

**EFFECTS OF MOBILE MONEY TRANSFER SERVICES ON ECONOMIC  
GROWTH IN KENYA**

**BY**

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## **DECLARATION**

I declare that this dissertation is my original work and has not been previously published or submitted elsewhere for award of a degree. I also declare that this contains no material written or published by other people except where due reference is made and author duly acknowledged.

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# EFFECTS OF MOBILE MONEY TRANSFER SERVICES ON ECONOMIC GROWTH IN KENYA

## ABSTRACT

The mobile money transfer service is an aspect of a broader concept emerging in the electronic payment and banking industry referred to as Mobile Money. Economic growth is measured in nominal terms. This study sought to establish the effect of mobile money transfers on economic growth in Kenya. The objective of the study was to establish the effect of mobile money transfer service on economic growth in Kenya. This phenomenon is keenly being achieved through Mobile Money Transfer Services initiative already taking significant and positive direction in Kenya. This study employed explanatory research design which focuses on why questions by developing casual explanations. An explanatory survey design shows how variables relate to each other. It aimed at establishing a cause and effect between variables. The dependent variable was economic growth for the year 2007 to 2015 (7 years or 28 quarters). The independent variables were mobile money transfer agents, mobile money transfer customer enrolments, mobile money transfer transaction frequency and mobile money transfer deposit value. The choice of the years was because of data availability. The target population accessible was 7 years. The sample size of the study was 7 years. This implied that a census methodology was used because of the mobile money transfer existence was short. The study used secondary data sources to gather information relevant in reaching the research objectives. The secondary data was collected from the CBK and the (KNBS) Kenya National Bureau of Statistics reports. The study's data collection source was justified by the fact that data on mobile money transfer agents, mobile money transfer customer enrolments, mobile money transfer transaction frequency and mobile money transfer deposit value were available in the CBK while the same works hand in hand with KNBS in making such statistics and estimation. The scope of the study determined the effect of mobile money transfer on economic growth. The geographical scope of the study was Kenya. Both regression analysis and time series analysis were used to analyze the data. There was no Co-integration between economic growth and mobile money agents, customers, frequency of transfer as well as the value of money transferred. VAR modeling impulse response revealed that number of agents, customers and frequency of transactions have a long run positive shock on economic growth while both interest rate and exchange rate impacts it negatively. There is need to intensify the need for adaption of mobile money transfer services among those who have not adapted them. The study recommends that the policy makers take mobile money transfer into consideration when drafting policies. This was because of the indirect relationship of mobile money transfer to economic growth through the provision of job opportunities, increased financial deepening and financial inclusion. Further, the study recommends that the government set up mechanism and framework to support innovation and offer substantive regulation in the mobile money transfer market to safeguard and offer security to the service users.

**Keywords:** Mobile money transfer, Economic growth, Agents, Customers

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## **DEDICATION**

This work is dedicated to my family who gave me invaluable moral support throughout the period.

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## **LIST OF ABBREVIATIONS**

<b>ATMs</b>	Automatic Teller Machines
<b>CBK</b>	Central Bank of Kenya
<b>CCK</b>	Communication Commission of Kenya
<b>GDP</b>	Gross Domestic Product
<b>IFPRI</b>	International Food Policy Research Institute
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>Kshs</b>	Kenya Shillings
<b>MMT</b>	Mobile Money Transfer
<b>P2P</b>	Person-to-person
<b>SMS</b>	Short Message Service

## OPERATIONAL DEFINITION OF TERMS

**Mobile Money Transfer** – This is the use of a mobile phone in order to transfer funds between banks or accounts, deposit or withdraw funds, or pay bills. This term is also used for the broader realm of electronic commerce; it can refer to the use of a mobile device to purchase items, whether physical or electronic (Agrawal, 2009)

**Mobile Money Transfer Agents** – A mobile transfer agent is one who acts for, or in the place of money transfer providers, such as Safaricom and YU, by authority from them(Pulver, 2009).

**Customer Enrollment** – this is the act of registering/subscribing people to a group. In the context of our study, it is the act of registering mobile phone users to money transfer services (Business English Dictionary).

**Transaction Frequency** – this is the rate at which transfer of cash occurs between one person/ group/organization to another (Business English Dictionary).

**Mobile Money Deposit Value** - to deposit is to leave an amount of (something, such as sand, snow, or mud) on a surface or area especially over a period of time. In the context of this study mobile money deposit value is the amount of money one can put/save in a mobile phone account (Klein and Mayer (2011).

**Economic Growth** - it is the increase in the market value of the goods and services produced by an economy over time. It is conventionally measured as the percentage rate of increase in real gross domestic product, or real GDP. Of more importance is the growth of the ratio of GDP to population (GDP per capita), which is also called per capita income. An increase in growth caused by more efficient use of inputs is referred to as intensive growth. GDP growth caused only by increases in inputs such as capital, population or territory is called extensive growth (Wikipedia the free encyclopedia).

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.1 Background of the Study**

It was in the twentieth century when mobile phones use increased dramatically as people found these portable electronic devices to be convenient and easy to use (Orozco, Jacob and Tescher, 2007). As a result of seeing people inclined to their phones, operations such as banking, money transfer and paying of bills was made easier by use of phones to perform such errands conveniently. This was also established to be of benefit to the very many people especially those in the rural areas who lacked access to financial services such as savings account, credit insurance and payment services. During that period, a great percentage of the country's households were financially excluded. Today in Kenya the adoption of mobile money services has been very successful. Mobile financial services aided companies to address needs of users (Njuguna & Mwangi, 2009).

Mobile money transfer operated in a very easy and simple way. The service allowed customers to use their phone like a bank account and a debit card. The customers credited their accounts at a local authorized agent and could then transfer the money to another person's phone or use for different transactions such as making loan repayment, paying bills or redeemed it as cash (Dichter, 2007).

Mobile money transfer providers are economic organizations or business organizations that can be family firms, partnerships or limited companies that had been formed with the aim of fulfilling a certain objective that was set. The providers engaged in business ventures that ranged from vendors, manufacturing, and customer service. The providers' juggled different types of businesses with the aim of making ends meet for

themselves while ensuring they remained enterprising and retained customer base and thus in most cases may be specialized in a certain industry and still engaged in another for revenue purposes (Dichter, 2007).

MMT had a clear edge over banks especially because it was fast and cost-effective. For instance, to send KSh. 35,000 (\$350) within the country using a classic money transfer company such as Western Union would cost KSh. 1,200 (\$ 12), but using MMT method, such as M-PESA, to send the same amount would cost only Ksh. 75(\$ 0.75) which is 6 times cheaper (Central Bank of Kenya, 2010). Classic money transfer methods requires that one must visit a given post office or bank (which could be a long distance away) to receive the remitted cash. Most banks and post offices were associated with long queues and fixed times of operation hence the opportunity cost of time spent while waiting to obtain the cash and other transaction costs were usually high(Mason, 2007).

Mobile Money operators (MNO's) are telecommunication organizations that provided telephony services such as voice, data, short messages services (SMS) that enabled customers to communicate with one another through provision of the service and most recently we had money transfer service through the use of mobile phone (Ivatury and Pickens,2006). In Kenya, there are various telecommunication companies like Essar Telecom commonly known as YU that was launched in the market in December 2008 and have their mobile money transfer (MMT) system called YuCash, Orange Telecom with Orange Money-Iko PESA, Airtel Kenya with Zap and Safaricom with M-PESA(Pilat, 2009).

To thrive and penetrate in any country MNO's provided business opportunities to the providers to act as their intermediaries with their key role acting as wholesalers or distributors of their merchandises that is airtime vouchers, SIM cards, handsets, laptops and various

electronic devices (World Bank, 2006). It enabled the providers to take up the business venture and embraces it as an additional revenue generation to their current business through the improvement of access to financial services, such as savings, deposits, insurance and remittances, as a vital to reducing poverty. Savings helped poor people to invest in productive assets like livestock, a loan helped in expanding business activities, and insurance provided income for a family when the breadwinner became sick. In many developing countries, however, 9 out of 10 people do not have a bank account or access to basic financial services (Pickens, 2009). Poor people were often not considered viable customers by the formal financial sector as their transaction sizes were small, and many lived in remote areas beyond the reach of bank's branch networks. Informal banking services such as microfinance, village savings and loan associations remained limited to their reach (EMI, 2010).

The approach to adopting mobile financial services differed throughout the world due to a variety of factors, including the regulatory and legal environments, access to supporting technologies, and economic constraints, as well as experience with antecedent products and services. Consumer needs and experience represent key components of each of these variables and were the ultimate determinants of adoption (GSMA, 2008).

The use of mobile phones for banking and payments, in particular, is taking off in many developing countries. They are particularly valuable in rural areas where no bank branches exist and where other traditional banking channels, such as Automatic Teller Machines (ATMs), fixed-line telephones and the internet are unavailable. Mobile banking in developed economies is just another channel among many others which are competing for consumer acceptance and investor commitment. In Africa and other developing economies they are the most cost effective means of delivering financial services and in particular the most economical way of providing access to remittances. In Africa and other developing

economies, where “necessity” is the mother of invention, mobile banking can fulfill fundamental needs very quickly, helping to leapfrog technologies and providing major transformational change (EMI, 2010).

The Kenyan government recognizes the role-played by the mobile phones, and associated technologies in the economic growth and development (sessional paper, 2005). Therefore together with other stakeholders and development partners, Kenyan government has encouraged the development of communication infrastructure such as communication commission of Kenya (CCK), which is regulating the mobile service providers, fixed line service providers, and other stakeholders in provision of the service industry (Research ICT Africa, 2004). At the same time the government has recognized with concern the growth of micro-enterprises as the foundation blocks of development and industrialization. The ministry of labor and human resources development has set up a department to deal with the development of the micro-and small enterprises. Through this ministry the government has identified that inappropriate technology as a major constraint in the country achieving the economic benefits resulting from the SMEs (Sessional paper, 2005). The government through ministry of Information and communication has encouraged the Kenyan population to join the information superhighways, to make them competitive and have a global reach, penetrate more markets, access information from different sources (customers, suppliers, banks), which are some of the factors hindering the productivity, and profitability of the SMEs, their growth and expansion.

### ***1.1.1 Global perspective of Mobile Money Transfer***

Developed economies have high access in using formal financing systems which are even serving enterprises with growth opportunities. World Bank (2008) says developed countries

are less competitive have well regulated financial systems with more developed contractual and informational infrastructures tend to have a high percentage in financial inclusion of its households. In European countries mobile banking has replaced branch networks replacing formal banking system. Mobile phones and other technological innovations are bringing financial services to the mass market thus creating alliances between telecommunications and companies. However this is not the case in United States of America, a recent article in New York noted that 50% Americans used on-line banking and only 10% use mobile based banking which is contrary to the Kenya where hundreds use the mobile money as an easier way of banking (Tillman, 2010).

A 2007 survey on mobile wallets and mobile financial services showed that respondents expected the number of subscribers using mobile domestic money transfers to grow more rapidly for developed markets than for developing markets. These results implied that consumers in developed markets are interested in electronic P2P payment options and would be willing to conduct them via the mobile device. The survey found similarly that cross-border remittances are expected to grow significantly over the same projected time period (GSMA, 2008).

Mobile money is causing a significant transformation in how banked and previously unbanked people in emerging markets are conducting their financial activities. These services play a central role in extending the reach of formal financial services to the unbanked and financially underserved populations in emerging economies. Furthermore, the mobile phone is the first self-service banking channel for a substantial share of the already banked individuals. In some countries mobile money services have already matured to the extent that significant business opportunities are emerging for companies from adjacent industries, such

as insurance providers and merchant acquirers (Emerging Markets Mobile Money Report, 2012).

Mobile money transfer, banking and payments are starting to take off, with emerging markets often taking the lead. "The advantage of mobile banking is that you can get to scale quickly," says Michael J Redding, Director of Development, and Accenture Technology Labs. "As a critical mass of phones is achieved in every market, so you can have a more rapid uptake. However, in the developed world most of the population is already happy with using standard retail outlets and internet banks, which means there's only a limited need in these markets for mobile banking to cover the very small part of the day when a consumer isn't near a computer or close to a bank in a town centre (Weill, 2012).

One aspect of mobile phones in the developing world that is being looked at with some anticipation is the introduction of mobile financial services and transactions. Many if not most rural users in less developed countries have no access to financial services of any kind, and getting these "unbanked" citizens linked somehow into the formal banking sector is a priority for many governments. However, the evidence to date of initial efforts in this regard is mixed. While users are employing the mobile banking systems to make payments for things such as airtime and pre-paid electricity, and many are using them for sending remittances back to friends and relatives in their rural villages, there is little evidence to date of an increase in the number of users registering for more formal banking services via mobile phone, such as savings and credit services (Morawczynski, 2008).

Successes in Africa (and particularly in Kenya's M-PESA) are being tried out elsewhere in the world. A recent inventory by the social venture credit SMS suggests that there are at least 23 distinct MMT, operating or pending in 20 countries following the success



of MPESA. Some, like MTN's Mobile Money, and Zain's Zap operate across multiple countries; others are country-specific. Some of these applications include: a Greenfield deployment in Indonesia launched in 2009 and the SMART Communications' Island Activations Program in the Philippines. The leading Afghan mobile network operator, Roshan, anticipate building an M-PESA-like infrastructure in Afghanistan by end of 2010 (Pulver, 2009).

