

**THE RELATIONSHIP BETWEEN NATIONAL PAYMENT SYSTEMS AND THE  
ECONOMIC GROWTH IN KENYA**

**BY:**

**GEOFFREY MUIRURI**

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## **DECLARATION**

I declare that this is my original work and has not been presented for a degree in any other university.

Geoffrey Muiruri -D61/60111/2013 Sign: ..... Date: .....

### Supervisor's Declaration

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

Dr. Kennedy Okiro Sign: ..... Date: .....

## **ABSTRACT**

In Kenya today, there has been continuous increase in use of the national payment systems rather than the actual dispensation of cash. All payment systems instruments have resulted to transfer of huge sum of money from one area or person to the other. Efficient payments systems promotes and support regional flows by increasing speed, convenience, reducing cost, lowering payment risks and ensuring a high degree of finality and affects directly the efficiency of the circulation of goods and services and the pace of economic expansion. The study was therefore carried out to establish whether there is any relationship between the national payment system instruments and the economic growth. Specifically the study looked at six payment systems that is being measured by the central bank of Kenya based on their volume, value and some based on the transactions. In total a total of 15 independent variables were looked at. The study used secondary data from the central bank of Kenya and Kenya national bureau of statistic from September 2005 to March 2015. Statistical tools were used to analyze the data and was presented inform of mean, standard deviation, maximum, minimum, median, skewedness, kurtosis and the regression model. The result established that there was a positive relationship at 79% and that the independent variables explain 38% while the rest of the 62% is explained by other factors other than the independent variables

## **LIST OF ABBREVIATIONS**

ACH	Automated Clearing House
ATMs	Automatic Teller Machines
BIS	Bank of international settlement
CAK	Communication Authority of Kenya
CBK	Central Bank of Kenya
ECB	European central bank
EFT	Electronic Fund Transfer
GDP	Gross Domestic Product
DFCC	Domestic foreign currency clearing
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
KEPSS	Kenya Electronic Payments and Settlement System
KNBS	Kenya National Bureau of Statistics
KSHS	Kenya Shillings
MMT	Mobile Money Transfer
NPS	National Payment System

POS	Point Of Sale
RTGS	Real Time Gross Settlement
SWIFT	Society of World Wide International Funds Transfer
VISA	Virtual Instrument Software Architecture

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# **CHAPTER ONE:**

## **INTRODUCTION**

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

It is widely recognized that a well-functioning payment infrastructure is crucial to enhance the efficiency of financial markets and the financial system as a whole, boost consumer confidence and facilitate economic interaction and trade both in goods and services (BIS, 2003; European central bank (ECB), 2010). Unsafe and inefficient payment systems may hamper the efficient transfer of funds among individuals and economic actors (Humphrey et al., 2006). Payment system is of systematic-wide importance because it facilitates both consumer-to-consumer and commercial transactions and in so doing has a significant impact on the overall economy (Cirasino & Garcia, 2008). Consumers will find themselves with a wider range of payment options that are likely to be globally accepted (ECB, 2010), implying smoother access to funds on deposit and immediate credit according to Global Insight study by VISA (2003). Similarly, merchants will find themselves with improved speed of transactions, higher security, less costs connected to paper-based transactions. In fact, by eliminating or reducing market frictions and costs, an efficient payment infrastructure helps trade, services and transfer of funds hence fostering economic interactions. Consumption and trade increase, in turn supporting production and so overall growth (Singh & Zandi, 2010). In sum, the impact of developments in payment systems, lead to a virtuous economic cycle that comes both from consumers', thanks to higher availability of credit and increased efficiency in transactions, and from merchants that find themselves with a large pool of consumers and better guaranteed payments.

Payment system involves sending or receiving money for either payment of salaries, settlement of business transactions, payment of school fees, or for family support and is common both for businesses and individuals (Kabbucho, Sander & Mukwana, 2003). It requires efficient, reliable and affordable payment system where money can be deposited in one location and withdrawn in another in both urban and rural areas. Payment systems involved in such transfers includes Electronic funds transfers (EFT), Real Time Gross settlement (RTGS), automated teller machines (ATM), cheques, in-house foreign denominated currencies and the mobile money transfer offered by commercial banks, mobile phone companies, couriers, bus companies, and by informal providers such as bus conductors and friends. Among the commercial bank instruments, RTGS, EFT and bank drafts are typically used for large value transfers, as they offer the cheapest service for the transfer of large amounts while banker's cheques are the preferred means of payment for school fees. Western Union, money gram, rapid transfers and similar services are often exclusively used to receive money rather than send it (Merritt, 2010).

New technology and new business models are changing the way people pay for their purchases. These developments accelerate the substitution from cash and cheques to electronic means of payment (Fung, Molico & Stuber, 2014). Over the last one century dramatic increase in the use of electronic payment means has been seen owing to it being more convenient, secure and easy to use. People in the rural areas who lacked access to financial services such as savings account, credit insurance and payment services are now able to do so through the use of mobile money transfers and mobile banking. Njuguna & Mwangi, 2009 observed that Kenya was very successful in the adoption of payment system such as RTGS, EFT'S, and Payment cards in addressing the needs of users through mobile companies and commercial banks.

Central Bank of a country plays a significant role in creation of Payment Systems as to formulation and implementation of policies that best promote the establishment, regulation and supervision of efficient, effective payment, clearing and settlement systems. It seeks to ensure that payment systems do not generate high level of risks to participants and users of financial services, continue to operate without major disruptions, offer efficient, reliable and safe payment services to customers and have the necessary and regulatory legal framework. In Kenya the Central Bank is a key facilitator of settlement, provider of payment systems and a supervisor of the Nairobi Automated Clearing House on behalf of Kenya Bankers Association in order to maintain integrity and confidence. It is a provider of liquidity and overseer of the payment system for final settlement of imbalances that are important at individual bank level and at system level. This is so because it cannot fail; it is the lender of last resort for any financial institution that might run into liquidity problems and can always supply liquidity in the amounts deemed necessary for the banking sector (Arnone & Bandiera, 2004)

### **1.1.1 National Payment System**

A national payment system is one of the principal components of a country's monetary and financial system and, therefore, crucial to a country's economic development (Kippetekut, 2007). It is through the national payment system that money is transferred between buyers and sellers in commercial and financial transactions. If done well, the development of the national payment system can reduce overall transaction costs and expand the opportunities for commercial and financial transactions in an economy. Introduction of a cheaper payment instrument such as electronic payments may be welfare improving (Calladoy, Hromcováz & Utrero, 2007). The efficiency of a nation's payment system is a primary concern of central banks. Since electronic payments are typically cheaper than paper-based or cash payments, pricing these transactions

should speed up the shift to electronics. Greenspan (1996) views payment system as a set of mechanisms which can only provide the necessary infrastructure when coupled with appropriate rules and procedures. Therefore having the technology, systems, or instruments such as debit or credit cards without the supporting rules and arrangements between the institutions involved, may not necessarily present a safe and working payment system. There may be a need for a platform of collaborative arrangements for the mechanism. Committee on Payment and Settlement Systems (CPSS), 2006 views the payment system as comprising all institutional and infrastructure arrangements in a financial system for initiating and transferring monetary claims in the form of commercial bank and central bank liabilities

The main stakeholders in a payment system include Central Bank of Kenya, commercial banks, infrastructure providers and other service providers such as non-banks and mobile service providers. Other stakeholders include regulatory bodies including the Government, Regional bodies and International Monetary bodies such as IMF and World Bank (Arnone & Bandiera, 2004). Payment systems have evolved from a simple system involving cash as a means of exchange to a more sophisticated system involving various institutions and related regulations providing payment instruments and infrastructures that fulfill business and social obligations. It includes any payment to businesses, banks, public services from citizens and governments, which are executed through electronic networks (Sumanjeet, 2009).

The modernization of payments system in Kenya began with the Automation of the Nairobi Clearing House in 1998 with the aim of enhancing the clearing of cheques between banks using Magnetic Ink Character Recognition technology and Electronic Funds Transfer (Central Bank of Kenya 2013). This reduced the clearing time from a high of fourteen (14) days to three (3) days by 2002 and

currently at one (1) day (Ndungu, 2008). The second milestone was the successful launches of the Kenya National Payments System Framework and Strategy in 2004 and the Kenya Electronic Payments and Settlement System (KEPSS) in 2005. KEPSS implementation helped phase out the previous paper-based inter-bank settlement system. Third and final milestone was cheque truncation, value capping, and failure to settle mechanism (Central Bank of Kenya 2013). The modernization of the National Payments System (NPS) has reduced transaction costs and improved the effectiveness of monetary policy instruments. The NPS provides a critical positive externality to lower the cost of doing business by building confidence and reducing transaction time costs (CBK Monetary Policy Statement, December 2014).

In Kenya there are several major payment methods that forms the national payment system broadly grouped into three categories namely cash, electronic and paper-based instruments. Real Time Gross Settlement (RTGS) System also known as the Kenya Electronic Payments and Settlement System (KEPSS) is a settlement system in which processing and settlement take place on a transaction-by-transaction basis (without netting) in real time (continuously) via the SWIFT (Society of World Wide International Funds Transfer) network, which is a safe money transfer net-work. Secondly EFT is a transfer mode that operates on a deferred net settlement basis which settles transactions in batches at a particular point of time. All transactions are held up till that time. EFT is used in repetitive tasks such as salaries and utility payments. Thirdly payment cards both debit and credit cards are used to disperse cash that are then used to purchase the cash transactions including the use of ATM and POS systems. Point of sale (POS) machine is mainly used in the supermarkets where a retail transaction is completed. It is the point at which a customer makes a payment to the merchant in exchange for goods or service. Fourthly the use of cheque that is paper based constitutes the non-bulk transaction that is of low value that does not

exceed one million shillings. Fifthly Domestic foreign currency clearing (DFCC) are domestic transactions that are in foreign denominated currencies and finally the mobile payments that are exclusively done through the mobile telecommunications.

### **1.1.2 Economic Growth**

An increase in the capacity of an economy to produce goods and services, compared from one period of time to another. Economic growth can be measured in nominal terms, which include inflation, or in real terms, which are adjusted for inflation. For comparing one country's economic growth to another, gross national product or gross national product per capita should be used as these take into account population differences between countries. Economic growth is achieved by increasing the economy's ability to produce goods and services.

This goal is best indicated by measuring the growth rate of production. If the economy produces more goods this year than last, then it is growing. Economic growth is also indicated by increases in the quantities of the resources (labor, capital, land, and entrepreneurship) used to produce goods. With economic growth, society gets more goods that can be used to satisfy more wants and needs. Sources of Economic Growth in a country includes the Quantity of Labor: (increase in natural population growth, immigration from other countries and higher labor force participation rate), Quantity of Capital (increases through the production of capital goods), Quantity of Natural Resources( increased through exploration after their existence and location is known), Quality of Labor ( through education, either formal schooling or informal on-the-job training) and finally Quality of Capital (increase of technological advances). Economic growth can be either positive or negative. Negative growth can be referred to by saying that the economy is shrinking. Negative growth is associated with economic recession and economic depression.



Ross Levine, 1997 suggests that financial systems are important for productivity, growth and development. Well-functioning institutions and markets notably augment technological innovation, capital accumulation and therefore economic growth. They also noted that well-functioning financial markets lower the costs of transaction thereby increasing the amount of savings put into investment. They also allows for capital to be allocated to projects that yield the highest returns and therefore enhance economic growth rates.

### **1.1.3 National Payment System and Economic Growth**

Kenya's economy is estimated to have expanded by 5.5 per cent during the third quarter of 2014 compared to a revised growth of 4.6 per cent in 2012, 5.8% in 2010, 1.5% in 2008 and 7% in 2007. The year 2014 growth was mainly supported by strong expansions of activities in construction, finance and insurance, wholesale and retail trade, information and communication, and agriculture and forestry (Kenya national bureau of statistics 2014). All the sectors of the economy recorded positive growths except accommodation and food services (hotels and restaurants) which have consistently been on the decline since the year 2013.

During the same period, total payments that were made via the Cheques and EFT amounted to Kshs 2 trillion in 2007 followed by an increase to 4 trillion in 2008 then dropping to 2 trillion in 2010. The same was maintained at Kshs 2.5 trillion in 2012 and as at March 2014 there was a total of Kshs 0.7 trillion paid during the three months (Central Bank of Kenya, 2014). RTGS payments has shown a steady increase from inception in 2005 at 2 trillion, 9 trillion in 2007 rising to 17 trillion in 2010, 19 trillion in 2012 and to 23 trillion in 2014 as per the central bank data. In general the overall payment system in Kenya has shown steady increase in the value of the transactions that has been conducted during the years from the year 2007 to date. The increase in the value of payment may mean an increase in the factors of production that may be associated

with the real or nominal GDP. All of payment systems are aimed at mitigating various risks and enhancing the efficiency and effectiveness of our payments system (Kiptepkut, 2007). Although the introduction of the Real Time Gross Settlement System was expected to reduce the systemic importance of the Automated Clearing House (ACH) and increase the stability and soundness of the payment systems, available information reveals that there has been no significant change in the volumes and values of payment instruments going through the ACH. Therefore the ACH still remains a Systemically Important Payment System as opposed to being a low risk retail payment system (Central bank 2012)

## **1.2 Research Problem**

An efficient national payment system reduces the cost of exchanging goods and services, and is indispensable to the functioning of the interbank, money, and capital markets. A weak payment system may severely drag on the stability and developmental capacity of a national economy since its failures can result in inefficient use of financial resources, inequitable risk-sharing among agents, actual losses for participants, and loss of confidence in the financial system and in the very use of money. Therefore technical efficiency of payment system is important for the development of an economy. Increased use of national payment system is an indicator of a well-functioning system and may be an indicator of the growth of the economy as a whole. The payment system development is part of the Vision 2030 goals which not only aims at meeting the Millennium Development Goals but also making the country globally competitive (Njuguna, Kamau & Owino, 2012). It is due to this fact that we needed to study whether the increased use of the national payment system has any relationship to the development of the national economy.

Previous studies have looked into costs and profitability related to the use of electronic payment instruments, showing the potential positive effects on capital allocation, capital accumulation and

growth. Berger (2003) showed that technological development in the financial system, such as internet banking, electronic payment technologies and information exchanges, is related to significant productivity increases due to improvements in the services provided by banks leading to gains in productivity and economies of scale. The previous studies have not however looked at the relationship of all the payment instruments and the economic growth.

Technology has introduced new ways of delivering banking services and products to the customers such as RTGS, EFTS, POS, ATMs, internet and mobile banking. Commercial banks and mobile telecommunication companies have found themselves at the forefront of technology adoption in the past three decades (Sing, 2002). These changes and developments in payment systems have impacts on the quality and future of the payment activities. Reliable communications and computer systems, including management information system, are essential in operating a payment system. M-pesa transactions, for instance, have become popular because of their ability to provide real time transfer of money. Previous studies have not focused themselves on the electronic payment instruments that are offered by the central bank of Kenya for the Kenyan environment.

