

**EFFECTS OF MOBILE MONEY ON FINANCIAL DEEPENING  
IN KENYA**

**BY**

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**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT  
OF THE REQUIREMENT FOR THE AWARD OF MASTERS OF BUSINESS  
ADMINISTRATION DEGREE, SCHOOL OF BUSINESS,  
UNIVERSITY OF NAIROBI.**

**OCTOBER 2014**

## DECLARATION

I declare that this research project is my original work and has not been presented in other university or academic institution for accreditation.

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## **ACKNOWLEDGEMENTS**

I express my appreciation to my supervisor Mr. Mirie Mwangi for his valuable criticism and constructive suggestions during the planning and development of this research work. His willingness to give his time so generously is highly appreciated. I also thank the coordinator, the chairman of the department and the entire teaching fraternity in the school of business, University of Nairobi for their knowledgeable contributions.

Thanks to my fellow students for teamwork spirit and encouragement during my academic life. Special thanks to my family members for their persistence encouragements, prayers and financial support throughout the program.

Thanks to Almighty God for taking me this far, thanks for good health, protection and wisdom to all people who contributed to make this work successful.

## **DEDICATION**

I dedicate this project to my mum Grace Wangui Mwangi for her tireless effort and sacrifice to ensure I attain university education. My uncle Timothy Muchiru for his concern and encouragement. Family members and all well wishers who participated in my harambee for me to join university, God bless you all.

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## **ABBREVIATIONS**

ASCAs	-	Accumulating Savings and Credit Associations
ASEAN countries	-	Indonesia, Malaysia, Philippines, Singapore and Thailand
ATM	-	Automated Teller Machine
EMCs	-	Emerging Markets Countries
FDI	-	Foreign Direct Investment
FSAP	-	Financial Sector Assessment Program
GDP	-	Gross Domestic Product
ICT	-	Information Communication Technology
IDAS	-	International Development Assistance Services
IMF	-	International Monetary Fund
LICs	-	Low Income Countries
MFI	-	Microfinance Institutions
NFC	-	Near Field Communication
ROSCAs	-	Rotating Savings and Credit Associations
SACCOs	-	Savings and Credit Cooperatives
SMEs	-	Small Microfinance Enterprises
SSA	-	Sub-Saharan Africa

## **ABSTRACT**

Globally, more than 2.5 billion adults do not have access formal bank account, most of them in developing economies. The recent and widespread availability of affordable mobile phone technology in developing countries has paved the way for the development of a number of mobile money and electronic remittance services. Similarly, financial services industry has undergone phenomenal transformation and in just half a century, banking and customer's access has changed from traditional retail banking to mobile phone banking. These developments triggered this study to determine the effects of mobile money on financial deepening in Kenya. The descriptive study used macroeconomics variables such as lending rates, deposits money bank and credit to private sector as control variables to develop a regression model using secondary data obtained from Central Bank of Kenya between 2007 and 2013. The results established that mobile money is the major determinant of financial deepening levels in Kenya. An increment in mobile money factor by single factor leads to increment of financial deepening factor by 3 times, at 95% level of confidence. Deposits and lending rates also have a positive influence on financial deepening while credit to private sector affects deepening levels negatively though insignificantly. This result calls for policy makers in Kenya to critically address the mobile money concept in order to develop financial sector. Risks factors affecting development of mobile money should be addressed urgently and regulation put in place to encourage use and access of these services. Finally mobile service providers should open up money transfer services to all players and competition should be encouraged to ensure efficiency and effective service delivery.

# CHAPTER ONE

## INTRODUCTION

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

Mobile payments technology is becoming increasingly significant, especially in the context of developing economies, where many low income households and micro enterprises do not have ready access to financial services. Mobile payment facilitates financial inclusion, and offers potential for financial integration. The rapid growth in the mobile money industry, in particular, has led to increased access for the less privileged and the disadvantaged population to affordable financial services not only within, but also across borders (Ignacio, 2009). Despite the opportunities this provides, the rapidly developing technology poses a challenge to regulators in supporting cross-border payments in a world that is engaged in money laundering, terrorist financing, fraud and other financial crimes.

Similarly, financial services industry has undergone phenomenal transformation and in just half a century, banking and customer's access has changed from traditional retail banking to automated teller machines (ATMS), home banking to call centers, telephone banking to internet banking and finally mobile phone banking. These developments have been rapidly adopted by the consumers due to their easiness of access to financial services and low transaction costs. According to Financial Access (2013), in developing countries mobile payment solutions have been deployed as a means of extending financial services to the community known as the unbanked or under-banked, which is estimated to be as much as 50% of the world's adult population.

Elise and Ogden (2013) provide evidence that mobile payments are enabling remittances and minimize the transaction costs associated with remittances. KPMG and IDAS (2012) also observe that many financial inclusion promoters now agree that direct access to financial services can improve individual livelihoods amongst the poor by enabling them to manage resources more efficiently, thereby smoothing consumption and protect against economic shocks. In light of these developments this study seeks to evaluate the concept of mobile money and the extent to which it affects financial deepening in Kenya.

### **1.1.1 Mobile Money**

Mobile money refers to payment services operated under financial regulation and performed via a mobile device. Instead of paying with cash, cheque or credit cards, a consumer uses a mobile phone to pay for goods and services. It includes peer to peer or person to business mobile phone money transfers. According to Jenkins (2008), mobile money ecosystem comprises of telecom operators, mobile money platform providers, financial institutions, regulators, payment processors, money transfer agents and consumers. Mobile financial services come in three forms:-remote mobile payments, where the phone acts as a store of value wallet and money is transmitted over the mobile network from one wallet to another, without the sender or receiver needing a bank account; Proximity mobile payments where the phone connects to a retailer's terminal using near-field communication (NFC) technology, mostly used in paying for purchases made in physical stores or transportation services. A consumer using a special mobile phone equipped with a smartcard waves his/her phone near a reader module and transaction is completed. The payment is deducted from a pre-paid account or charged to a mobile or bank

account directly; finally, the mobile banking, where the phone provides a direct connection to the user's bank account (Gaurav, 2007).

According to Frederic (2007), evolution of payment systems undergone the following stages; Commodity money:-money that was made up of precious metals or any other valuable commodity; Fiat money:- is the paper currency carried as a guarantee that it was convertible into coins or fixed quantity of precious metal; Checks:- is an instruction from bank to transfer money from one's account to someone else's account when she deposits the check; Electronic payments:- this is the technology where bills are settled electronically within points that have internet connection. Finally, the e-Money: - the first form of electronic money was debit card that allows people to buy goods by electronically transferring funds directly to merchants' account. An advanced form of e-money is stored value card. Cell phones are equipped with smart card features enabling one to pay by phone. Smart cards can be loaded from ATMs, personal computers or specially equipped telephones. Mobile money is an advanced form of electronic money.

According to Boer and de Boer (2007), there are three different mobile payments business models, which includes; - bank-centric, mobile-operator led and partnership led model. In the bank-led model, the financial institution controls the customer relationship and provides mobile services primarily as a new channel to existing services. The mobile operator provides the channel for the domestic transfers and international remittances conducted by the financial institution. In mobile network operator-led business model, mobile network operator eliminates the involvement of the financial institution in the payment, delivery, clearing of remittance services. Finally in the partnership model, the financial institutions, mobile network operators and third-party

service providers that make up the ecosystem partner and collaborate to provide payment services. They capitalize on each organization's respective strengths in providing customer service and innovation to ensure regulatory compliance.

### **1.1.2 Financial Deepening**

Financial deepening is a multidimensional process whereby financial institutions and markets provide a range of services and instruments that allow for efficient exchange of goods and services, effective savings and investment decisions, and assets for risk sharing purposes (hedging or diversification) IMF (2012). According to Sheera and Ashwani (2013), financial deepening has been identified in various stages starting from emergence of banks, stock market, development of fixed income markets and finally the derivative markets and securitization. In economic development financial deepening is increased provision of financial services with a wider choice of services geared to all levels of society. It means increased ratio of money supply to GDP. It implies that, the more liquid money available in an economy, the more opportunities exist for continued growth. As such, financial deepening confers important benefits for macroeconomic stability and sustained growth. Goldsmith (1969) and Ghali (1992) points that financial deepening is the product of the growth of financial intermediation. Financial markets undertake a vital role of intermediation process, by channeling funds from surplus units (savers) to deficit units (investors).

Financial deepening is a key aspect of macroeconomic policy implementation and economic growth. It provides absorption to economic shocks such as swings in commodity prices, fluctuations in external financial aid and remittances. Undeveloped financial systems provides inadequate shock absorption and can amplify the macro-financial vulnerabilities arising from external shocks, thereby hampering efforts to

achieve strong and durable growth and poverty reduction (IMF, 2011). Deepened financial market facilitates policy frameworks and effectiveness by providing flexibility of country's macroeconomic policy regimes. Both the choice of instruments for monetary policy implementation and the efficacy of the transmission mechanism in combating inflation are related to a country's level of financial development. Deep and diversified financial markets ensure more stable sources of government financing and can create an enabling environment for fiscal consolidation.

According to IMF (2012), lack of depth of local banking and financial markets has been found to increase the risks associated with large capital flows. Shallower markets allocate capital less efficiently, potentially contributing to boom-bust cycles in credit, investment, and the broader economy. High interconnected financial systems in more mature economies, explains, in part, their resilience to the recent global financial crisis. Foreign currency risk in the absence of currency forwards, other derivatives or natural hedges, direct and indirect exposure of financial institutions increases vulnerability to currency risk, particularly in dollarized economies. Credit risk is also increased, as borrowers who experience currency mismatches on their balance sheets are more vulnerable to unexpected exchange rate fluctuations and have higher risks of default on their debt. Shallowness of financial markets can complicate liquidity management in financial institutions due to increased costs to banks of adjusting their liquidity positions and managing their portfolios.