### ***1.1.2 Kenya perspective of Mobile Money Transfer***

Kenya has been in the leading board on the success story of the development and adoption of mobile money transfer. Four companies provide mobile phone services in Kenya. These include Safaricom, Airtel (formally Zain), YU and Orange (formally Telkom Kenya). Safaricom was the first company to provide mobile services and MMT services in Kenya. In partnership with the Commercial Bank of Africa and a micro-finance company, Faulu Kenya, Safaricom designed and tested a micro-payment platform called M-PESA in 2004. 'Pesa' means 'money' in Kiswahili and the prefix 'M' refers to the use of a mobile phone to facilitate banking transactions. M-PESA began by using Safaricom's airtime retailers (agents) to issue microloans that borrowers would repay at an interest rate reduced by eliminating the overhead conventional microloans carried. However, the skilled worker in Kenya soon began using the facility to transfer cash from working relatives in the city to their families in the rural areas (Hughes and Lonie, 2007).

MMT is still at an early stage of development in Kenya but ahead of the world: it is designed to bring the economic advantages of having a savings and money transfer facility to those with small, irregular or cyclical incomes (Pulver, 2009). Recent evidence suggests that there is an increase in penetration and use of MMT Services in Kenya. In early 2011,

Safaricom had an M- PESA subscription base of about 16 million and about 17,000 agents (outlets) country wide(Central Bank of Kenya, 2011). This represents substantially more points of service than the combined number of bank branches (1063) and Automated Teller Machines (ATMs) (1979) (Central Bank of Kenya, 2010).Statistics from the Central Bank of Kenya indicate that Safaricom’s M-PESA users moved more than Ksh. 728 Billion (approximately \$8 Billion) in 2010 as compared to only Ksh. 50 Million by Orange- money (Central Bank of Kenya, 2010). This amount was moved in the more than 306 Million transactions conducted in the service. The report further puts daily movement of cash to more than Ksh 2.3 Billion. Revenue from M-PESA in 2010 stood at Ksh 12 Billion, up from Ksh 8 Billion in 2009 (Central Bank of Kenya, 2010).M-PESA remains the most widely used method of mobile money transfer as evidenced by the number and value of transactions effected.

### ***1.1.3 The effect of Mobile Money on Economic Growth***

Though mobile phones make communication easier, resulting in economic growth, they can also be useful for things other than simple communication. One such innovation is mobile money: using mobile phones to electronically store currency and pay for goods and services via short message service (SMS) (Waverman, Meschi and Fuss, 2005).

Several studies have established the relationship between telecommunication and economic growth. Wilkison and Sundelelowotz (2007), for example, argue that there are direct and indirect links between the exponential growth of mobile telephony and the rate of economic growth in Africa. Such a link is also highlighted by the International Food Policy Research Institute (IFPRI) which estimates that for 113 countries over a 20-year period show a positive link between telecommunications and gross domestic product (GDP). The

estimates suggest that a 1% increase in the telecommunications penetration rate leads to a 0.03 percent increase in GDP' (IFPRI, 2006).

In Kenya, the fast growing mobile phones industry has brought a wide range of opportunities and threats. At the top of the pyramid, the mobile phone network providers and hardware supplies have been making huge profits over the last 10 years. At the bottom of the pyramid, the industry has provided a variety of opportunities for entrepreneurship and. Mobile banking services provide time independence, convenience and promptness to customers, along with cost savings. Mobile banking presents an opportunity for banks to expand market penetration through mobile services (Lee & Kim, 2007).

## **1.2 Statement of Problem**

The advent of mobile money transfer services revolutionized the way the financial services industry conducts business, empowering organizations with new business models and new ways to offer 24 hour accessibility to their customers. The ability offered financial transactions over the mobile phone has also created new players in the financial services industry, such as mobile phone service providers who offer personalized services. This was evident with the prevalent use of M-pesa, Airtel Money, Orange Money and YU Cash. The real time money transfer over the mobile phones enables individuals in areas with no demand to acquire demand within seconds.

Several studies have been done on mobile phone banking and economic growth concepts. Kigen (2011) studied the impact of mobile banking on transaction costs of microfinance institutions using a survey of microfinance institutions in Nairobi. In his findings, mobile banking drastically reduced the transaction costs of microfinance institutions (MFI) thereby increasing the penetration level of the MFIs. Blauw and Franses (2011) studied

the impact of mobile telephone use on economic development of households in Uganda. They found strong support that mobile phone use positively impacted economic development. Erickson (2010) did study on cell phone banking in developing countries. He demonstrated that mobile money could serve as a poverty reduction tool by increasing savings rates, creating jobs, and increasing access to financial products offered by microfinance institutions. From the above discussions, many studies had been undertaken in mobile banking.

This study therefore seeks to answer the following research question; is there an effect of mobile money transfer services on the economic growth in Kenya and to what extent does it impact the gross domestic Product. This study therefore, aimed at filling the identified gap in knowledge concerning the effect of mobile money transfers on economic growth in Kenya.

### **1.3 Research Objectives**

#### ***1.3.1 General Objective***

The main objective of the study was to establish the effect of mobile money transfer services on economic growth in Kenya.

#### ***1.3.2 Specific Objectives***

In order to achieve the above objective the study was guided by the following specific objectives:

- i) To establish the effect of mobile money transfer agents on economic growth in Kenya.
- ii) To determine the effect of mobile money transfer customer enrolment on economic growth in Kenya.

- iii) To find out the effect of mobile money transfer transaction frequency on economic growth in Kenya.
- iv) To establish the effect of mobile money transfer deposit value on economic growth in Kenya.

#### **1.4 Research Questions**

The study sought to seek answer for the following questions:

- i) What are the effects of mobile money transfer agents on economic growth (GDP) in Kenya?
- ii) To what extent does mobile money transfer customer enrolment affects economic growth (GDP) in Kenya?
- iii) What are the effects of mobile money transfer transaction frequency on economic growth (GDP) in Kenya?
- iv) What are the effects of mobile money transfer deposit value on economic growth (GDP) in Kenya?

#### **1.5 Scope of the Study**

The scope of the study was to determine the effect of mobile money transfer on economic growth. The geographical scope of this study was Kenya. The study used secondary data. The data was based on quarterly basis and was run for 7 years from June 2007- June 2015. This implied that the number of lags will be 28 quarters. The choice of the years was because of data availability.

## **1.6 Justification of the Study**

The study established that mobile money transfer caused economic and social impact to the society. The results of the study used the regulatory bodies, government and financial institutions to come up with education programmes and policies aimed at improving access to positively affect the households economically and socially.

## **1.7 Significance of the Study**

The study would be of value to different stakeholders:

The general public was informed about the benefits of mobile money transfer on economic growth. This follows the maxim that ‘information is power’ and hence empowers the users as well as providers of the service gearing towards improved services.

For the policy makers and agencies like the Central bank of Kenya (CBK), the findings of the study was important in informing the policy formulation especially with regard to regulating the mobile money transfer services. The research findings add dimension that may help improve policy direction with regard to regulation of MMT as well as factors that spur economic growth.

As for scholars and academicians, the study was important in providing information on mobile money transfer and economic growth. Nevertheless, the research also suggested areas of further studies where future scholars and researchers can seek more knowledge or better still corroborate emerging theories.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter contains a review of theories which inform the foundations of the study. It also contains general and empirical literature that informs the study.

#### 2.2 Theoretical Review

The section contained review of theories relevant and which inform the theoretical background of the research subject matter. The theories reviewed are: financial intermediation theory and the modern development theory.

##### 2.2.1 *Financial Intermediation Theory*

Financial intermediation was a process which involved surplus units depositing funds with financial institutions who then lend to deficit units. Bisignano (1998) and Leland and Pyle (1977) identify that financial intermediaries could be distinguished by four criteria. First, their main categories of liabilities (deposits) are specified for a fixed sum which was not related to the performance of a portfolio. Second, the deposits were typically short-term and of a much shorter term than their assets. Third, a high proportion of their liabilities were chequeable (can be withdrawn on demand) and fourthly, their liabilities and assets were largely not transferable. The most important contribution of intermediaries was a steady flow of funds from surplus to deficit units.

According to Scholtens and van Wensveen (2003), the role of the financial intermediary was essentially seen as that of creating specialized financial commodities. These

were created whenever an intermediary finds that it could sell them for prices which were expected to cover all costs of their production, both direct costs and opportunity costs. Financial intermediaries exist due to market imperfections. As such, in a 'perfect' market situation, with no transaction or information costs, financial intermediaries would not exist. Numerous markets are characterized by informational differences between buyers and sellers. In financial markets, information asymmetries are particularly pronounced. Borrowers typically know their collateral, industriousness, and moral integrity better than do lenders. On the other hand, entrepreneurs possess inside information about their own projects for which they seek financing (Leland and Pyle, 1977). Moral hazard hampers the transfer of information between market participants, which is an important factor for projects of good quality to be financed.

### ***2.2.2 Modern Development Theory***

The theory studied the evolution of growth, relative income inequalities and their persistence was unified in models (Galor & Zeira, 1993). In many of these models, financial market imperfections played a central role in influencing key decisions regarding human and physical capital accumulation and occupational choices. Market imperfections determined the extent to which the poor could borrow to invest in schooling or physical capital. In theories stressing entrepreneurship, financial market imperfections determined the extent to which talented but poor individuals could raise external funds to initiate projects. Thus, the evolution of financial development, growth and intergenerational income dynamics are closely intertwined.

Finance influences not only the efficiency of resource allocation throughout the economy but also the comparative economic opportunities of individuals from relatively rich



or poor households. Financial market imperfections are often at the core of this line of thought because inequalities persist because of these imperfections. For example, in the model of Galor and Zeira (1993), it is because of financial market frictions that poor people cannot invest in their education despite their high marginal productivity of investment.

Haber (2004), Pagano and Volpin (2001), Rajan and Zingales (2003) focus on how political economy forces shape national policies toward financial development and influence and change the political power of entrenched incumbents. According to this view, closed political systems are more likely to impede the development of financial systems that promote competition and threaten entrenched powers than open political systems. 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.

One implication of these modern development theories is that redistribution of wealth can foster growth. 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 (Mehrotra, Puhazhendhi, Nair & Sahoo, 2009). Modern development theory studies the evolution of growth, relative income inequalities, and their persistence in unified models. Finance influences not only the efficiency of resource allocation throughout the economy but also the comparative economic opportunities of individuals from relatively rich or poor households. This crucial focus on the financial sector in economic modeling has been strengthened with historical development of views on the links between economic growth and income inequality.

### **2.2.3 Agency Theory**

Agency theory was a concept that explained why behavior or decisions vary when exhibited by members of a group. Specifically, it describes the relationship between one party called the principal, that delegates work to another called the agent. It explained their differences in behavior or decisions by noting that the two parties often have different goals and, independent of their respective goals, may have different attitudes toward risk. The concept originated from the work of Adolf Augustus Berle and Gardiner Coit Means, who were discussing the issues of the agent and principle as early as 1932. Berle and Means explored the concepts of agency and their applications toward the development of large corporations. They saw how the interests of the directors and managers of a given firm differ from those of the owner of the firm, and used the concepts of agency and principal to explain the origins of those conflicts (Murtishaw and Sathaye, 2006).

Jensen and Meckling shaped the work of Berle and Means in the context of the risk-sharing research popular in the 1960s and '70s to develop agency theory as a formal concept. Jensen and Meckling formed a school of thought arguing that corporations are structured to minimize the costs of getting agents to follow the direction and interests of the principals. The theory essentially acknowledged that different parties involved in a given situation with the same given goal had been different motivations, and that these different motivations could manifest in divergent ways. It stated that there would always be partial goal conflict among parties, efficiency is inseparable from effectiveness, and information will always be somewhat asymmetric between principal and agent. The theory was successfully applied to myriad disciplines including accounting, economics, politics, finance, marketing, and sociology (Nikkinen and Sahlström, 2004).

#### **2.2.4 *Transaction Cost Theory***

Transaction cost theory explains why companies exist, and why companies expand or source out activities to the external environment. The theory supposes that companies try to minimize the costs of exchanging resources with the environment and minimize the bureaucratic costs of exchanges within the company. This implies that companies weigh the costs of exchanging resources with the environment, against the bureaucratic costs of performing activities in-house (Coase, 1937).

The theory sees institutions and market as different possible forms of organizing and coordinating economic transactions. When external transaction costs are higher than the company's internal bureaucratic costs, the company will grow, because the company is able to perform its activities more cheaply, than if the activities were performed in the market. However, if the bureaucratic costs for coordinating the activity are higher than the external transaction costs, the company will be downsized (Coase, 1937).

According to Ronald Coase (1937), every company expanded as long as the company's activities performed cheaper within the company, than by e.g. outsourcing the activities to external providers in the market. According to Williamson (1981), a transaction cost occurs "when a good or a service is transferred across a technologically separable interface". Therefore, transaction costs arise every time a product or service is being transferred from one stage to another, where new sets of technological capabilities are needed to make the product or service.

#### **2.2.5 *Savings Theory***

Savings could be in many forms of assets such as intangible goods, human capital and giving out loans. Economic theory predicts that the absolute amount of savings increased income.

This was because people with more income had more resources available to save. Theory also predicts that savings relative to income, the savings rate, would increase with income (Deaton, 1992b). This occurs because people with more income also tend to consume more. As they consume more, the marginal benefit from additional consumption decreases. The current cost of saving, in terms of foregone benefits from consumption, is lower for people who consume more, and this increases savings.

Empirical evidence clearly indicates that higher-income households save a larger portion of their incomes, and accumulate greater wealth, than lower-income households. In fact, most low-income households or organizations have very low or negative saving rates and very limited or negative asset accumulation (Carney & Gale, 2001; Hubbard, Skinner, & Zeldes, 1994, Wolff, 1998).

However, this theory ignores some important issues. For example, the level and rate of savings also depend on expected variation in income and subsistence requirements. The poor face greater risks, and this tends to increase their saving, both absolutely and relative to their income. Of course, the poor likely saved less in the past; if not, then they would not be poor. However, they may have saved at higher rates relative to resources available. Also, the poor may save at higher rates when they save, but dissave at higher rates when they dissave.