Volumes of transactions on any instrument are a measure of efficiency and effectiveness as the user would desist from using such instruments if they were not efficient. Values of transaction that are carried by the instrument would measure the economic value of the goods and services that have been purchased through such instruments. From the foregoing it is clear that we need to carry out the study to determine the relationship of the increasing use of national payment system and the development of an economy. This would enable us to answer our research question on whether the increasing use of national payment system that arises out of them being efficient,

reliable and timely to the users has any relationship to the economy through the increased economic activities..

### **1.3 Research Objective**

The objective of the study was to determine the relationship of the national payment systems and the growth of the Kenyan economy.

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

The general public will be informed about the benefits of payment systems 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. Proper understanding of the payment systems will stimulate their use and therefore achieve the intended purpose of their design in the first place. Payment system as a means of transferring fund will guide the providers of the payment systems in their future design, formulation and monitoring based on the shortcomings highlighted by the study and its recommendation for the future improvements.

Theories relating to the payment systems and money transfers services have been highlighted and hence the study provides a source for such revisit of the theories and their continued significance with time. Early theories showed that the centralized banking provided the best means of monetary management which later changed to the liberation of the financial services.

For the policy makers and agencies like the Central bank of Kenya (CBK), the findings of the study is important in informing the policy formulation especially with regard to regulating the payments systems. The commercial bank and other players in the money transfer services will understand the role they play towards the economic growth of the country. Different countries in the world have different payment systems that are specific to their need. The study will

highlighted some of the improvements done by the countries to have the safest and most reliable payment systems.

For government and non-government organization, the study facilitates knowledge on the benefits, challenges and improvements that can be done to the payment systems currently used in the country.

As for scholars and academicians, the study is important in providing information on payment systems in Kenya and its role to the economic growth. The study is a source of reference to the other scholars who will approve or disapprove the findings. Nevertheless, the research also suggests 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**

Electronic payments are at a critical threshold of growth. In developed economies, the continued expansion of payment options will be a key factor in reducing friction and creating economic efficiencies. In developing or transitional economies, electronic payment systems can play a powerful role in modernizing financial systems, creating economic transparency, and contributing to greater predictability, liquidity and stability. This section looks at the reviews of financial systems theories geared at the development of economies and their role in modernizing the payments systems. This section contains review 2.2- theoretical review, 2.3 determinants of payment system and 2.3- the empirical literature of the research subject matter.

#### **2.2 Theoretical Literature Review**

History demonstrates a compelling need to standardize payment forms to enhance their utility. Examples are ancient Qin Dynasty in China (221-207 B.C.), when the Emperor unified three or four forms of currency into one coin, and recent creation of the Euro in the 21st Century. This section is aimed at looking at the theories which have led to understanding of the payment systems together with the financial intermediaries that ensure the completion of payment transactions. The theories reviewed in this section are financial intermediation theory, monetary theory, Modern Monetary Theory, Quantity theory of money and Lacker's Model.

##### **2.2.1 Financial Intermediation Theory**

This theory was advanced by Franklin Allen and Anthony Santomero in 1996 while reviewing the state of intermediation theory and attempting to reconcile it with the observed behavior of

institutions in modern capital markets. Financial intermediation is the process performed by banks of taking in funds from a depositor and then lending them out to a borrower. The banking business thrives on the financial intermediation abilities of financial institutions that allow them to lend out money at relatively high rates of interest while receiving money on deposit at relatively low rates of interest. Intermediation therefore involves the activity of matching lenders who have savings to borrowers who need money by an agent or third party, such as a bank. A financial intermediary is an entity that acts as the middleman between two parties in a financial transaction. While a commercial bank is a typical financial intermediary, this category also includes other financial institutions such as investment banks, insurance companies, broker-dealers, mutual funds and pension funds.

Current financial intermediation theory builds on the notion that intermediaries serve to reduce transaction costs and informational asymmetries. 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 (Scholtens & Wensveen, 2003). As developments in information technology, deregulation and deepening of financial markets tend to reduce transaction costs and informational asymmetries (Fama, 1980). Gurley and Shaw (1960) and many subsequent authors have stressed the role of transaction costs.

The role of central bank and the commercial banks in the national payment system is first to reduce the transaction cost both in terms of time taken to complete transactions and also to reduce distance that one would have otherwise been required to have travel to access the required funds. National payment system has greatly achieved this important role which means that the costs that would have otherwise been used in this direction are saved and invested to other important activities that enhances the economic growth of the parties involved.

### **2.2.2 Monetary Theory**

This theory is mainly associated with the work of Milton Friedman in 1972 who suggested that different monetary policies can benefit nations depending on their unique set of resources and limitations. It is based on core ideas about how factors like the size of the money supply, price levels and benchmark interest rates affect the economy. The central bank operates on a monetary theory that focuses on maintaining stable prices (low inflation), promoting full employment and achieving steady growth in gross domestic product (GDP). Monetary policy rests on the relationship between the rates of interest in an economy, that is the price at which money can be borrowed, and the total supply of money by influencing the outcomes of economic growth, inflation, exchange rates with other currencies and unemployment.

One of the major roles played by central bank is being a provider of liquidity and overseer of the payment system. This role helps the central bank monitor the liquidity level of the country and in that context helps the central bank of Kenya manipulates the interest rates and the inflation to its desired levels. National payment system has therefore played a key role in providing the key factors that are used to control the money supply and other factors necessary to economic growth of a country.

### **2.2.3 Modern Monetary Theory**

George Friedrich Knapp, a German economist coined the term modern monetary theory (MMT) also known as chartalism in his State Theory of Money, which was published in German in 1905 and translated into English in 1924 as an economic theory that details the procedures and consequences of using government-issued tokens as the unit of money, i.e., fiat money (currency which derives its value from government regulation or law). According to modern monetary theory, governments with the power to issue their own currency are always solvent, and can



afford to buy anything for sale in their domestic unit of account even though they may face inflationary and political constraints. This means that no such sovereign government can be forced to tolerate mass unemployment because of the state of its finances no matter what that state happens.

MMT aims to describe and analyze modern economies in which the national currency is fiat money, established and created exclusively by the government. In MMT, money enters circulation through government spending, taxation and its legal tender power to discharge debt, establish the fiat money as currency, giving it value by creating demand for it in the form of a private tax obligation that must be met using the government's currency. Because the government can issue its own currency at will, MMT maintains that the level of taxation relative to government spending is in reality a policy tool that regulates inflation and unemployment

National payment system has enacted several means of electronic payment such as EFT'S and RTGS instead of using of real currency. Electronic payments are an integral part of e-commerce and are one of its most critical aspects. An e-commerce electronic payment is a financial exchange that takes place in an online environment, (Kalakota & Whinston, 1997). Transactions are debited to the payer and the credited to the receiver. This means of payment has largely controlled the actual printing of currency in a country and has controlled the excess supply of such currency. This has in turn helped the government to control the inflation of the country and hence improve on the real GDP.

#### **2.2.4 Quantity Theory of Money**

This theory states that an increase in the quantity of money leads to the rise in the general price. It was effectively put forward by Irving Fisher in 1926 which was later reprinted in 1973 by journal

of political economy. Quantity theory considers real income or national output (i.e., transactions of final goods only) rather than all transactions. The general price level in a country is measured taking into account only the prices of final goods and services which constitute national product. The function of money is considered to be a means of exchange as in the transactions approach of Fisher.

Income velocity is considered as the average number of times per period a unit of money is used in making payments involving final goods and services, that is, national product or national income measured by  $Y/M$  where  $Y$  stands for real national income and  $M$  for the quantity of money. Quantity theory of money is therefore written as  $P = MV/Y$  Where  $M$  = Quantity of money,  $V$  = Income velocity of money,  $P$  = Average price level of final goods and services and  $Y$  = Real national income (or aggregate output). Income velocity ( $V$ ) and national output ( $Y$ ) remaining constant, price level ( $P$ ) is determined by the quantity of money ( $M$ ).

National payment system is focused with the efficient payment system within the country. It aims at making the increasing volumes and value of transaction not only efficient but also reliable to conduct the daily business transactions. This volumes transactions and value of money results to income velocity that will eventually may determine the price levels.

### **2.2.5 Lacker's Model of Clearing and Settlement**

Lacker (1997) focuses on clearing and settlement via a central bank and the impact of certain central bank policies such as reserve requirements and interest paid on reserves. Lacker develops a model in which there is a large number,  $N$ , of islands, on each of which live  $N$  individuals. Each island produces a single perishable good that must be consumed on the island. In each period, all but one of the individuals who live on a given island travel to all the other islands at random but

one staying behind. All individuals consume the good that is produced on the island they visit (so the one who remains consumes the good produced on his island). Because goods do not move between islands, there is no possibility to directly exchange one for another. Instead, individual purchases consumption from the merchant on the island he visits by providing a bill or check drawn on his deposit held by his own merchant who stayed at home.

Let us replace the perishable good with an electronic charge to the e-account that is not paid instantaneously and an island with a commercial bank. Each bank collects bills or e-credits from all other banks. In any given period, some banks will consume more than they produce (i.e., issue more bills than they collect or be left with negative e-balances), while the opposite will be true for others. Inter temporal trade between banks across periods, i.e., interbank borrowing and lending of e-balances, is thus efficient. In the final stage of the period, all the merchant bankers travel with their bills to a central location in this case the central bank and submit them to each other for payment. With ICT technologies, physical meetings would not be necessary. Payment is effected through an accounting mechanism, with each banks account being credited and debited according to the bills or e-money presented to and by it. The residual that does not clear is carried over, in surplus or deficit.

### **2.3 Determinants of Economic Growth**

There are four factors that determine a country's Gross Domestic Product for the year which are the natural resources, human capital, capital goods and entrepreneurship. Countries that have a lot of natural resources are able to use them to produce goods and services cheaper than a country that has to import natural resources. Nations that invest in the health, education, and training of their people will have a more valuable workforce. All of the factories, machines, technologies, buildings, and property are needed by businesses to operate. Examples include tools, equipment,

factories, technology, computers, machinery, etc. The more capital goods a country has, the more goods and services they are able to produce and the more money they can make. Entrepreneurs must organize their businesses well for them to be successful. They bring together natural, human, and capital resources to produce goods or services to be provided by their businesses. For all the above factors to be met, then goods and services must be produced and paid for by the country's payment system. National payment system takes the bulk of these payments.

National payment systems involve the use of payment system that has been designed by the central bank. There is continued designation of payment systems that involves the creation of payment instruments such as payment cards, RTGS, EFT'S, credit transfers, direct debits, cheque and cash. Migration from one system would result to decrease in one and an increase in the other. Any increase in consumption arising from any payment system drives corresponding increases in GDP.

High value transactions are usually in the form of RTGS, EFTS, and DFCC. RTGS are specialist funds transfer systems where transfer of money or securities takes place from one bank to another on a real time and on gross basis. The transactions are settled as soon as they are processed and payments are final and irrevocable. EFT is a system of transferring money from one bank account directly to another without any paper money changing hands and is mainly used for high volume of transactions but usually small value such as payroll system where you would have a company paying thousands of employees within one EFT transaction. Reducing the transactions costs involved in digital payment systems is via de-coupling the various tasks that characterize the exchange of goods and money thereby making the system more suitable for low value transactions (Baddeley, 2004). Domestic Foreign Currency Clearing (DFCC) is a System where

the commercial banks are able to clear cheques' drawn in in foreign currencies such as the US Dollar (USD), Great Britain pound (GBP) and European currency (EUR).

Small value transactions are transacted through the use of cash, cheque, POS and mobile payments. The availability of ATM terminals should tend to increase the use of cash in transactions by increasing the number of cash withdrawals. Therefore, the number of cash withdrawals should be used as a proxy for cash. Trend for cheque use is slowly in decrease which would mean an existence of an inverse relationship between the use of electronic transactions and the use of cheque. Diffusion POS increases the convenience of cards payments over cash for low value payments. The diffusion of transactions technology increases the availability of means of payment, easing transactions and increasing efficiency in processing payments. Credit cards issued by credit card firms and banks are the most widely used method of payments both online and offline, and are tightly integrated into the buying process (Sangjo 2006).

Use of difference between quarters will show the variability in the use of the instruments. Our expectations are that there will be a positive relationship between the penetration of payment instruments as a measure for financial development, and the real economy, proxied by real GDP and total final consumption of goods and trade. In our research the payment system instruments will be assumed to be payment of goods and services that contributes to the national economy. Broadly the real GDP will be a function of the penetration of payment system instruments. The differences in the year to year for these instruments will show the direction that the instrument is taking. When increasing it will show positive growth while decreasing will show negative growth. Real GDP is measured as a percentage of the differences between time periods. For the

instruments to be measured meaningfully, they need to be measured by the same way as percentage of the differences between time periods in this study being three months intervals.

## **2.4 Empirical Literature Review**

There is vast empirical literature that substantiates the importance of financial development for the contribution of a financial system to productivity and growth. (King & Levine, 1993; Rajan & Zingales, 1998; Beck, Levine and Loyaza, 2000).

### **2.4.1 International Studies**

Humphrey et al. (1996) who examined the payment systems of 14 developed countries found that the use of electronic means of payment is clearly increasing in all countries. Besides, they tried to explain the possible factors behind the different structures across countries. Among these they found that the most important was the degree of payment availability (number of users, terminals, etc.) and institutional and cultural differences (income, new payment instruments, etc.). Similarly, Callado and Utrero (2007) analyze the case of European emerging economies and found that the use of cash, although reducing, is still persistent. Hancock and Humphrey (1998) provide evidence of how electronic means of payment (credit and debit cards) gain importance with respect to checks and cash in many developed countries between 1987 and 1993

Abrazhevich (2004) cited the case of Chipknip and Chipper to illustrate a failure of an electronic payment system due to failure to focus on user and market needs. The Chipknip and Chipper smart card payment technologies were introduced in the Netherlands in the early 1990s (Nannery, 1998). Both systems provided a way of handling everyday transactions involving small amounts that people would normally pay with cash. These two systems competed with each other for some time but were incompatible, so customers could not pay with the competitor's card at points of

sale, and this limited the user base for both systems (Bank of International Settlements, 2001). In most contexts where Chipknip and Chipper were available, payers did not feel the need for another payment system. Chipknip and Chipper duplicated the functions and applications of debit cards without providing significant benefits in ease of use or range of applications. Apparently, consumers do not use the system because they first have to load the smart card with money which takes time and effort, and furthermore, they are afraid to lose the card that is already loaded with the amount. They did not address the needs that smart card systems are best suited to, for example, for small payments at parking lots, vending machines, and public transport tickets machines. In this case, an important factor stimulating the development of electronic payment system which is the reduced operational and processing costs was not met.

