ELECTRONIC PAYMENT SYSTEM AND FINANCIAL DEEPENING IN NIGERIA, 2009-2017.

Abstract

This study sought to evaluate the impact of the electronic payment system on financial deepening indicators in Nigeria with particular focus on the popular Automated Teller Machine (ATM). The study adopted the ex-post factor research design and the granger causality tests, correlation analyses combined with other preliminary tests were used. Quarterly time series data for a 6-year-period 2009-2017, collected from the central bank of Nigeria statistical bulletins were used. Ratios of Broad money supply to Gross Domestic Product (M2GDP) and ratio of credit to the private sector to gross domestic product (CPSGDP) were used as the dependent variable and proxies for financial deepening, while the independent variables included volume of automated teller machine transactions, web payment, mobile payment and point of sales respectively. The research findings there exists a bi-directional relationship between automated teller machine transaction (LATM) and private sector credit (LCPSGDP) in Nigeria. Also, a unidirectional relationship between automated teller machine transaction (LATM) and broad money supply (LM2GDP) in Nigeria. The results recorded from the study agree with existing findings and theories and they all agree that there is a relationship between financial deepening and electronic payment channels in the Nigeria. It is therefore recommended that the government should make policies that will improve the use of diverse electronic channels with the aim of strengthening their impact on the degree of financial depth in Nigeria. Additionally, Adequate regulatory architecture should be put in place to ensure that the negative fallouts of the use of electronic payment channels are minimized. This is with the view to making them more acceptable to the people.

Keywords: e-payment; web payment; Automated Teller Machines; Financial Deepening.

1. INTRODUCTION

Modern technology has changed the original method of payment system into a more efficient and effective system, devoid of cash and carry syndrome. The easiness of transacting economic substances as well as a safer and quicker access to funds, among other factors, has placed e-payment system on a more elevated pace than cash-based system Ayo, (2010). Interesting, in Nigeria, e-payment system is gaining prominence to the extent that users have now preferred to carry out monetary exchange without visiting banks.

Thus, one of the most remarkable innovations that have taken place in the Nigerian financial system recently is the use of electronic payment for banking and other financial transactions. According to Chijioke (2016) Electronic banking is a driving force that is changing the landscape of the banking industry in Nigeria, as it has blurred the boundaries between different financial institutions, enabled new financial products and services and made existing financial services available in different packages.

The electronic payment system or electronic banking refers to the application of improved and faster information communication technology to banking especially in payment. Anyanwaokoro (1999) defined electronic banking as the application of computerized technology to banking activities especially as it concerns deposit transfer aspects of banking. He also defined e-banking as a system of banking with an electronic banking system which involves an on-line processing of the same day credit and debit transfers of funds between member institutions of a clearing system.

The use of electronic payment system is part of the outcome of the cash-less policy introduced by the monetary authorities in Nigeria called economy. Cashless economy is an economy where the physical cash circulating in the economy is minimized while payments through electronic instruments are used. Cash-less economy is a combination of the cash-based payment system and electronic payment systems Odior & Banuso, (2013). Usually at the commencement of cash-less economy, the cash-based payment exceeds the e-payment system, with time; the former then exceeds the latter which evolves to a cashless economy.

Meanwhile, the formidable tools that are used in electronic banking system are the automated teller machine (ATM), the point of sale (POS) system, Point of Sale terminals (POS), Mobile money solutions and the automated clearing houses (ACH). Electronic payment system also employs cash substitutes such as debit cards, credit cards, electronic funds transfer, direct debits credits, internet banking and e-payments systems. This electronic payment based system has done a lot to increase the convenience of bank's customers, staffs as well as the society at large Kelvin, (2012). Today, paying and receiving money between buyers and sellers are not necessarily done through raw cash. Chijioke (2016) further stressed that it has easily comes to

mind that the introduction of e-banking by the Central Bank of Nigeria (CBN) has seen a drastic reduction in time spent by customers on transactions. These days, by merely logging into the Internet and pressing some prompts, a bank customer can conclude his transactions in record time and in a most convenient atmosphere.

Nigeria is cash based economy with retail and commercial payments primarily made in cash. With the introduction of electronic payment system, according to CBN (2013) in Okoro (2014), the volume and value of transactions of various forms of e-payment stood at 114.6 million and 645.04 billion naira, respectively in 2009, showing an increase of 73.4 and 46.1 percent, respectively when compared with 66.1 million and N441.6 billion in 2008. Also, the volume and value of electronic card (e-card) transactions increased significantly from 195,525,568 and N1,072.9 billion in 2010 to 355,252,401 and N1,671.4 billion in 2013, reflecting an increase of 81.5 and 55.8 per cent, respectively. The increase was attributed to enhanced public confidence in electronic card payments.

Inevitably, the electronic fund transfer practiced today allows money to be transferred from an individual in one location say Lagos to another individual in another location say Enugu while the sender may have paid physical cash at the money transfer agency, the cash does not move physically, what move is information Okoro (2014).