This theory is relevant to this study in that it elaborates how individuals or organizations save dependent on their level of income. This implied that an individual with a high level of income was likely to use mobile money transfer services as opposed to an individual with low level of income.

## **2.3 Empirical Review**

This section brings out previous studies done which are relevant to the objectives of the study.

### ***2.3.1 Effect of Mobile Money Transfer Agents on Economic Growth (GDP)***

Mwai (2013) sought to evaluate the extent to which the agency model has on financial element of the commercial banks in Kenya. The study used secondary data, collected from Central bank, and its website. The data was analyzed using SPSS providing various parameters to show the strength of the relationship between the various variables i.e. no of agency banking quarterly and then yearly, agency banking income and net assets for the period. Results showed that financial innovation such as agency banking continued to be instrumental tools on growth of the banking sector. With several advents of technology, the banks needed to take advantage and utilize these platforms to enhance their returns. The study revealed that out of the 43 banks, currently licensed to carry out banking, 12 banks were fully throttle into agency banking, which gave a good representation.

Erickson (2010) did study mobile money: cell phone banking in developing countries. He established that transfer either local currency or mobile minutes. Mobile money can increase access to financial services. Microfinance institutions in particular can benefit from the use of mobile money. Unfortunately, regulatory and initial investment barriers can prevent widespread adoption of mobile money. He demonstrates that mobile money can serve as a poverty reduction tool by increasing savings rates, creating jobs, and increasing access to financial products offered by microfinance institutions. Based on the potential benefits of mobile money, he recommended that governments subsidize the development of local mobile

money infrastructure and adopt policies that enable the formation of a decentralized network of trusted mobile money agents.

Kamau (2012) sought to establish the relationship between agency banking and financial performance of the banks in Kenya. Through review of secondary data, the study found that agency banking outlets had increased to 9,748 active agents in 2011 from 8,809 in 2010. These specific agents facilitated a total volume of 8.7 million transactions valued at KSh 43.6 billion in 2011. Most of these transactions were mainly made up of cash withdrawals and cash deposits carried out at the various banking agency outlets. The study used regression analysis to find the relationship between agency banking (in terms of number of agents and number of deposit and withdrawals transactions undertaken through agents) and the financial performance of banks as measured by return on equity. From the regression model, all the independent variables were found to have either negative or weak correlation to the dependent variable. Therefore the study concluded that agency banking does not solely contribute to increased profitability in Kenyan banks as per the secondary data reviewed for 2010 and 2011.

Kithuka (2012) sought to investigate the factors that affect the growth of agency banking in Kenya with specific focus on Kwale County. The study also sought to address the distinctiveness features of agency banking, the customers as well as the characteristics of banks offering the agency banking services. The study used descriptive survey research design. The study concentrated on a sample of 100 agencies doing bank focused, bank led and non-bank led transactions engaged in the 3 categories. The samples were taken for the study using stratified and simple random sampling. Data was collected using a questionnaire. Analyses of the data revealed that convenience of the money transfer technology plus its accessibility, cost, support and security factors were related to behavioral intention to use and

actual usage of the payment services by the agency banking micro businesses to enhance their success and growth. The findings revealed that security influenced the growth of agency banking in Kenya, distance did not influence the frequency of customer transactions, perceived usefulness influenced the growth of agency banking, financial education enhanced knowledge, attitude and practice in agency banking and lack of coordination between banking agencies influenced the growth of agency banking in Kenya and especially Kwale County.

Ndirangu (2013) sought to determine the effect of agency banking on financial performance of commercial banks in Kenya. The research design took the form of a census that covered 100% of the banks that are licensed to operate agency banking as at December 31st 2012 .The Population of the study was 44 banks licensed to operate in Kenya while the sample contained 10 banks operating agency banking as at the time of the research time frame. Results showed that the number of agents operated by a commercial banks and the resultant volume of transactions (Deposits and withdrawals) were not directly correlated with the banks financial performance as measured by the return on equity.

Aker and Mbiti (2010) conducted a study to examine the evolution of mobile phone coverage and adoption in sub-Saharan Africa over the past decade. The findings revealed that, the first people to adopt the mobile phones were primarily male, educated, young, wealthy and urban populations. This was due to the relatively high costs of handsets and services. By the year 2009, mobile phone was owned by even the poor, the elderly and rural populations, in part facilitated by the introduction of low-priced handsets and lower denomination mobile top-up cards. The study revealed that, on average, M-pesa users are wealthier, better educated, urban populations and are “already banked”. The findings also show that most of the M-pesa transfers are occurring within urban areas.

Ndiem (2013) sought to establish how agency banking has improved the financial performance of commercial banks in Kenya. The study used a descriptive research design survey study to find out the effect of agency banking top financial performance of commercial banks. The results of the study indicated that to a large extent agency banking had been implemented by commercial banks practicing agency banking. That agency banking has improved the financial performance of commercial banks in Kenya in terms of profitability, reduced employment cost and establishing branches.

According to Communication Commission of Kenya (CCK) (2012) Quarterly sector statistics reported that the success of this infrastructure is mainly through a very tight agency distribution in the country of 74,216 agents as at March 2013.

### ***2.3.2 Effect of Mobile Money Transfer Customer Enrolment on Economic Growth (GDP)***

Murega (2012) investigated the relationship between mobile money transfer services and financial inclusion in Kenya. The study employed a descriptive survey research method due to the wide range of data source identified in the research area. The research used secondary data on mobile phone users in Kenya and commercial banks accounts in Kenya between 2007 and 2012 and used content analysis and descriptive analysis. The findings of the study revealed that mobile money transfer services are continuously improving and growing and as it grows, the level of financial inclusion is simultaneously and proportionately growing. The study further showed that increasing the number of the customers with access to mobile phone services and enrolls them to mobile money transfer service and mobile money agencies within the country impacted increasingly the reach of the financial services to the people thus raising the levels of financial inclusion.



Kandie (2013) sought to find out the effects of agency banking on financial inclusion in Kenya. The study adopted a cross sectional survey approach in research design. The population consisted of six commercial banks with agency banking services in Kenya. Secondary data was used since it was readily available. Inferential statistical techniques were used to make a prediction about the dependent variable based on the covariance with the concerned independent variable. From the findings it was evident that there is a strong positive relationship between financial inclusion and agency banking. The tests conducted revealed that the correlation coefficient between agency banking aspects and financial inclusion was 0.727, which indicated that there exists a strong relationship between the independent variables and the dependent variable. The R-square is 0.529 which meant that 52.9% of the variance in the financial inclusion variable could be explained and predicted by the agency banking aspects variables.

Mari (2003) conducted a study on adoption of M-banking in Finland. Methodologically, the dissertation takes a descriptive approach to the phenomenon under study. The data in the empirical study were collected by means of a questionnaire mailed to banking customers (1253 responses received). The results from the study indicated that certain attributes of M-banking innovation drive its usage. The attributes include; relative advantage, compatibility and communication. The investigation of complexity and risk of using M-banking yielded no support as being barriers to adoption. The findings also revealed that, technology perceptions and certain demographical variables of the customers have a significant impact on adoption. In a different study titled, "An empirical investigation of mobile banking adoption", the results indicate that perceived relative advantage, ease of use, compatibility, competence and integrity significantly influence attitude. The attitude then leads to behavioral intention to adopt M-banking (Lin, 2011).

Kigagah (2012) analyzed the factors influencing access to agency banking by the local community in Kitui central district. These included literacy levels; demographic factors; the type of economic activity engaged in; availability of financial services and the risks involved in agency banking. The study used descriptive survey and the data collection instruments that were used were questionnaires that had both open and closed ended questions. The sample study location was carried out in Kitui Central district. The target population was bank account holders with various banks in Kitui town plus the agency banks in this area. The sample size was 70 bank account holders who transacted at the agency banks plus 30 bank agents. The study revealed that gender and age are major factors that influence access to agency banking. Majority of the bank account holders and bank agents were male as compared to the females. More people opened bank accounts at a much older age, and most of the bank account holders and bank agents had attained at least secondary level of education. Majority of the bank customers were engaged in the personal services sector while majority of the bank agents were in the retail sector. Most of the agency banks were located in town while fewer were located in the village. Equity bank had most of the bank account holders plus bank agencies while the least number was at Family bank which is just rolling out agency banking services in the country.

King'oo (2013) critically examined financial inclusion and economic development in Kenya. The objective of the study was to review existing sources of detailed data on financial inclusion and economic development and establish the relationship between financial inclusion and economic development in Kenya and make recommendation. The study used a meta-analysis research design. Secondary data was collected from United Nations Development Programme (UNDP), International Monetary Fund (IMF) and Financial Access Surveys (FAS). This data was analyzed using descriptive statistical approach, regression and

correlation analysis. The period covered by the study was 7 years from the year 2005 to 2011. The study found out that there is a positive relationship between financial inclusion and economic development and an increase in financial inclusion leads to an increase in economic development.

Morawczynski, (2009) examined the adoption, usage and outcomes of mobile money services using the case of M-PESA in Kenya. From his findings, he noted that since being launched in 2007, the service has seen phenomenal growth in Kenya. Over 7.5 million users, or 34% of the adult population, have registered with M-PESA. The analysis was presented from two perspectives. First, the socio-technical systems framework was used to present M-PESA as a complex system rather than an isolated application. This perspective made it clear that M-PESA grew rapidly because it had a dedicated team of system builders. These individuals took numerous strategies to enroll the elements and maintain the stability of the entire system. They further worked to engineer the social, economic, legal and political environments of the technology. The analysis showed that a whole industry for mobile money developed as a result of M-PESA's success.

Bangens and Soderberg (2011) conducted an empirical study that aimed at exploring the use of mobile money transfer (MMT) among micro- and small-sized enterprises (MSEs) in Tanzania. The study specifically focused on business usage such as paying suppliers or receiving payments from customers and paid less attention to person-to-person money transfer. The results were based on a non-randomized sample of 110 MSEs mainly located in Dar es Salaam but partly in Morogoro, Singida, and Mwanza. The key findings were: MMT use was high (24% for business use and additional 15% for personal use), actually double compared to the national average. The impact was mainly seen in time saved and improved logistics though there were indirect effects on liquidity.

### ***2.3.3 Effect of Mobile Money Transaction Frequency on Economic Growth (GDP)***

Adana (2012) sought to establish the relationship between mobile money transfers and economic growth in Kenya. The study applied descriptive research design. The target population included six mobile phone service providers who provide mobile money transfer services. The total amounts transferred via the mobile for the past five years was collected and then correlated with the economic growth proxy Gross Domestic Product measured by change in GDP. The study used secondary data from the Central bank of Kenya, Mobile phone Companies and Kenya National Bureau of Statistics. The researcher conducted a correlation analysis in order to establish the relationship between mobile money transfer and economic growth. During the study period, 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. The growth was motivated by the convenience offered by the service as the service does not require an individual to have a bank account in order to transact. Customers also transacted business on mobile money transfer platform from anywhere thus offering convenience. The correlation analysis conducted established that there was a weak positive insignificant correlation between economic growth and mobile money transfer in Kenya as explained by the Pearson correlation coefficient of +0.027 which was very low with the significance two tailed test figure being 0.966 which was greater than 0.05.

Blauw and Franses (2011) studied the impact of mobile telephone use on economic development of households in Uganda. They examined the impact of mobile telephone use on economic development of individual households. Unique cross-sectional data 18 were collected in personal interviews with heads of households (N=196) in Uganda. Economic

development was measured at the household level by the Progress out of Poverty Index. They found strong support that mobile phone use positively impacts economic development.

Kiptoo (2011) examined the awareness, use and impact of mobile phone-based money transfer services among rural farmers in Kenya. The study used descriptive analysis to assess the awareness and regression techniques to examine conditioners of use of mobile phone-based money transfer services. The study used data collected via personal interviews using pre-tested questionnaires in Kirinyaga, Bungoma and Migori districts. These areas were purposively selected to represent diverse social, cultural and economic backgrounds and capture differences in agricultural potential. It used probability proportionate to size sampling technique to collect information from 379 respondents stratified by participation in let-based projects (162 participants and 216 non participants). The study found that there was high awareness (96 percent) of mobile phone-based money transfer services among the smallholder farmers. However, this has not translated into high usage. Only 52 percent of the respondents had used mobile phone-based money transfer services. Results indicated higher usage in the higher potential areas of Kirinyaga district than the rest of the study areas. Results of the regression analysis indicated that education, distance to a commercial bank, membership to farmer organizations, and distance to the mobile phone-based money transfer agent and endowment with physical and financial assets affect the use of mobile phone-based money transfer services.

Jensen (2007) and Aker (2010) find that the introduction of mobile phones reduced price dispersion in fish markets in India and grain markets in Niger respectively. In these instances the mobile phone technology has increased information flows, which has resulted in price reductions. In contrast, the development and introduction of M-pesa in Kenya can be viewed as a "disruptive technology" (Bower and Christensen, 1995) or an example of

"creative destruction" (Aghion and Howitt, 1992), where M-Pesa revolutionized the money transfer industry. M-Pesa became the dominant money transfer mechanism within 2 years of its inception.

Kimingi (2010) investigated the effects of technological innovation on the performance of commercial banks in Kenya. The study used a descriptive survey. The population of interest in this study comprised commercial banks in Kenya. The study conducted a census survey owing to the small number of commercial banks in Kenya. Primary data was collected using a questionnaire with close ended and open ended questions administered to the management staff of the commercial banks. Secondary data on financial data were obtained from annual reports of commercial banks which were obtained from the central bank and from individual commercial banks. Results showed that the banks had employed various technological innovations. These included ATM services, mobile phone transactions and internet based banking services. The study further concluded that technological innovations had led to improved financial performance of commercial banks in Kenya. This was through increased bank sales, profits increment and return on equity.