In Mohammad & Abdallah (2011) conducted a research that was aimed at establishing the factors that contributes to the acceptance of the electronic finance. The finding of this study indicate that, importance of authorization and importance of encryption influence the perceived security of E-finance transactions, these features can contribute toward enhancing the perceptions of the users that the web and online transactions including E-Finance transaction are secure, and encourage them to use the online system and do financial transactions online. Organizations are searching for appropriate ways that can encourage their clients to make the financial transactions online and share their information with the organizations through the Internet. Some of these features found in this study are authorization and encryption.

Hromcovaz (2008) developed a model that technology improvement happens via accumulation of human capital through studying and the cost of each payment instrument depends on the place and time of the transaction. A necessary infrastructure for electronic payments is available before it is actually used and do not emerge until the economy is ready to use them (apart from being

trustworthy they must be cheap enough). A monetary policy or an authority's action that favors some of the available means of payments alters agent's payment instrument choice and welfare. The model calibrated using data from the US and Norway economies between 1991 and 2007. The model explains changes in the payment behavior due to variations in the payment infrastructure, relative cost of payment instruments, degree of technology development and monetary policy.

#### **2.4.2 Local Studies**

Mutong'Wa et al. (2014) identified that Mpesa mobile money transfer has been very successful in Kenya compared to the counter parts orange money and yu cash. One of the distinguishing factors is the availability of the agents totaling to over 18,000 where one can deposit and receive cash. This factor has given advantage to Safaricom since all the agents are exclusively for the company. While the other mobile transfers have been accepted by some users, the rate of acceptance is hindered by the ability to deposit and receive within the area of the depositor and the receiver. The value proposition for use of M-Pesa by organizations focuses on a number of benefits, including reduction of cash leakage and corruption, increased operating efficiencies including less paperwork, better transparency and accountability via the electronic records, and more independence and self-sufficiency for users (Mugo, 2011). The study concluded that a unified platform for sharing Agents under a profit sharing agreement should be established based on the data derived from Communication authority of Kenya.

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

Various literature reviews has shown that the majority of the researches have concentrated on the electronic means of payment leaving out the cash and paper based instruments. Other researches



have concentrated on the cost of transacting demonstrating that the electronic transactions are more efficient compared to cash and paper based. Others literature review has specifically looked at the effects of the mobile payment system showing whether there are any relationship on the increasing number of agents, transactions, volume and value. In all the above there has no research that incorporates all the instruments that forms the national payment system and demonstrate whether there is a direct impact on the economy growth. In addition the current research is aimed at identifying the instrument that has the most impact towards the economy may it be cash, paper or electronic payment instrument. In so doing it will guide further researches on the instrument that have most impact on the growth of the economy through the data analysis of the regression coefficient.

The intermediation theory has looked at what happens when the bank is an intermediary between the borrower and the lender and the banks main objective being to reduce the information asymmetry. Monetary theory reveals what would happen by changing the money supply in an economy while modern monetary theory looks at the use of fiat money as sole payment mode. Most of the theories have concentrated on what would impact on the macro and micro economics indicators to the economy such as the interest rate, inflation and money supply and demands. They however not looked at what is the impact of the payment system as a means of buying and selling of goods and services and whether there would be a direct relationship between the value and volume of transactions and the actual goods purchased.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

The four purposes of this chapter are to (1) describe the research methodology of this study, (2) explain the sample selection, (3) describe the procedure used in designing the instrument and collecting the data, and (4) provide an explanation of the statistical procedures used to analyze the data.

#### **3.2 Research Design**

A case study research methodology will be used for this study. A case study is an in depth study of a particular situation rather than a sweeping statistical survey. It is a method used to narrow down a very broad field of research into one easily researchable topic. Whilst it will not answer a question completely, it will give some indications and allow further elaboration and hypothesis creation on a subject. Our analysis will analyze the relationships between the payment instruments and their relationship to the overall gross domestic product through the use of difference in percentage and the regression model.

#### **3.3 Data Collection**

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes. Extraction of Central Bank of Kenya data, Kenya national Bureau of statistics and any other supporting database such as World Bank will be used to collect data. Our research will therefore use secondary data in the whole data set from the September 2005 being the first quarter to December 2014 being the last quarter.

Polit and Hungler (1999) refer to the population as an aggregate or totality of all the objects, subjects or members that conform to a set of specifications. In this research the population of the study will be all the national payments system that are done using various payment instruments both by the commercial banks, mobile companies and the central bank of Kenya. Any payment transactions done from the year September 2005 to the year March 2015 will be considered. Secondary data from the central bank of Kenya will be analyzed on quarterly basis to be in line with the quarterly GDP figures produced by the Kenya national bureau of statistics. Each payment instrument will comprise 38 quarters during the period of analysis with same 38 quarters for the GDP. RTGS, EFT, cheque, DFCC, ATM, POS, credit cards and mobile payment will have at least the volume and value of transaction being analyzed which would mean  $38 \times 2 \times 9$  instrument = 684 set of data. Since the regression model in excel cannot accommodate more than 16 columns, we shall have to combine the ATM, POS and credit card as one broad item.

### **3.4 Data Analysis**

Analysis of data is a process of inspecting, cleaning, transforming, and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision-making. The regression analysis is expected to be used during this research based on the following baseline model.

Real GDP = f (Penetration of RTGS, EFT, Cheque, cash, ATM, POS, Mobile and others) for payment systems instruments both value and volume of transactions. The quarterly data will be taken, quarterly difference analyzed and percentage movements established to be in line with the percentage movement of the gross domestic product. The function provides the relationship between the gross domestic product and the payment systems instruments that are currently

available and measurable by the central bank of Kenya. The coefficient of the payment modes provides the extent to which the payment mode contributes to the national economy.

$$y(i,t) = \alpha + \beta'X(i,t) + \varepsilon$$

Where  $y(i,t)$  - is the percentage movement of real GDP in country  $i$  at time  $t$ ,

$\alpha$  - Fixed term at the beginning of the period

$X$  - Represents payment instrument penetration variables

$\varepsilon$  - is the error term.

The instruments of payments to be considered would include the following:

- X<sub>1</sub> - Change in Real time gross settlements value and volume
- X<sub>2</sub>- Change in Electronic funds transfers' value and volume
- X<sub>3</sub>- Change in Cheque value and volume
- X<sub>4</sub>- Change in Domestic foreign currency clearing value and volume
- X<sub>5</sub>- Change in Payment cards transactions volume and value
- X<sub>6</sub>- Change in Mobile agents, customers, transactions volume and value

### **3.5 Test of Significance**

The research will use the 5% significance level during data analysis. This level is assumed to be large enough to make an appropriate decision that may have an authoritative confidence level.

## CHAPTER 4

### DATA ANALYSIS, FINDINGS AND INTERPRETATIONS

#### 4.1 Introduction

This chapter presents the analysis of data, findings and interpretation as set out in the research methodology. Section 4.2 presents data analysis with descriptive statistics, findings from the study and discussions, 4.3 the regression output, 4.4 the Anova Table, 4.5 coefficient of correlation and 4.6 summary. The study used secondary data covering the period September 2005 to March 2015 on quarterly basis each year having four quotas except for year 2005 and year 2015 that has one quarter each. The data was sourced from central bank of Kenya and Kenya national bureau of statistics and was used to answer the research queries. The study sought to evaluate the relationship between the national payment systems and the gross national product.

The collected data was edited and cleared for completeness in the preparation to analysis through the regression model. The descriptive statistic considered were the minimum, maximum, mean, standard deviation, skewedness and kurtosis.

#### 4.2 Descriptive Statistic

The study sought to establish the descriptive statistic of the data collected. The results were as presented in Table 4.1 below. The table shows the averages, standard deviations, skewedness, kurtosis and median of the national payment systems instruments. The averages have been arrived at after all the absolute values were analyzed in terms of percentage change between one quarter and the next. The first change in quarter was observed in December 2005 after deducting from the September 2005 position.

Table 4.1: Statistics of National Payment Instruments

INSTRUMENTS	average (mean)	standard deviation	minimum	maximum	skewedness	kurtosis	median	coefficient of variance
GDP	5.39%	2.05%	1.58%	9.15%	-26.43%	85.45%	5.68%	4.88%
RTGS Value	9.46%	15.72%	-3.73%	54.14%	266.16%	796.97%	5.61%	0.25%
RTGS Volume	13.55%	13.68%	5.79%	44.59%	195.18%	241.81%	7.96%	-0.63%
EFTs Volumes	2.02%	5.55%	-5.42%	12.37%	109.08%	78.25%	0.11%	-1.19%
EFTs Values	-0.12%	5.47%	-13.58%	6.61%	-162.07%	327.64%	0.00%	5.11%
Cheques Volumes	0.45%	1.15%	-1.34%	2.92%	67.84%	111.14%	0.35%	15.44%
Cheques Values	-0.03%	4.93%	-13.99%	4.44%	-262.39%	785.62%	1.24%	-10.93%
DFCC Value	-0.81%	2.27%	-7.15%	0.90%	-262.31%	713.89%	0.00%	-11.15%
DFCC Volume	-0.42%	1.53%	-3.56%	1.66%	-87.84%	55.20%	0.00%	14.64%
Mobile Payments Agents	23.24%	36.22%	0.00%	122.07%	238.83%	614.81%	10.93%	-3.52%
Mobile Payment Customer numbers	52.67%	145.46%	0.00%	489.44%	326.79%	1075.50%	4.65%	4.47%
Mobile Payment Transaction in numbers	65.28%	174.57%	0.00%	588.27%	324.37%	1062.53%	6.97%	-9.48%
Mobile Payment Value	67.14%	182.43%	0.00%	614.52%	326.04%	1071.35%	5.91%	6.44%
Paymnet Cards Number	2.64%	3.97%	-1.32%	11.75%	146.53%	174.24%	1.13%	31.25%
Paymnet Cards Transactions	2.77%	8.73%	-9.93%	24.83%	161.28%	420.83%	0.00%	-2.82%
Paymnet Cards Value	2.47%	5.47%	-4.46%	14.90%	116.46%	165.09%	0.00%	2.06%

### **4.2.1 Gross Domestic Product**

The result sought to evaluate how the GDP rate behaved within the period analyzed. Quarterly GDP figures were analyzed in terms of years to represent the gross domestic product per each year for ease of presentations and interpretations. GDP rate averaged at 5% for the 11 years with a maximum rate observed in the year 2010 at 9% and lowest in year 2008 at 2%. This low rate was mainly due to the post-election violence that was observed in this same year. During the same period, the GDP rate had a variation from the mean of 2% as evidenced by the standard deviation. Below figure 4.1 and 4.2 shows the yearly GDP rates and the cumulative GDP rate from the year 2005.

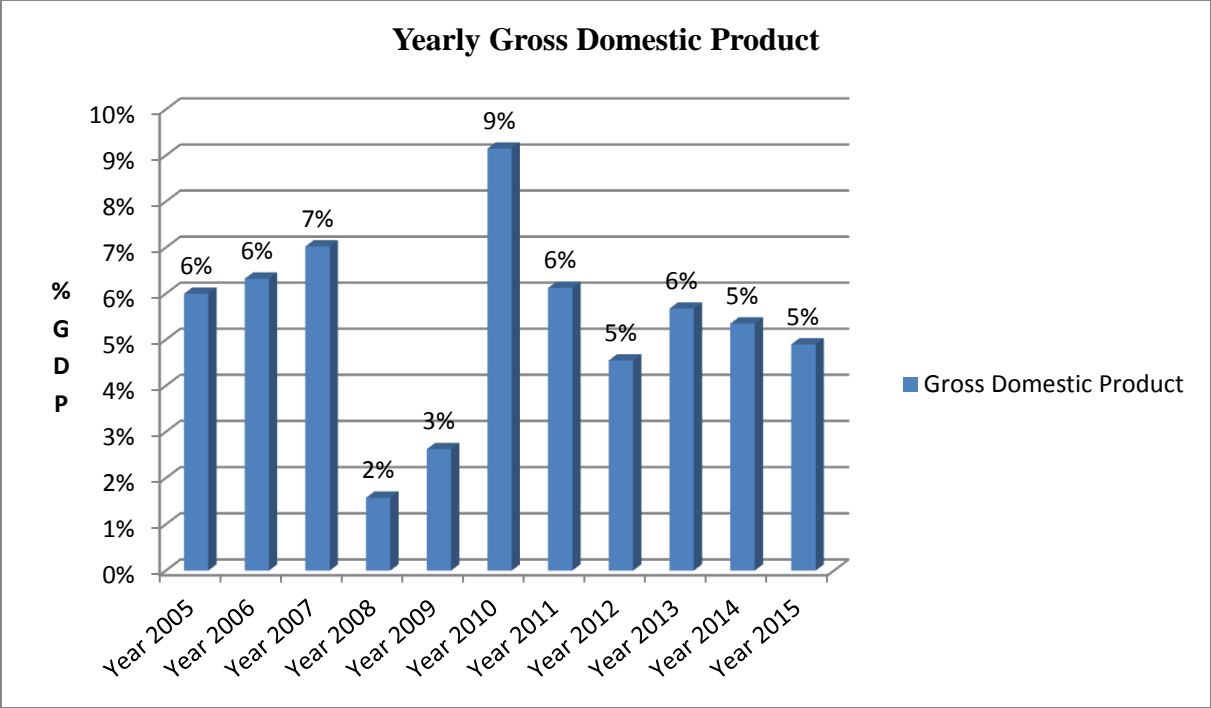


Fig. 4.1 The Yearly Gross Domestic Product.

The cumulative GDP shows that there has been a steady growth throughout the analyzed period. This will be evidenced to be consistent with the national payment system under the analysis.