This is highly embraced in the country as individuals and bank customers in Nigeria today are no longer concern about safety of their funds and increase returns on their investments only though fear of bank failure is gradually fading away due to innovations in the system. They want efficient, fast and convenient services which can only be offered to them through E-payment system. Customers also want banking services that will meet their particular needs and support their business goals for instance; businessmen want to travel without carryout cash for security reasons. They want to be able to check their balance online, find out if a cheque is cleared, transfer funds among accounts and even want to download transaction records into their own computer at work or home. All these are only achievable through electronic banking system. Hence, this study examines electronic payment system and financial intermediation in Nigeria.

In the operation of the electronic payment system users are issued with electronic cards which can be slotted into special electronic machines in order to effect payments. At the centre of such payment system are the Point of Sales (POS) terminals Azeez (2011). These are to be deployed across commercial points in the country. These POS terminals thus deployed will serve like the

Automatic Teller Machines (ATM). In this case, upon completing a transaction and the value ascertained, the amount is entered into a POS terminal into which the electronic card has been slotted. The cash equivalent of the amount is transferred from the payer's account into the account of the payee automatically. Users are issued with a card (the electronic purse). The electronic purse is topped up using revaluation terminals. There are different types of terminals: coin & note, credit card and payroll deduction terminals. The cards are simply inserted into the revaluation terminal and certain programmed instructions are followed, and money is added onto the electronic purse. This can then be used to pay for goods/services by inserting them into the POS terminals. When the card is inserted into the POS, and the transaction amount entered, the reader reads the amount and is quickly deducted from the card Akhalumeh & Ohiokha, (2012).

Consumers using cash or checks may be limited in the amount of funds they have for particular transactions. With cash, consumers are limited to the funds they have on hand. Sellers may be reluctant to accept checks for bigger transactions because of the risk of nonpayment. Electronic payments have addressed both of these issues: As noted by Tijani, and Ilugbemi, (2015) e-payment or e-banking have provided consumers with access to all available funds or lines of credit for a given transaction and they have given sellers peace of mind about payment.

Specifically, CBN's analytics estimated that higher card usage contributed an additional N296 billion to consumption between 2011 and 2015, or a 0.1% cumulative increase in overall GDP during the sample time period. That equals about a N74 billion contributions to GDP each year. Real consumption grew at an average of 2.3% in the same period, of which 0.01 percentage points is attributable to increased card penetration. This implies that card usage accounted for about 0.4% of growth in consumption, as well as an average increase of 2.6 million jobs over 2011-2015 CBN, (2015).

Furthermore, the Central Bank of Nigeria (CBN) report notes that the volume and value of electronic card transactions increased significantly from 195,525,568 and N1,072.9billion in 2010 to 355,252,201 and N 1,6714.4 billion in 2015, an increase of 81.5% and 55.8% respectively. ATMs account for 97.8%, followed by web-payments (1%), POS and mobile payments (0.6%) in terms of volume. In value terms, ATM s accounted for 93.4%, web (3.5%), POS (1.9%) and mobile (1.2%). The CBN's policy of promoting electronic cards and channels is driven by the objectives of reducing banking industry costs by 30 percent. It estimated the total direct cost of cash management in the Nigerian Banking Industry is N114.5billion

($715.6million) as at 2009, with cash in transit costs (24%), cash processing cost (67%) and vault management costs (9%). The CBN projects the direct cost of cash to reach N192bn by 2012. The CBN report stressed that electronic payment system have impacted the economy immensely by enhancing tax revenue, increased economic growth, increased financial inclusion, reduced robberies and cash-based fraud, reduced operating costs for banks, increased payments system efficiency and increased banking penetration. It further shows this that the system have had as high as 3.1% of GDP economic impact in 2013. This impact is largely from increased employment, savings from corruption, higher imports/domestic trade, financial sector savings from cash management, and non-financial sector substitution for cash.

This obvious impact notwithstanding, the most essential area of influence of the electronic payment system has arguably been the deepening of the financial system. This has made it possible to provide services to the unserved and banking to the unbanked.

1.2 Statement of the Problem

As the Central Bank of Nigeria (CBN) and commercial banks transcend banking operations to an electronic level, there are a couple of concerns about the feasibility of the system in Nigeria. Though the system is as beautiful as it faces great challenges. A few of these inherent challenges as documented by Olanipekun, Brimah and Akanni, (2013) are listed below: The facilities that will be used for efficient financial transactions by the available deposit money banks in Nigeria may not be able to carry the load of the electronic system; ATM's, Point of Sales system, mobile banking and other mediums have to dramatically expand to touch at least 80% of the whole country before any efficient financial intermediation can be achieved.

Moreover, customers also complain of network failures alongside ATM failures. Implying that network and the ATM machines must be improved dramatically to accommodate for smooth operations of financial activities Amaka (2012) and Okey (2013).

Based on these challenges, it is certainly an issue of argument whether the electronic payment system will be able to improve on economic growth in the country especially the remote or rural areas of the country.

There are many research works on electronic payment system especially theoretical review and performance appraisal Okey, (2013) and Onyinye (2012), but not much has been done empirically using secondary data to ascertain if electronic payment system so far has a significant effect on the depth of the financial system in Nigeria. Findings of studies on

electronic banking in Nigeria and its impact on the depth of the financial system in the Nigerian economy has relied mostly on data collected from questionnaire and field works based on bank specific studies or location specific. As a result, conclusions have been drawn on a particular location or a particular bank without the use of aggregate data to study the whole economy. Such studies are Dahunsi and Akinyede (2014), Siyanbola, (2013) etc,. These studies have not used time series to analyze empirically the effect of electronic banking on the depth of the financial system of the Nigerian economy.