Momanyi (2011) sought to identify the challenges facing Safaricom in managing transactions capacity and how the capacity of the money transfer service can be effectively managed. Primary data for this study was collected through questionnaires administered to persons offering M-pesa services. Secondary data was obtained from the company intranet and other company reports. The collected data was sorted and organized for analysis. Data collected was analyzed using descriptive statistics. The study found that effective capacity in the money transfer service has not been optimally managed in a way that would ensure effective capacity in the money transfer industry. The study also found that the current M-pesa capacity is constrained thereby negatively affecting the quality of services. Capacity has

been affected by variables among them the following: cash flow and liquidity management, technology, quality of service, government regulation, cash in transit and capacity management.

Masinge (2010) studied the factors influencing the adoption of mobile banking services at the bottom of the Pyramid in South Africa. Data from this study was collected through a physical hardcopy survey in townships around Gauteng. Masinge finds that with the convergence of banking services and mobile technologies, users are able to conduct banking services at any place and at any time through mobile banking. This Study examined the factors influencing the adoption of mobile banking by the Bottom of the Pyramid (BOP) in South Africa, with a special focus on trust, perceived cost and perceived risk including the facets of perceived risks: performance risk, security/privacy risk, time risk, social risk and financial risk. The research model includes the original variables of extended technology acceptance model (TAM).

Karu (2011) sought to establish the response of commercial banks in Kenya to the introduction of mobile money transfer and also to establish the factors influencing the response of the banks in Kenya to the introduction of the mobile money transfer. The study used a case survey research design. The study used primary data which was collected by use of questionnaires. The study found that banks adopted mobile money services to satisfy their customer demands, acquire an extensive network coverage and maintain their market share and profitability and as a response to the market and their competitors.

#### ***2.3.4 Effect of Mobile Money Transfer Deposit Value on Economic Growth (GDP)***

Omankhanlen (2012) investigated the role of banks in capital formation and economic growth: The case of Nigeria for the period 1980-2009. This study employed the Ordinary

Least square method in carrying out the research. The explanatory variables employed included Commercial Banks Deposit Liability, Maximum Lending Rate, Commercial Banks' Credit and Investment by banks in Nigeria. The dependent variables are Gross Fixed Capital Formation and Gross Domestic Product (GDP), which was a measure of a nation's economic performance, economic growth in this instance. From the various test carried out, results showed that Commercial Banks Deposit Liabilities was elastic to Gross Fixed Capital Formation in Nigeria. This positivity of the coefficient of Commercial Banks Deposit Liabilities was in conformity to the economic a priori expectation of a positive impact of Commercial Banks Deposit Liabilities on Gross Fixed Capital Formation.

Lomuto (2008) analyzed ownership and importance of bank deposit in commercial banks in Kenya. The study sought to analyze the factors that influenced Commercial banks deposit growth in Kenya. Time series data covering 1968 - 2006 was analyzed. Analyzed results showed that lagged Commercial bank deposits and all the other variables including Structural Adjustment Programmes significantly affected Commercial banks deposit growth in Kenya. Based on these results, several policy implications were drawn that aimed at encouraging deposits growth by Commercial banks for the benefit of the domestic deposit mobilization.

Maende (2010) evaluated various ways and means of enhancing the mobilization and growth of commercial bank deposits in Kenya. In particular, the determinants of the demand for commercial bank deposits in Kenya were identified and appraised, using a myriad of descriptive, analytical and mostly empirical methodology. Time series data covering 1999-2009 was analyzed using the ordinary least squares, Two stage least squares methods of estimation and Granger tests of causality. Results showed that commercial banks' branch network expansion, increased national income levels and stability within the banking industry



were the major factors which govern the demand for commercial bank deposits in Kenya. It was established that there is a one way or unidirectional relationship between the volume of bank deposits and bank branch network expansion.

Okun (2012) sought to find out the effect of the level of deposits on financial performance of commercial banks in Kenya. The study adopted a causal research design. The population of the study was all 44 commercial banks. The study used secondary data (spanning 8 years from 2004 to 2011) from the banking supervision department of central bank. A cross sectional regression model was adapted. The regressions were conducted using statistical package for social sciences (SPSS) version 17. Regression results indicated that there is a positive and significant relationship between Deposits Ratio and ROE. The results also indicated that there is a positive and significant relationship between Deposits Ratio and ROA.

Masrek, Omar, Uzir and Khairuddin (2012) carried out a study on mobile banking utilizations, satisfaction and loyalty: a case study of Malaysian consumers. The study adopted a survey research methodology involving 312 respondents, the findings of this study showed that that mobile banking utilization is positively related to satisfaction but not loyalty. Also it is found that satisfaction significantly predicts loyalty.

## **2.4 Conceptual Framework**

The conceptual framework illustrates the dependent and independent variables. The dependent variable in this study is economic growth. The independent variables include mobile money transfer agents, mobile money transfer customer enrolments, mobile money transfer transaction frequency and mobile money transfer deposit value.

To establish the effect of mobile money transfer services on economic growth in the Kenya, regression and correlation analysis will be used to estimate the effect of mobile money transfer services changes on economic growth. Regression analysis will involve identifying the relationship between a dependent variable and one or more independent variables. A model of the relationship is hypothesized, and estimates of the parameter values are used to develop an estimated regression equation. Various tests are then employed to determine if the model is satisfactory. If the model is deemed satisfactory, the estimated regression equation can be used to predict the value of the dependent variable given values for the independent variables. Correlation and regression analysis are related in the sense that both deal with relationships among variables. The correlation coefficient is a measure of linear association between two variables. Values of the correlation coefficient are always between -1 and +1. A correlation coefficient of +1 indicates that two variables are perfectly related in a positive linear sense; a correlation coefficient of -1 indicates that two variables are perfectly related in a negative linear sense, and a correlation coefficient of 0 indicates that there is no linear relationship between the two variables. For simple linear regression, the sample correlation coefficient is the square root of the coefficient of determination, with the sign of the correlation coefficient being the same as the sign of  $b_1$ , the coefficient of  $x_1$  in the estimated regression equation.

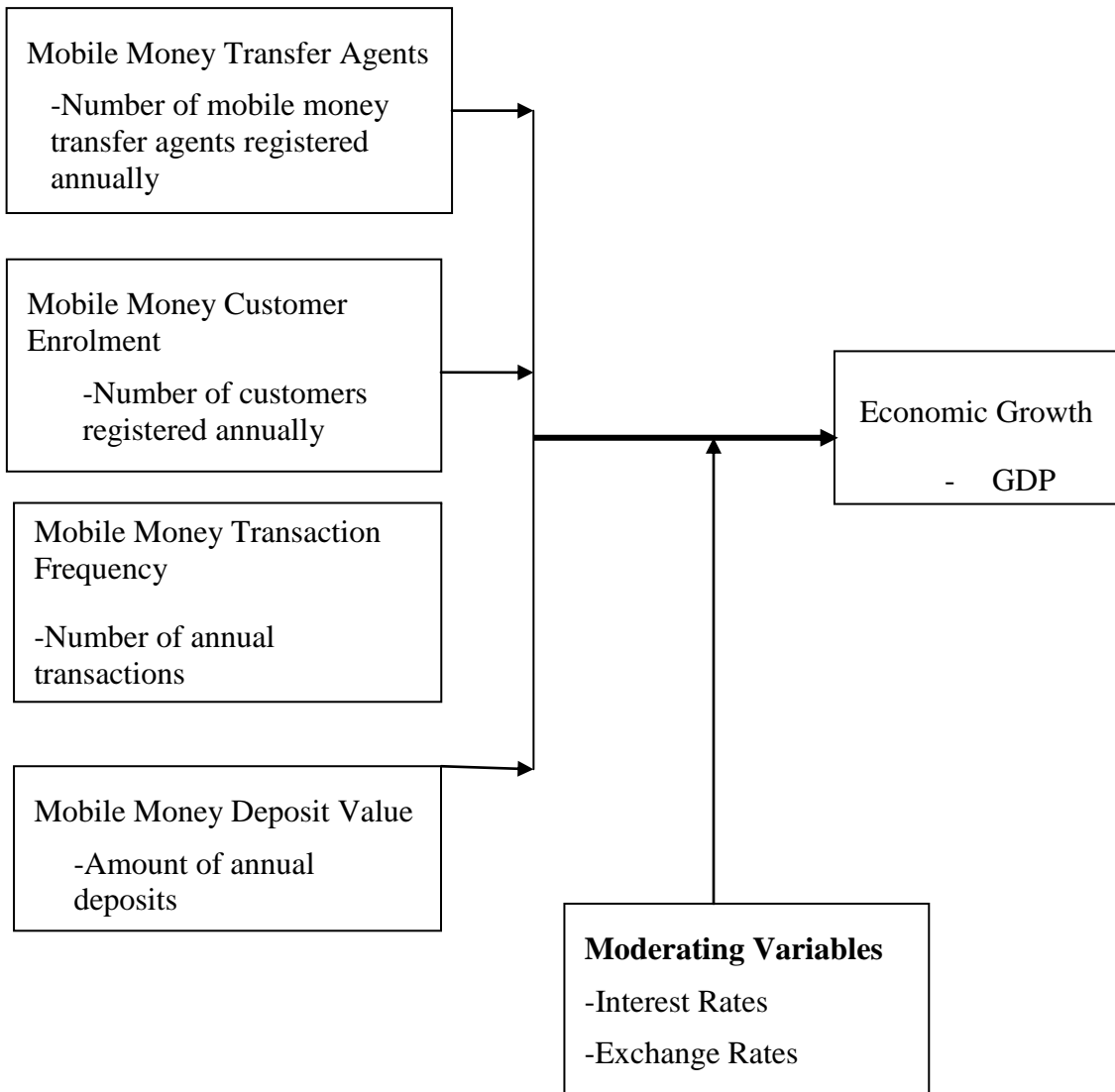
Neither regression nor correlation analyses can be interpreted as establishing cause-and-effect relationships. They can indicate only how or to what extent variables are associated with each other. The correlation coefficient measures only the degree of linear association between two variables. Any conclusions about a cause-and-effect relationship must be based on the judgment of the analyst.

**FIGURE 1**

**CONCEPTUAL FRAMEWORK**

**Independent variable**

**Dependent Variable**



**Source: Author (2014)**

**TABLE 1****OPERATIONALIZATION OF VARIABLES**

<b>Types of Variables</b>	<b>Variables</b>	<b>Measurements</b>	<b>Level of Measurements</b>
Independent Variable	Mobile Money Transfer Agents	Number of Mobile transfer Agents registered annually	Ordinary/ Nominal
Independent Variable	Mobile Money Transfer Customer Enrolment	Number of Mobile transfer Customers registered annually	Ordinary/ Nominal
Independent Variable	Mobile Money Transaction frequency	Number of annual transactions	Ordinary/ Nominal
Independent Variable	Mobile Money Deposit Value	Amount of annual Deposits	Ordinary/ Nominal
Moderating Variable	Interest Rates	Central Bank Rates	Ordinary/ Nominal
Moderating Variable	Exchange Rates	Monthly Exchange Rates	Ordinary/ Nominal
Dependent Variable	Economic Growth	Gross Domestic Product(GDP)	Ordinary/ Nominal

**2.5 Research Gaps**

This section provides a review of the research gaps identified from the literature above;

**2.5.1 Gaps on the Objectives and Expected Findings**

The study identified some research gaps from the literature which are discussed herein. Kithuka (2012) sought to investigate the factors that affect the growth of agency banking in Kenya with specific focus on Kwale County. The findings revealed that security influenced the growth of agency banking in Kenya, distance did not influence the frequency of customer transactions, perceived usefulness influenced the growth of agency banking, financial education enhanced knowledge, attitude and practice in agency banking and lack of coordination between banking agencies influenced the growth of agency banking in Kenya and especially Kwale County. This reveals a gap with regard to the first objective since the

first objective of this study is to establish the effect of mobile money transfer agents on economic growth.

Murega (2012) investigated the relationship between mobile money transfer services and financial inclusion in Kenya. The findings of the study revealed that mobile money transfer services are continuously improving and growing and as it grows, the level of financial inclusion is simultaneously and proportionately growing. This reveals a gap with regard to the second objective since the second objective of this study is to establish the effect of mobile money customer enrolment on economic growth.

Adana (2012) sought to establish the relationship between mobile money transfers and economic growth in Kenya. Results showed that growth was motivated by the convenience offered by the service as the service does not require an individual to have a bank account in order to transact. This reveals a gap with regard to the third objective since the third objective of the study was established the effect of mobile money transaction frequency on economic growth.

Omankhanlen (2012) investigated the role of banks in capital formation and economic growth in Nigeria. From the various test carried out, results showed that Commercial Banks Deposit Liabilities was elastic to Gross Fixed Capital Formation in Nigeria. This reveals a gap with regard to the forth objective since the forth objective of current study is to establish the effect of mobile money transfer deposit value on economic growth.

### **2.5.2 Methodology Gaps**

Karu (2011) sought to establish the response of commercial banks in Kenya to the introduction of mobile money transfer and also to establish the factors influencing the response of the banks in Kenya to the introduction of the mobile money transfer. The study

used a case survey research design. The study used primary data which was collected by use of questionnaires. The study found out that banks adopted mobile money services to satisfy their customer demands, acquire an extensive network coverage and maintain their market share and profitability and as a response to the market and their competitors. This reveals a methodological gap since this study used an explanatory research design. In addition, to the study secondary data was used.