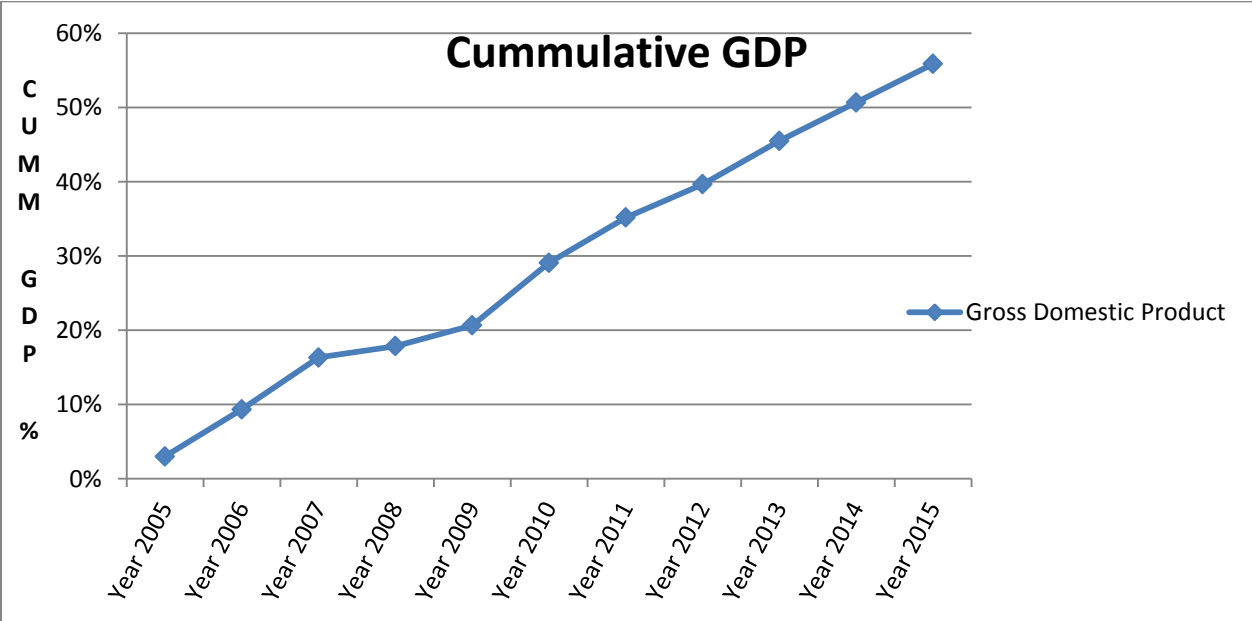




Fig. 4.2 The Yearly Cumulative Gross Domestic Product

#### 4.2.2 Real Time Gross Settlement

The study sought to evaluate the statistical analysis relating to real time gross settlement. RTGS had an average change of 9% and 14% on the value and volume respectively with a corresponding deviation of 16% and 14%. Maximum change was observed in 2005 after the introduction of RTGS as most of the high value cheques were redirected to RTGS. There was a significant drop in RTGS value in 2010 due to the cheque truncation which reduced the time period in clearing cheques. This is evident with the huge increase of cheques volume and values.

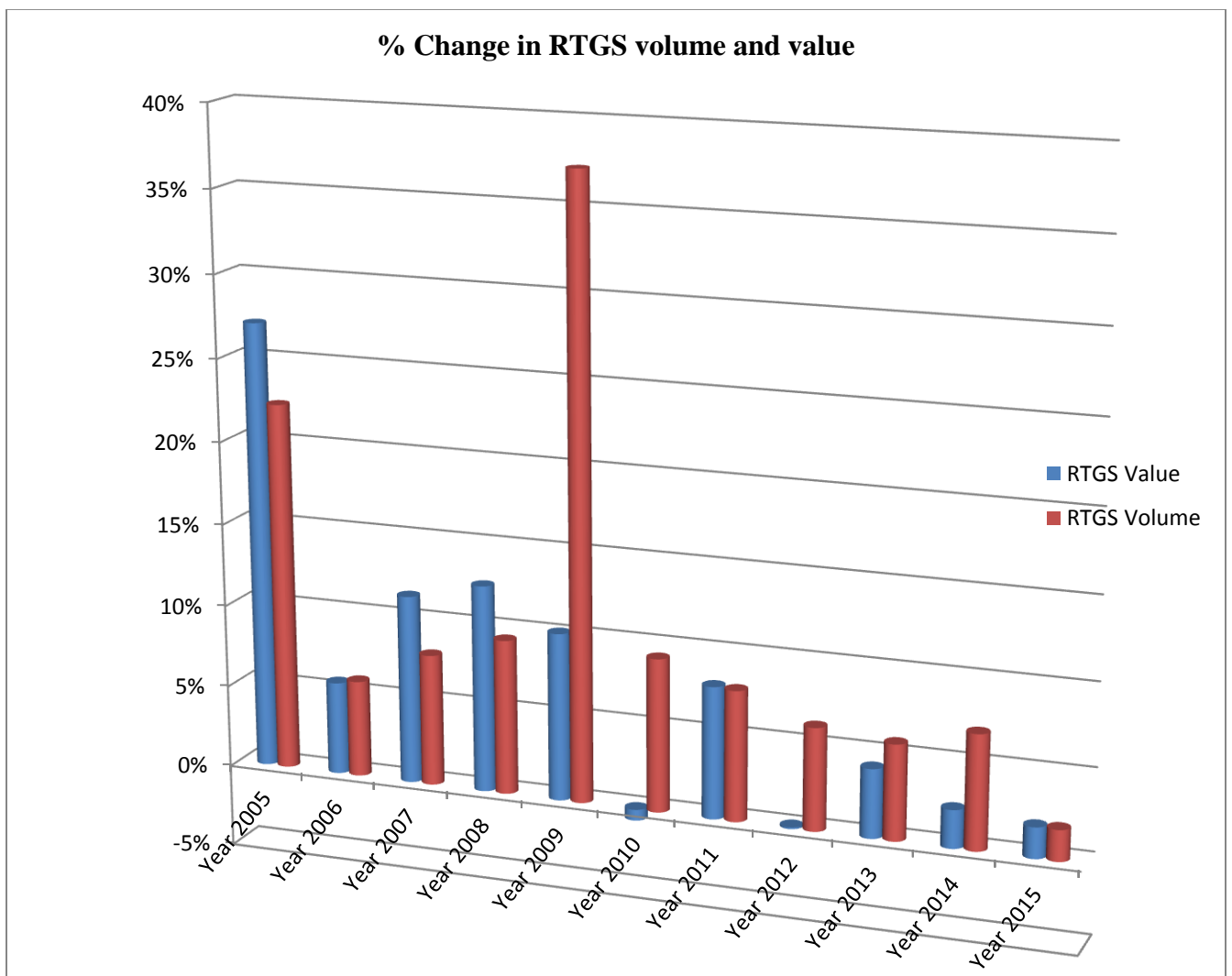


Fig. 4.3 Percentage Change Of Rtgs Volume And Value Per Year

In the year 2009, there was huge change in RTGS volume despite the low value due to the fact that the cheque system was under the third face of cheques truncation and capping. Due to slow time to process, cheques were redirected to be cleared through the RTGS.

Cumulative there has been a stable steady growth of the RTGS over the years as indicated by the below figure and data

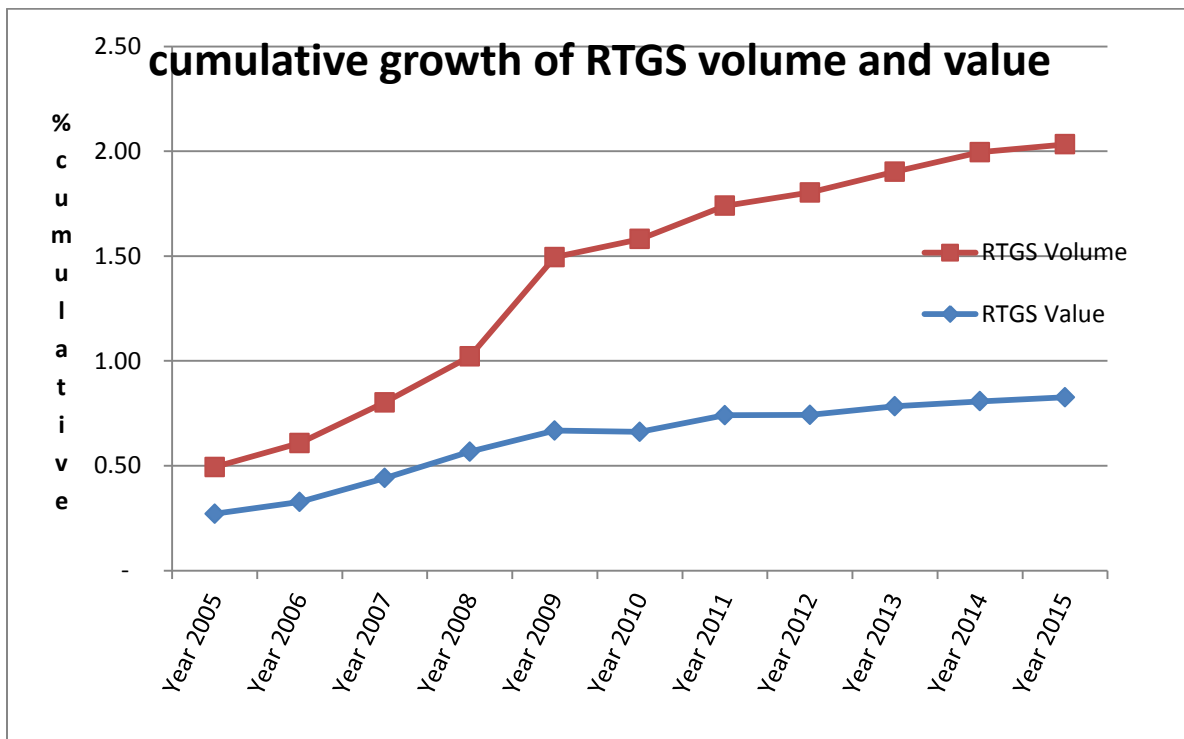


Fig. 4.4 Cumulative Percentage Change Of Rtgs Volume And Value

### 4.2.3 Electronic Funds Transfer

EFTS' are low value transactions that have high volume. They are mainly used by such transactions such as payrolls where one company may be paying thousands of its employees by using only one order to the bank. The bank will credit all the employees account with a corresponding one entry

from the employers account. EFT was introduced in Kenya in the year 2007 and has gradually grown over the year. During the period analyzed, the EFT had an average positive change of 2% and 0% respectively for volume and values with a corresponding standard deviation of 6% and 5%. Minimum change was observed in the year 2011 at 3.4% and year 2009 at 13.6% for volume and values respectively. On average there has been 767 thousand transactions worth Kshs 41 million per every quarter as at March 2015

There has however never been any year with huge change except for the year 2010 when value dipped but the value only decreased with a lesser margin. In the year 2012, both the value and the volume dipped below the previous year. For the year 2015, this is due to the one quarter compared to the four quarters in the other year.

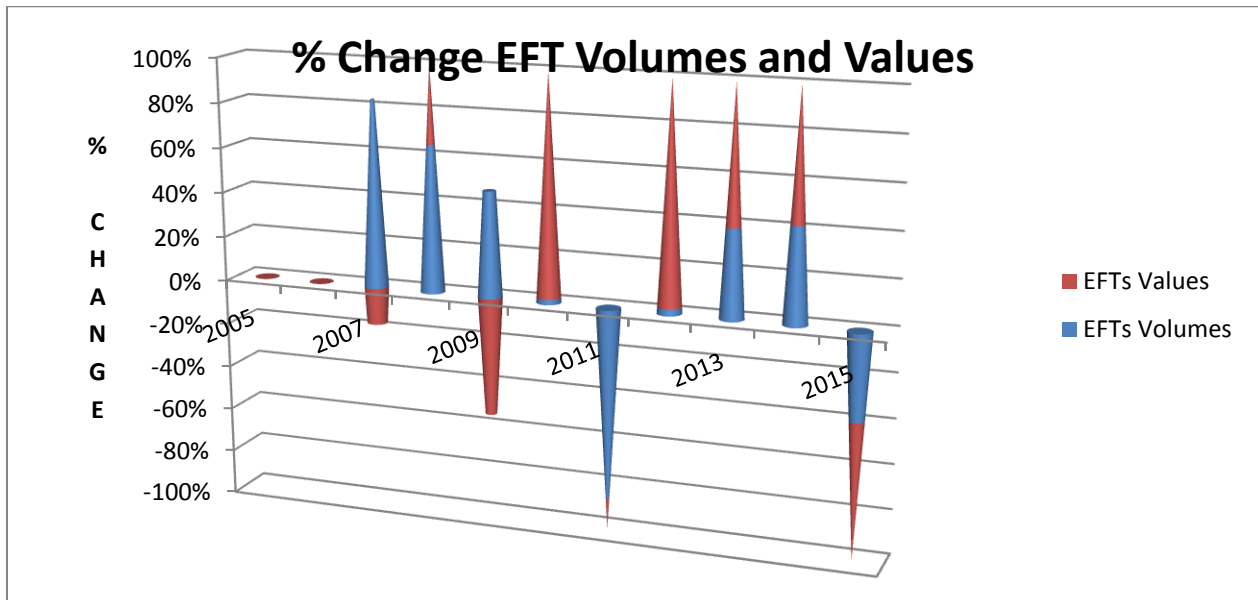


Fig. 4.5 Percentage Change of EFT Volume and Value per Year

Cumulatively there has been moderate 25% growth in volumes and values throughout the period. This is an indication that the economy has accepted EFT as a suitable mode of payment.

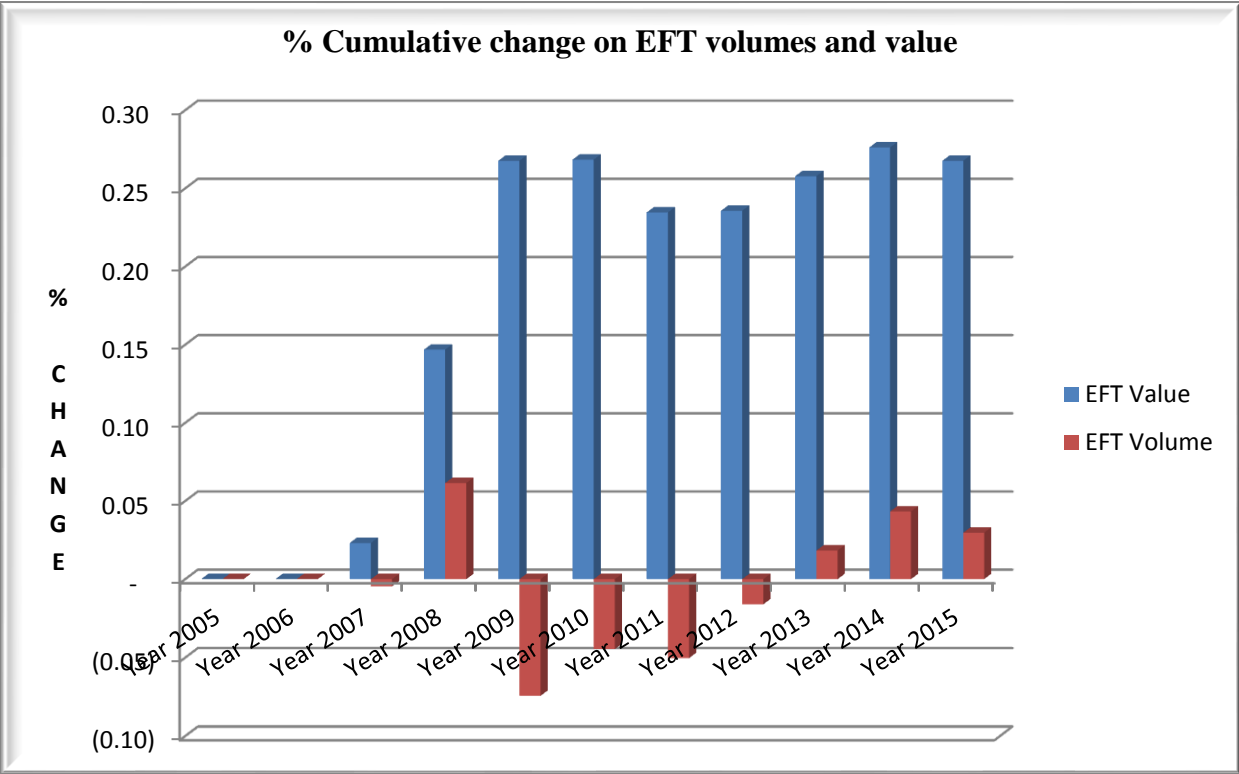


Fig. 4.6 Cumulative Percentage Change of EFT Volume and Values per Year.

