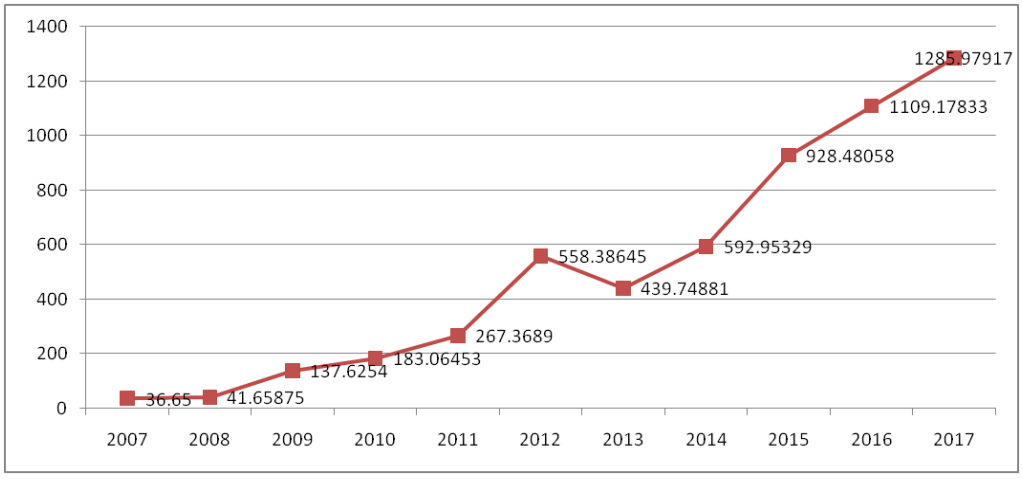

Source: Author (2019)

### 4.2.3 Mobile Money Transaction Frequency

The study sought to examine the extent to which mobile money transaction frequency influences economic growth based over the period of 2007 to 2017. Results in Figure 4.3 revealed that mobile money transaction had a mean of 35.29125 in 2007, mean of 41.65875 in 2008, a mean of 137.6254 in 2009, a mean of 183.06453 in 2010, a mean of 267.3689 in 2011 a mean of 558.38645 in 2012 a mean of 439.74881 in 2013 and a mean of 592.95329 in 2014. The findings indicate that there was a gradual increase from 35.291 million to 558.38m in the year 2012 and a slight decline to 439.74881 in 2013 due to fear of post-election violence. However, the mobile money transactions increased consistently to 1285.97 million in 2017.

The findings implied that mobile money transactions had consistently increased over the 11-year period but with a few mishaps. The mobile banking platform which has experienced tremendous growth and adoption by many Kenyans has made it easy in carrying out financial transactions. This is because most of the services that banks used to offer in the confines of banking halls, one can access them at the comfort of their home at any time during the day or at night as long as the person has a mobile phone device. This has helped the citizens save so much time which could be consumed in the banking halls and do constructive activities in their areas of specialization which can lead to improved economic growth and wellbeing of each citizen.