### **1.1.3 The Relationship between Mobile Money and Financial Deepening**

Mobile money facilitates financial inclusion a key variable of financial deepening which helps to address the basic issue of growth with equity (Adunda and Kalunda, 2012). Large population mostly the low income households and microenterprises do not have ready access to financial services but they have access to mobile phones. Once people start using mobile money they become financially included and are likely to consider other financial products, such as a bank account or microfinance. Rapid growth in the mobile money industry, in particular, has led to increased access for the less privileged and the disadvantaged population to affordable financial services not only within, but also across borders (Mbithi and Weil, 2011). Financial inclusions across the world empower the underprivileged population who are a major driver of social and economic development. Money mobile agents act as financial intermediaries or banks branches since they have sufficient liquidity to satisfy consumers' needs to deposit and withdraw cash. This network of agents can expand the mobile operator's reach to rural areas in order to achieve a higher level of financial penetration in unbanked markets where there is no physical bank presence, essentially enabling a branchless payment system, outside the traditional bank-led business model.

Mobile money contributes to financial deepening process by providing range of markets instruments and enabling reach/access to financial services. The most common mobile money concept is mobile banking. It enables users to perform banking transactions such as check of account balance, fund transfers, bill payments via mobile phones. Mobile saving services are an innovative ways of encouraging a culture of saving without requiring minimum account balances and other traditional



banking fees (Gaurav, 2007). Mobile credit services are being set up to provide micro loans to low-income individuals as an addition to traditional credit and savings groups. Mobile money for the unbanked programme is helping mobile operators and the financial industry collaborate to deliver affordable financial services that provide safety, security and convenience to millions of previously unbanked customers.

Mobile money provides a platform for efficient exchange of goods and services by reducing transactions time at the point of sale, providing versatility by enabling customers to use a single device for multiple services (Jenkins, 2008). Transactions are carried out at lower costs and at a much higher accessibility level. Today, mobile subscribers are using mobile money for transactions and services such as domestic and international remittances, bill payments, payroll deposit, loan receipt and repayment. It also facilitates the flow of money from one party to another using a communications infrastructure that already connects billions of customers around the world. According to Jack and Suri (2010), mobile money is enabling remittances to increase risk sharing and improve consumption smoothing. It reduces the cost and risk inherent in dealing with cash. Mobile airtime also acts as new market instrument where phone companies have allowed individuals to purchase “air-time” and to send this credit to other users. Recipient user hence can on-sell the received air-time to a local broker/agent in return for cash, or indeed for goods and services, thus effecting a transfer of purchasing power from the initial sender to the recipient.

#### **1.1.4 Mobile Money Transfer and Financial Deepening in Kenya**

Using Jenkin’s (2008) mobile money ecosystem, in Kenya the system comprises of telecom operators and respective mobile money platforms as follows; - Essar Telecom

Kenya offers Yu-money, Orange Telecom offers Orange money, Mobile Pay Limited offers Tangaza pesa, Waseela Microfinance Bank Ltd offers Mobicash, Barti Airtel Kenya offers Airtel money and Safaricom Kenya Ltd offers Mpesa. Financial institutions include; - Equity Bank, Commercial bank of Africa, Family bank Commercial Bank of Kenya and Barclay's Bank among others. Central Bank of Kenya and Communication Commission of Kenya are the regulators. Money transfer agents involve retail shops and private individuals registered by mobile service providers, the ATMs and various microfinance institutions. Some derived services include M-banking, M-shwari, M-sacco, M-kesho and M-bima. M-banking is most popular concept in Kenya whereby bank customers conduct their bank transactions directly from their mobile phones without physically visiting the banking hall.

The Kenyan financial sector is composed of the banking sector, microfinance institutions (MFIs), Savings and Credit Cooperatives (SACCOs), money transfer services and the informal financial services sector comprising of Rotating Savings and Credit Associations (ROSCAs) and Accumulating Savings and Credit Associations (ASCAs). This can be divided into formal, other formal and informal. The demarcation between these categories is primarily an institutional one: the formal are prudentially regulated, while the other formal are simply registered under law and the informal are unregistered (FSD, 2010). The main regulator is the Central Bank of Kenya (CBK). Kenya's financial services market is relatively well-developed. Competition is strong amongst a diverse group of service providers that has moved deeper into the low-income market over the last five years. From 2006 to 2009, overall financial inclusion increased from 58.7% to 67.3% (IDAS 2012). Gains have come from the introduction of mobile money and the responding rollout of branchless

agency banking models by commercial banks competing for the mass market space. Kenyan regulators have also been instrumental in introducing appropriate regulations to facilitate low-income banking and strengthen SACCOs and MFIs.

Though Kenya's financial system is the largest in East Africa, it has failed to provide adequate access to banking services to the bulk of the population and lending is skewed in favor of large private and public enterprises in urban areas. This is evidenced by distribution of bank branches at 93 percent in urban and rural areas and 7 percent in arid and semi-arid areas (Beck et al., 2010). The poorer section of the society, who are found in rural and arid and semi arid areas have not been able to access adequately financial services. FinAccess (2006) revealed that the level of financial exclusion has fallen from 38.4 percent to 32.7 percent of the population and the proportion of people formally included, that is, able to access a service from formal sources: banks, SACCOs, MFIs, and money transfer operators has increased significantly from 26.4 percent to 40.5 percent between 2004 and 2006.

## **1.2 Research Problem**

Money mobile has experienced fast adoption and has been credited for drastic reduction of financial transaction costs, serving the unbanked population and risk diversification. However, the effects of mobile money to the financial sector and economy at macro levels have not been studied. This calls for a macro approach of mobile money with specific focus to financial deepening which is a key indicator of financial development and economic development. This study attempts to analyze mobile money data in relation to financial deepening variables to establish possible relationship that exist between the two concepts. Since money mobile is acceptable

internationally, it can be a direct channel for remittances and capital inflow, the level of financial deepening is critical for absorbing capital inflows. Shallow markets allocate capital less efficiently, potentially contributing to boom-bust cycles in credit, investment, and the broader economy. Mobile money is also replacing cash systematically, in event of cyber crimes on mobile networks there can be financial dilemma which needs to be mitigated. Therefore, there is need to study the two variables critically and establish a model that can be used by policy makers and regulators to establish the optimum levels and avoid financial crisis.

Theoretically, mobile money portrays a positive impact on financial deepening. Among the key attributes of market deepening brought about by money mobile is financial inclusion. Underprivileged populations who contribute heavily to social and economic development are integrated in financial services via mobile money. People access financial services such as credit facilities and savings through mobile phones without requirement of a bank account. It also provides secure, convenient and affordable financial services to millions of unbanked population. Goods and services are transacted more efficiently, faster and at lower costs. M-banking services integrate mobile money and financial services making the two concepts complement each other. Mobile money is a financial innovation that revolutionizes operations of banking and other financial sectors.

Global study by Financial Access (2013), found that in 2008, the combined market for all types of mobile payments was projected to reach more than \$600B globally by 2013. In contrast, 3.5 billion of the world's population did not have access to formal banking services in 2009 (Mas and Morawczynski, 2009). World Bank estimates

suggest that a 5 percent reduction in a 20 percent transaction fee, can lead to US\$3.5 billion savings in money sent home (Rath, 2003). According to World Bank (2012), 90% of the globe is now covered by a mobile signal and providing financial services available through phones is a way to extend access to more people, even in remote areas, where it's unlikely to access banking services. More than two-thirds of people in developing countries don't have access to a bank account of any kind. That number grows to nearly 80 percent in rural sub-Saharan Africa. Mutsune (2014) observed that financial services that are delivered through the mobile channel, are in some respects not different from those delivered through conventional banking channels, and can therefore be viewed as a form of branchless banking.

A local study by Kangoo (2011) and Maina (2012), found a positive relationship between mobile money and the performances of commercial banks in Kenya. Jack and Suri (2010) provide evidence that low transaction costs associated with mobile money increased household adoption from 43% to 70% and reduced risks associated with economic shocks in Kenya. Kenyuru (2013) observes that financial innovations have insignificant effects on financial deepening though the two variables are highly correlated. Study conducted by Inter-media in Kenya in 2009 found that over 40% of respondents without access to banking services had used a mobile phone for conducting financial-related transactions, 99% of these users had engaged in mobile money transfer transactions. According to Financial Access (2013), mobile money agents represent 75% of total financial access points mapped in Kenya and are a major driver in bringing financial access points closer. According IDAS (2012), between 2006 and 2009 in Kenya, overall financial inclusion increased from 58.7% to 67.3%, gains from the introduction of mobile money and the responding rollout of

branchless agency banking models by commercial banks competing for the mass market space.

From the studies above, it is evident that no research has linked mobile money transfers with financial deepening in Kenya. Early analysis of the economic impact of cell phones focused on their role in facilitating access to information, particularly with regard to prices (Aker and Mbiti, 2010). Therefore knowledge gap exist on dynamic innovations in the field of mobile money as an industry and the implication on financial and macroeconomic variables. Therefore, this study attempts to answer the following research questions: What is the effect of mobile money adoption on financial deepening in Kenya? Can downtime or technical hitches in mobile transfers lead to financial crisis or an economic dilemma? Do mobile money agents contribute towards financial intermediation and deepening in Kenya?

### **1.3 Objective of the Study**

The objective of this study is to determine the effect of mobile money on financial deepening in Kenya.

### **1.4 Value of the Study**

The findings of this study will be useful to entrepreneurs in making investment decisions in mobile money ecosystem. Since mobile money is relatively green area, there exist many gaps in the economy where profitable investments can channeled. For instance, investment in NFC payment technology can be very profitable in Kenya given its safe, fast and cheaper way compared to SMS model commonly used by most of mobile companies in Kenya.

Policy makers will use findings of this study to develop a mobile money and financial deepening model that will be useful in management of monetary and fiscal policy. The model will be useful in mitigation of financial crisis posed by capital inflows via mobile money. Policy makers will use this model to indentify the optimum levels in relation to economic ability to absorb and reallocate capital inflows.

The study contributes to finance theory by providing foundation for further research on dynamic field of mobile money. Since financial innovations and specifically mobile money is predicted to replace cash, scholars will heavily rely on finding of this study to further financial and economic implications of such a shift.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter provides a review of theories and models relating to financial deepening and money mobile in section 2.2. Then determinants of financial deepening and an analysis of empirical studies conducted both locally and globally in section 2.3 and 2.4 respectively. A summary of literature review is provided in section 2.5.