### ***2.5.3 Gaps on the Scope and Geographical Context***

Omankhanlen (2012) investigated the role of banks in capital formation and economic growth in Nigeria. From the various test carried out, results showed that Commercial Banks Deposit Liabilities were elastic to Gross Fixed Capital Formation in Nigeria. This reveals a gap with regard to the geographical context since this study was done in Kenya.

Kithuka (2012) sought to investigate the factors that affect the growth of agency banking in Kenya with specific focus on Kwale County. The findings revealed that security influenced the growth of agency banking in Kenya, financial education enhanced knowledge, attitude and practice in agency banking and lack of coordination between banking agencies influenced the growth of agency banking in Kenya and especially Kwale County. This reveals a gap with regard to the geographical context since this study was done in Kenya.

## **2.6 Conclusion.**

This chapter reviewed the literature on mobile money transfer and economic growth. It started by looking at the theoretical framework where it discussed the theories on which the study is found: financial intermediation theory, modern economics theory agency theory, transaction cost theory and savings theory. Financial intermediation theory brings out the role

played by mobile money transfer systems in the wide financial system by enabling the transfer of funds from one individual to another, While the modern economics theory puts into perspective the changing times and adaption to the environment. Agency theory explains different behavior or decisions by noting that the two parties have different goals, while transaction cost theory explains why companies exist and why they source out activities to external environment. Savings theory elaborates how individuals or organisations save depends on their income.

The chapter further looked at the measures of economic growth including Gross Domestic Product which is designed to measure the value of production of those activities that fall within the boundary of the national accounts system. Waverman et al. (2005) found a positive significant effect of mobile telecommunications on economic growth and emphasize that this impact” may be twice as large in developing countries compared to developed countries.” Masinge (2010) studied the factors influencing the adoption of mobile banking services at the bottom of the Pyramid in South Africa. Masinge finds that with the convergence of banking services and mobile technologies, users are able to conduct banking services at any place and at any time through mobile banking. Erickson (2010) did study mobile money: cell phone banking in developing countries and established that transfer either local currency or mobile minutes. Mobile money can increase access to financial services. Blauw and Franses (2011) studied the impact of mobile telephone use on economic development of households in Uganda. Jensen (2007) and Aker (2010) find that the introduction of mobile phones reduced price dispersion in fish markets in India and grain markets in Niger respectively. Jack and Suri's (2010) empirical study shows that M-Pesa improves the ability of households to smooth risks. They contribute to the literature by providing quantitative estimates of the impact of M-Pesa in Kenya on a variety of economic and social outcomes including financial access and usage. From the above discussion, it is

clear that the effect of mobile money transfer services on economic growth in Kenya has not been explored. This study therefore seeks to fill this research gap by establishing the effect of mobile money transfer services on the economic growth.



## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

The chapter presented the research methodology that was used for the study. It discussed the research design, its characteristics and why it was preferred over other research designs. It also provided information on the population of the study, some background and key characteristics of the organization, which was studied. The chapter examines the sample frame and sample selection. It also provided information on the data collection method and the data collection instrument to be used in the survey. Finally, the chapter presented the data analysis method to be used and how the statistics was generated from the study.

#### **3.2 Research Design**

The research design employed in this study was 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. Explanatory research design connects ideas to understand cause 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 and Mugenda, 2003).

The dependent variable was economic growth for the year 2007 to 2015 (7 years or 28 quarters). The independent variables were mobile money transfer agents, mobile money transfer customer enrolments, mobile money transfer transaction frequency and mobile money transfer deposit value. The choice of the years was because of data availability.

### **3.3 Data Collection Procedures**

The study used secondary data sources to gather information relevant in reaching at the research objectives. The secondary data was collected from the CBK and the (KNBS) Kenya National Bureau of Statistics reports. The study's data collection source was justified by the fact that data on mobile money transfer agents, mobile money transfer customer enrolments, mobile money transfer transaction frequency and mobile money transfer deposit value were available in the CBK while the same works hand in hand with KNBS in making such statistics and estimation.

### **3.4 Data Analysis**

The data was modeled in time series. The analysis was conducted through a procedure of various steps. After successful data collection exercise, the obtained data was verified and edited for completeness and consistency. A content analysis and descriptive analysis will be employed. Tables and other geographical presentations as appropriate will be used to present the data collected for ease of understanding and analysis. Various assumptions were carried out to find out the causal and effect of the variables between the independent variables and dependent variables.

#### ***3.4.1 Descriptive and Trend Analysis***

First step was to analysis the data using descriptive and trend analysis that provides simple summaries about the sample and the observations that have been made. These summaries may either form the basis of the initial description of the data as part of a more extensive statistical analysis, or they may be sufficient in and of themselves for a particular investigation. Descriptive analysis provided results on measures of central tendency of the

variables were presented. Trend analysis also provided graphical representation of the movement and changes of the variables under study over the years was presented.

### ***3.4.2 Normality Tests in Time Series***

The normality of the data was tested in time series. The reason why normality test was tested because of checking whether the data set was well modeled to suit the normal distribution and to compute how likely it would be for a random variable underlying the data set to be normally distributed. Razali, Nornadiah; Wah, Yap Bee (2011). Therefore checking for outliers in data would reveal if the data exhibited outlier thus significant skewness and kurtosis coefficient. Hence, skewness and kurtosis coefficient was used to test normality. The Jacque Bera test combines both the skewness and kurtosis coefficient into a concrete measure of normality was also used. Brani Vidakovic (2011). The null hypothesis under Jacque bera test was that the distribution of the data was not significantly different from that of a normal distribution. In case the variables were not normally distributed under the Jacque bera test the most conclusive was the normality of error term resulting from the regression.

### ***3.4.3 Multicollinearity tests***

The multicollinearity of the data was tested using Pearson correlation coefficients. Multicollinearity (also collinearity) is a phenomenon in which two or more predictor variables in a multiple regression model are highly correlated, meaning that one can be linearly predicted from the others with a substantial degree of accuracy. Therefore the research was carried out to find out whether the variables were highly correlated or not. A multiple regression model with correlated predictors can indicate how well the entire bundle of predictors predicts the outcome variable, but does not give valid results about any individual predictor, or about which predictors are redundant with respect to others. The rule

of the thumb is that a correlation coefficient of more than 0.8 indicates serious multicollinearity. O'Brien, R. M. (2007).

### 3.4.4 *Heteroscedasticity and Autocorrelation in Time Series*

Heteroscedasticity checks whether the error term was constant across the observations. Gujarati, D. N.; Porter, Dawn C. (2009). The test was carried out using the white tests. The condition was corrected by applying corrected standard errors. Autocorrelation test was conducted to check whether the error terms were correlated across time. Verbeek, Marno (2012). The LM test was conducted to test for the first order autocorrelation. To correct for autocorrelation additional lags was employed. This resulted in a Durbin Watsons statistic of close to two which was an indicator that autocorrelation no longer exists.

### 3.4.5 *The Long run Time Series*

A multiple linear regression model using OLS was used to test the significance of the influence of the independent variables on the dependent variable.

Inferential statistics regression was applied to establish the effect of Mobile Money Transfer services on the economic growth in Kenya. Economic growth was taken as dependent variable where as a various measures of Mobile Money Transfer such as number of agency distribution, number of customer enrolments, number of frequency of transactions and the deposit value. The regression model that was used in this study is;

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \beta_6 X_{6t} + e \dots \dots \dots (i)$$

Where;

Y= Real Economic Growth rate (dependent variable)

$X_{1t}$ – Mobile money transfer agents

$X_{2t}$ – Mobile money transfer customer enrolments

$X_{3t}$  – Mobile money transfer transaction frequency

$X_{4t}$  – Mobile money transfer deposit value

$X_{5t}$ – Interest Rates

$X_{6t}$ – Exchange Rates

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$  = Beta coefficients indicating various levels of importance (weight of each factor) Statistical tools will be used to analyze the data in order to provide for meaningful distribution of scores. For this purpose, E-views and R-statistics will be used in analysis. The package will be able to execute such high level of analysis of variance, the chi-square tests, comparisons of several means and many other statistical operations will be applied.

### **3.4.6 Unit roots**

Unit root tests were conducted on each variable. If variables had mixture of stationary and non-stationary series, then the first step was to conduct first differences for the non-stationary series until the state of stationary was achieved. 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. The p-perron tests were also useful in testing or unit roots.

The ADF and p-perron test assume 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.

### **3.4.7 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. Two methods were available for it. The first method was the 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 stationarity of the residuals was established by applying the ADF and PP tests. 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.

The second method was the Johansen co integration test. However, the Johansen co integration had been cited as more robust and more accurate in identifying the presence of co integration. The Johansen test required that the appropriate lag length to be known. The lag length (p) was determined by the Schwarz criterion to ensure that the residual was white noise.

### **3.4.8 Vector Autoregressive Modeling**

This helped to establish the short run relationship between the variables. However, the short run relationship was 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.

The study employed the VAR procedure of Hendry (1995). The approach minimized the possibility of estimating spurious relationships while retaining long-run information without arbitrarily restricting the lag structure (Hendry, 1995). VAR also provided estimates with valid t-statistics even in the presence of endogenous explanatory variables (Inder, 1993).The error correction model used as laid below.

$$DY_t = \beta_0 + \beta_1 DX_{1t} + \beta_2 DX_{2t} + \beta_3 DX_{3t} + \beta_4 DX_{4t} + \beta_5 DX_{5t} + \beta_6 DX_{6t} + lag\ residual + e \dots \dots \dots (ii)$$

Where;

Y= Real Economic Growth rate (dependent variable)

X<sub>1t</sub>– Mobile money transfer agents

X<sub>2t</sub>– Mobile money transfer customer enrolments

X<sub>3t</sub> – Mobile money transfer transaction frequency

X<sub>4t</sub> – Mobile money transfer deposit value

X<sub>5t</sub>– Interest Rates

X<sub>6t</sub>– Exchange Rates

$\beta_0$  - is the constant term

$\beta$ = This represents the Beta values of the independent variables

$\beta_1$ = The coefficient representing mobile money transfer agents

$\beta_2$  = The coefficient representing mobile money transfer customer enrolments

$\beta_3$  = The coefficient representing mobile money transfer transaction frequency

$\beta_4$  = The coefficient representing mobile money transfer deposit value

$e$  is the error term which is assumed to be normally distributed with mean zero and constant variance.



## **CHAPTER FOUR**

### **DATA ANALYSIS PRESENTATION AND INTERPRETATION**

#### **4.1 Introduction**

This chapter presents the study findings. First it presented time series properties of the data to avoid spurious results. Secondly it presented the relationship between number of transfer agents, number of customers, frequency of transactions and deposit value effects on GDP. In addition, the study examined the moderating effects of interest rate and exchange rate.

#### **4.2 Descriptive Analysis**

Descriptive analysis shows that the average GDP was 5.11% with a maximum of 11.60. GDP was normally distributed since the P value for Jarque-Bera test of 0.02 which is less than the threshold of 0.05. Brani Vidakovic (2011) on average the number of agents was 154.86, while the customer's average amount transferred was 16 million per quarter. The average interest rate was 8.2% with an average exchange rate of 80.85. The Kenyan shilling weakened up to Kshs 94 per US dollar.

**TABLE 2****DESCRIPTIVE ANALYSIS**

	<b>GDP</b>	<b>Agents</b>	<b>Customers</b>	<b>Transactions</b>	<b>Value</b>	<b>Interstrate</b>	<b>Exchangerate</b>
Mean	5.11	154.86	44.00	108.74	282.07	8.18	80.85
Median	5.35	116.65	52.44	97.03	256.93	8.08	82.87
Maximum	11.60	381.60	78.86	252.74	650.51	19.35	94.85
Minimum	0.30	1.34	0.34	0.45	1.42	1.82	62.95
Std. Dev.	2.50	132.20	26.88	79.63	208.70	3.44	8.42
Skewness	-0.01	0.49	-0.27	0.27	0.25	1.06	-0.61
Kurtosis	3.12	1.81	1.62	1.88	1.79	5.90	2.47
Jarque-Bera	0.02	3.16	2.90	2.07	2.29	17.22	2.37
Probability	0.99	0.21	0.23	0.36	0.32	0.00	0.31
Sum	163.50	4955.42	1408.13	3479.78	9026.28	261.66	2587.29
Sum Sq. Dev.	193.07	541777.80	22398.04	196561.10	1350217.00	366.41	2197.40
Observations	32	32	32	32	32	32	32

**Interpretation of the results**

Measures of central tendency were computed to summarize the data for the GDP variable. Measures of dispersion were computed to understand the variability of scores for the GDP variable. The following are the results of this analysis;  $N = 32$ ,  $M=5.11$ ,  $SD=2.5$ . The standard deviation is small, which shows that the scores were close to the value of the mean and the mean was a good representation of the typical respondent and the distribution was negatively skewed. The majority of data points are positioned extremely close to the Mean. The closer the Standard Deviation to 0, the more reliable the Mean is. More than that though, Standard Deviation close to 0 tells us that there is very little volatility in the sample. Therefore the GDP is remarkably consistent. Boundless (2015)

Measures of central tendency were computed to summarize the data for the agents variable. Measures of dispersion were computed to understand the variability of scores for the agents variable. The following are the results of this analysis;  $N = 32$ ,  $M=44$ ,  $SD=132.2$ . The standard deviation is large, which shows that the scores were not close to the value of the mean and the distribution was positively skewed because the mean was higher than the median.

Measures of central tendency were computed to summarize the data for the customer's enrollment variable. Measures of dispersion were computed to understand the variability of scores for the customer enrollment variable. The following are the results of this analysis;  $N = 32$ ,  $M=154.8$ ,  $SD=26.8$ . The standard deviation is large, which shows that the scores were far away the value of the mean and the distribution was negatively skewed because the mean was lower than the median.