**Figure 4.3 Mobile Money Transaction**

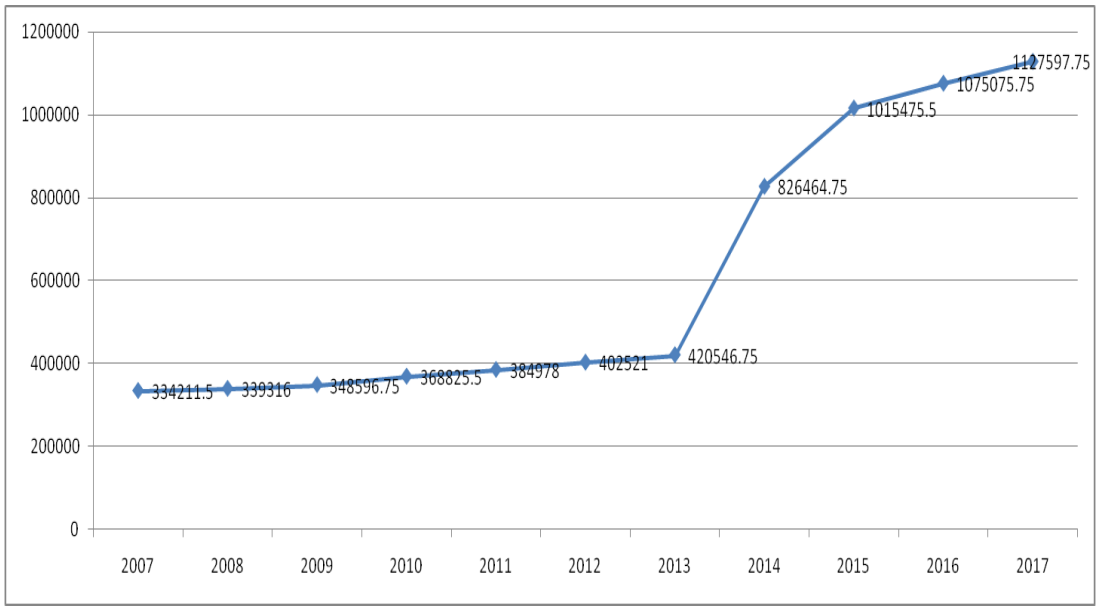



Source: Author (2019)

### 4.2.4 Gross Domestic Product

The main purpose of the study is to establish the impact of mobile money on economic growth of Kenya over the period between 2007 and 2017. Results in Figure 4.4 revealed that GDP had a mean of 334,211.5 in 2007, mean of 339,316 in 2008, a mean of 348,596.75 in 2009 a mean of 368,825.5 in 2010, a mean of 384,978 in 2011 a mean of 402,521 in 2012 a mean of 420,546.75 in 2013 and a mean of 1127597.75 in 2017. The mean increased gradually from 2007 to 2013 and asteep rise was experienced in 2017 which could be attributed to government rebasing the economy in that year. The findings implied that since the launch of mobile money banking in 2007 GDP had consistently increased over the period of the 11 years.

**Figure 4.4: Economic Growth**



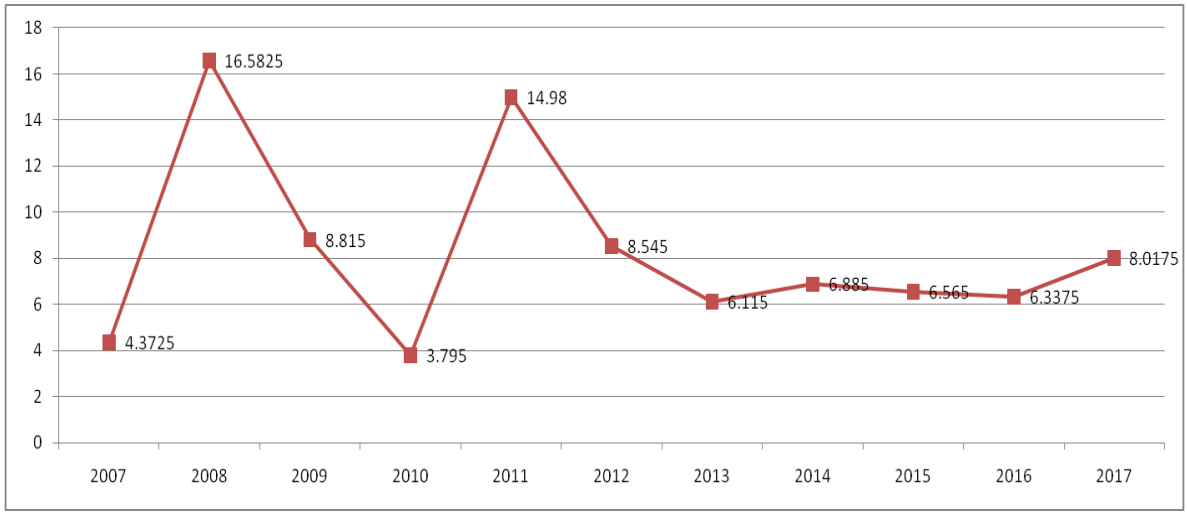

Source: Author (2018)

### 4.2.5 Inflation

The study used inflation as a control variable to examine the effect of mobile money transfer and economic growth. Figure 4.5 shows that the inflation rate was fluctuating up and down to show that the economy was not doing well constantly. When the inflation rate is high it means that the cost of living is high and so there could be slow business and hence low mobile money transfers. There was a gradual increase in the year 2007 to 2008 due to post violence after the elections and

similarly in 2011 there was tension due to early election campaigns and the ICC court case which was on going due to post election violence in 2007.