#### **2.2 Theoretical Framework**

To achieve the main objective of determining the effects of mobile money on financial deepening in Kenya, the researcher is informed by five theories namely; Keynesian Theory of Money Supply, McKinnon-Shaw hypothesis, Neo-structuralists Theory, Townsend Model of Financial Deepening and Growth and Quantity Theory of Money Supply.

##### **2.2.1 Keynesian Theory of Money Supply**

According to Keynesian theory, financial deepening occurs due to an expansion in government expenditure. The injection of money by governments to boost the demand for attaining full employment increases income which results in a higher interest rate due to increased demand for money. The higher interest rate may increase the level of savings but somehow discourage private investment (Dornbusch and Fischer, 1978). Later, McKinnon (1973) and Shaw (1973) came up with a rival hypothesis that depicts a positive relationship between interest rate and financial deepening.



According to them, financial liberalization instead of repression increases the interest rate which induces savings, and thus enhances the volume of investment.

However according to Robert (1991), a post Keynesian economists have developed the theory of money supply endogeneity. In opposing the simplistic neoclassical notion that money supply grows strictly by initiatives of central banks, the Post-Keynesians have developed view that pressures generated endogenously by financial market forces are the determinants of money supply growth, and more broadly, credit availability. In terms of policy analysis they imply that central bank interventions of controlling the growth of money supply and credit are not as potent as assumed in the mainstream literature.

### **2.2.2 McKinnon-Shaw Hypothesis**

McKinnon and Shaw came up with a rival hypothesis that depicts a positive relationship between interest rate and financial deepening. According to them, developing countries have repressed economies with ceilings on interest rates and limitations in credit availability which imposes restrictions on growth. Various economists have empirically tested the McKinnon-Shaw hypothesis on the positive relationship between interest rates and financial deepening and found mixed results. The availability of credit can be taken as the second instrument for financial deepening. Developing countries have been advised to increase the availability of funds by removing restrictions in the financial sector. The third financial deepening instrument that can be identified from the theory is the reserve ratio. A reduction in the reserve ratio or a payment for reserves based on a market clearing loan rate is growth enhancing.

### **2.2.3 Neo-structuralists Theory**

Wijnbergen (1983) and Taylor (1983) demonstrated characteristics that are opposite to the position highlighted by McKinnon and Shaw by analyzing the effects on curb markets. Wijnbergen (1983) concludes that financial liberalization is likely to reduce the rate of economic growth by reducing the total real supply of credit available to investors due to the effects on the curb market. Accordingly, an increase in interest rate will reduce credit available to the informal sector due to substitution of deposits in the organized sector. Further, they stated that statutory reserve requirement in the banking sector may constraint credit supply and that this could not happen in the curb market, which is not subject to reserve requirements. Consequently, the curb market is able to provide more efficient financing. Hence, interest rates, bank credit and reserve requirement can be used to achieve financial deepening.

### **2.2.4 Townsend Model of Financial Deepening and Growth**

According to Jack, Suri and Townsend (2010), this model focuses directly on improvements in the technology of communication and links the degree of financial interconnectedness of agents with the level of economic development in a cross section and also over time. The idea is, as electronic payments connects otherwise spatially separated agents there is an increase in the specialization of labor, hence an increase in the consumption of market-produced goods, and a shift toward e-money relative to fiat money. This is the story of how financial deepening and growth are intertwined and how M-PESA could help Kenya increase gross domestic product over time at the same time as it increases monetized exchange.

This model assumes that there exist each household of type  $i$  and can only produce good  $i$ , and each household has a utility function over its own consumption of good  $i$  and a good it cannot produce  $i + 1$ , as well as leisure. When households are in autarky, without physical or electronic contact, no trade is possible, so each household consumes all its production of good  $i$  only. In this situation, there is no need for a means of payment. In contrast, with some travel household  $i$  can trade other with households. In case there is lack of double coincidence of wants, decentralized trade would give rise to autarky if it were not for valued fiat money

Townsend and Wallace (1982) improved the model by accommodating Walrasian, centralized exchange regime with electronic debits and credits. Where household  $i$  travel to market  $(i, i + 1)$  to buy good  $i + 1$  from household  $i + 1$ , it is as if that member were using a credit card (or phone) linked electronically to a central account, which will not be paid until the end of the period. The second member of household  $i$  who travels to market  $(i, i - 1)$  and sells good  $i$  is paid with a credit card from household  $i - 1$ . At the end of the period, these electronic debits and credits are cleared and accounts must balance. In fact, in the equilibrium of this electronic accounting system, fiat money plays no role and its price is zero. The prices of goods themselves are in some (arbitrary) unit of account. Related, though households remain separated in space, it is as if they are transacting with one another in a centralized market that ignores the spatial segmentation as far as prices and values are concerned. In summary moving from autarky to the decentralized money regime and then to the centralized Walrasian regime, the model predicts that labor supply increases, output of the produced commodity rises, consumption of the non-produced good rises,

consumption of the produced good drops, trade volume increases, and welfare increases.

### **2.2.5 Quantity Theory of Money Supply**

According to Fisher (1911), there exist a direct relationship between quantity of money in an economy and the level of prices of commodities. According to this theory if the amount of money increases the price levels also increases. In other word, money like any other commodity, increase in its supply decreases its marginal value. So, an increase in money supply causes prices to rise as they compensate for the decrease in money's marginal value.

Fishers' quantity of money model

$$MV = PT$$

where,

M = Money Supply ;V = Velocity of Circulation (the number of times money changes hands);P = Average Price Level ;T = Volume of Transactions of Goods and Services

The original theory was considered orthodox among 17<sup>th</sup> century classical economists and was overhauled by 20th-century economists. It is built on the principle of "equation of exchange":

$$\text{Amount of Money} \times \text{Velocity of Circulation} = \text{Total Spending}$$

In its most basic form, the theory assumes that velocity of circulation and volume of transactions are constant in the short term. The theory also assumes that the quantity of money, which is determined by outside forces, is the main influence of economic activity in a society. A change in money supply results in changes in price levels and/or a change in supply of goods and services. It is primarily these changes in

money stock that cause a change in spending. And the velocity of circulation depends not on the amount of money available or on the current price level but on changes in price levels.

Finally, the number of transactions is determined by labor, capital, natural resources (i.e. the factors of production), knowledge and organization. The theory assumes an economy in equilibrium and at full employment. John Maynard Keynes challenged the theory in the 1930s, saying that increases in money supply lead to a decrease in the velocity of circulation and that of real income, and flow of money to the factors of production also increased. Therefore, velocity could change in response to changes in money supply. It was conceded by many economists after him that Keynes' idea was accurate.

### **2.3 Determinants of Financial Deepening**

A well-developed financial system is instrumental in attaining sustainable and balanced growth. Such a system increases the availability of funding by mobilizing idle savings, facilitating transactions and attracting foreign investments. Such markets can achieve improved allocation of financial resources and enhanced risk management, transparency and corporate governance practices. Financial deepening is collectively determined by institutional and regulatory preconditions, legal institutions, good democratic governance and financial reforms. Other factors include; economic stability, government debt, capital inflows and trade flows as discussed below.

Financial reforms have a positive impact on financial development of a country and according to Abiad et al. (2008) there are seven key policy variables that represent

financial reforms. They include credit controls and ceilings, interest rate controls, entry barriers, privatization, capital markets, banking regulation and international capital restrictions. For example, private credit and bank deposits are substantially higher in more regulated markets. Stock market capitalization and stock market total value traded is greater in more liberalized markets. Institutional and regulatory preconditions also determine the level of financial deepening. Financial development is stronger where institutions protect and match the needs of investors. Reinforcing the rights of creditors and contract enforcement tend to deepen financial markets. The availability of information on borrowers also improves the availability of credit and enhances the efficiency of financial institutions, especially in less developed systems.

Institutional quality, in particular the extent to which institutional checks and balances exist, are also found to be crucial in determining the success of financial reforms and mitigating the likelihood of crises. Certain regulatory arrangements could also be detrimental to the development and the performance of financial markets. Most notably, regulations that restrict the activities of banks could be more prone to banking crises and may hinder financial market deepening (Barth et al., 1999; 2004). Similarly, Cull et al. (2005) find that, excessively generous deposit guarantee systems tend to undermine financial development and stability, especially in countries with inadequately developed legal and regulatory systems. The strength and impartiality of the legal system as well as the popular observance of the law is also critical. The law and order index, measures the strength and impartiality of the legal system as well as the popular observance of the law. For example, a country suffers a low rating if the law is routinely ignored without effective sanctions.

Political instability and civil unrest curtails development of financial sector. Countries with closed and static political regimes tend to resist the availability of external financing, since the ensuing competition would threaten the entrenched powers of the political elite. Public ownership in the banking sector, governments do not have the necessary incentives or the resources to ensure efficient investments, they often support politically attractive projects. State-owned banks inefficiently allocate credit, creating significant systemic risks and generating potential for political capture and corruption (Barth et al., 2004). Use of public banks as a political tool is evident where credit to the private sector tends to increase during election years. When inequality, the main driver of political instability is rampant, investor-protection institutions are less effective. Greater political accountability is associated with higher entry in sectors that are more dependent on external financing. Low level of corporate governance in financial institutions has also sustained poor financial deepening in the system.

Economic stability and certainty also determines financial sector deepening. High inflation reduces real returns and in doing so reduces likely lenders and increases likely borrowers, effectively exacerbating the market imperfections. High inflation environment is more prone to banking crises. Typically, a country characterized by high and volatile inflation and distorted interest and exchange rate structures, there are low savings and investments and low level of financials intermediation, as interest rates do not reflect the cost of capital (Huybens and Smith, 1999). Fiscal policy also impact financial deepening. A heavily indebted government may engage in financial repression by using financial sector as an 'easy' source of funding. Excessive public debt may crowd-out private investment, especially in emerging economies with less

developed financial systems. The safe returns from a large public debt may make banks become too complacent and undermine their efficiencies.