Absolute values for the EFT per quarter have also been analyzed to see the absolute movement of the values and volumes for EFT. Initially high volumes of eft were observed from the low volumes of EFT transactions but subsequently high volumes of transactions were observed although their values drastically reduces in September 2009. Gradual increase in EFT transactions and values has been observed on the entire period.

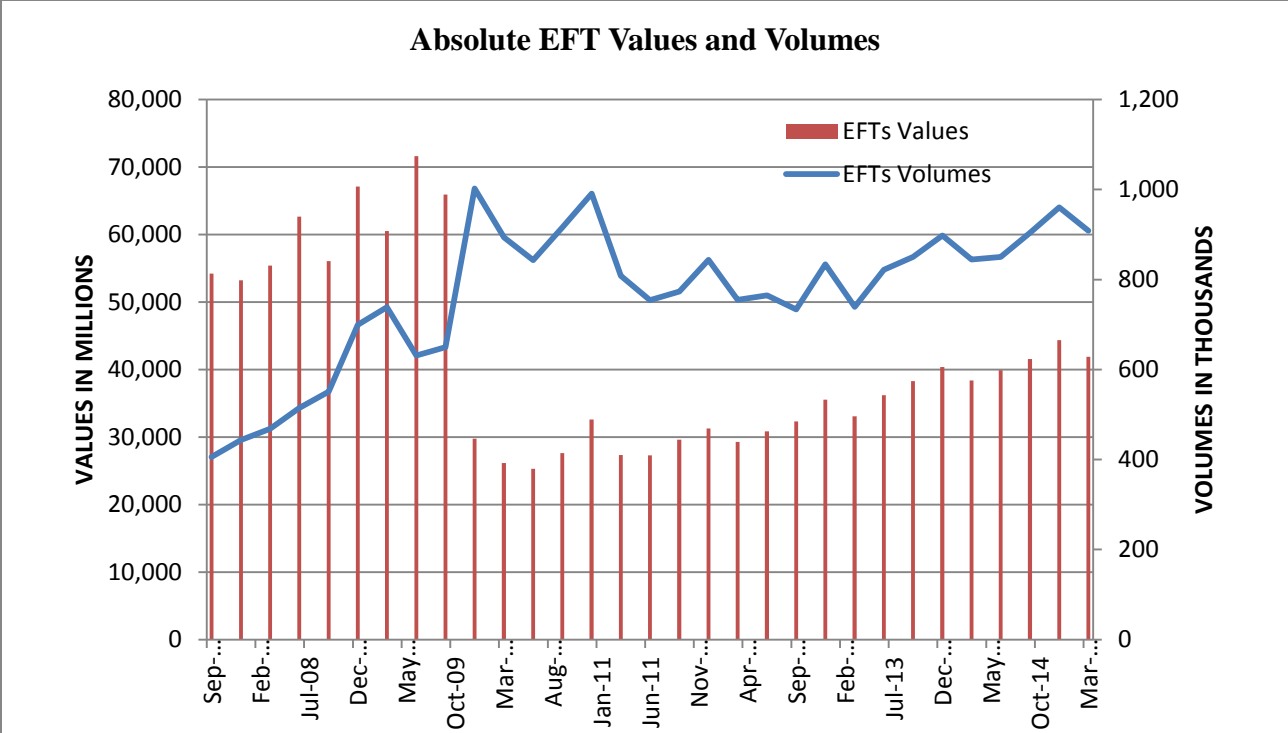


Fig. 4.7 Absolute Values of EFT Volume and Values per Quarter

**4.2.4 Cheques and Domestic Foreign Clearing Currency**

Over the period analyzed, both cheques and DFCC had an average mean of 0% due to the huge variation in data as evidenced by the high of 4% and a low of 14% for cheque values and 3% and negative 1% for cheque volumes. The change was unevenly distributed.

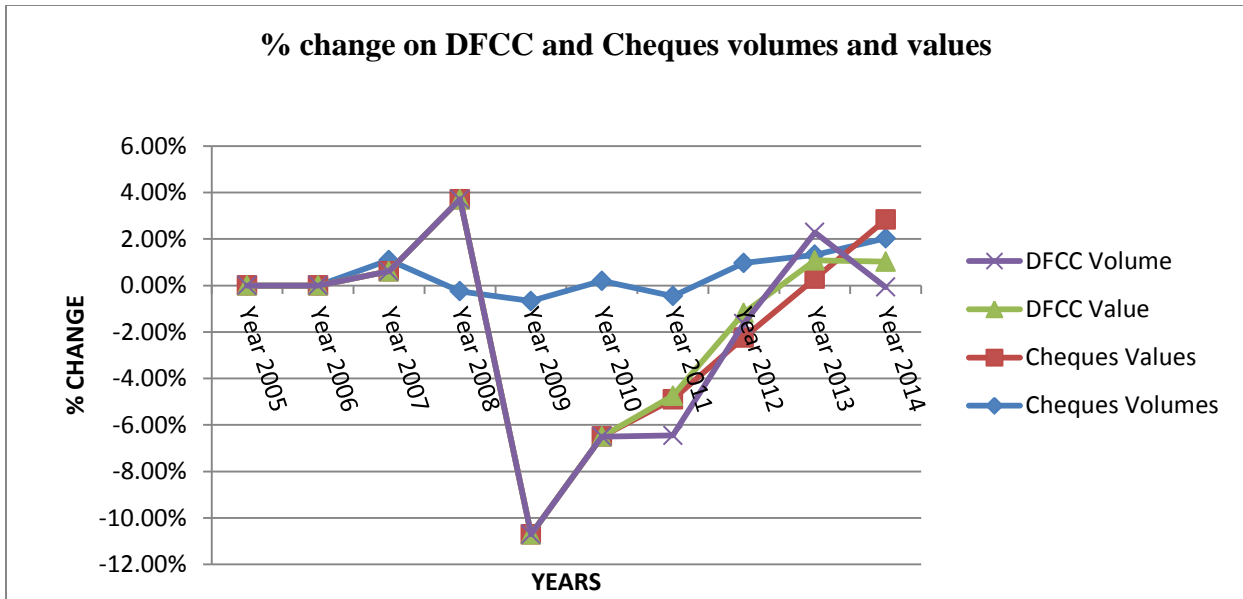


Fig. 4.8 Percentage Change on DFCC and Cheques in Values and Volumes

Absolute values for DFCC and cheques show a significant growth at inception followed by steep drop in October 2009 and then gradual increase on the cheques volumes and values. As stated elsewhere the drop was during cheque truncation transformation period.

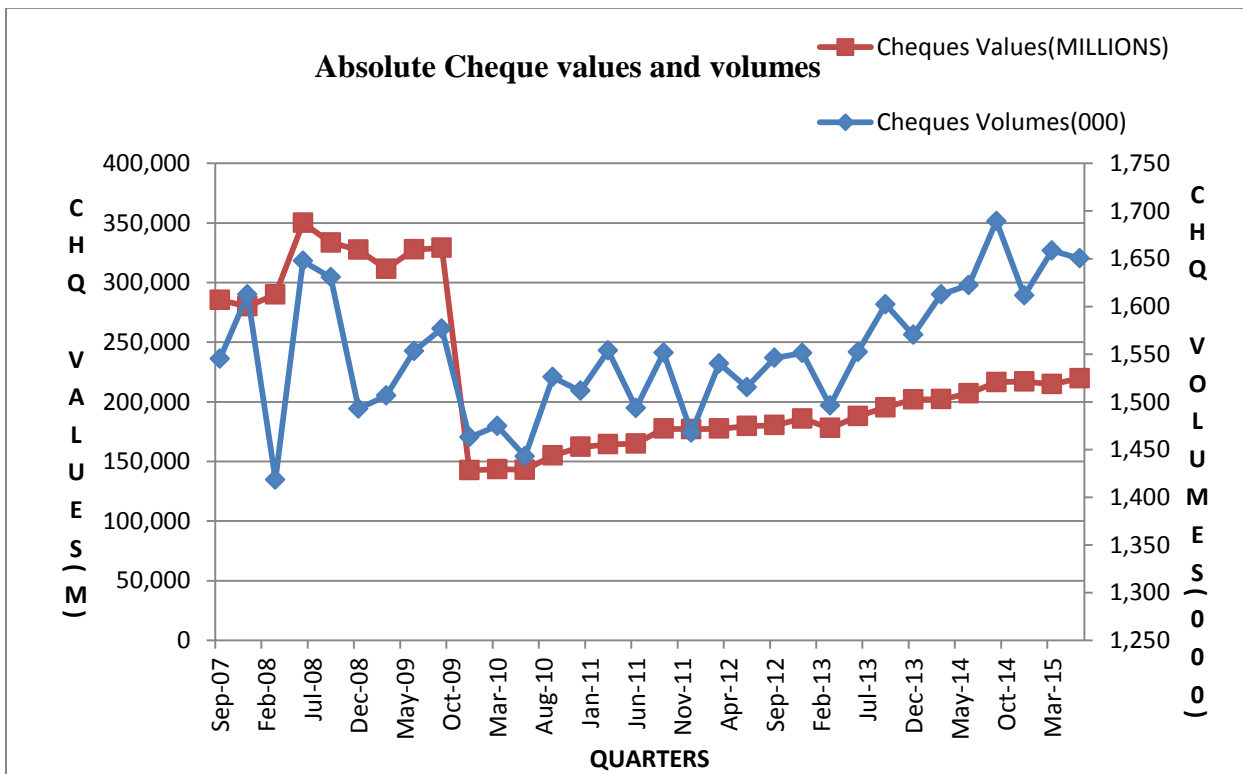


Fig. 4.9 Absolute Cheques in Values and Volumes

#### **4.2.5 Mobile payments**

In the context of mobile payment it will be observed that the need to have such transaction was the year 2007 when this service was being introduced in Kenyan market. Each mobile holder was in the rush to be registered to use this service. Agents, transactions, volume and value of the mobile money had a spike during this year. After all the mobile holders had been registered, any further change is as a result of the new unsubscribed customers who are coming on board. This is the reason why thereafter, there is insignificant change. There has been an increase of value and volume from an absolute figure of 7 thousands and Kshs 21 million respectively to the current figure of 88million and Kshs 223billion in the first quarter of March 2015. These show a steady growth over the years. Mobile value and transactions shows an average percentage change of 67% and 52% with a corresponding standard deviations of 174% and 145% respectively over the period. There has been a maximum change of 588% and 489% for values and transactions during the year 2007.

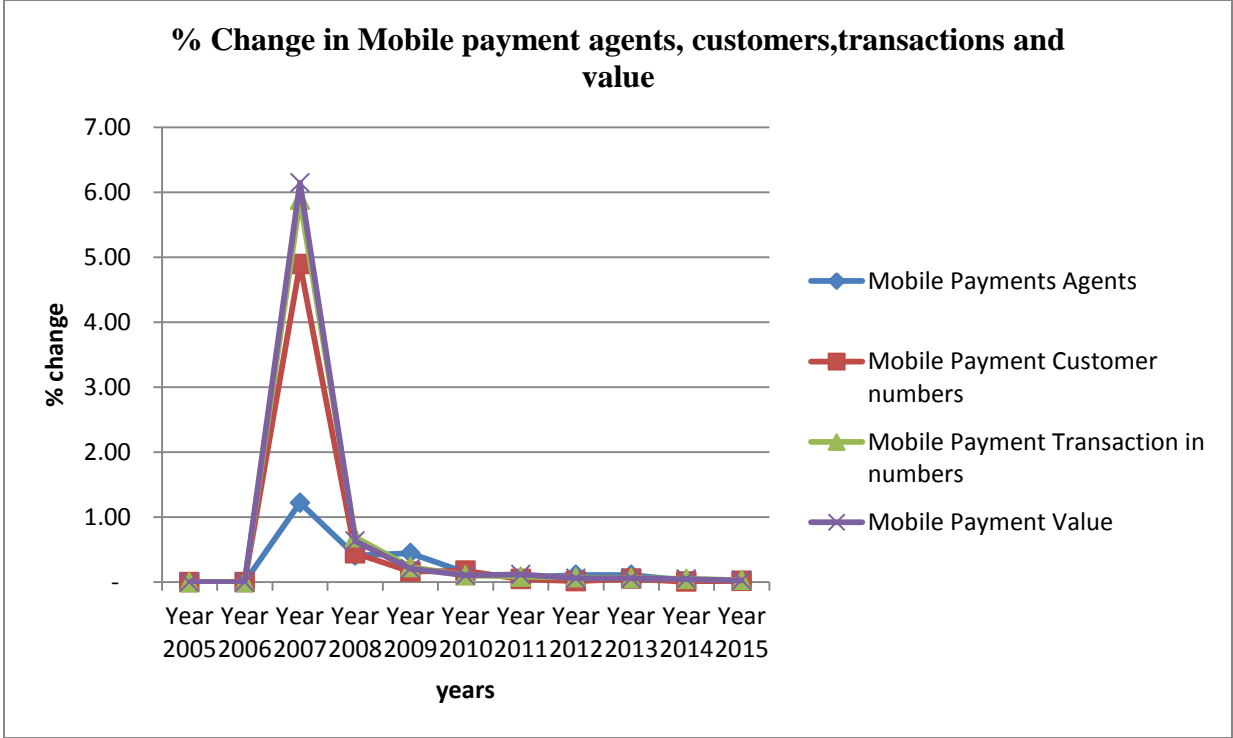


Fig. 4.10 Percentage Change in Mobile Payments Agents, Customers, Transactions and Values.

Cumulatively there is a steady growth on all areas of mobile transfers although at a low rate of between 0% and 1%. The year 2006 has a very high change as this is the first time the service was introduced.