**Figure 4.5: Trends Graph for Inflation**




Source: Author (2019)

## 4.3 Inferential Statistics Analysis

### 4.3.1 Correlation Analysis

The correlation coefficient indicates that the combined effect of all the independent variables to economic growth was positive however, the effect of inflation was negative although had a strong relationship with economic growth (GDP) as well as among themselves.

**Table 4.2: Correlation matrix**

| Variables | GDP | Transaction | Agents | Customers | Inflation |
|---|---|---|---|---|---|
| **GDP** | 1.0000 | | | | |
| **Transaction** | 0.8928* | 1.0000 | | | |
| **Agents** | 0.2443 | 0.2933 | 1.0000 | | |
| **Customers** | 0.9163* | 0.9309* | 0.2050 | 1.0000 | |
| **Inflation** | -0.2055 | -0.2406 | 0.0327 | -0.1869 | 1.0000 |

Source: Author (2019)

Due to the high correlation between transactions and customers, there is a possibility of one of these variables being redundant within the model and thus possibly needing to be removed from the model. To address this instance of multicollinearity, two

different specifications of the based model was estimated; the first, with transaction without customers and the second with customers without transaction.

### 4.3.2 Unit Root Results

The unit root test is applied to detect non-stationarity in all the variables under the study to avoid spurious estimates. The Augmented Dickey Fuller (ADF) test was applied to test whether the collected time series was stationary or not.

Table 4.3 below indicates the computed test statistics at lags zero, critical values at 95% confidence interval and respective p-values in an effort to determine stationarity. The study found out that the p-value of all tested variables was less than 5% except for frequency of transactions and inflation. For all variables that are had p values more than 0.05, we fail to reject the null hypothesis meaning the variables have a unit root. The study thus conducted first differences for the other variables to attain stationarity.

**Table 4.3: Testing for Stationarity**

| **Variables** | **Test statistic and P Values** | |
|---|---|---|
| | **at lags (0)** | **at lags (0) after first differencing** |
| GDP | -7.215 (0.0000) | - |
| Frequency of Transactions | -0.743 (0.8352) | -9.569 (0.0000) |
| Number of Agents | -8.936 (0.0000) | - |
| Number of Customers | -6.466 (0.0000) | - |
| Inflation rate | -2.165(0.2193) | -3.164 (0.0222) |

**Values in parentheses are p values.
Source: Author (2019)

### 4.3.3 Co-integration Test

This involves establishment of either a long run or short run relationship between GDP and other independent variables. Having established the stationarity, we shall generate the residuals and the first differences of the residuals. The first differences, lagged values and lagged values of the first differences are included in another successive regression as model regressors.

**Table 4.4: The Engle-Granger Test**

| | No customers | | | No transactions | | |
|---|---|---|---|---|---|---|
| **Residuals** | **Coefficients.** | **t** | **P>t** | **Coefficients.** | **t** | **P>t** |
| _cons | 26135.38 | 4.04 | 0.000 | 27386.2 | 4.24 | 0.000 |
| L1. | -1.369224 | -5.16 | 0.000 | -1.44008 | -5.42 | 0.000 |
| LD. | .00685 | 0.04 | 0.966 | .0498811 | 0.31 | 0.758 |
| F(2, 38) | 40.66 | | | 41.84 | | |
| Prob > F | 0.000 | | | 0.000 | | |
| R-squared | 0.6813 | | | 0.6877 | | |
| Adj R-squared | 0.6645 | | | 0.6713 | | |
| Observations | 41 | | | 41 | | |

*Source: Author estimates from research data (2019)*

From the results in the Table 4.4, the p-value of 0.0000 is less than 0.05 implying that there is co-integration in both cases. This means that there is a long run relationship between economic growth and other explanatory variables. The variables under study move together in the same direction.