Financial development is also determined by a country's openness to financial inflows, especially in countries without a sizeable natural-resource endowment. It improves bank deposits and credit to the private sector. Most developing countries have inadequate domestic savings, making foreign funding an important source of growth. Remittances make up a very large portion of the economies of some of the labor-supplying countries. Lastly trade flows can have an impact on financial development. Increasing exporting opportunities may serve to boost the demand for external funding. The present evidence shows that such a relation is particularly strong in countries with predominantly high-tech manufacturing activities (Do and Levchenko, 2004).

## **2.4 Empirical Studies**

A study by Okoli (2010) investigated the nexus between financial deepening and stock market and volatility of stock market in Nigeria. Variables observed include stock market return, the ratio of the value of stock traded to GDP, the ratio of market capitalization to GDP. Secondary data was sourced from Central Bank of Nigeria Statistical Bulletin and the Stock Exchange, fact book. The data spans the annual period between 1980 and 2010 (thirty years), the maximum time period in which consistent data was available for all variables. Estimation depending on the measures of financial deepening and market returns were evaluated using GARCH (1, 1) model. Financial deepening was represented by two variables, the ratio of the value of stock traded to GDP (FD1t) and the ratio of market capitalization to GDP (FD2t). Empirical



results revealed that financial deepening (FD1t) measured as the ratio of value of stock traded to GDP do not affect the stock market and there is no news about volatility. But financial deepening (FD2t) measured as the ratio of market capitalization to GDP affect the stock market. It indicated that financial deepening reduces the level of risk (volatility) in the stock market. The study recommends an improvement of financial development in the country by increasing the range of financial assets. Deepening finance intermediation may promote economic growth by mobilizing more investments and lifting returns of financial resources which raises productivity.

Raju, Kagni and Dhaneshwar (2009) studied the role of institutions on financial deepening in the CFA Franc Zone. They empirically investigate factors that may explain why financial sectors in the CFA franc zone are less deep even than the rest of Sub-Saharan Africa (SSA). The econometric analysis used panel data for 40 SSA countries, of which 14 belong to the CFA franc zone. The data are averaged over five-year periods from 1992 to 2006. A two-step Feasible Generalized Least Squares (FGLS) is used to estimate the model and address the problem of heteroscedasticity.

The study observed that with similar level of financial liberalization and similar macroeconomic conditions, countries that better protect property rights, encourage information sharing, and promote the rule of law are likely to have deeper financial systems. The main policy recommendation is expanding creditor information and strengthening creditors' rights in CFA franc countries. Strengthening creditor rights would require changes in legislation of governing debt collection and collateral. Legislation on debt recovery would depend in turn on efficient property registration

and land surveying in both cities and countryside. Finally, reform of the courts is vital for improving enforcement.

A study by Sheera and Ashwani (2010) investigates the financial deepening of selected ASEAN economies within three major crises that occurred at global and regional levels over the past two decades. Principal component analysis technique was exploited in order to compute the composite index of financial deepening. The study quantifies the financial deepening of four economies comprising Indonesia, Malaysia, Philippines and Thailand of the ASEAN region using data from 1960 to 2011. The indicators identified to measure the dimensions of financial development include liquid liabilities, bank, private, privy and credit generated by the banking sector to private sector from the institutional side, and stock traded value ratio (STVR), turnover ratio (TR) and market capitalization (MC) from the financial market. Liquid liabilities (currency plus demand and interest bearing liabilities of banks and non-bank financial intermediaries), as a percentage of GDP, measure the size of financial intermediaries. The study use secondary data sourced from World Bank publication.

From the survey the study found that, financial systems of these economies were severely affected by the Asian financial crisis and it has been a struggle to maintain the pre-crisis level of development. However, all these economies, with the exception of Thailand have exhibited stable behavior in the recent crises period. Thailand's financial system has been volatile and this could be attributed to inconsistency among the institutional and market based indicators. The study recommends that, in order to have balanced development of financial systems, these economies are required to pay attention to improving the institutional environment such as resource allocation

indicators in Malaysia and Thailand; commercial banking participation in Philippines and financial institution activity in Thailand.

A study by IMF in 2012 on enhancing financial sector surveillance in low income countries: Financial deepening and macro-stability. The study was motivated by the shallow and undiversified financial systems in low-income countries (LICs) limiting macroeconomic policy choices, hampering policy transmission and implementation, and impede opportunities for risk transfer. The paper aimed to provide better account for the interplay between financial deepening and macro-financial stability. The findings and analyses are based on a variety of official IMF documents, original research, case studies across a broad spectrum of countries, IMF-World Bank FSAP reports, and available data sources within the two institutions. Empirical evidence offers a somewhat ambiguous account at the macro-level since financial deepening can also propagate the transmission of financial shocks, as evidenced by the global financial crisis. But new empirical analysis, however, supports the view that deeper financial systems can moderate the amplitude of output and sectoral (consumption and investment) volatility in developing countries. Secondly, while there is a strong link between financial liberalization and financial accelerations, liberalization is more likely to lead to sustained periods of deepening in the presence of strong institutions. While excessive credit growth could precipitate crises even if the financial sector is deep, due to excessive risk-taking and lagging regulatory and supervisory capacities.

A study by Ozurumba and Chigbu (2013) critically assessed determinants of financial deepening in Nigeria between 1970 and 2010. The study was necessitated by the central role which the banking system plays in the mobilization of savings and

allocating money for investment activities needed for economic development. Among the variables observed against financial deepening are; bank investments, cost of bank credit, saving mobilization by commercial banks, clearing activities by the banks and private sector credit. The study used secondary data sourced from the Central Bank of Nigeria publications and those of the Bureau of Statistics for a period of 41 years.

From the survey the study observe that the roles of deposit money banks in the development of Nigerian financial system are imperative. The value of cheques cleared has a negative and significant relationship with financial deepening. Financial saving and prime lending rate have a negative and insignificant impact on financial deepening; deposit money banks assets and private sector credit are statistically significant and positively related to financial deepening. The study recommends establishment of banks branches and rural banking scheme in order to mobilize financial resources that are outside the system for productive investment. The regulatory authorities should also strengthen the legal and regulatory framework within which the commercial banks and financial systems operates.

A study by Jack et al. (2010) investigates monetary theory and electronic money reflecting on the Kenyan experience. They examines the role of monetary theory in understanding new generation of mobile banking products, especially those that, like M-PESA, do not simply provide electronic access to existing bank accounts. The co-existence of two forms of cash even if closely related and linked, raises certain theoretical modeling issues in itself, one form of cash is issued by a profit-maximizing entity and the other by the central bank. The issues of competition, regulation, and coordination naturally emerged. 3,000 households and 250 M-PESA agents in Kenya in late 2008 were studied. The study focused on issues related to M-PESA agents as

reported by consumers and the agents themselves .e.g. unable to deposit cash (no E-money) or unable to withdraw cash (no cash), how often do agents run out of E-money and how is E-money paid for when an agent requests it. The study reviewed rich models of money that are believed to reflect particular features of the Kenyan financial environment. From the study it was observed that in many cases, the scenarios envisioned in monetary theory models appear to match the reality of M-PESA and as such, these models promise to inform decisions taken by both Safaricom in managing M-PESA and the central bank in managing the Kenyan economy. From the empirical evidence presented, the study note that, as the central bank may intervene to relax liquidity constraints, it is arguable that Safaricom should actively manage electronic liquidity by issuing e-money that is at times, in some locations, unbacked by money deposits, assuming that such activism would be costless and allowed by the central bank. The study recommend companies to have better information on net demands for e-money across agents than the agents themselves have, or at least be better able to act on this information without the space/time coordination problems that the models suggest.

A study by Mutsune in 2014 investigates financial inclusion through mobile banking in Kenya. The study examines Kenya's highly successful money transfer model, M-pesa, in an effort to explore the nature and role of financial inclusiveness in stimulating economic activity. The study borrow from a combination of the ideas of velocity circulation of money and a simple diffusion model to develop a framework that can be usefully applied to appropriate data. The study assumes frequency of use of M-pesa stimulates and disperses economic activity, via velocity mechanism, to develop a thought process that investigates the nature and role of vitality dispensed in

the economy. The study borrows the ideas of the velocity of money concept rooted in Fisher's (1911) quantity theory of money, which supposes a direct relationship between price (P) and money supply (M). Under this supposition, increase in the amount of money in circulation result to higher prices for goods and services. The study develop a model on the interactions between M-pesa adoptions over time under a given monetary regime and economic activity. It focused on exploring a useful framework that can be used to estimate how financial inclusion in Kenya through mobile banking has impacted economic dynamism. The ideas presented are an innovative exploration that blends economic thinking and with aspects of natural science with the aim of developing a framework that can be applied to appropriate data. The study recommends flexibility in this new form of technology application by policy makers. Due to increasing velocity of transactions in Kenya, and the increasing assumption of banking services by mobile service providers, the monetary authorities should go back to the drawing board to recalibrate rules on money supply and banking services respectively. The study suggests a close attention to policy concerns in future studies.

A study by Maina (2012) investigates contribution of mobile banking towards financial performance of commercial banks in Kenya. The study seeks to establish the benefits of adoption of mobile services by the banks in provision of their banking services in Kenya. The study also discussed the effect of process, product and technological development of the mobile banking service, its impact on performance of financial institutions in Kenya. The research was conducted through survey design with secondary data obtained from financial statements of seven banks in Kenya. The study took on multiple regression models whereby quantitative variables are

examined in relationship to any other factors. Financial innovation is measured using the level of investment in research and development by various banks. The finding of this study indicates that e-banking increased the performance of the banks, service delivery and improved efficiency. It enabled the banks meet their cost and earn profits even in short span of time. Banks also increased clientele and also retained their customers while reducing cost and increasing profits. The study recommends banks to adopt market development strategies to improve profitability and clientele. The study recommend banks to update the fast changing technology and to achieve this financial and human resource must be adequately allocated.