Measures of central tendency were computed to summarize the data for the number of transactions variable. Measures of dispersion were computed to understand the variability of scores for the number of transactions variable. The following are the results of this analysis;  $N = 32$ ,  $M=108.4$ ,  $SD=79.6$ . The standard deviation is large, which shows that the scores were far away the value of the mean and the distribution was positively skewed because the mean was higher than the median.

Measures of central tendency were computed to summarize the data for the deposit value variable. Measures of dispersion were computed to understand the variability of scores for the number of deposit value variable. The following are the results of this analysis;  $N = 32$ ,  $M=286$ ,  $SD=208.7$ . The standard deviation is large, which shows that the scores were far

away the value of the mean and the distribution was positively skewed because the mean was higher than the median.

Measures of central tendency were computed to summarize the data for the interest rate variable. Measures of dispersion were computed to understand the variability of scores for the number of interest rate variable. The following are the results of this analysis;  $N = 32$ ,  $M=8.2$ ,  $SD=3.4$ . The standard deviation was small which shows that the scores were close to the value of the mean and the distribution was positively skewed because the mean was higher than the median.

Measures of central tendency were computed to summarize the data for the exchange rate variable. Measures of dispersion were computed to understand the variability of scores for the number of exchange rate variable. The following are the results of this analysis;  $N = 32$ ,  $M=80.8$ ,  $SD=8.4$ . The standard deviation is large, which shows that the scores were far away the value of the mean and the distribution was negatively skewed because the mean was lower than the median.

### **4.3 Regression Analysis**

The study hypothesized that there was a relationship between economic growth rate and number of agents, customers served through mobile money, frequency of transaction, and value of the transaction, interest rate and exchange rate. Both controlled and independent variables had no significant influence on the economic growth since the F statistics was 2.28 and the p value was 0.07 which was greater than 0.05. Therefore, it was not appropriate to fit ordinary least squares regression model to examine the relationship between number of

agents, frequency of transaction, and value of transaction, interest rate and exchange rates against economic growth. DeVeaux, Velleman, and Bock (2012)

**TABLE 3**

**REGRESSION ANALYSIS**

<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
Agents	0.000001	0.00	1.920617	0.066256
Customers	0.0019137	0.002462	0.77721	0.444328
Transaction	-0.002015	0.004968	-0.40566	0.688442
Value	-0.000325	0.002022	-0.1609	0.873465
Interest rates	-0.003125	0.00211	-1.48058	0.151213
Exchange rates	0.0017943	0.001019	1.760819	0.090498
C	-0.052	0.067553	-0.76977	0.448652
R-squared	0.3537981	Mean dependent var		0.051938
Adjusted R-squared	0.1987096	S.D. dependent var		0.026217
S.E. of regression	0.0234684	Akaike info criterion		-4.47568
Sum squared resid	0.0137692	Schwarz criterion		-4.15505
Log likelihood	78.61089	Hannan-Quinn criter.		-4.3694
F-statistic	2.2812661	Durbin-Watson stat		1.637155
Prob(F-statistic)	0.068122			

The pictorial presentation in Figure 2 shows the normality test for the error term. From the findings, it can be deduced that the residuals were normally distributed since the P value for Jarque Berra was greater than 0.05. Since the P value is greater than the level therefore it is not significant (greater-than 0.10 or 0.05), therefore isn't enough evidence to reject the null hypothesis and the assumption of the sample is normally distributed.

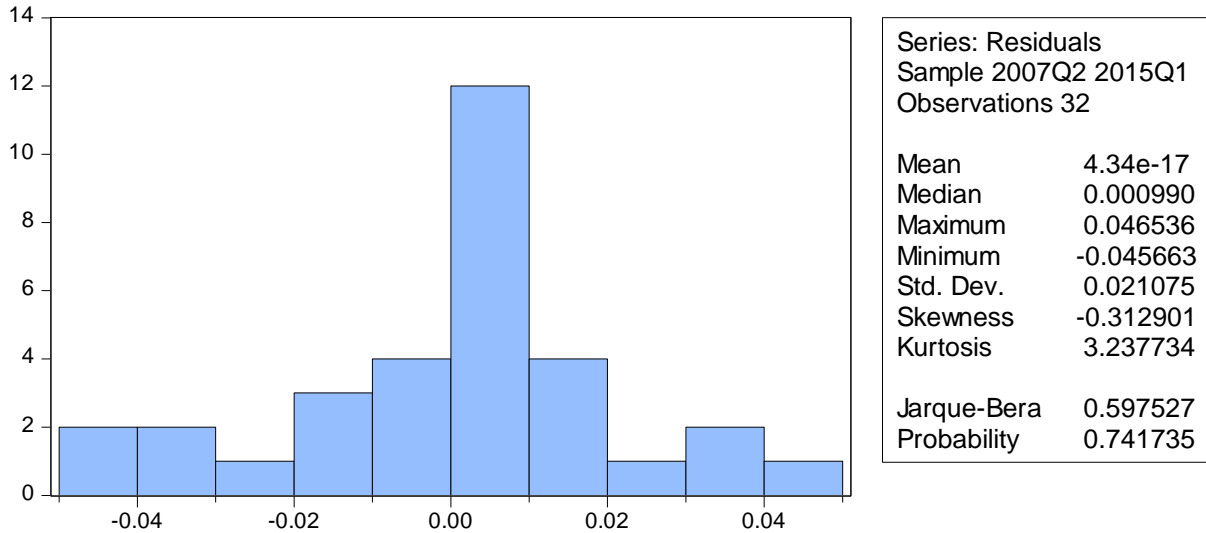
*Null Hypothesis: residuals (u) are normally distribution*

*Alternative: Not normally distributed*

Jarque Berra statistics is 0.5975 and the corresponding p value is 0.7417. Since p value is more than 5 percent we accept null meaning that population residual (u) is normally distributed which fulfills the assumption of a good regression line. McGraw Hill (2007)

**FIGURE 2**

**NORMALITY TEST**



Results in Table 4 shows the serial correlation test using Breusch Godfrey test, the residual were serially correlated since the P value was greater than 0.05. Null hypothesis: No serial correlation in the residuals (u) Alternative: There is serial correlation in the residuals (u). Since the p-value (0.4133) of Obs\*R-squared is more than 5 percent ( $p > 0.05$ ), we cannot reject null hypothesis meaning that residuals (u) are not serially correlated which is desirable. Asteriou, Dimitrios; Hall, Stephen G. (2011)

**TABLE 4**

**BREUSCH-GODFREY SERIAL CORRELATION LM TEST**

F-statistic	0.512563	Prob. F(1,24)	0.48094
Obs*R-squared	0.669127	Prob. Chi-Square(1)	0.413356

Results in Table 5 shows that there was heteroskedasticity among the error terms since the p value was greater than 0.05. Null Hypothesis: Residuals (u) are Homoscedastic  
 Alternative: Residuals (u) are Heteroscedastic.

The p-value of Obs\*R-squared show that we cannot reject null. Therefore the residuals do have constant variance which is desirable meaning that residuals are homoscedastic.

**TABLE 5**  
**HETEROSKEDASTICITY WHITE TEST**

F-statistic	0.70841	Prob. F(27,4)	0.743131
Obs*R-squared	26.46536	Prob. Chi-Square(27)	0.492905
Scaled explained SS	18.07325	Prob. Chi-Square(27)	0.901265

#### **4.5 Time Series Analysis**

After establishing that it was not appropriate to fit OLS on the study data, time series analysis was used to answer the research questions.

##### **4.5.1 Stationary Test**

Stationary time series is one whose statistical properties are constant over time. Statistical properties means that mean value (or average level) of the series, the variance (the variation of the time series around the mean) and the autocorrelation. Nason, G.P. (2013) Both Augmented Dickey Fuller (ADF) and Phillips Perrons (PP) were applied to test the data stationary.

#### 4.5.2 Unit Root Test Results

Owing to the time series nature of the data, it was necessary to test its stationary at levels or needed to be differentiated to make it stationary prior to analysis. Through these test the study results were valid. Both Augmented Dickey Fuller (ADF) and Phillips Perrons (PP) were applied to test the data stationary.

**TABLE 6**

**AUGMENTED DICKEY-FULLER (ADF) TEST**

Variable	Level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference	Decision
GDP	-2.9853*	-6.9514***	-8.2835***	I(0)***
Agents	0.6822	-3.7416**	-8.7684***	I(1)***
Customers	0.2443	-4.9793**	-3.5553**	I(1)***
Transactions	0.3122	-6.3584***	-6.7042***	I(1)***
Value	0.2755	-5.8800***	-5.8350***	I(1)***
Interest rate	-3.2670**	-3.3152**	-5.6335***	I(0)***
Exchange rate	-1.3332	-4.7356**	-5.6208***	I(1)***

*\*, \*\* and \*\*\* indicate that co-efficient is significantly different from zero at 10%, 5% and 1% probability level respectively.*

The study used Augmented Dickey Fuller Test (ADF) unit root test to check the stationary level of the variable. The results in Table 6, shows that GDP and interest rates were stationary at 5% level of significance. For all the other variables, the null hypothesis for the presence of unit root was accepted thus they were non-stationary at levels. Since majority were non-stationary it was necessary to difference. The first and second difference showed that there were non-stationary at 1% level of significance. Therefore, the study findings showed that both interest rate and GDP were integrated of order (0), while number of agents, number of customers, and frequency of transactions, value and exchange rates were integrated of order (1). This revealed that the GDP and interest rates were stationary meaning that they did not



depend on time while the others had to be differenced to make them stationary at order one.

Blake, A. P. and G. Kapetanios (2003)

**TABLE 7**

**PHILIP PERRONS UNIT ROOT TEST**

Variable	Level	1 <sup>st</sup> difference	2 <sup>nd</sup> difference	Decision
GDP	-3.0966**	-6.9698***	-14.5147***	I(1)***
Agents	1.6049	-3.7454**	-10.6790***	I(2)***
Customers	-1.5534	-5.4421***	-28.6349***	I(1)***
Transactions	1.8600	-8.7393***	-22.3467***	I(1)***
Value	1.9337	-6.7414***	-21.0021***	I(1)***
Interest rate	-2.1498	-2.9354**	-9.3311***	I(1)***
Exchange rate	-1.0332	-6.9562***	-15.1832***	I(1)***

*\*, \*\* and \*\*\* indicate that co-efficient is significantly different from zero at 10%, 5% and 1% probability level respectively.*

Results in Table 7 shows that only GDP was stationary at all levels. Further the results showed that all the other variables, were non-stationary at all levels thus there was enough evidence to warrant rejection of the null hypothesis. Since majority of the variables were non-stationary it was paramount to go to the next level of first and second order difference where both first and second difference showed that the variables were stationary at the first difference. Hence, according to Philip Perron the study variables GDP, was integrated to order (0) while the other variables were integrated to order (1). Davidson, Russell; MacKinnon, James G. (2004)

**4.5.3 Co-integration Analysis**

Since most of the variables were integrated of order (1) with the exception of GDP, co integration analysis was necessary. In this study Johansen co integration approach which is a

multivariate autoregressive model was applied. In the Johansen approach, the Trace statistic is used to test the estimates of Eigen values.

**TABLE 8**

**THE JOHANSEN CO INTEGRATION TEST**

---

**Trend assumption: No deterministic trend**  
**Series: GDP agents customer transaction value interest rate exchange rate**  
**Lags interval (in first differences): 1 to 1**  
**Unrestricted Cointegration Rank Test (Trace)**

<b>Hypothesized</b>		<b>Trace</b>	<b>0.0500</b>	
<b>No. of CE(s)</b>	<b>Eigenvalue</b>	<b>Statistic</b>	<b>Critical Value</b>	<b>Prob.**</b>
None	0.656	94.974	111.780	0.353
At most 1	0.507	62.954	83.937	0.597
At most 2	0.466	41.722	60.061	0.628
At most 3	0.391	22.888	40.175	0.768
At most 4	0.157	7.986	24.276	0.952
At most 5	0.091	2.862	12.321	0.865
At most 6	0.000	0.001	4.130	0.981

---

The results in Table 8 showed absence of Co-integration relationship between GDP, number of agents, number of customers, number of transactions, value of transactions, interest rate and exchange rate. The trace statistics indicated zero co-integrating equations at 5% level of significance. This implied that the variables had no long run relationship. Moreover, the absence of Co-integration increased the possibility of spurious correlation. Although, there was co integration the results failed to point the direction of the relationship between variables. In addition, Granger Causality test was carried out to know the direction of causality. Enders, Walter (2004).

**4.5.4 Granger Causality Tests**

The test was used to test whether one time series can be used to forecast another. The test was done after ensuring that the study variables were stationary. Results in Table 11 (appendix

III) of the study variables were unidirectional directional relationship between GDP and number of customers, frequency of transactions, and value of the interest, exchange rate and interest rate. In general, the null hypothesis that number of customers, frequency of transactions, and value of money transferred interest rate and exchange rate that they could not predict economic growth was rejected. In summary, although the test gave evidence that the variables under prediction had substantial prediction power the results did not indicate the direction of the relationship between variables. Hence, the study adopted VAR to determine the relationship between variables. Eichler, Michael (2012)

#### ***4.5.5 Vector Auto Regressive Model (VAR) and Post Estimation Analysis***

Since it was established that the variables were not co-integrated, the study proceeded to estimate the VAR. VAR was used to estimate the short run relationship in the system. In addition, it was used to test for any adjustment in the long run. Since some of the variables were stationary at order (0) and others at order (1) assumption for long run relationship could hold. It was important to concentrate on the variable of the study which was economic growth as measured by changes in GDP, thus it was taken as the dependent variable. Hatemi-J, A.; Hacker, R. S. (2009).