### 4.4 Regression Analysis

#### 4.4.1 Long Run Estimates

This section presented the regression analysis for both the long run model and short run model. The long-run estimates are indicated in the table 4.5. Based on the observed higher correlation between Transaction and Number of Customers (Table 4.2), two stepwise were undertaken. The first model (Model 1) includes Transaction without Number of Customers while second model (Model 2) includes Number of Customers without Transactions. The results in table 4.6 show that the coefficient of determination also called the R-squared is 0.0571 and 0.8231 for Models 1 (Transaction) and 2 (Number of Customers) respectively. This means that the combined effect of the predictor variables (Agents, transaction, customer enrolment, and inflation) explains 5.71% and 82.31% of the variations in economic growth for Models 1 and 2 respectively.

The combined effect of independent variables (agents, transaction, customer enrolment and inflation rate) were shown through Analysis of Variance (ANOVA) as statistically significant in explaining economic growth (GDP) in model two (without transactions) and statistically non-significant in a model one (without customers). Results indicated that the overall model (model two) was significant (F=

59.77, p-value<0.05), that is, the independent variables jointly explain dependent variable that is effective economy growth. On the other hand, model 1 independent variables were jointly not significant in explaining dependent variable that is effective economy growth (F= 0.79, p-value>0.05).

**Table 4.5: Long Run Regression Results for Economic Growth in Kenya**

| | (Model 1) | | (Model 2) | |
|---|---|---|---|---|
| **LNGDP** | **Coefficients** | **P>t** | **Coefficients** | **P>t** |
| Number of Agents | 0.0003<br>(1.27) | 0.213 | 0.0001<br>(0.93) | 0.361 |
| Transaction. D1. | 0.0002<br>(0.35) | 0.729 | - | - |
| Number of Customers | - | - | 0.0036***<br>(12.94) | 0.000 |
| Inflation D1. | -0.0095<br>(-0.33) | 0.744 | -0.0014<br>(-0.912) | 0.912 |
| Constant | 12.79***<br>(39.97) | 0.000 | 12.64***<br>(93.01) | 0.000 |
| F(3, 39) | 0.79 | | 59.77 | |
| Prob > F | 0.5087 | | 0.0000 | |
| R-squared | 0.0571 | | 0.8214 | |
| Adj R-squared | -0.0155 | | 0.8076 | |
| Root MSE | 0.50935 | | 0.2217 | |
| Observations | 43 | | 43 | |

*The Values in parentheses are t statistics*
*Source: Author's Computation from research data (2019)*

In interpreting the regression coefficients of the independent variables in Table 4.5 and Table 4.7; the results indicate that holding all other factors constant, economic growth will significantly rise by 1279 percent and 1264 percent in the long run for model one and two, respectively. Regression results indicate that money transfer agents and economic growth had a positive but insignificant relationship in the long run in both models (beta1= 0.00027722, p value =0.213; and beta2=0.0000844, p value =0.361) but a positive and a negative effect in the short run in model one and two respectively. In the short run, the study had different results (beta1=101.9985, p value =0.056; and beta2=-179.3348, p value =0.002). The findings imply that an extra money transfer agent leads to an increase in economic growth significantly in the long run holding other factors constant. The findings imply that an extra money transfer agent leads to an increase in economic growth by 48.38 million. The findings agree with those of Mwai (2013) who evaluated the extent to which the agency model has to the financial element of the commercial banks in Kenya and

concluded that financial improvement and modernization such as banking throughagencies continues to be influential tools on growth of the banking sector.

Specifically, the results indicate that transactions and economic growth had a positive but insignificant relationship in the long run in model one (beta1=0.0001734, p value =0.729) respectively but a positive and a significant effect in the short run in model one. In the short run, the study had different results (beta1=65.7577, p value =0.000). This means that for any additional transaction made, economic growth rises in the long run by 0.01734 percent significantly holding other factors constant. The findings agree with those ofAdana (2012) whose study sought to establish the relationship between mobile money transfers and economic growth in Kenya. Adana (2012) found that the amount of money transacted through the mobile money transfers increased steadily from 0.06 billion in 2007 on its launch to 118.08 billion by the last month of the analysis.