A study by Kangoo (2011) investigates the relationship between electronic banking and financial performance of commercial banks in Kenya. Study sought to establish whether there exist a relationship between e-banking and the performance of the banks in Kenya. Banks performance was measured by return on assets (dependent variable) and independent variable e-banking was measured by numbers of ATMS and debit cards issued to customers. The study investigated 26 banks and used secondary data collected from annual reports of targeted banks and central bank of Kenya between 2006 and 2010. The researcher used correlation analysis to establish the relationship between the variables. The results observed negative relationship between rate of return and expenditure on ICT and number of ATMS installed by the bank. It also found that there exist a relationship between performance of commercial banks and e-banking. The e-banking produced changes in bank income. There was increased competition that lowered lending margins but the banks diversified their sources of income and relied on fees income e.g. payment transactions, safe custody and account administration. Banking industry in Kenya

experienced significant and strong effects of e-banking which makes them productive and effective. Workers in banking industry improved their efficiency and effectiveness. The study recommends authorities to formulate regulatory framework for banking sector and improve capacity building in this field. Security risks posed by money laundering and electronic fraud ought to be mitigated.

A study by Kenyoru (2013) investigated the effects of financial innovation on financial deepening in Kenya. The study was motivated by increased financial innovations in Kenya and the implications they have in management of financial risks. The study sought to establish the nature of financial innovations in Kenya's financial sector and their effects on financial deepening. Study used secondary data from Central Bank of Kenya World Bank, IMF and local mobile companies. Multiple regression models were used to establish the relationship between different variables. The results of this study showed financial innovations in Kenya has insignificant impact on financial deepening, contrary to a study by Cracknell (2012) on policy innovations and their impact on financial access in Kenya. There was a high correlation between financial innovations and deepening in Kenya while joint effect of innovations to deepening was insignificant. The study however recommends enhancement of financial deepening in Kenya and policy makers should adopt mobile money in Kenya. Agency banking should be adopted in the banking sector since it showed a huge impact on financial deepening.



## **2.5 Summary of the Literature Review**

Theoretical framework provides vital understanding of interplay of key macroeconomic factors such as money supply, savings, interest rates, investments and employment. Townsend model explains how financial interconnectedness through electronic technology leads to specialization of labor hence increased output, consumption of goods, trade volume and welfare improves thereof. However, co-existence of fiat money and mobile money at the same time yet one is offered by a profit making organization and the other by central bank raises a critical concern for regulation.

The literature also highlights collective responsibility of financial reforms, legal frameworks, institutional and regulatory preconditions in determining financial deepening. Empirical studies support that deepening finance intermediation promotes economic growth by mobilizing of investments and improves returns for financial resources which therefore raises productivity. Studies also exhibit a positive relationship between electronic money and financial performance of commercial banks. Financial deepening also is found to reduce market volatility and improve macroeconomic transmission and implementation. The empirical studies however have not linked the mobile money to financial deepening hence this study seeks to fill the gap by analyzing the relationship of the two concepts in Kenya.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter describes the methodology used in this study to establish the effects of mobile money on financial deepening in Kenya. This chapter outlines the research design in section 3.2, data collection procedures on 3.3, data analysis and regression model on section 3.4.

#### **3.2 Research design**

This study is descriptive. According to Cooper and Schindler (2003), descriptive study is concerned in finding out what, when and how of a phenomenon. It enables a researcher to generalize findings of a large population. The approach collects a large amount of data for detailed analysis that lead to important recommendations in practice. Descriptive studies are usually the best methods for collecting information that will demonstrate relationships and describe the world as it exists, in this case we seeks to demonstrate the association and effects of mobile money on financial deepening in Kenya.

#### **3.3 Data Collection**

This study uses secondary data obtained from CBK which includes monthly figures of money supply, banks money deposits, commercial banks credit to private sector and GDP between 2007 and 2013. Values mobile money transfers are obtained from mobile service providers i.e. Safaricom, Airtel, Orange and Yu mobile company

annual reports. According to Mugenda & Mugenda (2004), this data collection technique produce estimates of overall population parameters with greater precision and ensure a more representative sample is derived from a relatively homogeneous population.

### **3.4 Data Analysis and Research model**

The data collected is accurately arranged and entered into a computer to enable coding and tabulation before final analysis using IBM SPSS 20 program. Quantitative data is analyzed through descriptive statistics such as measure of central tendency, frequency, mode and mean. Data presentation is done by use of linear curves and graphical representations. This provides simple understanding of the results. First, Pearson Product –Moment Correlation coefficient as a measure of association is used to examine the relationship between mobile money and financial deepening.

The study uses a multiple regression model which is a method of data analysis that is appropriate whenever a variable (dependent variable) is examined in relation to other factors (independent variables). The relationship may be linear or non-linear, independent variables may be quantitative or qualitative and one can examine the effect of a single variable or multiple variables with or without taking account of other variables. In this study we reformulate the model used by Nnanna and Dogo (1999) in their investigation of the financial deepening function in pre and post financial reform periods in Nigeria. Financial deepening is the dependent variable measured by ratio of money supply to GDP. Independent variables are; - value of mobile money transactions to GDP ratio (MM/GDP); Deposit money banks' asset to GDP ratio (DMB/GDP); prime lending rates (PLR) and credit to private sector (CRPS).

Multiple regression models is as follow:-

$$FD = f (MM, DMB, PRL, CRPS) \dots\dots\dots (i)$$

$$FD = \beta_0 + \beta_1 MM + \beta_2 DMB + \beta_3 PLR + \beta_4 CRPS + \mu t \dots\dots\dots (ii) \text{ Or}$$

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \mu t$$

Where Y i.e. FD is the financial deepening and can be represented by the following variables; Ratio of money supply to GDP, private debt to GDP, ratio of the value of stock to GDP or ratio of market capitalization to GDP (Okoli 2010). In this study we use ratio of money supply to GDP.

X<sub>1</sub> I.e. MM is Mobile money and is represented by the total value of mobile money transactions expressed as ratio to GDP

X<sub>2</sub> i.e. DMB is the ratio of deposit money banks assets to GDP

X<sub>3</sub> i.e. PLR is prime lending rates

X<sub>4</sub> i.e. CRPS Credit to Private sector.

β<sub>0</sub>- Regression co-efficient,

β<sub>1</sub>, β<sub>2</sub>, β<sub>3</sub>, β<sub>4</sub> and β<sub>5</sub> are the partial slope coefficients on parameters of X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, and X<sub>4</sub> respectively.

Where: μt is disturbance term defined by Koutsoyiannis (2003) as a random (stochastic) variable that has well defined probabilistic properties.

## CHAPTER FOUR

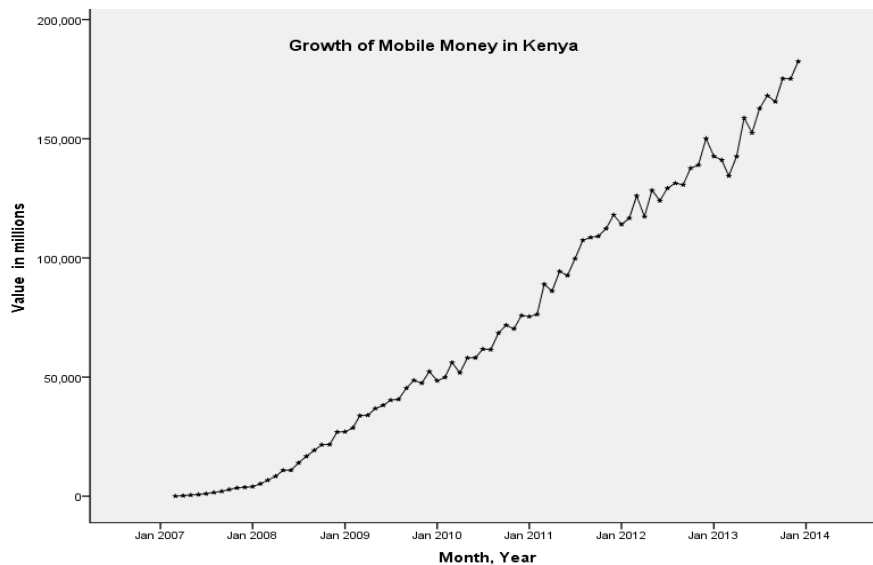
### DATA ANALYSIS, RESULTS AND DISCUSSION

#### 4.1 Introduction

This chapter presents analysis, results and discussion of the effects of mobile money on financial deepening in Kenya as set out in the research methodology. Section 4.2 provides time series analysis, correlation analysis in section 4.3, regression analysis in section 4.5 and finally discussion of research findings on section 4.6.

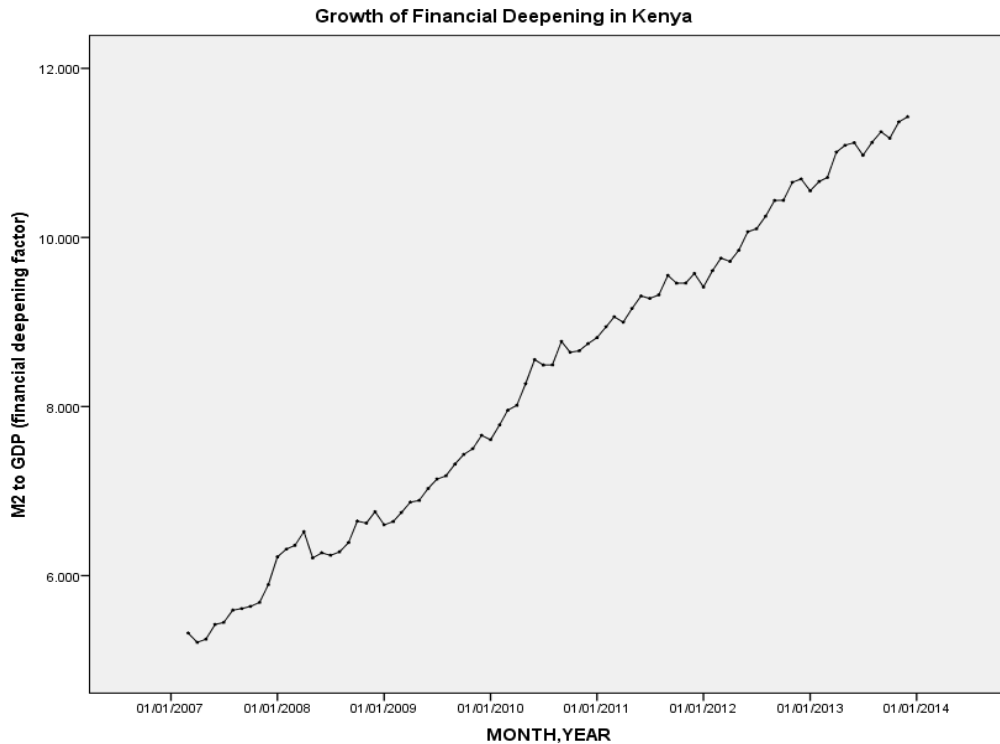
#### 4.2 Time Series Analysis

This method analyzes time series data in order to extract meaningful statistics and other characteristics of the data. It is applied to real-valued, continuous data or discrete numeric data. In this study use value of mobile money transaction and financial deepening factor as measured by broad money to GDP ratio over the period of seven years i.e. from 2007 to 2013.