The study first tested the optimal number of lags. Table 9 revealed that the optimal number of lags was one. Moreover, the lag exclusion test showed that one lag was important.

**TABLE 9**

#### **LAG SELECTION CRITERIA**

<b>Lag</b>	<b>LogL</b>	<b>LR</b>	<b>FPE</b>	<b>AIC</b>	<b>SC</b>	<b>HQ</b>
0	-661.391	NA	5.30E+10	44.5594	44.88635	44.66399
1	-576.68	124.2423*	5.38e+09*	42.17869*	44.79426*	43.01543*
2	-545.782	30.89847	3.27E+10	43.38546	48.28965	44.95435

\* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

**Results for VAR Model.** Although, economic growth and mobile phone money transfer services had no Co-integration, VAR was fitted on the conceptualized model as shown in Chapter two. The resulting equation is as shown below.

$$\Delta GDP_t = -0.10 - .18\Delta GDP_{t-1} - .002\Delta C_{t-1} + 0.000001\Delta A_{t-1} - 0.008\Delta T_{t-1} - .004\Delta V_{t-1} + 0.003\Delta I_{t-1} + 0.002\Delta E_{t-1}$$

Standard error = .07      0.21      0.003      0.00      .005      .002      .002      .001

T statistic =    -1.34      -.83      .532      0.85      -1.49      -1.75      1.09      1.422

The number of mobile money agents had no relationship with GDP since it had zero slopes. It was important to note that none of the independent and control variables had significant influence on economic growth. Having established the relationship post estimation was carried out to examine the model fitness.

*Post Estimation Analysis.* Results in Table 10 shows VAR diagnostic test which revealed that the model was stable, it was important to lag for one period, there was no serial correlation at lag order one and residuals were normally distributed.

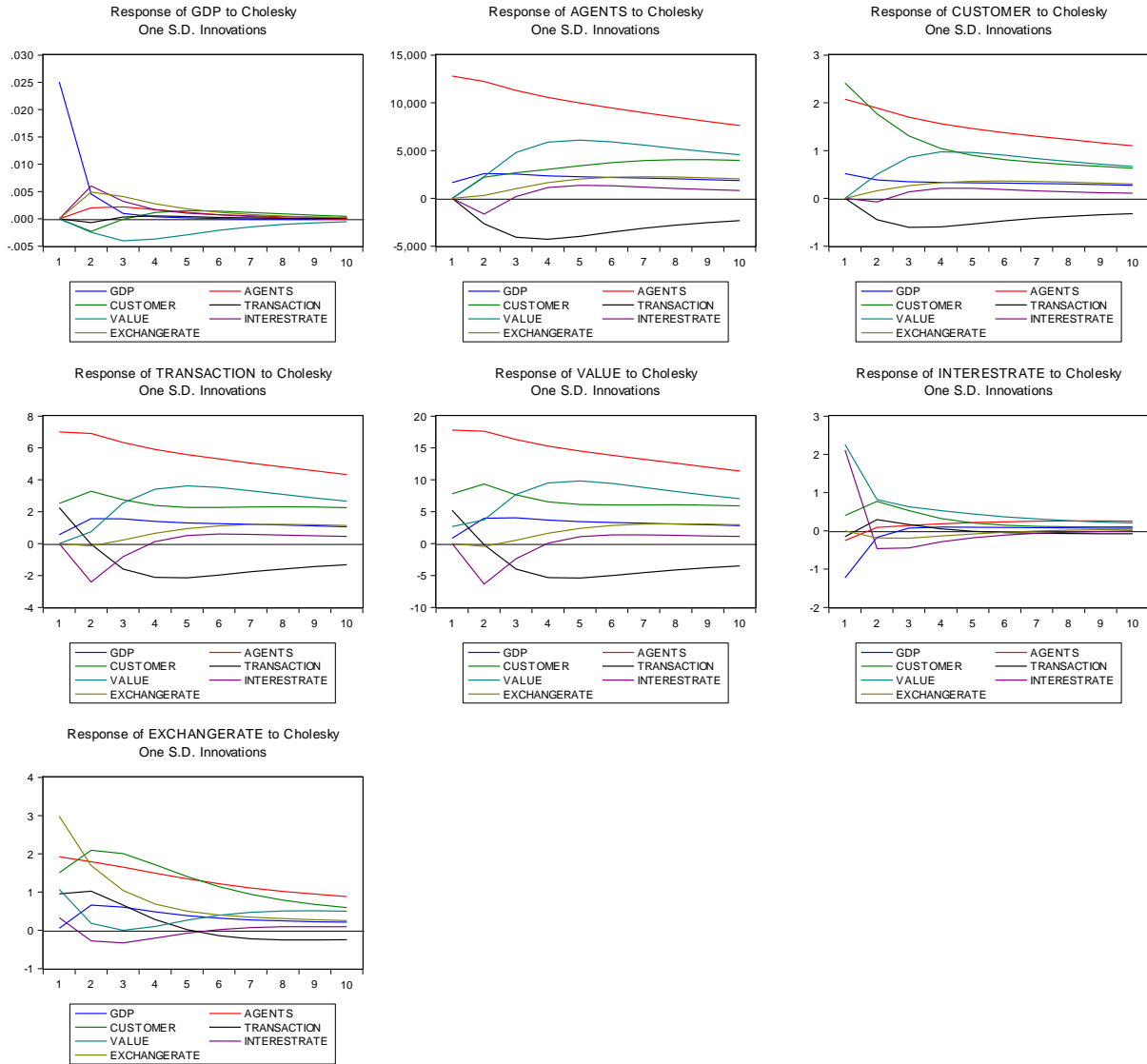
**TABLE 10**  
**VAR DIAGNOSTIC TESTS**

<b>VAR condition check</b>	<b>Test</b>	<b>Conclusion</b>
Stability condition	Roots of the polynomial are within unit circle. The highest is 0.95499	VAR is stable
Lag exclusion test	Wald test for 1 lags, Chi-square = 138.1341 p-value = 0.0000	1 lag is important
Residual serial correlation	LM test statistic=26.709 p value =0.9961	No serial correlation at lag order 1
Residual multivariate normality	Jarque Berra test statistic (joint)=26.689, p value =0.0211	Residuals are not multivariate normal
Residual heteroskedasticity	Chi-square = 0.000 p-value = 0.9472	Residuals are heteroskedastic

*Impulse Response.* To minimize the chances of misinterpretation of the VAR results, since they cannot be interpreted as OLS results. Impulse response analysis was carried out with the sole purpose of examining the impact of each independent variable on the dependent variable. Figure 3 shows the impulse response of every variable against the others. The first graph shows for a shock of GDP number of agents, customers, frequency of transactions causes a positive shock while both exchange rate and interest rate causes negative shocks. This implies that number of agents, customers and frequency of transactions have a long run positive shock on economic growth while both interest rate and exchange rate impacts it negatively.

**FIGURE 3**

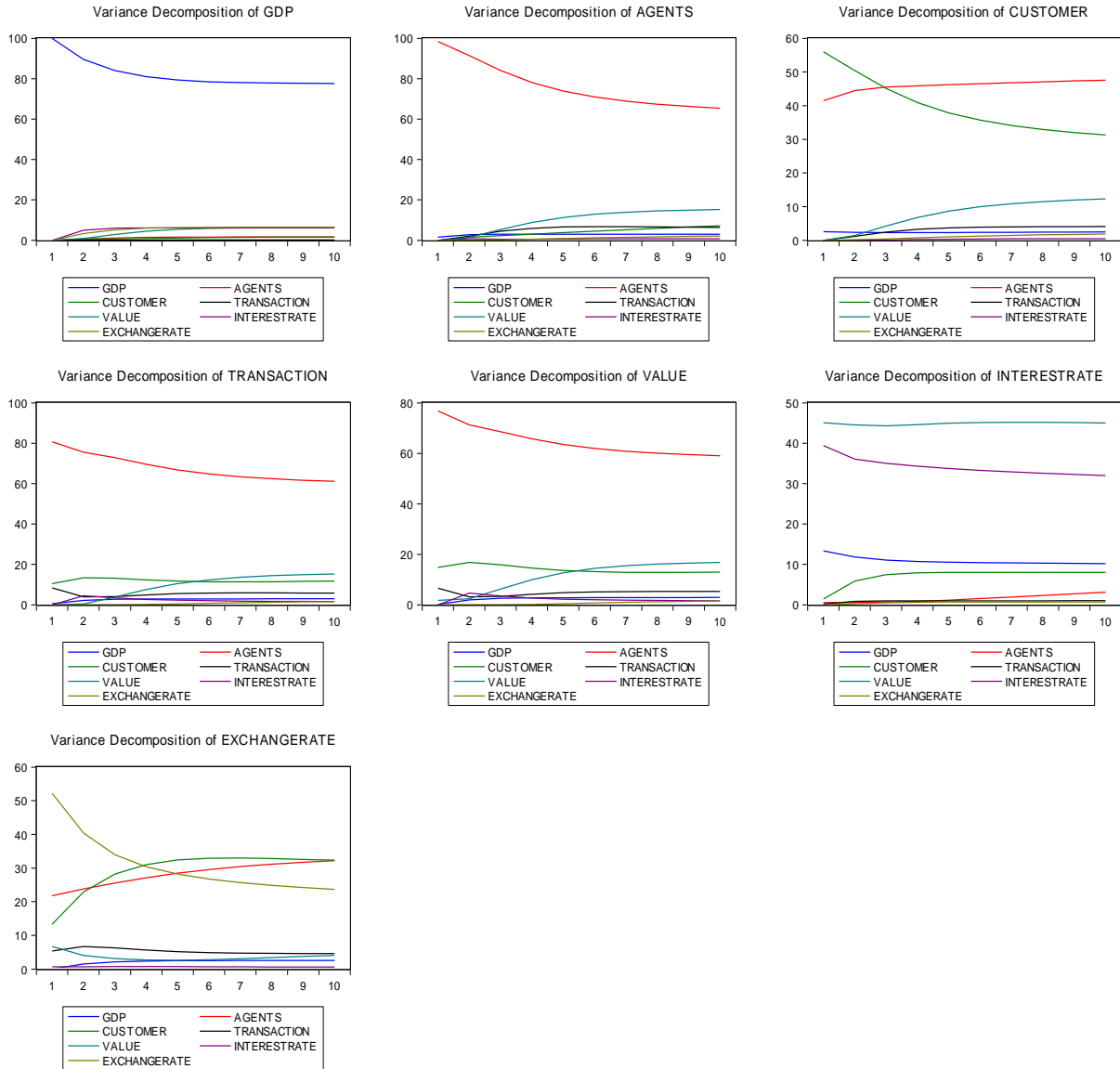
**IMPULSE RESPONSE**



**Variance Decomposition.** Variance decomposition was carried out to examine the variation of endogenous variables on VAR components. Results in Figure 4 showed that mobile money transfer had least contribution towards economic growth.

FIGURE 4

VARIANCE DECOMPOSITION



## CHAPTER FIVE

### SUMMARY CONCLUSION AND POLICY IMPLICATIONS

#### 5.1 Introduction

The current chapter summarizes the study from which conclusions and policy implications of the results are drawn as well as areas of future research.

#### 5.2 Summary

There are always chances of improved economic development if there are new technological innovations. Mobile money transfer was conceived by Safaricom through a product known as Mpesa. Scholars have shown significant relationship between economic growth and product innovations. In the current study it was hypothesized that number of Mpesa agents, number customers using Mpesa services, frequency of transactions carried out through Mpesa transactions and value of transactions all had collective effect on economic growth. Moreover, the study hypothesized that both interest rate and exchange rate both had significant controlling effect on economic growth. Since independence the Kenyan government has endeavoured to fight poverty whose efforts can be attained through product innovations aimed at minimizing transactions costs.

The first objective of the study sought to establish whether mobile money transfer agents affect economic growth (GDP) in Kenya. To achieve this, the study regressed mobile money transfer agents against GDP. VAR was used to examine both short run and long run adjustment processes. Quarterly time series data of 2007 to 2015 was used. VAR was appropriate since all the variables were non-stationary at levels thus differencing was appropriate to eliminate the chances of spurious regression. Results of the study showed there was a positive relationship between mobile money transfer agents and economic growth.



The second objective sought to determine whether mobile money transfer customer enrolment affect economic growth (GDP) in Kenya. The study applied both regression modeling estimates and VAR techniques. There was no significant relationship between customer enrollment and GDP growth.

Thirdly the study sought to find out whether mobile money transfer transaction frequency affects economic growth (GDP) in Kenya. From the analysis the frequency of mobile money transfer had positive but insignificant relationship with economic growth.

The fourth objective of the study sought to establish whether mobile money transfer deposit value affects economic growth (GDP) in Kenya. Results of the study showed that there was a positive but insignificant relationship between mobile money transfer deposit value and economic growth in Kenya. Finally, the results showed that there was a positive relationship between both exchange rate and interest rate on GDP growth rate.

### **5.3 Conclusion**

Since the number of agent's decreased economic growth in both short run and long run there is need to develop measures aimed at increasing the number of agents aimed at increasing service provision of mobile money transfer services. The decrease in the number of mobile money transfer services can be attributed to the minimal operating balance which the money transfer service provider should always maintain.

Although, there was a positive and not significant relationship between the number of customers and GDP growth. There is need for an intensified campaign to recruit locals to the mobile money transfer services owing to their flexibility and improved security as compared to carrying physical cash.

The frequency of mobile money transactions ought to be increased through encouragement and opening of money mobile money transfer agents to regions which are deserted in relation to demand for money transfer services which will ultimately influence economic growth positively.