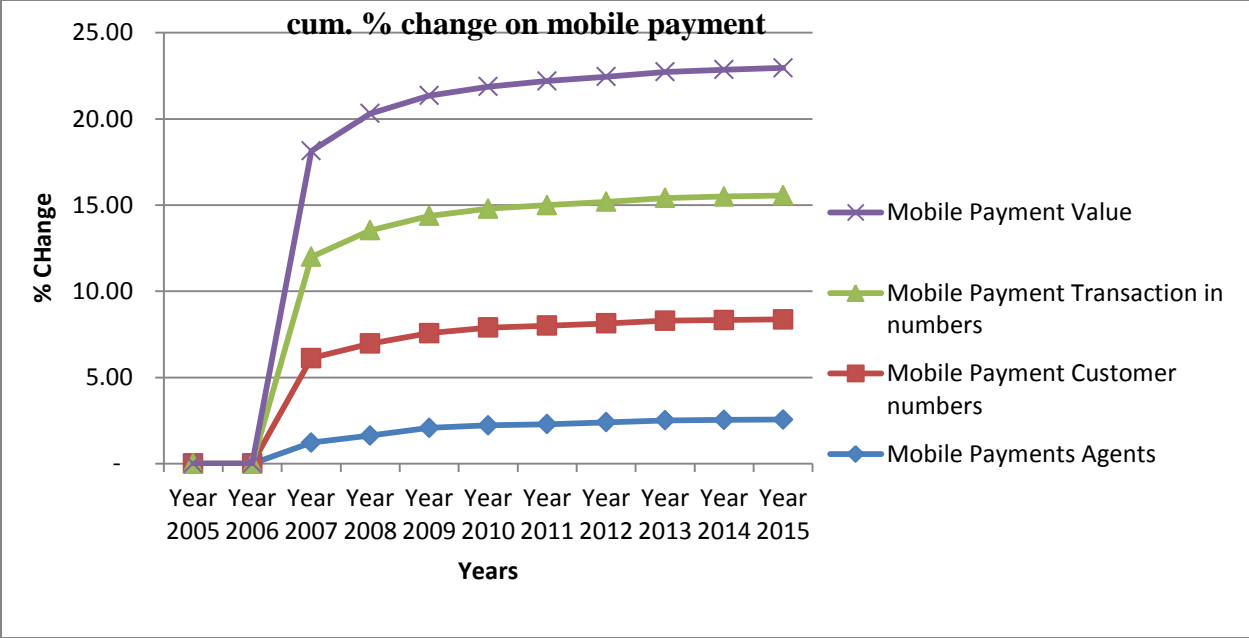


Fig. 4.11 Cumulative Percentage Change in Mobile Agents, Customers, Transactions and Values.

**4.2.6 Payments Cards**

Payment cards analysis shows an average of 2.4% for value, 2.6% for cards number and 2.7% for cards transactions. This shows that there has been a higher change on cards transactions rather than on value and the cards number conducted. The variation of this change is highest with the cards transactions at 8.7% as explained by the standard deviations.

Cumulatively all the payment cards transactions, cards numbers and value have shown increase since inception. In terms of absolute values, the payment cards have rose from the initial record of 4m cards, 7m transactions worth 40 millions in quarter three of September 2009 to a record of 13m, 19m worth 111m respectively in quarter one of 2015. There is stable growth of the payment cards that restrict the growth of cheque system that is generally expensive.

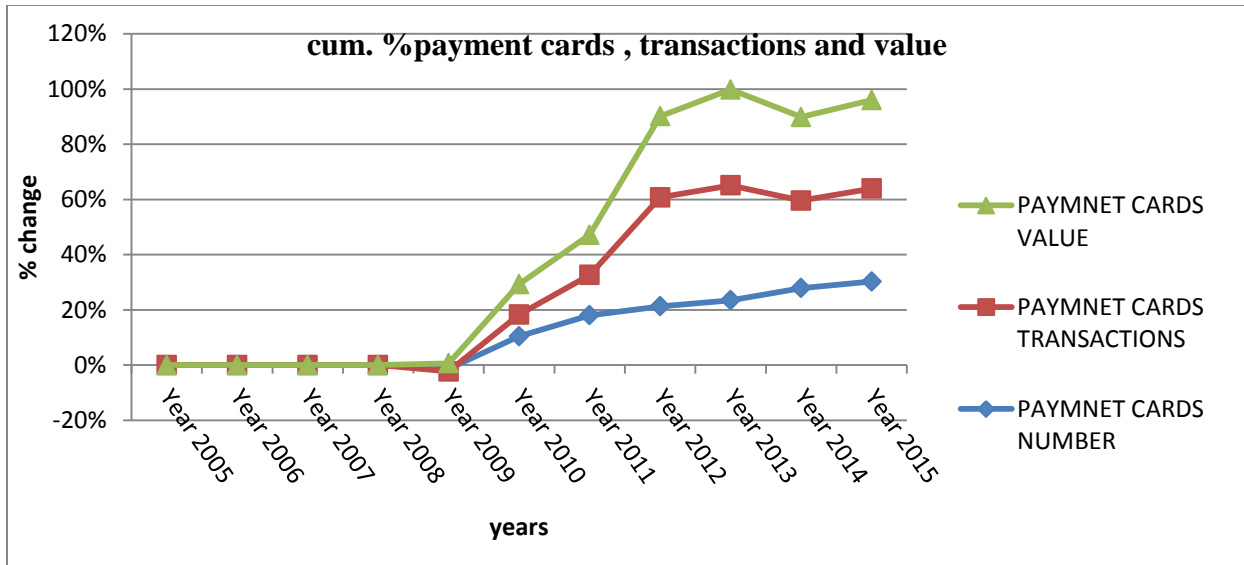


Fig. 4.12 Cumulative Percentage Change in Payment Cards Number, Transactions and Value.

Payment cards absolute values per quarter shows that all the three elements of payment cards i.e cards numbers, transactions and values have evenly been having the same direction throughout the period. An increase in transactions has shown a similar increase in value.

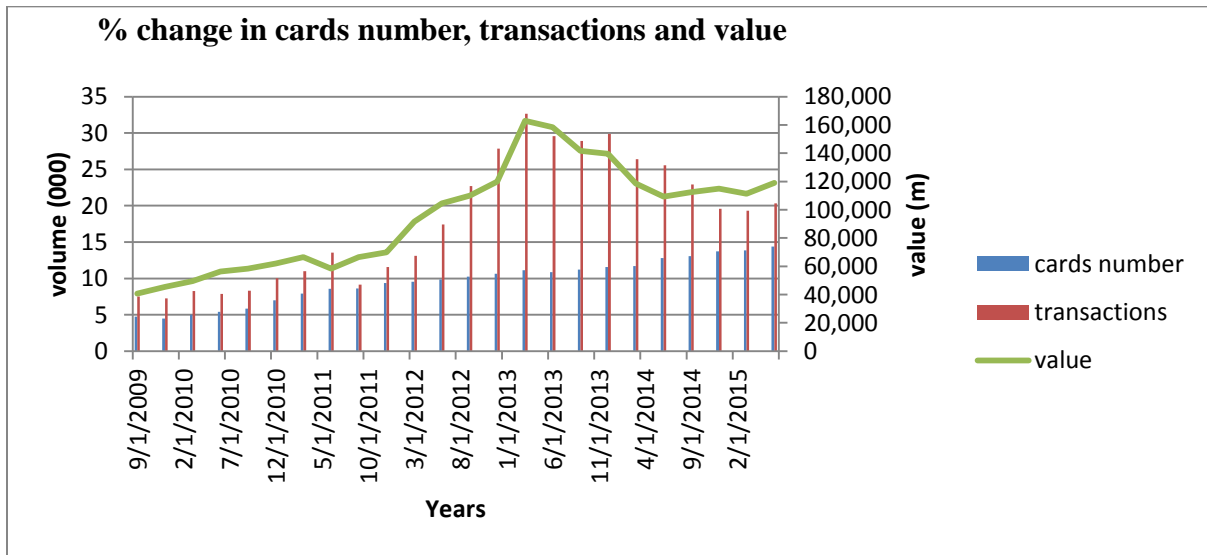


Fig. 4.13 Absolute Values on Payment Cards Number, Transactions and Value

### 4.3 Multiple Regression Analysis

The study sought to evaluate the relationship between the payment instrument and the gross national product. To establish the relationship, GDP was regressed against the proxies of the national payment instruments.

The research findings indicated that there was an overall strong and positive relationship between the variables. The findings are as shown in the tables 4.2.7.

Table 4.2: Regression statistics

Regression Statistics	Multiple R	R Square	Adjusted R Square	Standard Error	Observations
model	0.79	0.63	0.38	0.02	38.00

(Source Excel regression output 2015)

In a model summary the “R” value is used to indicate the direction of the relationship variables. The closer the value gets to 1 or -1, the stronger the direction of the relationship compared to the dependent variable. A positive or negative sign indicate the direction of the relationship. In this case the R= 0.79. This means that there is an overall strong positive relationship between the national payment system instruments and the GDP.

The R square of 63% has little meaning since it can be manipulated by adding additional coefficient in the regression hence the need to interpret the adjusted R square.

The adjusted R- squared in the study was found to be 0.38. The adjusted R-squared penalizes any additional extraneous predictors and is therefore better measure than R-squared. This value indicates that the independent variable explain 38% of GDP while the difference of 62% is contributed by other factors outside our consideration. It is clear to conclude that with proper payment systems in place, there is a likely hood that one can estimates the possibility of having a certain GDP value based on a certain degree of confidence.

The standard error of the estimate of 0.02 in this study is the standard deviation of the error term and the square root of the mean square for the residuals.

The study had 38 observations on each instrument being composed one four quarters on years 2006 to 2014 and one quarter each for 2005 and 2015.

#### 4.4 Analysis of variance (ANOVA)

The analysis of variance is composed of various statistical output such as sum of squares, mean squares, degree of freedom and most important of all, the significance of the test.

Table 4.3: Analysis of variance statistics

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	15.00	0.01426	0.00095	2.50	0.0251
Residual	22.00	0.0084	0.00038		

Total	37.00	0.0226
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(Source Regression output 2015)

At 95% confidence level, significant value of 0.0251 was registered. This shows that the regression model has a probability of less than 2.5% of giving a wrong prediction. Hence the above regression model is suitable to predicate the explainable factors.

The degrees of freedom (df) is associated with the sources of variance. The number of sources in this study is 15. The total variance has N-1 degrees of freedom. The regression degrees of freedom corresponds to the number of coefficients including the intercept minus 1. In this case, the model has  $16-1=15$  degrees of freedom. The error of freedom is the DF total minus the DF model, i.e.  $37-15=22$ .

Mean square (ms) is the sum of squares divided by their respective DF.

F is the f- statistic which is the mean square of the regression divided by the mean square of the residuals. In this case  $0.00095/0.00038 = 2.5$

The sum of squares (ss) is the sum of squares associated with three sources of variance that is Total, Model and Residual. The total variance is partitioned into the variance which can be explained by the independent variables (regression) and the variance which cannot be explained by the independent variable (residuals). In this study the total variance is 2.3% of which 1.4% can be explained by the model while 0.8% by the residuals.

#### 4.5 Coefficient of determination

The coefficient of determination indicates the direction. A positive sign indicates a positive relationship while a negative sign shows the negative relationship.

Table 4.4 Coefficient of correlation

INTRUMNETS	Coefficients	P-value
Intercept	0.0488	0.00
RTGS Value	0.0025	0.91
RTGS Volume	(0.0063)	0.86
EFTs Volumes	(0.0119)	0.81
EFTs Values	0.0511	0.48
Cheques Volumes	0.1544	0.16
Cheques Values	(0.1093)	0.40
DFCC Value	(0.1115)	0.48
DFCC Volume	0.1464	0.30
Mobile Payments Agents	(0.0352)	0.18
Mobile Payment Customer numbers	0.0447	0.02
Mobile Payment Transaction in numbers	(0.09)	0.37

Mobile Payment Value	0.06	0.48
Payment cards number	0.31	0.00
Payment cards transactions	(0.03)	0.39
Payment cards value	0.02	0.62

(Source Regression output 2015)

From the data output, there is a significant contribution payment card number, cheques volume and DFCC volume with 31%, 15% and 15% respectively that suggest a high relationship contribution to the GDP. Payment card number, mobile payment customer numbers are statistically significant as they have low p-value of less than 0.05. Although there was an expectation of a positive relationship between mobile payment agents and GDP due to the employment factor, the result however rejected this expectation to a negative relationship. Payment cards transaction could have a negative relationship due to cues, machine usage and power usage. Introduction of RTGS and EFTS' was largely to reduce the transaction costs of the cheque system. This was however not the case as the initial record was at 1.5m cheque volume and 285b worth of value in December 2007 to 1.6m cheques worth 214b in march 2007. This explains the reason as to why there is still a positive relationship to the GDP. If the analysis was to look at the cost factor, then there would be no significant savings that would be observed by the cheque system but would be seen at the shift from the cheque system to the electronic means.

The equation of the baseline model was therefore expressed as

$$\text{GPD \%} = 0.488 + 0.0025 \cdot \text{rtgsvl} - 0.01 \cdot \text{rtgsvm} - 0.01 \cdot \text{eftvm} + 0.05 \cdot \text{eftvl} + 0.15 \cdot \text{chqvm} - 0.11 \cdot \text{chqvl} \\ + 0.11 \cdot \text{dfccvl} + 0.15 \cdot \text{dfccvm} - 0.04 \cdot \text{mpa} + 0.04 \cdot \text{mpcn} - 0.09 \cdot \text{mptn} + 0.06 \cdot \text{mpv} + 0.31 \cdot \text{pcn} - 0.03 \cdot \text{pct} \\ + 0.02 \cdot \text{pcv} + e$$

Where e = error term

Rtgsvl	-RTGS Value
Rtgsvm	-RTGS Volume
Eftvm	-EFTs Volumes
Eftvl	-EFTs Values
Chqvm	-Cheques Volumes
Chqvl	-Cheques Values
Dfccvl	-DFCC Value
Dfccvm	-DFCC Volume
Mpa	-Mobile Payments Agents
Mpcn	-Mobile Payment Customer numbers
Mpv	-Mobile Payment Value
Pct	-Payment Cards Transactions
Pcv	-Payment Cards Value

#### 4.6 Summary



The study has revealed that there was an overall average GDP growth of 5.39% with an average standard deviation of 2.05% during the period analyzed. The maximum average positive growth was recorded highest on mobile value which recorded 67.14% which also recorded the highest standard deviation of 182%. Payment card that recorded low 2.64% positive growth with 3.97% standard deviation recorded the highest coefficient of correlation at 31%.