The central bank of Nigeria has stimulated interest in this area of study by collating and publishing e-banking and its allied statistics. With the release of such data on e-banking activities in Nigeria, it is empirically imperative to investigate the effect of electronic banking policy on the Nigerian financial system with particular focus on its deepening as whole from 2009 to 2015 Therefore, this study seeks to fill the gap created by lack of research in the area of the nexus between electronic payment system and financial deepening in Nigeria.

1.3 Objectives of the Study

The broad objective of the Study is to examine the effect of electronic payment system on financial deepening in Nigeria. Specifically, the study tends to;

1. To determine whether a causal relationship exist between automated teller machine transaction and credit to private sector in Nigeria.
2. To ascertain whether there is a causal relationship between automated teller machine transaction and broad money supply in Nigeria.

1.4 Research Questions

The study is based on the following questions:

1. What is the form and direction of causality between automated teller machine transaction and credit to private sector in Nigeria?
2. To what extent can a causal relationship be established between automated teller machine transaction and broad money supply in Nigeria?

Statement of Hypothesis

$\mathbf{H_{o1}}$: Volume of Automated teller machine transactions does not granger cause credit to the private sector in Nigeria.

$\mathbf{H_{o2}}$: There is no causal relationship between automated teller machine transaction and broad money supply in Nigeria.

The study is important to the average Nigerian trader, farmer and public servant to know the benefits of the electronic banking to the Nigerian economy and the need to embrace the system completely. It will also help the unbanked in the semi-urban areas and rural areas and even in the urban areas that still did not trust the banking system in Nigeria the need to use the banking system to enable them enjoy the benefits of the cashless policy that will save the fear in carrying physical cash. The study will help to unveil how these new means of financial transactions can drive financial deepening and inclusion which will positively affect the economy at large. Also, this study is important to policy makers to enable them monitor trends in the levels and composition of electronic banking system, and to assess the impacts on the economy over time. This will enable them make the evolve rightly to the benefit of the rich or the poor in the society. This study also adds to the existing literature on the link between cashless banking system and economic growth.

The study is divided into five sections with introduction as section one, two is review of literature and three is methodology, four contains empirical results with five as conclusion.

2. LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 Payment System

Payment system is seen as a financial system supporting transfer of funds from suppliers (savers) to the users (borrowers), and from payers to the payee, usually through exchange of debits and credits among financial institutions. It consists of a paper-based mechanism for handling cheques and drafts, and a paperless mechanism (such as electronic funds transfer) for handling electronic commerce transactions.

The payment system occupies an important place in the development of a country's economy; infact the level of development of a country's payment system is a reflection of the state or condition of the country's economy. The concept payment system has different meanings among writers. The definition ranges from a simple definition to a more complex definition. Below are different definitions of payment system from different authors: Bruce (2012) defined payment system as an operational network - governed by laws, rules and standards - that links bank accounts and provides the functionality for monetary exchange using bank deposits. According to Lacker (2005), payment system is referred to as the interbank settlement system, which is a

contractual and operational arrangement that banks and other financial institutions use to transfer funds to each other.

2.1.2 Electronic payment system

The electronic payment system or electronic banking refers to the application of improved and faster information communication technology to banking especially in payment. Electronic payment, popularly known as e-money, is a payment platform where users pay money in advance into their e-money account or create an e-money account that is linked to their credit card or bank account. The mechanisms that enable the operation of the system are the automated teller machine (ATM), the point of sale (POS) system, Point of Sale terminals (POS), Mobile money solutions and the automated clearing houses (ACH). However, cashless banking system also employs cash substitutes such as debit cards, credit cards, electronic funds transfer, direct debits |credits, internet banking and e-payments systems, Kelvin, (2012).

2.1.3 Concept of Financial Deepening

Financial deepening is a concept that has assumed prominence over the last decade. It refers to the expansion in provision of diverse forms of financial and banking services to a wider range and strata of society Wikipeadia, (2016).

According to the Central Bank of Nigeria (2015) financial Deepening is measured by ratio of gross domestic capital formation to GDP, ratio of gross domestic savings to GDP. Precisely, the level of financial deepening in an economy is shown by the ratio of credit to the private sector to the GDP and the ratio of broad money supply to the GDP.

2.1.4 Electronic Banking Instruments

Electronic – based transaction seeks to drive the development and modernization of Nigeria's cashless banking system in line with her goal of being among the top 20 economies of the world by the year 2020 Central Bank of Nigeria, (2011). The essence of the policy is to shift the economy from a cash-based economy to a cashless one. Thus, it is geared towards engendering an efficient payment system anchored on electronic – based transactions. It is a truism that an efficient and modern payment system is a key enabler and a sine qua non for driving growth and development. The policy also aims at improving the effectiveness of monetary policy in managing inflation in the economy CBN, (2011)

The electronic payment system applies to all accounts and one of the prerequisite for its development according to Ajayi and Ojo (2006) is to encourage a payment system that is secure,

convenient, and affordable. In this regard, developed countries of the world, to a large extent, are moving away from paper payment instruments toward electronic ones, especially payment cards Humphrey, (2004).