**Figure 4.1: Growth of Mobile Money in Kenya**

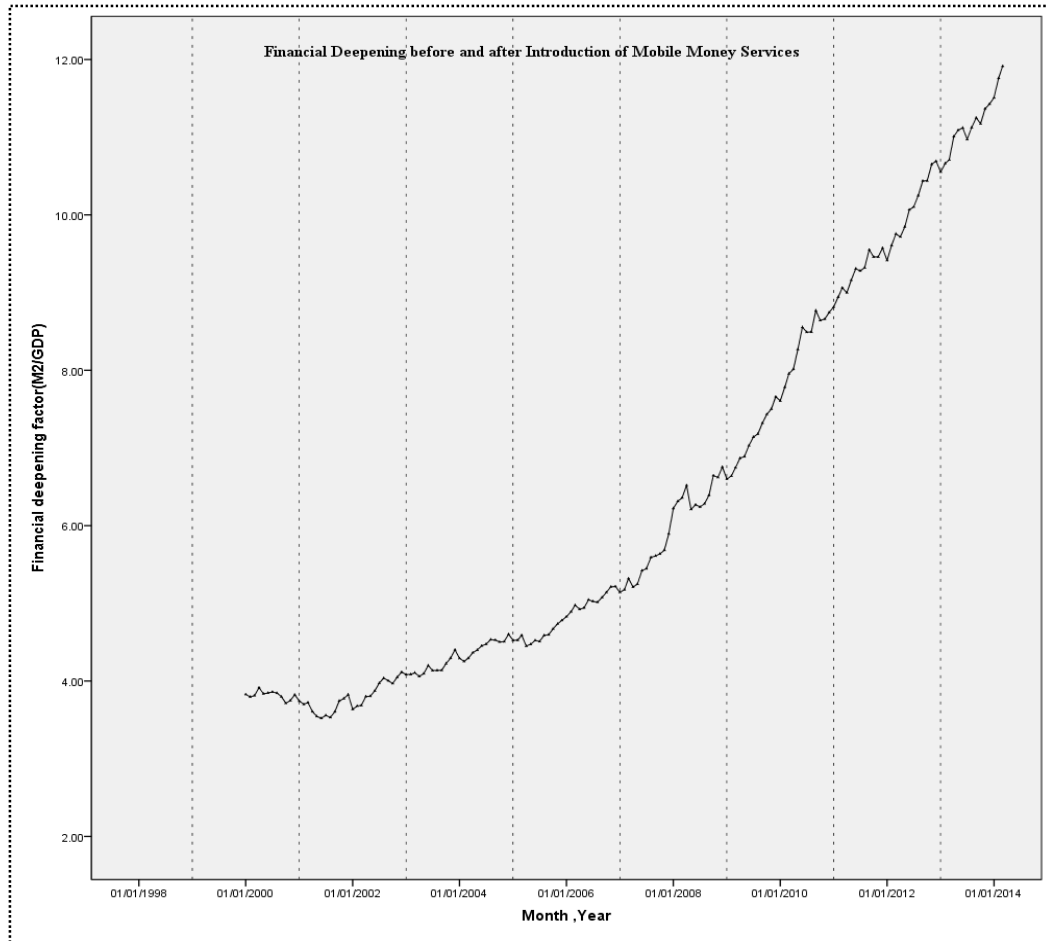
Since introduction of mobile money services in Kenya in March 2007, the usage is growing exponentially as demonstrated by the line graph on figure 4.1 above. The results are based on monthly data of mobile money transaction values in Kenya for all mobile service providers. Value of monthly transactions grew from 64 millions in March 2007 to 182 billion by December 2013.



**Figure 4.2 Financial Deepening Growth in Kenya**

Financial deepening levels as represented by ratio of broad money to GDP have grown steadily over the years. Figure 4.2 above shows growth between the year 2007 and 2013 when Kenya experienced various changes that influence financial deepening. Among these factors include: - introduction of mobile money in March 2007, pulmalgation of the new constitution, institutional and financial reforms, judicial independence and reforms were put in place, capital market authority was

reconstituted and Nairobi stock market introduced new measures to enhance good corporate governance and fair trading practices.



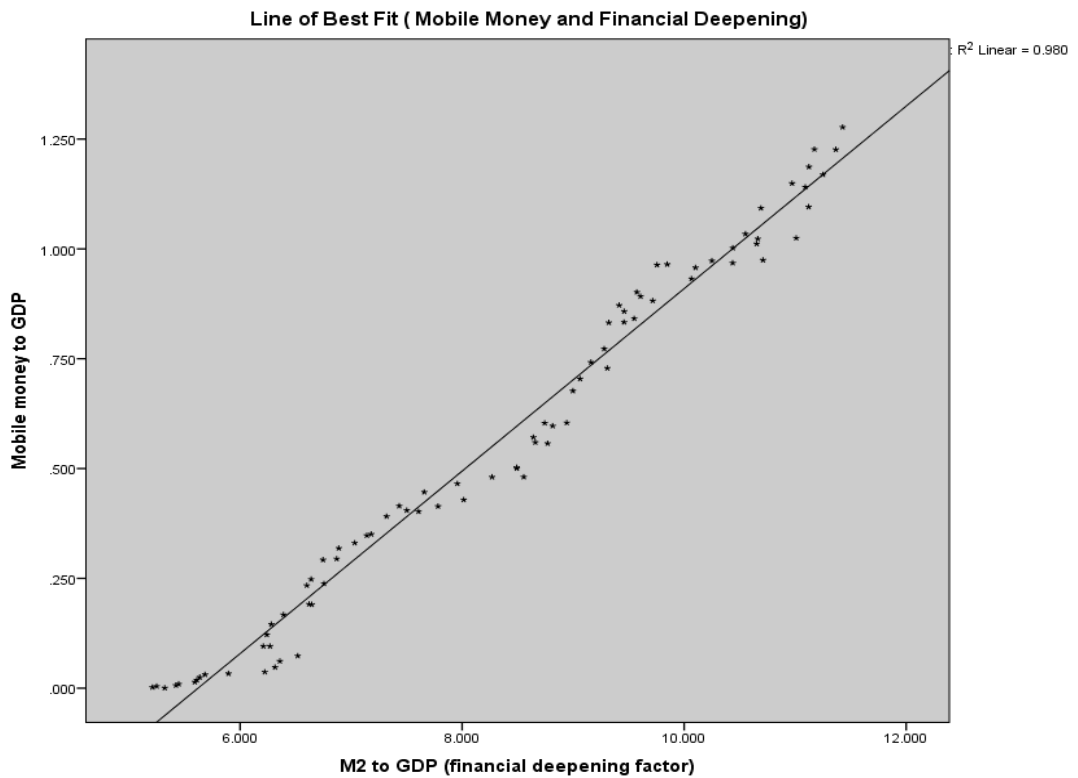
**Figure 4.3 Financial Deepening Before and After Introduction of Money Mobile in 2007**

The levels of financial deepening in Kenya were stagnating between year 2000 and 2007, but improved drastically thereafter as demonstrated by the line graphs on figure 4.3. The rate of growth shift upward after the year 2007. This is visible when you compare financial deepening in the period between 2007 and 2013 represented on figure 4.2 and period from 2000 to 2007 in figure 4.3. This study attributes this shift

to introduction of mobile money in the year 2007 since most institutional and financial reforms started in 2002 when there was a major change in political regime.

### 4.3 Correlation Analysis

This method helps the study to establish association between mobile money and financial deepening levels in Kenya. It also helps the study in measuring the degree and significance of relationship between the two variables. The results guide the study to establish the cause and effect relationship in later stage.



**Figure 4.4: Line of Best Fit (Money and Financial Deepening)**



**Table 4.1 Correlation Results**

		M2 to GDP (financial deepening factor)	Mobile money to GDP	Credit to GDP	Deposits to GDP	Prime Lending Rates
M2 to GDP (financial deepening factor)	Pearson Correlation	1	.990	.985	.978	.727
	Sig. (2-tailed)		.000	.000	.000	.000
Mobile money to GDP	Pearson Correlation	.990	1	.994	.959	.762
	Sig. (2-tailed)	.000		.000	.000	.000
Credit to GDP	Pearson Correlation	.985	.994	1	.957	.772
	Sig. (2-tailed)	.000	.000		.000	.000
Deposits to GDP	Pearson Correlation	.978	.959	.957	1	.631
	Sig. (2-tailed)	.000	.000	.000		.000
Prime Lending Rates	Pearson Correlation	.727	.762	.772	.631	1
	Sig. (2-tailed)	.000	.000	.000	.000	

According to the table 4.1 above there exist a strong positive correlation between mobile money and financial deepening in Kenya. The same is demonstrated by the line of best fit on figure 4.4 above with a correlation coefficient of 0.99 at 1% level of significance which is strong evidence that support this relationship. Though there is a high correlation it may not necessarily mean a cause-and-effect relationship between

mobile money and financial deepening, a further scientific analysis is useful to establish causality. Mobile money show a strong association of 0.9 between credit to private sector and bank deposit and a relatively lower relationship with banks lending rates (0.762). Similarly financial deepening is strongly related to mobile money, credit to private sector and bank deposits and relatively related to bank lending rates. Lending rates show relatively low relationship with all other variables though positively.