From regression analysis, the results indicate that customer enrolment and economic growth had a positive and significant relationship in the long run in model (model two) but a non-significant effect in short run in model two (beta2=0.0036, p value =0.000) but a positive and a non-significant effect in model two. In the short run, the study had different results (beta1=65.7577, p value =0.519). This means that for any additional customer enrolled, economic growth rises in the long run by 0.36 percent significantly holding other factors constant.The study findings disagree with those of Kigagah (2012) who analysed the factors that influence access to agency banking by the local community in Kitui Central district. The study findings illustrated that gender and age are the most important factors that affect access to agency banking this was supported by theresponses from the respondents who indicated that most of the bank account holders and bank agents were male.

Further, inflation rates had a negative and insignificant relationship with economic growth in both cases (model one and two). The estimates for long run are as shown in table (beta1=-0.0095, p value=0.744; and beta2=-0.0014, p value=0.912). Also, in the short run model, beta1=0.0722, p value=0.533 and beta2=-0.1377, p value=0.302 meaning the positive and negative effect in model one and two respectively was not significant. This implies that for a unit rise in inflation rates, economic growth

reduces by 0.95 and 0.14 percent in long run and short run respectively holding other factors constant.

### 4.4.2 Short Run Estimates

The existence of a long-run relationship as shown in co-integration findings imply that estimation of the Error Correction Term (ECT) for economic growth model is also important to determine the speed of adjustment to the equilibrium long run relationship from the short run. Before estimation of the model, the study conducted a lag selection analysis where different criteria were compared as shown in table 4.6. It was established that all criteria agreed that lag one was the correct lag for error correction model.

**Table 4.6: Lag Selection Criteria**

Sample: 2007q4 - 2017q4 Number of obs = 41

| lag | LL | LR | df | p | FPE | AIC | HQIC | SBIC |
|---|---|---|---|---|---|---|---|---|
| 0 | -918.384 | | | | 2.5e+13 | 45.0431 | 45.1192 | 45.2521 |
| 1 | -805.5 | 225.77* | 25 | 0.000 | 3.5e+11* | 40.7561* | 41.2127* | 42.0099* |
| 2 | -788.299 | 34.403 | 25 | 0.100 | 5.4e+11 | 41.1365 | 41.9736 | 43.4352 |

Endogenous: lnGDPmn D.Transactionmn Agents000 Customers D.Inflation
Exogenous: _cons

The finding of the short run ECT is presented in Table 4.7. In the short run, transactions, number of agents and inflation enjoy an inverse relationship with growth. The coefficient of the ECT is negative and significant for Models 1 and 2. It shows the speed at which the long run disequilibrium is corrected. From the findings, the ECT was between -1 and 0 as expected theoretically. More details for short run estimation are as shown. The values in parentheses are t statistics.

**Table 4.7: Short Run Estimates for Economic Growth in Kenya**

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| **LNGDP** | **Coefficients** | **P>t** | **Coefficients** | **P>t** |
| **ECT** | -0.0047* | **0.051** | -0.3456*** | **0.002** |
| LnGDP L1 | 0.0119* | 0.055 | -0.0007* | 0.092 |
| | (1.91) | | (-3.10) | |
| Number of Agents | 0.0525*** | 0.001 | -0.0422** | 0.012 |
| (L1) | (4.16) | | (-9.48) | |
| Transaction.L1 | 0.0686** | 0.023 | - | - |
| | (8.38) | | | |
| Number of | - | - | 0.1268*** | 0.002 |
| Customers.L1 | | | (3.65) | |
| Inflation.L1 | 1.1020 | 0.823 | -0.0970 | 0.857 |
| | (0.06) | | (0.302) | |
| Constant | -4.7111*** | 0.000 | -1.3729 | 0.929 |
| | (-13.03) | | (-0.30) | |
| $\chi^2$ | 5.669154, | | 11.89189 | |
| P>$\chi^2$ | 0.0587 | | 0.0026 | |
| AIC | 32.0554 | | 27.668 | |
| Log likelihood | -662.1635 | | -570.0276 | |
| HQIC | 32.22222 | | 27.83 | |
| SBIC | 32.5105 | | 28.1231 | |
| Observation | 42 | | | |