2.1.5 E-Payment and the Cashless Policy

Electronic based transactions are a major tool used to discourage high circulation of cash in any economy. It is also the bases for the implementation of cashless policy in Nigeria. Electronic cash is a system that allows individuals purchase goods or services in today's society without the exchange of anything tangible. The term money still exists, but it is more in an electronic form. This is more acceptable as the world over makes a shift towards a cashless society which is being sold as a more convenient method of payment and a method of preventing crimes all the way from robbery of cash from individuals to the extent of money laundering among crime syndicates and cash stockpiling at home by corrupt government officials.

The CBN also defines electronic banking as the provision of retail and small value banking product and services through electronic channels. Such product and service can include deposit taking, lending, account management, provision of financial advice, electronic bill payment and the provision of other e-payment product and service such as e-money. Below are some of the e-banking product and services that is pivotal to implementation of the cashless policy from the CBN report, Siyanbola, (2013).

2.1.6 Popular e-Banking Products

2.1.61 Point of Sale Terminals

This mode of e-banking handles cheque verification, credit authorization, cash deposit and withdrawal and cash payment. It enhances electronic fund transfer at the point of sales. Thus customers account would be debited immediately with the cost of purchase in an outlet such as a petrol station or supermarket. The implication of this is that customers can make payment for goods and services without necessarily coming in contact with physical cash as the purchase price would be debited on the buyer's card and credited on the seller's account, Akhalumeh, and Ohiokha, (2012).

2.1.63 GSM/Mobile banking

This mode of e-banking primarily uses mobile phones as the electronic devices. Mobile phone gives customer the opportunity to operate their account with bank as long as their phones and

network services provider support the SMS (short messaging service) which would enable the customer check account balance.

2.1.64 Automated Teller Machine

Automated teller machine is a computer controlled device that dispenses and provides other services to customers who identify themselves with a personal identification number (PIN). The physical carriage of cash as well as frequent visit to the banks is being reduced. The principal advantage of ATM is that it dispenses cash at any time of the day even as it needs not to be located within the banking premises but in stores, shopping malls, fuel stations etc. unlike the traditional method where customers have to queue for a very long period of time to withdraw cash or transfer funds.

2.1.65 Card System

It is a unique electronic payment type which involves the use of smart cards. Smart cards are devices with embedded integrated circuit being used for settlement of financial obligations. It can be used as credit card, debit card and even ATM cards. The power of these cards lies in its sophistication and acceptability to store and manipulate data as well as handling of multiple applications on one card securely.

2.2 Theoretical Literature

There have been no generalized theory guiding the use of electronic banking, but studies on the subject matter depends on theories that advocate for innovations and improvements in the financial and banking system. As a result, the theoretical bases for this study are based on two scholarly intellectual contributions, namely the Mckinnon-Shaw Framework and the Structuralist Approach.

2.2.1 Mckinnon-Shaw Framework

The Mckinnon-Shaw framework contained two essential issues which give room for innovations in the financial system of developing countries; (1) the financial sector is critical for economic growth and (2) extensive government controls imposed on the financial sector prevents financial deepening and hinders the contribution of the sector to development.

Mckinnon (1973) came up with the proposition in his study that there is a complimentary relationship between physical capital and money which reflect in money demand. This complimentarily relationship according to Mckinnon (1973) connects the demand for money

directly with the process of physical capital accumulation, due to the fact that the conditions of money supply have an influence on decision to save and invest.

On the other hand, Shaw (1973), hypothesis centred on financial intermediation between the savers and users of the saved fund resulting from financial liberalisation and development. This he said increase the incentive to save and invest, stimulates investments due to an increase supply of private sector credit, and raises the average efficiency of investment. This view stresses the importance of competition within the financial markets as prerequisites for successful financial intermediation. It is the Shaw argument that give way for financial institutions in developing countries to embark on policies that leads to improvement in their financial sector.

However, the general notion from their debate is that the functions of financial institutions in the savings-investment process were spelt out as being an effective element for the mobilization and allocation of capital by making equal the supply of loan-able funds with the demand for investment funds and the transformation and distribution of risks and maturities.

2.2.3 Romer's Model of Technological Change

Romer's model of Endogenous Technical change of 1990 identifies a research sector specializing in the production of ideas. To Romer, ideas are more important than natural resources. He cited the example of Japan which has very few resources but was open to new western ideas and technology. It imported machines from the United States during the meija era, dismantled them to see how they worked and manufactured their better prototypes. Therefore, ideas are essential for the growth of an economy. These ideas relate to improved designs for the production of durable goods for final production. In the Romer model, new knowledge enters into the production process in three ways;

- A new design is used in the goods sector for the production of a new intermediate input.
- In the final sector, labour, human capital and available producer durables produce the final product.
- A new design increases the total stock of knowledge which increases the productivity of human capital employed in the research sector.