Table 4.4 Summary of instruments average mean, standard deviations and coefficient of correlation

INSTRUMENTS	average (mean)	standard deviation	coefficient of variance
RTGS Value	9.46%	15.72%	0.25%
RTGS Volume	13.55%	13.68%	-0.63%
EFTs Volumes	2.02%	5.55%	-1.19%
EFTs Values	-0.12%	5.47%	5.11%
Cheques Volumes	0.45%	1.15%	15.44%
Cheques Values	-0.03%	4.93%	-10.93%
DFCC Value	-0.81%	2.27%	-11.15%
DFCC Volume	-0.42%	1.53%	14.64%
Mobile Payments Agents	23.24%	36.22%	-3.52%
Mobile Payment Customer numbers	52.67%	145.46%	4.47%
Mobile Payment Transaction in numbers	65.28%	174.57%	-9.48%
Mobile Payment Value	67.14%	182.43%	6.44%
Paymnet Cards Number	2.64%	3.97%	31.25%
Paymnet Cards Transactions	2.77%	8.73%	-2.82%
Paymnet Cards Value	2.47%	5.47%	2.06%

All instruments with very high standard deviation or with standard deviation higher than that of GDP recorded low or negative coefficient of correlation hence the assumptions that they did not have the same directions as the GDP. RTGS value and volume, Cheques value, all mobile payment and payment cards transactions recorded very high standard deviations leading to their low or negative contributions to GDP. Instruments with high negative skewedness also lead to negative coefficient of correlation such as the cheques values and DFCC value. Instruments that recorded similar directions in terms of mean, standard deviations, median and skewedness with the GDP also recorded high coefficient of correlation.

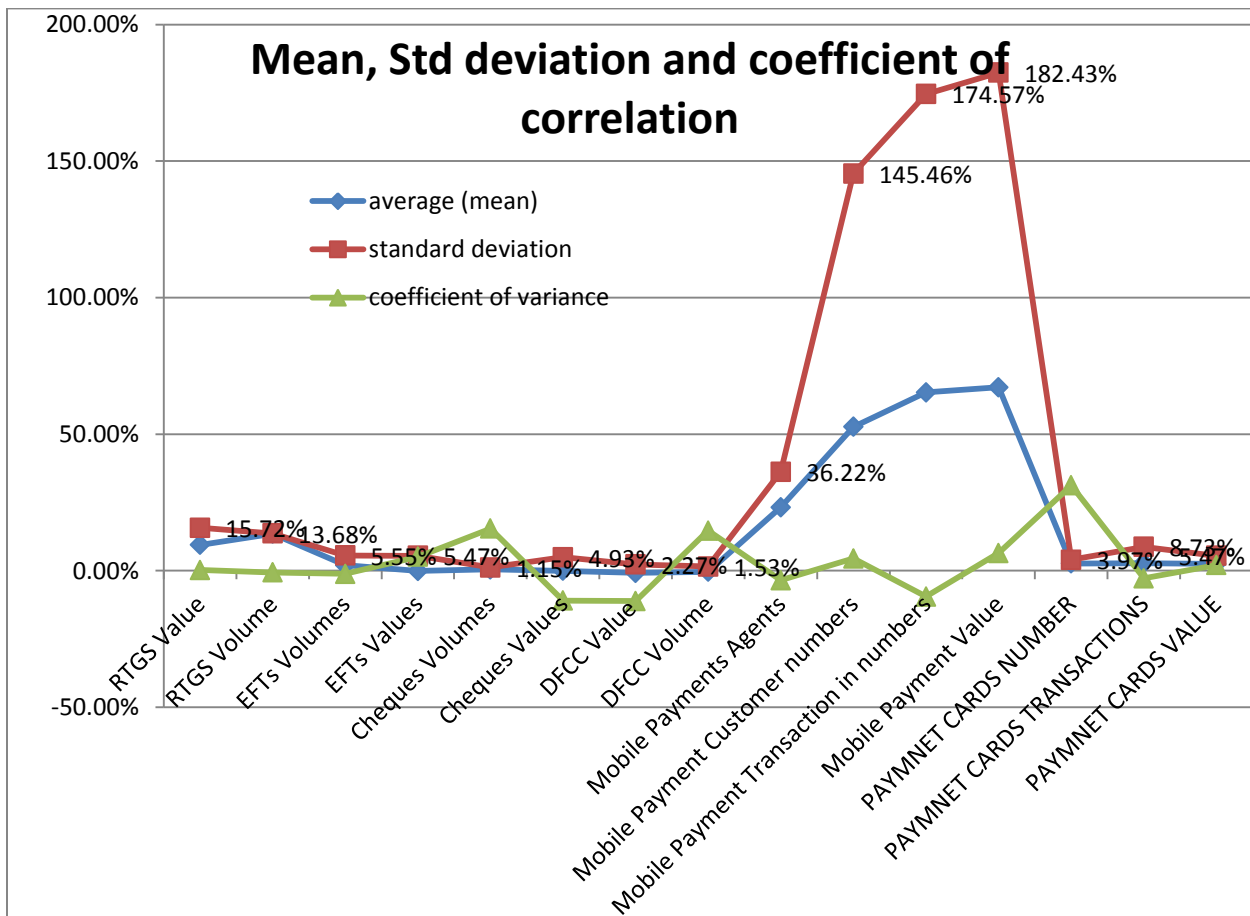


Fig. 4.14 Mean, Standard Deviation and Coefficient of Correlation for all Instruments

Our study also identified the instruments that had the highest coefficient of correlation and those with the lowest correlation as per fig 4.15 below. The study analyzed the quarterly absolute figures and compared with the percentage GDP per quarter. The outcome of the analysis showed that the mobile customer number had steadily grown positively over the period analyzed from a figure of seven thousands to current figure of 25 million customers. In this case there is a positive growth which is supported by the positive coefficient of the regression analysis. The GDP on the other hand has averaged between 6% and 8% for most of the years except for exceptional performance during quarter of March 2011. Regarding the cheque values, there is a high negative coefficient in the regression of 10.9% from 285 million to 217 million as at March 2015 which is supported by the graphical movement of the absolute figures relating for the cheque values. If the graphical smoothening was done, it would reveal a negative movement during the period analyzed. Further analysis was done for the DFCC of negative 11.5% which revealed revealed that there is a negative graphical movement of the DFCC values during the period analyzed from the absolute values of 126 million to 114 million in March 2015.

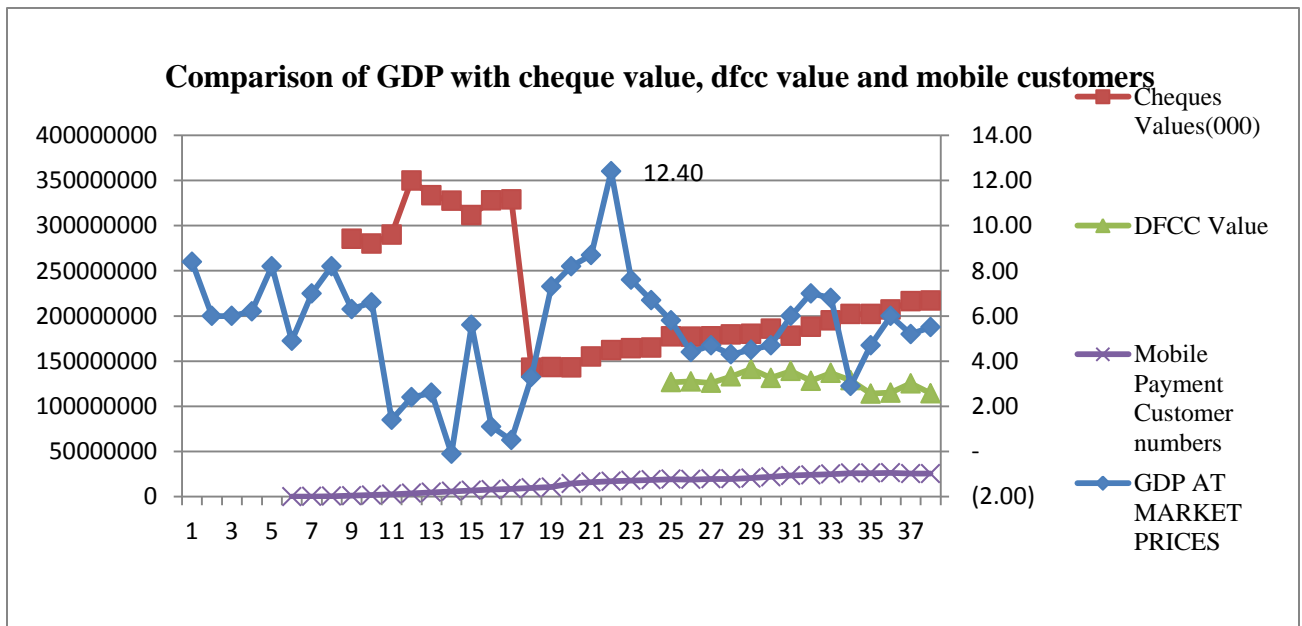


Fig. 4.15 Highest and Lowest Coefficient of Correlation Instruments Compared to GDP

Anova test of 0.0251 is significantly important as it show that the data can be relied upon and the R- squared of 0.38 is significant in explaining that the instruments under review can be associated to the GDP to an extent of 38%. Other factors outside the observed instruments contribute to 62%.The degrees of freedom (df) is associated with the sources of variance which was at 15 instruments. The number of sources in this study is 15.

## **CHAPTER FIVE**

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

#### **5.1 Summary**

The goal of national payment system is to ensure that money is transferred between buyers and sellers in commercial and financial transactions. If done well, the national payment system can reduce overall transaction costs and expand the opportunities for commercial and financial transactions in an economy. The goal of the study was therefore to understand whether the payment system was in a positive or negative relationship with the GDP and therefore understand whether to what extent we can rely of the payment system to predict the national gross product per quarter.

The study used secondary data collected from central bank of Kenya and Kenya national bureau of statistics from September 2005 to March 2015. The data was readily available hence the choice of the period. The data was analyzed on quarterly with each year having four quarters except for 2005 and 2015 that had one quarter each. The data was analyzed using statistical tools to perform the regression model. The result of the regression has in fact shown that there is a positive relationship between the GDP in relations to the instrument to a high of 79% and with a reliability to which the instruments can explain the GDP of 38%.

GDP recorded an average mean of 5% with a corresponding standard variation of 2%. The highest GDP was recorded in December 2010 with the lowest being in December 2008 with negative 0.01%.

RTGS value and volume had a coefficient of relation 0.25% and negative 0.63% respectively with corresponding 9.46% and 13.55% average growth. This shows that the RTGS value has growth over the period analyzed from the absolute values of Kshs 378m and 7 thousands on volume as at September 2005 to Kshs 2.1B and 255 thousands on volume as at March 2015. RTGS has shown that it has become an absolute necessary method of transacting business which in turn has assisted in the growth of the national economy. The savings that has arisen due to the use of the RTGS is immense which could have been incurred if this method of payment has not been adopted. Its use has offloaded the other expensive modes such as paper based and cash based system.

EFT volumes and values recorded an average of 2.02% and negative 0.12% growth during the period with a standard deviation of 5.5% and 5.47% respectively. The regression output revealed a negative 1.19% and 5.11% on EFT volumes and values respectively. EFT has been instrumental in ensuring the payments with high volumes but low values are quickly and efficiently paid. As at March 2015, a total volume of 908 thousand EFT transactions are transacted per quarter. If this were not adopted long process of cheque system could have taken a tall order as each of the EFT transactions could be having thousands of individual payments. On the other hand long queues in the banking halls could be seen as each individual would be queuing to cash the cheque or cash withdrawals.

Cheque systems volumes and values recorded an average of 0.45% and negative 0.03% growth during the period with a standard deviation of 1.15% and 4.93% respectively. The regression output revealed a positive 15.44% and negative 10.93% on volumes and values respectively. The use largely replaced the use of actual cash and was seen as a safe method until the new methods were brought into action. The method is still being useful after the transformation that has seen

the cheque system still a major method of payment. As at March 2015, a total volume of 1.6million cheques were transacted per quarter with a total value of 214 billion shillings.

DFCC values and volumes recorded an average of negative 0.81% and negative 0.42% growth during the period with a standard deviation of 2.27% and 1.53% respectively. The regression output revealed a negative 11.15% and positive 14.64% on values and volumes respectively. As at March 2015, a total volume of 31 thousands with values of Kshs 106 million were transacted during this quarter. The method of payment is popular to organizations with foreign denominated accounts. Instead of making transactions using the local currency to pay foreign amount, they make direct transactions using the foreign denominated accounts. Method was introduced in September 2011 when a total of 34 thousands DFCC cheques worth Kshs 126 million had been transacted compared to the current lower level hence the cause of negative average mean as per the statistical output.

Mobile payment methods were measured per agents, customer numbers, transactions made and their total values. Among the measured elements, mobile value recorded the highest average mean at 67.14% followed by transaction at 65.28%, customer numbers at 52% and finally agents at 23%. The standard deviation were in the same order as the average mean at 182%, 174%, 145% and 36% in that order. The regression output revealed a positive 6.44%, negative 9.48% positive 4.47% and negative 3.52% on values, transactions, customer numbers and agents respectively. As at March 2015, a total volume of 127thousands agents, 25 million customers performing 84 million transactions worth Kshs 216 billion were recorded. The statistical showed that each customer has an average number of three transactions worth a total value of Kshs 8,500. On the other hand, each agents transacted an average of 662 transactions valued at Kshs 1.7 million per the quarter of March 2015.

Payment cards were measured per number of cards, transactions made and their total values. Among the measured elements, payment card transactions recorded the highest average mean at 2.77% followed by cards number at 2.64% and finally agents at 2.47% while the standard deviation were at 8.73%, 3.97% and 5.47% in that order. The regression output revealed a negative 2.82%, positive 31.25% and positive 2.06% on transactions, card numbers and values respectively. As at the quarter ending March 2015, a total volume of 13 million cards performing 84 million transactions worth kshs111 billion were recorded up from 4.7 million cards performing 7 million transactions with a total value of Kshs 40 billion as at September 2009 . The statistical showed that each card has an average number of one and a half transactions worth a total value of Kshs 8,000.

## **5.2 Conclusion**

The study sought to evaluate the relationship of the payment instruments and the GDP. The result of the analysis has shown a very strong positive direction to the GDP of 79% and explainable factors to be 38%. The statistical significance was recorded at 0.0251 based on the 95% confidence level with the recorded 38 observations. This is important due to the fact that all the measurements of the GDP in an ideal situation have been measured at the change of value of worthiness of each sector to the GDP. The payment system is largely used to measure such sectors of the economy. The Anova test is significant as it is below 0.05 which test the reliability of the data. Coefficient of correlation was highest at 31% on number of payment cards followed by cheque volumes at 15.44%. Only intercept, mobile transactions and number of payment cards that recorded a p-value of below 0.05.



### **5.3 Recommendations**

Having duly conducted the study, the researcher would wish to make the following recommendations in line with the study finding.