*Significant at (5%) level*The Values in parentheses are t statistics*

*Source: Author's Computation from research data (2019)*

The estimated short run model includes the first lag of the error correction term despite the fact that the variables which were integrated of order one I (1) were not cointegrated as per the Engle-Granger test. The above estimation shows that the dynamic stability was illustrated by the negative error correction term of 0.0047 and 0.3456 for model 1 and 2 respectively. This represents the speed of adjustment to the long-run equilibrium that affects short run movement by the dependent variable. Also, the negative sign agrees with the theory which indicates the backward move to equilibrium and the coefficient is less than the unit in absolute terms. From the model above, it was found that the speed of adjustment was slow at 0.47% in model 1 and a bit higher at 34.56% in model 2 which implies that it can take quite a long time to return back to equilibrium in the long run in model one than in model two.

The result that the ECM is highly significant in model 2 comparing to model one (significant at 10 percent level) suggested that the prior test used was not likely to be strong. A long run relationship established was thus deemed reliable. The study therefore relied on long-run estimates as indicated in Table 4.5.

# CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

## 5.1 Introduction

The purpose of this chapter is to finalize the study by providing the discussion, summary of the study findings, conclusions and recommendations for policy practice and improvement. The summary, conclusion and recommendations were done with reference to the objectives of the study and results obtained from the data that was collected and analysed.

## 5.2 Summary

The main purpose of the study is to examinethe impact of mobile money on economic growth of Kenya.The study was guided by the three specific objectives which were to determine theinfluenceof mobile money transfer agents, mobile money transfer customer enrolment and mobile money transfer transaction frequency on economic growth in Kenya.

The research used descriptive and explanatory research design and employed secondary data collected from CBK and the KNBS. The selected period was 2007 to year 2017 (11 years). Descriptive and inferential statistics were used to analyse the data. In particular, means and standard deviations were calculated for all the variables in the study. Further statistical analysis was carried out by use of regression analysis where economic growth was regressed against transaction, agents and customers.

Descriptive findings indicated that money transfer agents have been increasing over the period. The number of transfer agents had improved since 2007 and showed great incline especially in 2014 which hit to 1,584 agents. In addition, mobile money transfers during the period of study continued to increase progressively as the number of subscribers grew. Further, the number of companies providing the service of mobile money transfer has also grown vastly during the period of the study from a single entity to firm in 2007 to several firms by the end of the study period. The growth has been motivated by the convenience of the service as the service does not require an individual to have a bank account in order to transact. The number of

customers tremendously increased over the period of 11 years. This is because customers are now able to transact business through the mobile money transfer platform from anywhere thus offering convenience.

The regression results indicated that money transfer agents and economic growth had a positive but insignificant relationship. The findings imply that an extra money transfer agent leads to an increase in economic growth by 48.38 million. Results further indicated that customer enrolment had a positive and significant relationship with economic growth. This means that for every individual customer enrolled, economic growth increases by 2373.147 million holding other factors constant. In addition, results revealed that mobile money transaction had a positive but insignificant relationship with economic growth. This means that for any additional transaction made, economic growth rises by 10.05815 million.

## 5.3 Discussions

### 5.3.1 Mobile Money Transfer Agents and Economic Growth (GDP)

Regression results indicate that money transfer agents and economic growth had a positive but insignificant relationship. The findings imply that an extra money transfer agent leads to an increase in economic growth by 48.38 million. The findings agree with those of Mwai (2013) who evaluated the extent to which the agency model has to the financial element of the commercial banks in Kenya and concluded that financial improvement and modernization such as banking through agencies continues to be influential tools on growth of the banking sector. It is through adoption of technology that the banks will gain a competitive advantage and enhance their performance through taking advantage of such technological advents taking place worldwide. The study further revealed that 12 banks out of the active and licensed 43 are fully engaged and have gone into agency banking. This provides a good and excellent representation of all banks and in furtherance implies that mobile banking is actually being embraced and has seen tremendous growth.