One of the policy implications of endogenous growth theory according to (Jhingan 2010) is that the measured contribution of both physical and human capital to growth may be larger than suggested by the Solow residual model. Investment on education or research and development of

a firm has not only a positive effect on the firm itself but also spill over effects on other firms hence on the economy as a whole. It further implies that countries having greater stocks of human capital and investing more on research and development will enjoy a faster rate of economic growth. This may be one of the reasons for the slow growth rate of certain developing countries.

2.3 Empirical Review

A lot of previous researchers have made several findings on the effect of the electronic payment system in an economy. Some of these studies are as mentioned below.

Okoro (2014) examined the impact of selected e-payment instruments on the intermediation efficiency of the Nigerian economy. Using time series data of 2006 – 2011, he employed multiple regression technique in the analysis of the data. He used intermediation efficiency indicator (the ratio of currency outside bank to broad money supply) as a dependent variable, while the automated teller machine (ATM), point of sales (PoS), Mobile and Internet service values were used as the independent variables. He made the following findings: that there is significant relationship between ATM, PoS, Internet service values and the intermediation efficiency of the Nigerian economy. However, his study also reviles that there is no significant relationship between Mobile service value and intermediation efficiency of the Nigerian economy within the period under study. This implies that the ATM, PoS and Internet services are the major instruments used by the customers of the deposit money banks in Nigeria. On the other hand, he posited that the insignificant contribution of the Mobile service value to intermediation efficiency may be as a result of the user's ignorance or the banks' insufficient effort in selling the product effectively. Therefore, his study recommends that the banks should put more effort in advertising these products in Nigeria.

Iwedi and Igbanibo (2015) modelled the relationship between financial intermediation functions of banks and economic growth in Nigeria using data spanning (1970-2014). They used credit to private sector (CPS), banks deposit liabilities (DLS), and money supply (MOS) as proxy for bank financial intermediation functions while gross domestic product represents economic growth. They used the OLS regression technique and the augmented Dickey-Fuller unit root test for the analysis. The relative statistics of their estimated model shows that credit to the private sector (CPS) negatively and insignificantly correlate with GDP in the short run, bank deposit liabilities shows a positive relationship with GDP though statistical insignificant at 5% level.

They also found that money supply positively and significantly correlates with GDP at short run. Their analysis revealed the existence of a long run relationship between bank financial intermediation indicators and gross domestic product in Nigeria. And the granger causality test results reveal that there exists unidirectional causality flowing from Gross domestic product to Credit to Private Sector (CPS). Bi-directional causality runs between Deposit Liabilities (DLS), Money Supply (MOS) and GDP. Their results suggest that growth in the volume of deposit liabilities could boost banks financial intermediation functions in the economy and exert a positive impact on level of productivity hence having a contagion effect on the output level of goods and services in the economy. They recommend that the managers of the Nigeria economy should fashion out appropriate policies that will enhance the bi-directional flow of influence between the banking sector where investable funds are sourced and the real sector of the economy where goods and services are produced, and there should be efficient and effective financial intermediation process in order to achieve the nominated objective of investment, productivity and economic growth.

Nwaolisa and Kasie (2012) examined the user acceptability and payment problems encountered by Nigerians in utilizing electronic banking system. Their study equally ascertained the contribution of electronic retail payment to the elimination or reduction in problems inherent in the payment process in Nigeria. They sourced data from both primary and secondary sources, and data collected were analysed using tables and percentages. However, they found out that cash usage is still very high in Nigeria irrespective of the efforts of Central Bank of Nigeria towards the adoption of electronic payment system. They also reported that the reason for this is the challenges of inadequate power supply, shortage of critical technological infrastructures, lack of socio-cultural support and absence of regulatory framework that are required to operate seamless and effective electronic payment system in the country. They recommend that there is the need for the government to remove barriers to innovation, including regulatory barriers to pave way for rapid development of the electronic payment systems in Nigeria.

Tijani & Ilugbemi (2015) examines the impact of electronic payments channels (EPC) on National development (ND). The study was survey targeted at current and savings accounts customers of deposit money banks in Nigeria using Ado–Ekiti as a case study. They administered one hundred and twenty (120) questionnaires in six (06) banks in Ado–Ekiti metropolis. Ninety-Eight (98) questionnaires were returned for processing, and their data was

analyzed using inferential statistics specifically with the use of chi-square. Their study reveals that electronic payment channels (EPC) have impacted on the economy and therefore contributing positively to national development (ND). They recommended that the Central Bank of Nigeria (CBN) should mount other e-payment products for the promotion of trade and commerce in Nigeria. The Central Bank of Nigeria (CBN) should embark on intensive campaign for complete adoption of e-payment products especially at the grassroots level among others.