#### **5.4 Policy Implications**

From the above conclusion, the study recommends that policy makers consider mobile money transfers in their formulation of policies on economic development. This is because despite insignificant relationship of the number of agents, customers, transactions and deposit there was a significant relationship for exchange rate and Interest rate with the economic growth, thus the impact could be pronounced if much change is recorded. This is because the relationship may not be direct but an indirect one resulting from the convenience that the mobile money transfer services offers to the economy.

First, mobile money transfer provides employment to a majority of Kenyans and improves the level of financial deepening and inclusion thus increasing the chances of the poor to access the main stream financial services. Mobile money transfer also increases convenience and reduces the costs of sending and receiving funds from abroad.

Secondly, the security on the mobile transfer agents needs to be improved by the government subsidizing the cost of acquiring surveillance camera making them affordable for the small businesses.

#### **5.5 Areas of Future Research**

Future research should adopt the use of primary data as such to examine the qualitative influencers of economic growth in relation to mobile money transfer services. From this

study it will be appropriate to retrieve the first hand information from Kenyan on their perception on the impact of mobile money transfer on economic development.

Secondly the study suggest since they are efforts for economic integration, a similar study sought to be carried among mobile service providers in the member of the economic integration. This is because an opening of common market will create avenues for arbitrage profits especially on currency transactions more so there are chances of seeking alternative interest rate among member countries as well as enjoying on the inflation rate mismatch.

Interestingly there are different mobile service providers and each has a different platform for mobile money transfer comparative studies ought to be carried out among themselves as such to ascertain their penetration effect and their role on financial deepening.

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## APPENDICES

### Appendix I: List of Mobile Money Transfer Companies in Kenya

<b>S/No</b>	<b>List of Companies</b>	<b>Services</b>
1	Safaricom	M-pesa
2	Airtel Kenya	Airtel Money
3	Orange Telkom	Orange Money
4	YU	YU Cash



## Appendix II: Data Collection Sheet

<b>Year</b>	<b>Agents</b>	<b>Customers (Kshs .millions)</b>	<b>Transactions (Kshs .millions)</b>	<b>Deposit Value (Kshs .millions)</b>
2014				
2013				
2012				
2011				
2010				
2009				
2008				
2007				

### Appendix III: Results

**Table 11 Granger Causality Test**

<b>Null Hypothesis:</b>	<b>Obs</b>	<b>F-Statistic</b>	<b>Prob.</b>	<b>Conclusion</b>
Number of agents does not Granger Cause GDP	23	1.5703	0.235	Uni-directional causality running from agents and GDP
GDP does not Granger Cause number of agents		1.7690	0.198	
Number of customers does not Granger Cause GDP	23	0.4794	0.629	Uni-directional causality running from customer and GDP
GDP does not Granger Cause number of customers		0.7580	0.483	
Frequency of transactions does not Granger Cause GDP	23	9.7982	0.001	Uni-directional causality running from frequency of transactions and GDP
GDP does not Granger Cause frequency of transactions		2.7922	0.088	
Value of transactions does not Granger Cause GDP	23	6.6385	0.007	Uni-directional causality running from value of transfer and GDP
GDP does not Granger Cause Value of transactions		7.9704	0.003	
INTEREST_RATE does not Granger Cause GDP	23	0.1814	0.8356	Uni-directional causality running from interest rate and GDP
GDP does not Granger Cause Interest rate		0.7846	0.4713	
Exchange rate does not Granger Cause GDP	23	0.1908	0.8280	Uni-directional causality running from exchange rate and GDP
GDP does not Granger Cause exchange rate		2.9890	0.0757	
Number of customers does not Granger Cause number of agents	23	0.8367	0.4493	Uni-directional causality running from customer and number of agents.
Number of agents does not Granger Cause number of customers		0.6540	0.5319	
Frequency of transactions does not Granger Cause number of agents	23	1.9826	0.1667	Uni-directional causality running from number of transactions and agents.
Number of agents does not Granger Cause frequency of transactions		1.0629	0.3662	
Value of transactions does not Granger Cause number of agents	23	2.2803	0.1310	Uni-directional causality running from value and number of agents.
Number of agents does not Granger Cause value of transactions		0.7027	0.5083	
Interest rate does not Granger Cause number of agents	23	0.7953	0.4667	Uni-directional causality running from interest and number agents.
Number of agents does not Granger Cause Interest rate		0.2239	0.8016	
Exchange rate does not Granger Cause number of agents	23	0.1433	0.8674	Uni-directional causality running from exchange rate and agents.
Number of agents does not Granger Cause Exchange rate		1.6244	0.2246	
Frequency of transactions does not Granger Cause number of customers	23	0.0548	0.9468	Uni-directional causality running from transactions and number of customers.
Number of customers does not Granger Cause frequency of transactions		0.2451	0.7852	
Value of transactions does not Granger Cause number of customers	23	0.0918	0.9127	Uni-directional causality running from number of customers and

Number of customers does not Granger Cause value of transactions		2.9134	0.0801	value of transfer.
Interest rate does not Granger Cause number of customers	23	0.8514	0.4433	Uni-directional causality running from number of interest and number of customers.
Number of customers does not Granger Cause interest rate		0.9508	0.4050	
Exchange rate does not Granger Cause number of customers	23	0.6313	0.5433	Uni-directional causality running from exchange rate and number of customers.
Number of customers does not Granger Cause exchange rate		4.6210	0.0240	
Value of transactions does not Granger Cause frequency of transactions	23	0.1836	0.8338	Uni-directional causality running from value of transaction and value of amount transferred.
Frequency of transactions does not Granger Cause value of the transactions		0.1660	0.8483	
Interest rate does not Granger Cause value of transactions	23	0.0368	0.9639	Uni-directional causality running from number of transactions and interest rate.
Value of transactions does not Granger Cause interest rate		0.8572	0.4410	
Exchange rate does not Granger Cause value of transactions	23	0.0364	0.9643	Uni-directional causality running from number of transactions and Exchange rate.
Value of transactions does not Granger Cause exchange rate		1.8970	0.1788	
Interest rate does not Granger Cause value of transactions	23	1.0922	0.3567	Uni-directional causality running from interest rate and value.
Value of transactions does not Granger Cause Interest rate		1.2087	0.3217	
Exchange rate does not Granger Cause value of transactions	23	0.6132	0.5525	Uni-directional causality running from value of transactions and exchange rate.
Value of transactions does not Granger Cause exchange rate		2.7465	0.0910	
Exchange rate does not Granger Cause interest rate	23	18.2498	0.0000	Uni-directional causality running from interest rate and exchange rate.
Interest rate does not Granger Cause exchange rate		1.4726	0.2557	

## Appendix IV

### Table 12 VAR Estimation Results

		<b>GDP</b>	<b>AGENTS</b>	<b>CUSTOMER</b>	<b>TRANSACTION</b>	<b>VALUE</b>	<b>INTEREST RATE</b>	<b>EXCHANGE RATE</b>
GDP(-1)	Coefficient	0.107213	40055.68	8.819782	11.02736	39.24579	-11.9812	7.183817
	standard error	0.27668	98648.3	30.80392	66.27661	175.6398	37.39435	45.46552
	T statistics	[ 0.38750]	[ 0.40605]	[ 0.28632]	[ 0.16638]	[ 0.22344]	[-0.32040]	[ 0.15801]
GDP(-2)	Coefficient	-0.03876	-42479.5	-35.4339	-70.0322	-154.972	18.78601	-33.0855
	standard error	0.263355	93897.35	29.32038	63.0847	167.1809	35.59342	43.27588
	T statistics	[-0.14719]	[-0.45240]	[-1.20851]	[-1.11013]	[-0.92697]	[ 0.52779]	[-0.76453]
AGENTS(-1)	Coefficient	8.98E-07	0.618358	-3.23E-05	-4.16E-05	-0.00019	-9.07E-05	-0.00016
	standard error	1.26E-06	0.449375	0.00014	0.000302	0.0008	0.00017	0.000207
	T statistics	[ 0.71215]	[ 1.37604]	[-0.23001]	[-0.13784]	[-0.23404]	[-0.53224]	[-0.79317]
AGENTS(-2)	Coefficient	-9.95E-07	0.520559	0.000184	0.000403	0.001063	4.74E-05	9.41E-05
	standard error	1.22E-06	0.435751	0.000136	0.000293	0.000776	0.000165	0.000201
	T statistics	[-0.81416]	[ 1.19463]	[ 1.34948]	[ 1.37508]	[ 1.37007]	[ 0.28715]	[ 0.46844]
CUSTOMER(-1)	Coefficient	0.00326	-1525.87	0.249189	-0.8531	-2.33145	-0.02714	-0.41193
	standard error	0.004662	1662.023	0.518983	1.116626	2.959173	0.630019	0.766002
	T statistics	[ 0.69931]	[-0.91808]	[ 0.48015]	[-0.76400]	[-0.78787]	[-0.04307]	[-0.53777]
CUSTOMER(-2)	Coefficient	-0.00036	2973.514	0.61805	1.551636	4.032036	-0.09086	0.427551
	standard error	0.004502	1605.065	0.501198	1.078359	2.857761	0.608428	0.739751
	T statistics	[-0.07921]	[ 1.85258]	[ 1.23315]	[ 1.43889]	[ 1.41091]	[-0.14934]	[ 0.57797]
TRANSACTION(-1)	Coefficient	0.00496	-6288.1	-1.29974	-4.50505	-13.0472	-0.60625	-0.65968
	standard error	0.008333	2971.224	0.927794	1.996209	5.290158	1.126294	1.369393
	T statistics	[ 0.59514]	[-2.11633]	[-1.40089]	[-2.25680]	[-2.46632]	[-0.53827]	[-0.48173]
TRANSACTION(-2)	Coefficient	0.007606	7774.904	1.391103	4.345749	10.61447	-1.00591	2.591593
	standard error	0.009161	3266.173	1.019895	2.19437	5.815304	1.2381	1.50533
	T statistics	[ 0.83025]	[ 2.38043]	[ 1.36397]	[ 1.98041]	[ 1.82526]	[-0.81246]	[ 1.72161]
VALUE(-1)	Coefficient	-0.00256	2747.704	0.589024	2.183732	6.230036	0.25571	0.469881
	standard error	0.003377	1203.942	0.375943	0.808865	2.143575	0.456375	0.554879
	T statistics	[-0.75822]	[ 2.28226]	[ 1.56679]	[ 2.69975]	[ 2.90638]	[ 0.56031]	[ 0.84682]
VALUE(-2)	Coefficient	-0.00251	-3616.97	-0.731	-2.08428	-5.13683	0.41785	-1.17586
	standard error	0.003944	1406.23	0.439109	0.944772	2.503741	0.533056	0.64811
	T statistics	[-0.63707]	[-2.57210]	[-1.66474]	[-2.20612]	[-2.05166]	[ 0.78388]	[-1.81429]
INTEREST RATE(-1)	Coefficient	0.002303	-1499.79	-0.19827	-1.57915	-4.10189	-0.16341	-0.30765
	standard error	0.002913	1038.456	0.324268	0.697684	1.848934	0.393645	0.478609
	T statistics	[ 0.79061]	[-1.44425]	[-0.61144]	[-2.26341]	[-2.21852]	[-0.41513]	[-0.64279]

INTEREST RATE(-2)	Coefficient	0.000468	4254.254	0.587361	1.950701	4.948069	-0.22917	0.875244
	standard error	0.003552	1266.263	0.395403	0.850736	2.254536	0.479999	0.583602
	T statistics	[ 0.13189]	[ 3.35969]	[ 1.48547]	[ 2.29296]	[ 2.19472]	[-0.47743]	[ 1.49973]
EXCHANGE RATE(-1)	Coefficient	-0.00104	-278.335	-0.05992	-0.17723	-0.47565	0.210234	0.657318
	standard error	0.001904	679.0315	0.212034	0.456206	1.208991	0.257399	0.312955
	T statistics	[-0.54524]	[-0.40990]	[-0.28262]	[-0.38850]	[-0.39343]	[ 0.81677]	[ 2.10036]
EXCHANGE RATE(-2)	Coefficient	0.001113	45.26215	0.10462	0.26463	0.684613	-0.08302	0.30584
	standard error	0.001788	637.4855	0.199061	0.428293	1.13502	0.24165	0.293807
	T statistics	[ 0.62272]	[ 0.07100]	[ 0.52557]	[ 0.61787]	[ 0.60317]	[-0.34356]	[ 1.04095]
R-squared		0.311553	0.966008	0.891293	0.952853	0.951949	0.303372	0.786374
Adj. R-squared		-0.24781	0.93839	0.802968	0.914546	0.912907	-0.26264	0.612802
Sum sq. resids		0.013866	1.76E+09	171.8764	795.6554	5587.919	253.2891	374.4284
S.E. equation		0.029439	10496.19	3.277541	7.051841	18.6881	3.978764	4.837538
F-statistic		0.556979	34.97701	10.09111	24.87419	24.38293	0.535984	4.530549
Log likelihood		72.62419	-310.902	-68.7518	-91.7377	-120.976	-74.5682	-80.4312
Akaike AIC		-3.90828	21.66014	5.516789	7.049179	8.998375	5.904544	6.295414
Schwarz SC		-3.25439	22.31403	6.170681	7.703071	9.652267	6.558437	6.949306
Mean dependent		0.050467	55992.65	16.50359	40.04929	103.9701	8.267221	81.70531
S.D. dependent		0.026354	42286.86	7.383802	24.1233	63.32481	3.540861	7.774242
Determinant resid covariance (dof adj.)			2.3E+09					
Determinant resid covariance			28251870					
Log likelihood			-555.327					
Akaike information criterion			43.55514					
Schwarz criterion			48.13239					