### 5.3.2 Mobile Money Transfer Customer Enrolment and EconomicGrowth (GDP)

Results further indicate that customer enrolment had a positive and significant relationship with economic growth. This means that for every individual customer enrolled, economic increases by 2373.147 million holding other factors constant. The study findings disagree with those of Kigagah (2012) who analysed the factors that influence access to agency banking by the local community in Kitui Central district. The study findings illustrated that gender and age are the most important factors that affect access to agency banking this was supported by the responses from the respondents who indicated that most of the bank account holders and bank agents were male. Since majority of the bank customers were engaged in the personal services sector the inception of mobile banking would really influence the activities, borrowing and saving culture of individuals due to access of the financial services at their convenient places.

### 5.3.3 Mobile Money Transaction Frequency and Economic Growth (GDP)

Regression results reveal that mobile money transaction frequency was not statistically significant in explaining economic growth. The findings agree with those of Adana (2012) whose study sought to establish the relationship between mobile money transfers and economic growth in Kenya. He found that the amount of money transacted through mobile money transfers increased progressively from 0.06 billion in 2007 upon its launch to 118.08 billion as at the last month of the analysis (Adana 2012). The Pearsons Correlation results also established a weak positive but insignificant relationship between economic growth and mobile money transfer in Kenya.

Lastly, inflation rates had a negative and insignificant relationship with economic growth. This implies that for a unit rise in inflation rates, economic growth reduces by 350.1964 million holding other factors constant.

## 5.4 Conclusions

The study concludes that though minimal, the effect of money transfer agents on economic growth in Kenya is positive. The implication of this finding is that an increase in the number of mobile money transfer agents will lead to gradual improvement in economic growth. The study also concludes that mobile money customer enrolment has a positive and significant influence on economic growth in Kenya. The implication of the outcome is that an increase in mobile money customer enrolment will result to tremendous improvement in Kenya's economic growth. Further, the study concludes that mobile money transaction frequency has a positive though minimal influence on economic growth in Kenya. The implication of this finding is that an increase in the mobile money transaction frequency will lead to gradual improvement in Kenya's economic growth.

## 5.5 Recommendations

The study recommends that policy makers should consider mobile money transfers in their formulation of policies on economic development. This is because despite there being negligible relationship between mobile banking and economic growth, the impact could be pronounced if much change is recorded. Though the relationship may not be direct, an indirect one may arise as a result of the convenience that the mobile money transfer services offers to the economy.

With the increased innovation and technological advancement, there is need for the market players to come together and optimize on the efficiencies that each player has as well as focus on offering smooth inter-operator-based services where the users do not experience service differences. Whilst this is a key competitive edge that each player has kept top secret and controlled, the study recommends further studies on identifying the specific and quantifiable benefits to service providers, subscribers, other users and the government in order to enhance and optimize financial inclusion levels in the country. In order to review further the level of acceptance on the mobile money transfer services, the study recommends a deep dive to other factors that influence subscribers opt in for this service and look at the possible reasons why a notable number of subscribers are still not using the services whilst there are regular users of other financial services providers in the country

The amount transacted through mobile money every year is enormous. In addition, adoption by financial institutions of mobile money-based products like insurance and banking was found to lead to high increase in the number of bank clients and accounts. Therefore, financial institutions should embrace and integrate mobile money products into their products portfolio to promote their financial performance. This will ensure the institutions reach more people and develop more superior products which will further promote economic growth.

### 5.6 Suggestions for Further Studies

The study suggests that further research should be conducted on the relationship between mobile money transfers and the levels of performing and non-performing loans in Kenya. This is because mobile money transfer has given rise to an important financial service in the form of providing loanable funds through the mobile platform.

Further studies also would include: Study on the factors affecting the mobile services penetration in order to optimize the mobile money transfer services; Study on the role of government in supporting the adoption of Mobile banking in the country; Study on the risks associated with the mobile money transfer services in order to address ethical concerns like money laundering; Study on the impact of mobile money transfer services to the National Payment System.

In addition, a similar study can be conducted in future with inclusion of structural breaks test. Scholars may also find it useful to study the reasons why the use of mobile money transfer services was and has continued being a great success story in Kenya and rather slow in the other African countries.