#### 4.4 Regression Analysis and Hypothesis Testing

This method guides the study in estimating average relationship between macroeconomic variables and financial deepening levels. It enables development of a model to estimate or forecast financial deepening levels given predetermined macroeconomic variables and mobile money values. It provides the standard error and significance of the model and that of variables that enables the study to make inferences. Using a set of data derived from CBK between 2007 and 2013 the following statistical results are obtained using SPSS 20.

**Table 4.2 Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.996 <sup>a</sup>	.991	.991	.182206

- a) Predictors: (Constant), Prime Lending Rates, Deposits to GDP, Mobile money to GDP, Credit to GDP

**Table 4.3 ANOVA**

Model	Sum of Squares	Df	Mean Square	F	Sig.
1					
Regression	282.544	4	70.636	2127.654	.000 <sup>b</sup>
Residual	2.556	77	.033		
Total	285.100	81			

- a. Dependent Variable: M2 to GDP (financial deepening factor)
- b. Predictors: (Constant), Prime Lending Rates, Deposits to GDP, Mobile money to GDP, Credit to GDP

**Table 4.4 Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	2.985	.523		5.708	.000
1 Mobile money to GDP	3.089	.478	.648	6.468	.000
Credit to GDP	-.064	.098	-.068	-.652	.516
Deposits to GDP	1.135	.134	.403	8.494	.000
Prime Lending Rates	.026	.018	.031	1.476	.144

From above multiple regression statistics the model estimate is as follows;

$$B_0 = 2.985, \beta_1 = 3.089, \beta_2 = 1.135, \beta_3 = 0.026, \beta_4 = -0.064$$

The regression model  $Y = 2.985 + 3.089 X_1 + 1.135X_2 + 0.026X_3 - 0.064X_4$

We use F-test to determine the significance of the model. The model would be insignificant if none of the independent variables relate to the dependent variable, hence our derived hypothesis are as follows:-

Null Hypothesis:  $H_0$ : None of the independent variables  $X_1$ ,  $X_2$ ,  $X_3$  and  $X_4$  are significantly related to  $Y$  i.e.  $\beta_1, \beta_2, \beta_3$  and  $\beta_4 = 0$ . Alternative Hypothesis:  $H_a$ : At least one of independent variables is significantly related to  $Y$  i.e.  $\beta_1, \beta_2, \beta_3$  or  $\beta_4 \neq 0$ ; level of significant is set at 5%.

Table 4.2 provides model results that enable us to test the significance of the multiple regression models at 5% significance level. Using the critical value  $F_{0.5}$  based on 4 numerators and 77 denominators the F-statistic is 2.45. Comparing it with our  $F_{(model)} = 2127 > F_{0.5} = 2.25$ . Also comparing the  $P$ -value of 0.000 (calculated above) which is smaller than 0.05, 0.01 and 0.001, we reject the  $H_0$  hypothesis in favor of  $H_a$  hypothesis at 5%, 1% and .01%. This is strong evidence that the independent variables (mobile money, credit to private sector, savings and lending rates) significantly relates to financial deepening in Kenya.

We test the independent variables at 0.05 level of significance using critical value  $t_{0.5/2}$  based on  $(n-(k+1)) = 77$  degrees of freedom. Null Hypothesis: independent variable has no effect on dependent variable i.e. the slope equals to zero  $H_0: \beta_1 = 0$ . Alternative Hypothesis: independent variable has an effect on dependent variable  $H_a: \beta_1 \neq 0, \beta_1 > 0, \beta_1 < 0$ . Decision rule: Reject  $H_0$  if the  $P$ -value  $< 0.05$ . For intercept  $\beta_0, |t| = 5.708 > 1.991; (0.00 < 0.05)$ , reject the null hypothesis. For  $X_1$  –mobile money  $\beta_1 |t| = 6.468 > 1.991; (0.00 < 0.05)$ , reject the null hypothesis. For  $X_2$ - Credit to private sector  $\beta_2 |t| = 0.652 < 1.991; (0.516 > 0.05)$ , accept the null hypothesis. For  $X_3$  demand deposit-  $\beta_3$

$|t| = 8.494 > 1.991$ ; ( $0.00 < 0.05$ ), reject the null hypothesis. For  $X_4$  prime lending rate  $\beta_4 |t| = 1.476 < 1.991$ ; ( $0.144 > 0.05$ ), accept the null hypothesis

#### **4.5 Discussion of Research Findings**

Based on the results above, mobile money is strongly and positively related to financial deepening with a slope of 3.089 at 95% confidence level. This implies that for every unit increment of mobile money factor, financial deepening levels increases by 3.089 factors as represented by money supply to GDP ratio. The regression result is supported by the strong positive correlation results of 0.990 and the time series analysis as presented in linear graph in figure 4.3 above.

The results of this study coincide with findings by Adunda and Kalunda (2012) that mobile money facilitates financial inclusion which is a key factor in economic development. This result also supports a study by Mutsune (2014) on model of financial inclusion by mobile banking in Kenya. Theoretically this result is supported by Townsend model of financial deepening and growth in that improvement in technology of communication increase financial interconnectedness of agents increasing labor specialization hence increase in consumption of market produced goods over time.

Bank deposits also exhibit a positive relationship with financial deepening with a slope coefficient of 1.135 at 95% level of significance. This means a unit increase in bank deposit increases financial deepening levels by 1.135 factors *ceteris paribus*. The impact of banks deposits on financial deepening in this study is parallel to the study by Ozurumba and Chigbu (2013) when they observed that deposit money banks is imperative in the development of Nigerian financial system. According Abiad et. al.

(2008) strong banking institutions supports financial deepening of a country, this may support the positive relationship in this study.

Credit to private sector negatively affects financial deepening. A unit increase in credit to private sector reduces the level of financial deepening by a factor of 0.064 though there is no sufficient evidence to prove it (not significant). Unit increase in money deposits leads to 1.135 unit increase in financial deepening factor. These results support the Keynesian theory of financial deepening that high savings increases levels of financial deepening and government spending increases deepening levels. The results are contrary to the study by Ezeji (2013) which finds a positive relationship between financial deepening and credit to private sector.

Unit increase in lending rates leads to 0.026 unit increase in financial deepening levels though the results are insignificant at 95% level of confidence. This result coincides with McKinnon-Shaw hypothesis that financial deepening has a positive relationship with interest rates. They propagate liberalization of financial markets as way to increase deepening levels. The results of this study also coincide with the study by IMF (2012) in that excessive credit growth precipitate crises even if the financial sector is deep, this is due to excessive risk-taking and lagging regulatory and supervisory capacities in developing countries.

The overall model is significant at 95% level of confidence hence the independent variables; mobile money, credit to private sector, bank deposits and lending rates relates to financial deepening in Kenya. The positive bivariate correlation between the variables which is significant at 95% also supports the model. Therefore the model is relevant and applicable to the study on effects of mobile money on financial deepening in Kenya.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter summarizes the findings of the study in section 5.2, conclusion in section 5.3, recommendations in section 5.4, limitations of the study in section 5.5 and finally suggestions for further research in section 5.6.

#### **5.2 Summary of the Findings**

This study was to evaluate the impact of mobile money on financial deepening in Kenya. From the study it was established that mobile money is one of the key determinants of financial deepening measured as a ratio of money supply to GDP. There is a strong association between the two variables and based on the regression results, of all the macroeconomic variables tested mobile money generated a slope of highest magnitude (3.089), this implies that mobile money bears the most responsibility in determining financial deepening levels in Kenya.

Time series analysis found a strong case to support the impact of mobile money. The duration before introduction of mobile money i.e. between 2000 and 2007 financial deepening grew at snail speed. With the introduction of mobile money there was exponential growth of financial deepening levels in Kenya. The strong relationship between mobile money and financial deepening suggest a strong dependence of mobile services by our financial sector. This pose a critical challenge to policy makers to ensure that they develop legal and institutional frameworks to safeguard the



economy from crisis associated with mobile money services outages or network problems.

The study also found a positive relationship between banks money deposits and financial deepening. Mobile money products such as m-banking is known to increase the levels of bank deposits and mobile money agents acts as banks branches that unbanked population use to channel savings. From the study there is importance of liberalization of interest rates in facilitating financial deepening. From the model lending rates have a positive relationship with the deepening levels as provided in the literature review. Credit to private sector bears a negative impact to financial deepening. This can be attributed to poor regulation and enforcement of contracts and right of the lenders. Minimal information to borrowers and inadequate registration of collaterals may negatively affect repayment hence low deepening level.

### **5.3 Conclusion**

Deepening the financial sector is a complex process that goes beyond economic factors. This paper examined the effects of mobile money on financial deepening in Kenya. The results of this paper are consistent with growing body of literature underscoring the importance of financial inclusion in deepening finance sector. It explains why the financial sector remains shallow in Kenya as there exists a huge population of people who are excluded from basic financial services. With introduction of mobile phones and money services the number of excluded population is reduced hence improved financial deepening levels.

Mobile money services have also widened possibilities of people saving money and borrowing through services such as m-banking, m-kesho, m-shwari and m-bima among others. Transfer of cash via mobile phone also enables rural people to smooth out consumption and risk diversification hence improving people's economic status. Mobile money also speeds up economic transactions by providing safe, fast and low cost mode of money transfer.

Financial services providers have widened the reach and improved service delivery since introduction of mobile money. There are increased deposits from the population who were unbanked before. This contributes to growth and expansion of financial institution as they operate at low costs associated to mobile money. This includes agents who operate like bank branches to offer financial services to remote areas at minimal set up cost. Banks have introduced services such as Equity agents and co-op Jirani which are operated in neighborhoods and shopping centers hence facilitating reach and access to financial services.

#### **5.4 Recommendations**

Due to strong relationship between mobile money and financial deepening, this study recommends the policy makers to mitigate risks associated with mobile money services. This includes cyber crimes, hacking of mobile networks and transmission frequencies. Financial institutions should protect users of the mobile money services from financial crimes and swindlers who may slow the gains achieved from mobile services. Services such m-banking should be standardized and be safeguarded from hacking. All banks in Kenya should be encouraged to adopt the service and introduce more agency banking to provide services to rural and unbanked population.