The research has in fact shown that there is significant relationship with the payment instruments. All payment system has shown significant relationship and therefore the need to better understand the instruments is vital. Economy cannot grow without the payment system being in place and therefore the need to introduce more and more payment methods that are good to the economy in terms of affecting the exchange of goods and services and reduction of the transaction costs.

### **5.4 Limitation of the Study**

The data collected depended on when the central bank of Kenya started collecting this data. It does not however mean that there we zero transaction for some of the instruments such as the cheques and the EFTS. Our analysis was based on data that was available and therefore accuracy depends on the data provided. The study also includes the period of post-election violence of 2008 of which the economy drastically shrank to below zero percentage growth. Further research should be done excluding this period and the results compared with the one including.

### **5.5 Further Studies**

The research has in fact shown that there is significant relationship with the payment instruments. We would wish other researchers to conduct further studies based on the specific instruments that have shown high coefficient of correlation. This will bring out more evidence on what makes the instruments more important than the other either due to high mean or low standard deviation. Other evaluation should be done on the relationship of low skewedness or kurtosis and the contribution to the overall correlation with the GPD.

The research also recommends that further research needs to be done on the savings of the electronic means of payment have contributed in reducing the transaction costs of the paper based instruments such as cheques and cash based transactions. This will clearly show how the increasing use of electronic based payment systems contributes to the national economy.

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## APPENDICES

### Appendix 1: Analysis of change in instruments per year

PERIOD IN YEARS	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	average (mean)	standard deviation	minimum	maximum	skewedness	kurtosis	median
NUMBER OF OBSERVATIONS IN QUARTERS	1	4	4	4	4	4	4	4	4	4	1							
GDP AT MARKET PRICES	0.060	0.063	0.070	0.016	0.026	0.092	0.061	0.046	0.057	0.054	0.049	0.05	0.02	0.02	0.09	(0.26)	0.85	0.0568
RTGS VALUE	0.541	0.056	0.114	0.125	0.101	-0.007	0.080	0.001	0.042	0.023	-0.037	0.09	0.16	(0.04)	0.54	2.66	7.97	0.0561
RTGS VOLUME	0.446	0.058	0.080	0.094	0.372	0.093	0.079	0.062	0.058	0.069	0.080	0.14	0.14	0.06	0.45	1.95	2.42	0.0796
EFTS VOLUMES	0.000	0.000	0.023	0.124	0.121	0.001	-0.034	0.001	0.022	0.018	-0.054	0.02	0.06	(0.05)	0.12	1.09	0.78	0.0011
EFTS VALUES	0.000	0.000	-0.005	0.066	-0.136	0.030	-0.006	0.034	0.034	0.025	-0.056	(0.00)	0.05	(0.14)	0.07	(1.62)	3.28	0
CHEQUES VOLUMES	0.000	0.000	0.011	-0.013	-0.004	0.009	-0.006	0.014	0.004	0.007	0.029	0.00	0.01	(0.01)	0.03	0.68	1.11	0.0035
CHEQUES VALUES	0.000	0.000	-0.005	0.044	-0.140	0.033	0.023	0.012	0.022	0.018	-0.011	(0.00)	0.05	(0.14)	0.04	(2.62)	7.86	0.0124
DFCC VALUE	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.009	-0.003	-0.026	-0.072	(0.01)	0.02	(0.07)	0.01	(2.62)	7.14	0
DFCC VOLUME	0.000	0.000	0.000	0.000	0.000	0.000	-0.017	0.013	0.017	-0.023	-0.036	(0.00)	0.02	(0.04)	0.02	(0.88)	0.55	0
MOBILE PAYMENTS AGENTS	0.000	0.000	1.221	0.408	0.444	0.148	0.069	0.109	0.111	0.026	0.021	0.23	0.36	-	1.22	2.39	6.15	0.1093
MOBILE PAYMENT CUSTOMER NUMBERS	0	0.00%	489.44%	44.20%	16.15%	17.39%	4.65%	1.50%	5.06%	0.55%	0.46%	52.67%	145.46%	0.00%	489.44%	326.79%	1075.50%	0.0465
MOBILE PAYMENT TRANSACTION IN NUMBERS	0	0.00%	588.27%	68.82%	22.94%	10.15%	8.27%	6.97%	6.40%	4.93%	1.30%	65.28%	174.57%	0.00%	588.27%	324.37%	1062.53%	0.0697
MOBILE PAYMENT VALUE	0	0.00%	614.52%	63.26%	20.63%	10.15%	11.76%	5.91%	5.81%	4.66%	1.79%	67.14%	182.43%	0.00%	614.52%	326.04%	1071.35%	0.0591
PAYMNET CARDS NUMBER	0	0.00%	0.00%	0.00%	-1.32%	11.75%	7.60%	3.25%	2.17%	4.42%	1.13%	2.64%	3.97%	-1.32%	11.75%	146.53%	174.24%	0.0113
PAYMNET CARDS TRANSACTIONS	0	0.00%	0.00%	0.00%	-0.96%	8.86%	6.72%	24.83%	2.21%	-9.93%	-1.30%	2.77%	8.73%	-9.93%	24.83%	161.28%	420.83%	0
PAYMNET CARDS VALUE	0	0.00%	0.00%	0.00%	2.90%	8.12%	3.50%	14.90%	5.28%	-4.46%	-3.12%	2.47%	5.47%	-4.46%	14.90%	116.46%	165.09%	0

## Appendix 2. Absolute Figures for the Payment Instruments

period	GDP	RTGS Value	RTGS Volume	EFTs Volumes	EFTs Values	Cheques Volumes	Cheques Values	DFCC Value
Sep-05	8.4	378,557,000,000	6,909	-	-	-	-	-
Dec-05	6	583,522,000,000	9,990	-	-	-	-	-
Mar-06	6	662,587,333,333	11,074	-	-	-	-	-
Jun-06	6.2	862,400,333,333	12,110	-	-	-	-	-
Sep-06	8.2	655,890,333,333	11,822	-	-	-	-	-
Dec-06	4.9	673,544,333,333	12,476	-	-	-	-	-
Mar-07	7	630,867,333,333	13,409	-	-	-	-	-
Jun-07	8.2	682,699,000,000	14,114	-	-	-	-	-
Sep-07	6.3	874,171,666,667	15,643	406,002	54,207,421,265	1,544,947	285,494,234,991	-
Dec-07	6.6	1,012,073,666,667	16,938	443,566	53,219,354,230	1,612,402	279,968,057,754	-
Mar-08	1.4	1,044,152,666,667	22,657	468,015	55,389,207,139	1,418,366	290,038,797,385	-
Jun-08	2.4	1,905,252,333,333	22,267	514,439	62,639,306,554	1,647,653	349,961,592,604	-
Sep-08	2.6	1,519,529,666,667	22,895	550,879	56,045,370,004	1,630,478	333,481,093,394	-
Dec-08	-0.1	1,287,480,000,000	23,495	699,404	67,131,612,112	1,492,812	327,517,562,716	-
Mar-09	5.6	1,282,450,000,000	23,264	738,635	60,519,612,587	1,506,441	311,508,029,602	-
Jun-09	1.1	734,348,333,333	22,829	630,892	71,617,047,953	1,553,171	327,777,430,703	-
Sep-09	0.5	1,170,103,333,333	24,401	649,705	65,943,308,654	1,576,703	329,065,783,468	-
Dec-09	3.3	1,454,896,666,667	59,752	1,002,547	29,745,297,685	1,462,795	142,566,573,230	-
Mar-10	7.3	1,468,910,000,000	66,310	893,322	26,152,763,862	1,474,706	143,526,070,192	-



Jun-10	8.2	1,508,180,000,000	73,994	843,370	25,313,349,521	1,442,824	142,927,492,343	-
Sep-10	8.7	1,320,916,666,667	76,277	915,386	27,620,519,247	1,525,770	154,898,321,221	-
Dec-10	12.4	1,402,236,666,667	84,992	990,745	32,614,889,166	1,511,411	162,199,257,513	-
Mar-11	7.6	1,470,086,666,667	88,686	808,347	27,333,333,333	1,553,715	164,333,333,333	-
Jun-11	6.7	2,070,940,000,000	99,448	753,961	27,302,376,010	1,493,505	164,972,799,533	-
Sep-11	5.8	1,962,756,666,667	110,878	773,483	29,624,861,848	1,551,429	177,401,370,653	126,691,638
Dec-11	4.4	1,794,153,333,333	114,832	843,532	31,254,227,129	1,467,639	177,024,927,762	127,460,339
Mar-12	4.7	1,587,983,333,333	116,653	755,002	29,271,699,167	1,539,989	177,439,993,110	125,848,250
Jun-12	4.3	1,610,719,333,333	126,599	764,625	30,825,837,291	1,515,262	179,584,786,694	132,972,753
Sep-12	4.5	1,645,591,333,333	133,503	733,388	32,301,599,310	1,546,024	180,365,633,183	141,315,067
Dec-12	4.7	1,782,228,333,333	145,954	834,056	35,517,274,374	1,551,151	185,892,374,349	131,336,107
Mar-13	6	1,603,854,333,333	141,109	739,039	33,066,178,219	1,495,928	177,921,862,648	138,946,284
Jun-13	7	1,863,732,333,333	165,262	822,091	36,196,713,119	1,552,103	187,900,929,611	128,241,933
Sep-13	6.8	2,026,299,333,333	171,866	849,967	38,310,612,326	1,602,181	195,246,143,419	136,827,607
Dec-13	2.9	2,062,440,000,000	181,059	897,879	40,352,921,350	1,570,014	202,014,195,362	128,819,980
Mar-14	4.7	1,892,574,666,667	188,018	844,486	38,387,986,033	1,612,510	202,079,284,196	114,033,667
Jun-14	6	2,122,405,333,333	202,407	850,191	39,920,666,667	1,622,229	206,982,333,333	115,117,667
Sep-14	5.2	2,271,449,666,667	214,752	903,314	41,580,666,667	1,689,252	216,466,333,333	125,342,667
Dec-14	5.5	2,233,975,333,333	236,603	960,794	44,372,333,333	1,611,370	217,092,666,667	114,391,000
Mar-15	4.9	2,150,571,666,667	255,438	908,761	41,869,666,667	1,658,499	214,746,000,000	106,209,667

Appendix 3. Continued Absolute Figures for the Payment Instruments

period	DFCC Volume	Mobile Payments Agents	Mobile Payment Customer numbers	Mobile Payment Transaction in numbers	Mobile Payment Value	PAYMNET CARDS NUMBER	PAYMNET CARDS TRANSACTIONS	PAYMNET CARDS VALUE
Sep-05	-	-	-	-	-	-	-	-
Dec-05	-	-	-	-	-	-	-	-
Mar-06	-	-	-	-	-	-	-	-
Jun-06	-	-	-	-	-	-	-	-
Sep-06	-	-	-	-	-	-	-	-
Dec-06	-	-	-	-	-	-	-	-
Mar-07	-	102	6,997	7,238	21,463,500	-	-	-
Jun-07	-	445	112,776	151,220	474,902,333	-	-	-
Sep-07	-	820	445,605	513,409	1,571,656,667	-	-	-
Dec-07	-	1,386	1,118,144	1,151,583	3,371,590,000	-	-	-
Mar-08	-	2,069	1,828,720	1,828,077	5,342,093,333	-	-	-
Jun-08	-	2,796	2,710,037	3,765,200	10,070,346,667	-	-	-
Sep-08	-	3,790	3,745,470	6,295,133	16,681,100,000	-	-	-
Dec-08	-	5,428	4,751,380	9,025,187	23,430,233,333	-	-	-
Mar-09	-	9,391	5,861,273	11,608,000	29,860,466,667	-	-	-
Jun-09	-	15,820	6,855,080	14,937,667	36,333,966,667	-	-	-
Sep-09	-	19,029	7,718,917	17,426,433	42,128,133,333	4,752,909	7,539,480	40,694,666,667
Dec-09	-	22,040	8,621,967	20,528,033	49,481,266,667	4,502,416	7,248,629	45,419,666,667

Mar-10	-	25,955	9,707,920	21,653,733	51,494,900,000	4,997,982	8,276,185	49,545,666,667
Jun-10	-	30,836	10,536,700	24,141,833	55,997,466,667	5,391,285	7,882,191	56,382,666,667
Sep-10	-	34,070	14,427,767	27,728,000	63,936,666,667	5,848,909	8,316,663	58,356,666,667
Dec-10	-	38,220	16,085,300	30,158,500	72,644,266,667	6,998,349	10,021,018	61,903,666,667
Mar-11	-	34,913	17,016,067	29,827,000	80,255,333,333	7,900,818	11,013,500	66,397,666,667
Jun-11	-	39,545	17,942,700	34,531,100	91,034,600,000	8,552,145	13,552,190	58,430,000,000
Sep-11	34,901.67	44,858	18,604,200	38,829,833	105,249,800,000	8,638,107	9,137,079	66,447,666,667
Dec-11	32,518.33	49,145	19,286,900	41,144,800	113,177,000,000	9,352,560	11,559,484	69,791,333,333
Mar-12	33,129.67	53,909	18,955,133	42,594,133	118,948,000,000	9,529,212	13,095,574	91,551,666,667
Jun-12	35,088.00	59,029	19,673,300	46,730,600	123,261,000,000	9,854,931	17,414,993	104,467,666,667
Sep-12	37,754.67	64,968	19,556,667	49,330,000	130,450,000,000	10,239,611	22,688,005	110,064,333,333
Dec-12	33,840.00	74,370	20,443,333	53,803,333	142,276,666,667	10,626,136	27,855,391	119,924,333,333
Mar-13	33,016.00	89,051	21,849,900	53,090,000	139,408,333,333	11,143,236	32,658,374	162,882,666,667
Jun-13	33,887.67	100,023	23,412,833	58,789,767	151,293,000,000	10,869,609	29,545,612	158,485,000,000
Sep-13	38,558.33	108,220	24,036,667	63,616,667	165,483,333,333	11,228,464	28,892,879	141,651,666,667
Dec-13	35,721.33	112,591	24,885,433	68,702,600	177,668,333,333	11,561,685	29,860,753	139,706,333,333
Mar-14	32,686.67	115,106	26,027,067	68,875,667	181,323,333,333	11,703,551	26,394,782	118,508,000,000
Jun-14	33,224.67	118,390	25,961,167	73,557,167	191,568,666,667	12,808,913	25,574,086	109,375,000,000
Sep-14	35,559.00	123,783	26,286,333	78,179,533	204,684,333,333	13,060,214	22,911,953	112,356,666,667
Dec-14	32,222.00	124,609	25,397,233	83,166,000	213,021,666,667	13,717,368	19,567,426	114,939,666,667
Mar-15	31,073.67	127,201	25,514,333	84,247,200	216,836,000,000	13,871,851	19,313,427	111,355,333,333