Abubakar (2014) used time series data for the period 2006- 2012, to examine the effects of electronic banking on growth of deposit money banks in Nigeria. He used secondary data collected from secondary sources through annual reports and statistical bulletin of Central Bank of Nigeria. He measured electronic banking using the total value of internet and mobile banking while growth was measured using the value of total deposits and total assets of deposit money banks in Nigeria. Total deposit was regressed on internet and mobile banking, while total asset was regressed on internet and mobile banking using multiple regression technique. He revealed that positive relationships exist between mobile banking and total deposits, and between internet banking and total asset while on the other hand, no significant relationships between internet banking and total deposits, and between mobile banking and total asset. He therefore recommended that banks that want to improve their deposit growth performance must offer numerous products/services through mobile phones in an effective, efficient and cost effective manner. They must also make mobile banking application all mobile phones enabled so that those customers who cannot afford Java enabled mobile phones can also use the product. He also recommends that banks that want to increase their asset holdings must offer numerous, efficient and cost effective secured transactions through the internet.

Hernando and Nieto (2007) attempted to fill this gap by identifying and estimating the impact of the adaptation of a transactional web site on financial performances using a sample of 72 Deposit Money banks in Spain over the period 1994-2002. The analysis of the sample is based on several financial performance ratios. These financial ratios measure business activity as a percentage of average total assets and profitability. The results showed that the impact of transactional web adoption on banks performance take to appear. The adoption of the internet as a delivery channel involves a gradual reduction in overhead expenses. This effect is statistically significant after one and half year after adoption. The cost reduction translates into an improvement in banks

profitability, which becomes significant after one and half year in terms of return on assets (ROA) and after three years in terms of return on equity (ROE).

Maiyaki and Mokhtar (2010) employing a survey of 407 bank customers in 33 organizations in Kano State of Nigeria studied the effects of availability of electronic banking facilities among other factors. They study reveals that the availability of electronic banking facilities such as ATM, online banking and telephone banking do not have significant influence on customer's bank choice decision.

Okoye & Ezejiofor (2013) did an appraisal of cashless economy policy in development of Nigerian economy. The objective of their study is to examine its significant benefits and essential elements, and to check the extent to which it can enhance the growth of financial stability in the country. Two research hypotheses were formulated in line with the objectives of the study. The descriptive research design was adopted for the study with a sample size of 68. The convenience sampling technique was used. The questionnaire which was structured was the main instrument used for data collection. The data collected was subjected to face validity test, and was tested with ANOVA and chi – square (x2) technique was used to test the hypotheses. Their results indicate that: majority of Nigerians are already aware of the policy and majority agree that the policy will help fight against corruption/money laundering and reduce the risk of carrying cash. Major problems envisaged to hamper the implementation of the policy are cyber fraud and illiteracy. Based on the findings they made some recommendations made are: the government should adopt a different strategy to educate the non-literate Nigerians about the cashless economy; and a framework should be worked out to provide cyber security in Nigeria.

Most studies reviewed works looked at e-banking from the point of the ICT and financial system holistically. In terms of datasets and instrumentation, attention was given more to qualitative studies restricted to given periods and location.

Essentially, these studies were micro in nature with little or no focus on the economy in general. There is also the apparent deficiency of not using verifiable data as the publication of data on e-payment activities by the Central Bank of Nigeria started in the first quarter of 2009.

None of the studies reviewed gave attention to the impact of e-payment on financial deepening even in a financial world that is giving serious attention to banking the unbanked and serving the unserved. The justification for this study therefore, is made real by the obvious gaps in literature in terms of geography and method which it is set to fill. To fill this gap, this study is isolating the

most popular electronic payment instruments to investigate it in line with the need to deepen the financial system.

3. METHODOLOGY

3.1 Data and Design

The *ex-post facto* research design was adopted for this study. The population of the study consists of the values of electronic payment system tools of all deposit money banks in Nigeria. Secondary source of data was used for this study, and the data were sourced from Central Bank of Nigeria's statistical bulletin. The data is a quarterly data that covers the period 2009 - 2015. The variables of interest are the ratio of broad money and credit to the private sector to gross domestic product, which will constitute the dependent variables. While the independent variables are the volumes of transactions on internet payment, Automated Teller Machine (ATM), web payment, and point of sales terminals. This study will be descriptive and inferential in nature.

The data for this work is drawn from the statistical bulletin of the Central Bank of Nigeria for the range of years 2009 to 2017. Dataset covering a 8-year period is to be collected and studied. Financial deepening indicators proxied by CPSGDP and M2GDP as well will be used as drawn from the said Central Bank of Nigeria publications. The volumes of transactions on internet payment, Automated Teller Machine (ATM), web payment, and point of sales terminals will also be drawn from the Central Bank Bulletin.

Significantly, the datasets are purely time series. Time series are observations that are ordered in time or numerical values of variables from time to time Osuala, (2010). The second characteristic of the data set is that they are secondary. Secondary data is data created by someone other than the user. The data come from such sources as journals, publications, organizational records and data collected and kept in existing bodies of literature Hill et. al (2001).

Model specification

The model follows the Pairwise Granger Causality test which according to Gujarati and Porter, (2009) which is stated thus:

The Model for the Pairwise Granger Causality Test is stated following Gujarati and Porter (2009) thus:

$$M2GDP_t = \sum \alpha_1 LATM_{1-t} + \sum \alpha_2 LWEB_{1-t} + \sum \alpha_3 LPOS_{1-t} + u_{1t}$$

$CPSGDP_t = \sum \alpha_1 LATM_{1-t} + \sum \alpha_2 LWEB_{1-t} + \sum \alpha_3 LPOS_{1-t} + u_{1t}$

For FD →E-Payment Channels

u_{1t} = *the error terms*

M2GDP, LATM, LWEB, POS are as defined above.