Strict regulation and laws should be put in place to ensure efficiency and effectiveness of mobile services is guaranteed to all people at all time. A downtime of these services can lead to an economic crisis or a dilemma. Mobile service providers should also operate at level ground and encourage competitiveness in order to achieve high efficiency levels and quality services at optimum prices Strategies to increase bank deposit should be put in place so as to improve financial deepening levels in the country. This should be implemented by CBK by introducing monetary policy such as reducing the reserve ratios and interest rates spread so as to ensure that depositors earn higher returns.

## **5.5 Limitations of the Study**

The concept of financial deepening is very broad aspect and is a multidimensional process as defined by IMF (2012). Finance sector deepening is collectively determined by institutional and regulatory preconditions, legal institutions, good democratic governance and financial reforms as highlighted by Abiad et al. (2008). This study has focused on few macro economics variables and mobile money as key independent variables. Kenya has undergone drastic transformations on these qualitative factors such as introduction of new constitution in 2010, privatization of key parastatals, institutional reforms, judicial independence and land reforms. These key aspects are not captured in our model.

The GDP figures are only available on quarterly basis while data on mobile money, lending rates, credit to private sector and demand deposits are monthly. This situation compelled the study to use monthly average data derived from quarterly GDP estimates. This may compromise accuracy of the results hence affect the model.

Financial deepening is a multidimensional process with a very wide scope, selection of the control variables was purely subjective. Literature review provide wide range of variables that can be analyzed but due to limited scope ,time and resources available for this study , we only selected three control variables i.e. lending rates , credit to private sector and bank money deposits.

## **5.6 Suggestions for Further Research**

The study recommends students of finance to further investigate the effects of institutional and regulatory preconditions, legal institutions, good democratic governance and financial reforms on financial deepening in Kenya. The study will complement findings of this study by indentifying which factors that bears most responsibility and therefore recommend regulators to focus and redirect resources towards it.

A study on relationship between mobile money and financial inclusion is also recommended. This will establish measures to be put in place to expedite the process to of financial inclusion in order to achieve the millennium goals of poverty eradication by 2030. A model should be developed to relate financial inclusion and financial deepening to compliment the finding of this study.

A study on risks factors and challenges affecting mobile money technology should be conducted in order to assist the policy makers on measures of mitigating the financial risks posed by over-dependence on mobile money. The study would recommend the possible support and back-up programmes that should be put in place to avoid possible financial dilemma.

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## **APPENDICES**

### **Appendix I: List of Mobile Companies in Kenya and Respective Mobile Money Services**

1. Essar Telecom Kenya offers Yu-money,
2. Orange Telecom offers Orange money,
3. Mobile Pay Limited offers Tangaza pesa,
4. Waseela Microfinance Bank Ltd offers Mobicash,
5. Barti Airtel Kenya offers Airtel money
6. Safaricom Kenya Ltd offers Mpesa.

**APPENDIX II: Values of Monthly Mobile Transactions, Quarterly GDP, Broad Money, Credit to Private Sector, Demand Deposit in Banks and Prime Lending Rates**

MONTH, YE AR	Value of Mobile Money in Millions	Quarterly GDP in Millions	Broad Money (M2) in Millions	Credit to Private Sector in Millions	Demand deposit in Banks in Millions	Prime Lending Rates
Mar-07	64.00	324,927	576,281	466,158	207,053	13.56
Apr-07	221.00	335,034	581,901	474,643	213,416	13.33
1-May	484.00	335,034	586,137	484,553	238,181	13.38
Jun-07	720.00	335,034	605,550	451,614	251,300	13.14
Jul-07	1,065.00	337,479	612,677	462,826	253,333	13.29
Aug-07	1,580.00	337,479	629,048	472,518	263,674	13.04
Sep-07	2,070.00	337,479	631,141	474,374	261,312	12.87
Oct-07	2,830.00	339,393	637,641	478,891	261,350	13.24
Nov-07	3,515.00	339,393	643,052	496,272	262,963	13.39
Dec-07	3,770.00	339,393	666,875	519,457	275,360	13.32
Jan-08	4,029.00	328,934	682,257	533,932	278,689	13.78
Feb-08	5,220.00	328,934	692,362	533,916	281,960	13.84
Mar-08	6,747.00	328,934	697,122	530,705	285,514	14.06
Apr-08	8,390.00	342,586	744,492	587,121	345,411	13.91
May-08	10,904.00	342,586	709,063	584,784	303,608	14.01
Jun-08	10,917.00	342,586	715,968	572,950	299,599	14.06
Jul-08	14,017.00	345,634	718,974	603,118	287,562	13.9
Aug-08	16,756.00	345,634	723,695	610,357	288,395	13.66
Sep-08	19,270.00	345,634	736,325	632,438	290,800	13.66
Oct-08	21,601.00	340,328	753,842	649,989	300,421	14.12
Nov-08	21,700.00	340,328	751,151	662,433	290,382	14.33
Dec-08	26,990.00	340,328	766,393	662,317	289,429	14.87
Jan-09	27,075.00	347,083	763,649	663,175	298,298	14.78
Feb-09	28,686.00	347,083	768,191	674,980	282,036	14.67
Mar-09	33,820.00	347,083	780,513	676,092	311,834	14.87
Apr-09	34,020.00	346,451	793,307	676,931	285,078	14.71
May-09	36,806.00	346,451	795,601	688,633	296,382	14.85
Jun-09	38,176.00	346,451	812,055	697,168	305,009	15.09
Jul-09	40,337.00	348,046	828,521	694,057	330,409	14.79
Aug-09	40,679.00	348,046	833,081	706,325	336,785	14.76
Sep-09	45,368.00	348,046	849,209	701,077	337,280	14.74

Oct-09	48,637.00	351,771	871,616	721,542	344,661	14.78
Nov-09	47,466.00	351,771	879,608	729,591	334,092	14.85
Dec-09	52,342.00	351,771	898,099	747,312	332,404	14.76
Jan-10	48,463.00	361,592	916,868	756,096	357,051	14.98
Feb-10	49,906.00	361,592	938,135	763,725	350,857	14.98
Mar-10	56,117.00	361,592	959,005	768,205	359,321	14.8
Apr-10	51,814.00	362,486	968,329	779,322	367,581	14.58
May-10	58,080.00	362,486	999,145	797,948	382,679	14.46
Jun-10	58,099.00	362,486	1,033,704	809,025	399,490	14.39
Jul-10	61,773.00	368,861	1,044,019	824,648	405,803	14.29
Aug-10	61,531.00	368,861	1,044,178	837,437	398,981	14.18
Sep-10	68,506.00	368,861	1,078,277	852,607	416,165	13.98
Oct-10	71,795.00	377,154	1,086,465	874,947	425,393	13.85
Nov-10	70,373.00	377,154	1,088,667	885,991	433,324	13.95
Dec-10	75,865.00	377,154	1,099,234	898,490	442,106	13.87
Jan-11	75,433.00	379,065	1,113,901	915,229	450,805	14.03
Feb-11	76,337.00	379,065	1,129,991	939,888	462,535	13.92
Mar-11	88,997.00	379,065	1,145,003	964,808	479,024	13.92
Apr-11	86,088.00	381,566	1,144,395	989,957	462,995	13.92
May-11	94,372.00	381,566	1,165,087	1,014,626	479,041	13.88
Jun-11	92,644.00	381,566	1,183,864	1,054,465	490,242	13.91
Jul-11	99,710.00	387,244	1,197,837	1,088,689	488,425	14.14
Aug-11	107,424.00	387,244	1,203,146	1,107,874	485,608	14.32
Sep-11	108,615.00	387,244	1,232,807	1,158,794	493,086	14.79
Oct-11	109,119.00	392,909	1,238,834	1,179,441	514,819	15.21
Nov-11	112,332.00	392,909	1,238,922	1,170,545	488,020	18.51
Dec-11	118,080.00	392,909	1,253,958	1,173,137	472,299	20.04
Jan-12	114,060.00	392,516	1,231,744	1,168,801	467,399	19.54
Feb-12	116,691.00	392,516	1,256,993	1,181,865	476,859	20.28
Mar-12	126,093.00	392,516	1,276,403	1,193,587	468,772	20.34
Apr-12	117,360.00	399,166	1,292,927	1,211,319	481,770	20.22
May-12	28,403.00	399,166	1,310,282	1,233,007	473,044	20.12
Jun-12	124,020.00	399,166	1,339,425	1,227,702	479,170	20.3
Jul-12	129,280.00	405,086	1,364,193	1,238,728	489,326	20.15
Aug-12	131,380.00	405,086	1,384,095	1,243,818	498,285	20.13
Sep-12	130,690.00	405,086	1,409,368	1,248,945	521,953	19.73
Oct-12	137,680.00	412,192	1,434,230	1,264,347	545,738	19.04
Nov-12	138,990.00	412,192	1,463,707	1,277,806	534,128	17.78
Dec-12	150,160.00	412,192	1,469,037	1,295,395	548,545	18.15

Jan-13	142,653.00	413,853	1,455,685	1,309,289	544,197	18.13
Feb-13	141,126.00	413,853	1,470,972	1,317,998	550,495	17.84
Mar-13	134,446.00	413,853	1,477,412	1,328,352	554,623	17.73
Apr-13	142,609.00	417,547	1,532,367	1,338,767	586,728	17.87
May-13	158,770.00	417,547	1,543,737	1,352,307	589,573	17.45
Jun-13	152,500.00	417,547	1,547,882	1,380,034	584,779	16.97
Jul-13	162,760.00	424,883	1,554,003	1,402,202	580,067	17.02
Aug-13	168,100.00	424,883	1,575,523	1,440,803	582,206	16.96
Sep-13	165,590.00	424,883	1,593,396	1,465,824	605,731	16.86
Oct-13	175,290.00	428,664	1,596,593	1,494,235	609,619	17
Nov-13	175,220.00	428,664	1,624,132	1,533,119	602,251	16.89
Dec-13	182,495.00	428,664	1,632,845	1,555,586	594,012	16.99

**Source: Central Bank of Kenya**

## Appendix III: Mobile Money Ecosystem Configuration in Kenya