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## APPENDICES

### Appendix I: Data Collection Sheet

| Year | Transaction(‘mn) | Agents('mn) | Customers ('mn) | GDP(‘mn) |
|---|---|---|---|---|
| **2007Q1** | 10.025 | 0.908 | 0.00349 | 319,289 |
| **2007Q2** | 22.235 | 1.187 | 0.0061 | 319,696 |
| **2007Q3** | 40.45 | 1.158 | 0.00924 | 348,672 |
| **2007Q4** | 68.455 | 0.897 | 0.01265 | 349,189 |
| **2008Q1** | 16.035 | 1.208 | 0.00549 | 322,884 |
| **2008Q2** | 30.235 | 1.387 | 0.00813 | 326,704 |
| **2008Q3** | 50.06 | 1.369 | 0.01124 | 357,640 |
| **2008Q4** | 70.305 | 1.284 | 0.01425 | 350,036 |
| **2009Q1** | 166.635 | 1.174 | 0.01759 | 342,820 |
| **2009Q2** | 109.015 | 1.46 | 0.02056 | 332,800 |
| **2009Q3** | 126.396 | 2.087 | 0.02316 | 364,423 |
| **2009Q4** | 148.457 | 1.119 | 0.02587 | 354,344 |
| **2010Q1** | 154.498 | 1.866 | 0.02912 | 347,736 |
| **2010Q2** | 167.999 | 1.508 | 0.0316 | 352,973 |
| **2010Q3** | 191.82 | 2.211 | 0.04328 | 390,817 |
| **2010Q4** | 217.941 | 0.659 | 0.04825 | 383,776 |
| **2011Q1** | 240.78 | 1.738 | 0.05105 | 364,583 |
| **2011Q2** | 273.112 | 1.634 | 0.05383 | 365,499 |
| **2011Q3** | 216.039 | 1.573 | 0.05581 | 406,451 |
| **2011Q4** | 339.545 | 1.436 | 0.05786 | 403,379 |
| **2012Q1** | 356.856 | 1.726 | 0.05686 | 379,509 |
| **2012Q2** | 369.798 | 1.601 | 0.05902 | 381,828 |
| **2012Q3** | 390.119 | 0.889 | 0.05861 | 424,864 |
| **2012Q4** | 1116.77 | 2.11 | 0.06133 | 423,883 |
| **2013Q1** | 418.257 | 1.152 | 0.06555 | 398,820 |
| **2013Q2** | 311.272 | 1.068 | 0.07024 | 398,332 |
| **2013Q3** | 496.453 | 1.66 | 0.07211 | 443,400 |
| **2013Q4** | 533.013 | 1.774 | 0.07466 | 441,635 |
| **2014Q1** | 543.983 | 0.318 | 0.07809 | 414,971 |
| **2014Q2** | 574.704 | 2.169 | 0.07789 | 965,493 |
| **2014Q3** | 614.054 | 1.349 | 0.07886 | 942,353 |
| **2014Q4** | 639.072 | 1.584 | 0.0762 | 983,042 |
| **2015Q1** | 842.472 | 1.272 | 0.25514 | 1,039,268 |
| **2015Q2** | 884.922 | 1.302 | 0.26369 | 1,026,674 |

| | | | | |
|---|---|---|---|---|
| **2015Q3** | 948.128 | 1.36 | 0.27033 | 1,001,467 |
| **2015Q4** | 1038.4 | 1.423 | 0.28082 | 994,493 |
| **2016Q1** | 1014.53 | 1.488 | 0.29761 | 1,094,937 |
| **2016Q2** | 1065.56 | 1.575 | 0.31373 | 1,091,485 |
| **2016Q3** | 1124.19 | 1.715 | 0.32843 | 1,058,713 |
| **2016Q4** | 1232.44 | 1.699 | 0.34425 | 1,055,168 |
| **2017Q1** | 1242.87 | 1.551 | 0.33518 | 1,148,446 |
| **2017Q2** | 1290.79 | 1.632 | 0.34223 | 1,145,128 |
| **2017Q3** | 1257.36 | 1.682 | 0.35149 | 1,108,744 |
| **2017Q4** | 1352.9 | 1.766 | 0.36593 | 1,108,073 |

*Mean values Source: Central Bank of Kenya and Kenya National Bureau of Statistics websites