CPSGDP and M2GDP are financial deepening indicators while LATM, LWEB, LPOS are electronic payment channels

→ *show the direction of causality.*

The model is a modified form of the one developed by De Gregorio and Guidotti (1995) and Adamopoulous A (2013) in studying financial deepening on a global scale and the form used by Onwumere, Kalu and Nkwor (2015) in the study of financial deepening and economic growth in Nigeria. In this context, the dependent variable is financial deepening and e-payment channels are the explanatory variables and the model will appear thus:

M2GDP = F (VATM)

CPSGDP = F (VATM)

where

F is the functional notation, thus;

M2GDP= ratio of broad money supply to gross domestic product (a financial deepening indicator)

CPSGDP= ratio of credit to the private sector to gross domestic product (a financial deepening indicator)

VATM = Volume of Automated Teller Machine.

To test the individual hypotheses as formulated, the models to be used will be as follows:

Hypothesis One

$CPSGDP_t = \sum \alpha_1 LATM_{1-t} + \sum \alpha_2 LWEB_{1-t} + \sum \alpha_3 LPOS_{1-t} + u_{1t}$

Where

CPSGDP = ratio of credit to private sector to gross domestic product (a financial deepening indicator)

ATM =Volume of ATM transactions

WEB = Volume of Web Payment

POS = Volume of Point of Sales Transaction

Hypothesis Two

$$M2GDP_t = \sum \alpha_1 LATM_{1-t} + \sum \alpha_2 LWEB_{1-t} + \sum \alpha_3 LPOS_{1-t} + u_{1t}$$

Where

M2GDP = ratio of broad money supply to gross domestic product (a financial deepening indicator)

ATM =Volume of ATM transactions

WEB = Volume of Web Payment

POS = Volume of Point of Sales Transaction

3.5 Technique of Data Analyses

Relevant econometric techniques were employed in analyzing the collected data and drawing conclusions, with the aim of properly examining the response of financial deepening to electronic payment systems in Nigeria from 2009 to 2017.

Preliminary tests are conducted for the data properties, behavior and goodness for the purposes of using them for the model estimation. It includes among other things the following: descriptive statistics like mean, median, variance, standard deviation skewness, kurtosis, (test for normality) and Correlational analyses to test for linear association.

Pairwise Granger Causality test is used to prove the direction of influence. The test assumes that the information relevant to the prediction of the variable are contained solely in the time series data on these variables. This test is popularized by Granger (1969) who assumed that the current values of a variable (Y) is conditioned on the past values of another (X) or the other way round. This test shows whether a bidirectional or unidirectional causality exists between the variables of interest. In this work, this test was adopted to confirm whether financial deepening indicators granger causes electronic payment systems or electronic payment systems granger causes financial deepening indicators. It may also show whether they both granger causes themselves. Specifically, it showed whether there is a causal relationship between the two and if there is, is it unidirectional or bidirectional.

4. Results

The table below contains the proxies for the variables under study

Table. 1 LOG LINEARISED FORM OF FINANCIAL DEEPENING INDICATORS AND ELECTRONIC PAYMENT CHANNELS TRANSACTIONS – 2009 to 2017

YEAR	LATM	LM2GDP	LCPSGDP
2009	18.50834	3.636450	3.608212
2010	17.91208	3.005978	2.923162
2011	19.66648	2.961525	2.827314
2012	19.74374	2.964042	3.015535
2013	19.50348	2.940667	2.980619
2014	19.80723	2.988507	2.954910
2015	19.780543	2.986780	2.897654
2016	19.657480	2.9876543	2.987645
2017	19.778867	2.967540	2,876543

Source: Central Bank of Nigeria Statistical Bulletin 2017

4.2 Data Analysis

2.2.1 Descriptive Analysis

The descriptive analysis presents the aggregative averages of the variables under study. It describes the variables under study presenting the mean, minimum and maximum values, standard deviations and measures of distribution such as skewness and kurtosis. The descriptive goodness-of-fit test is also presented to ascertain the normality of the dataset.

Table 2 Description of the variables under study

Variable	Mean	Min	Max	Std dev.	JB-Stat	Prob. (JB)	No of observations
LATM	19.19	17.91	19.81	0.79	0.95	0.62	9
LATMU	2.52	2.41	2.78	0.14	1.41	0.49	9
LCPSGDP	3.05	2.83	3.61	0.28	2.65	0.27	9
LM2GDP	3.08	2.94	3.64	0.27	3.43	0.18	9

Source: Researcher's extract from E-views output

From the descriptive analysis in table 3 above, the minimum and maximum values indicates closeness among the series of the dataset. The standard deviation which is a measure of dispersion from the mean confirms that there is a close dispersion among the series of the dataset while the Jarque-Bera goodness-of-fit tests and associated probabilities greater than 0.05 shows the datasets are normally distributed.

2.2.2 Correlation Analysis

Table 3 Correlation Results of the Variables under study

Correlation	LCPSGDP	LM2GDP	LMOBILE	LATMU	LATM
LCPSGDP	1.000000				
LM2GDP	0.967370	1.000000			
LMOBILE	-0.295457	-0.371844	1.000000		
LATMU	-0.256958	-0.300204	0.944081	1.000000	
LATM	-0.383871	-0.471005	0.677901	0.551785	1.000000
Probability	**LCPSGDP**	**LM2GDP**	**LMOBILE**	**LATMU**	**LATM**
LCPSGDP	-----				
LM2GDP	0.0016	-----			
LMOBILE	0.5697	0.4679	-----		
LATMU	0.6230	0.5632	0.0046	-----	
LATM	0.4525	0.3457	0.1389	0.2563	-----

Source: Researcher's computation from E-views extract

The general correlational analysis shows that there exist significant linear associations between ATMU and mobile payment, point of sales and mobile payment, point of sales and ATMU, web payment and mobile payment, web payment and ATMU, and between web payment and point of sales in Nigeria.

4.3.1 Hypothesis one

H_1: Transactions with automated teller machine granger cause credit to the private sector in Nigeria.

Level of significance (α) = 0.05

Results

Table 4: LATM and LCPSGDP model analysis

LATM does not Granger Cause LCPSGDP	8	19.3951	0.0479
LCPSGDP does not Granger Cause LATM		39.4807	0.0244

Since the p-values of 0.0479 and 0.0244 are less than 0.05, we reject the null hypothesis and conclude that there exists a bi-directional relationship between automated teller machine transaction (LATM) and private sector credit (LCPSGDP) in Nigeria. This implies that the use of automated teller machine (ATM) drives the degree of credit to private sector which is a financial deepening indicator and financial deepening also drive the use of ATM in Nigeria.

4.3.2 Hypothesis Two

There is causal relationship between automated teller machine transaction and broad money supply in Nigeria.

Level of significance (α) = 0.05

Results

Table 5: LATM and LM2GDP model analysis

LATM does not Granger Cause LM2GDP	9	0.00065	0.9820
LM2GDP does not Granger Cause LATM		128.147	0.0077

Source: Researcher's Computation

Since the p-value of 0.0077 is less than 0.05, we can deduce that broad money supply drives the use of ATM in Nigeria. Hence, we reject the null hypothesis and conclude that there exists a unidirectional relationship between automated teller machine transaction (LATM) and broad money supply (LM2GDP) in Nigeria.

5. CONCLUSIONS

This study examined the impact of electronic payment on financial deepening in Nigeria. Following a detailed theoretical review and empirical analyses, findings were made in line with the research questions as well as set and tested hypotheses. The findings from the specific objectives of this study are as follows:

1. That there exists a bi-directional relationship between automated teller machine transaction (LATM) and private sector credit (LCPSGDP) in Nigeria.
2. That there exists a unidirectional relationship between automated teller machine transaction (LATM) and broad money supply (LM2GDP) in Nigeria.

We found out that the p-values of 0.0479 and 0.0244 are less than 0.05; we reject the null hypothesis and conclude that there exist a bi-directional causal relationship between automated teller machine transaction (LATM) and private sector credit (LCPSGDP) in Nigeria. This implies that the use of automated teller machine (ATM) drives the degree of credit to private sector which is a financial deepening indicator and financial deepening also drive the use of ATM in Nigeria. This implies that as the depth of the financial system increases, the use of automated teller machine increases. Similarly, the use of automated teller machines leads to financial inclusion and greater deepening. This finding is consistent with Nabila and Zakir (2014) who found bidirectional causality between financial development and the use of electronic payment system.

From the findings made, the p-value of 0.0077 is less than 0.05; we can deduce that broad money supply drives the use of ATM in Nigeria. It is concluded that a unidirectional causal relationship exists between automated teller machine transaction (LATM) and broad money supply (LM2GDP) in Nigeria. This essentially implies that as the volume of money in circulation increases, the channel for dispensing the money should enlarge correspondingly. This agrees with the position of Ghildiyal, Pokhriyal, and Mohan, (2015) who found a bidirectional causality in the Indian economy between money supply and electronic payment channels. The results

recorded from the study agree with existing findings and theories and they all agree that there is a relationship between financial deepening and electronic payment channels in the Nigeria.

By reason of the above findings, we recommend that the government should make policies that will improve the use of diverse electronic channels with the aim of strengthening their impact on the degree of financial depth in Nigeria. In addition, adequate regulatory architecture should be put in place to ensure that the negative fallouts of the use of electronic payment channels are minimized. This is with the view to making them more acceptable to the people. More so, government policies on financial deepening should be vigorously pursued so that its alliance with the electronic payment channels will be strengthened to the overall benefit of the Nigerian A major contribution to knowledge which this study has made is that it is based on empirical evidence from Nigeria. This makes the findings relevant for policy making in the Nigerian setting. It is our belief that this work made some contributions to knowledge based on the fact that it is a very gray and lowly unresearched area. To this effect, there are very few empirical works in this novel area. This work joins the league of the very few studies in electronic payment and financial deepening in Nigeria and can open a further study into the impact of electronic payment systems on the banking habits of Nigerians and other users of banking services in economies like Nigeria.

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