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Impact of electronic banking as a tool for financial Inclusion in Nigeria: A study

*E. Chuke Nwude[1], Sergius Nwannebuike Udeh[2], Comfort Amaka Nwude[3]

[1]Department of Banking and Finance, Faculty of Business Administration, University of Nigeria Nsukka, Enugu Campus, Enugu, Nigeria
[2]Department of Accounting and Finance, Faculty of Management and Social Sciences, Godfrey Okoye University, Enugu. Enugu state, Nigeria
[3]Department of Management, Faculty of Management and Social Sciences, Godfrey Okoye University, Enugu, Enugu state, Nigeria

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***Corresponding author:** E. Chuke Nwude

Department of Banking and Finance, Faculty of Business Administration, University of Nigeria Nsukka, Enugu Campus, Enugu, Nigeria

Abstract

This study explored the impact of electronic banking as a tool for financial inclusion in Nigeria as cashless policies unfold in the Nigerian financial system. The specific objectives of this study were to determine the extent to which transactions using: (i) mobile telephone banking (ii) point of sale and automated teller machine (iii) internet banking had impacted the banking adult in Nigeria. With Ordinary Least Square regression the study discovered that while mobile/telephone banking and ATM transactions shared positive but non-significant relationship with the banking adult, transactions through POS and Internet channels shared negative and non-significant relationship with the banking adult in Nigeria. Therefore, the study recommends that CBN should educate people adequately on the importance of e-banking through intensive campaign as it would promote trade and commerce through the electronic channels and facilitate the success of CBN financial inclusion policy.

Keywords: financial inclusion, e-banking, mobile telephone banking, automated teller machine, internet banking

INTRODUCTION

Nigeria is an immensely endowed country in both natural and human resources, with a population of over 140 million people according to 2006 census, (Dec 30, 2016 -National Population Commission (NPC) and the National Bureau of Statistics (NBS) have put the current figure of Nigeria's population at 193,392,517), who are largely engaged in the informal sector. This sector is primarily dominated by micro, small and medium-scale enterprises (MSMEs) and peasant farmers who require financial services to grow their businesses and improve their livelihood. They believe that if they are duly empowered through access to formal financial services, they will to a large extent, impact positively on poverty reduction and engender economic growth and development of the country. The advancement in software tools, computer hardware and telecommunications has shifted the focus of the banks towards computerization which have transformed the concept of branch banking to anytime anywhere banking. The introduction of universal banking practice in Nigeria in 2002 could not improve financial inclusion and was stopped in 2010. Cashless economy through e-banking platforms has been on course since 2012 but its impact on the banking public especially the unbanked is not yet clear. Financial inclusion has been professed, preached, and propagated in Nigeria by CBN, the apex financial regulatory body since 2010 but to what extent has it been impacted by e-banking platforms is currently not quite clear. Therefore the unresolved issue which the researchers seek to resolve in this study is that irrespective of the efforts towards improving the level of financial inclusion the psychology of the people to hold cash and conduct most of their transactions in cash still manifest in Nigeria. Financial exclusion seems to still manifests prominently in spite of the emergence of e-banking in Nigeria. Nigerians at present still operate a predominantly cash based payment system. The credit habit of an average Nigerian seems low as the banking adults seem to have the culture of holding cash as against holding credit instrument. The peculiarities and characteristics of the target population for financial inclusion has shown over the years that the structures and platforms of the conventional and specialized banks are inappropriate and inadequate to successfully

capture the financial needs of the financially excluded low-income and rural groups who prefer to patronize the informal sector. This informal sector could be a range of voluntary organizations, including community groups, private clubs, faith groups and tenant or resident groups and could also take the form of mutual, community interest groups, and trade organizations, industrial and charitable organizations which serve them at higher transaction costs. These scenarios call for assessment of the impact of e-banking platforms such as the Mobile/Telephone banking services, the Point of Sale machine/Automated Teller Machine; and the Internet banking services as tools for financial inclusion in Nigeria.

The broad objective of the study is to assess the impact of electronic banking on financial inclusion in Nigeria while the specific objectives are to determine the extent to which transactions through the Mobile/Telephone banking services, the Point of Sale machine/Automated Teller Machine; and the Internet banking services has impacted on the population of banking adult in Nigeria. These objectives necessitated some research questions which go thus, to what extent do transactions through the Mobile/Telephone banking services, the Point of Sale machine/Automated Teller Machine; and the Internet banking services has impacted on the population of banking adult in Nigeria. Based on the researchers' perception the apriori expectations are that transactions through the Mobile/Telephone banking services, the Point of Sale machine/Automated Teller Machine; and the Internet banking services do not have positive and significant impact on population of banking adult in Nigeria. The study covers the period 2006 to 2014. The beginning year was considered appropriate because full adoption of electronic banking in Nigeria started between 2003 and 2004 but the effect cannot be felt within just few years of adoption. Additionally, data on internet and mobile banking were available from 2006. The period 2006-2016 was chosen due to limited access to relevant data beyond 2014. Ordinary Least Square Regression model is adopted for data analysis using E-views7. Diagnostic tests were applied on the data. The relevant secondary data was sourced from Central Bank of Nigeria and Nigeria Deposit Insurance Corporation (NDIC), National Bureau of Statistics and National Population Commission.

The outcome of this study will provide evidence for banks to know the unexplored level of penetration in their service delivery towards financial inclusion. This could help the banks device more means to reach the unbanked in remote areas and mobilize the idle funds in the villages and communities for viable investments which will result to increased profitability, returns on equity and better savings culture for customers. The apex regulator and propagator of financial inclusion will also be exposed to the level of achievement towards financial inclusion and cashless policy as at 2016 in Nigeria. The banking public will understand how far the cashless policy has gone in taking care of their financial services needs and improve their knowledge, confidence and trust on workability of our modern banking operations which can encourage them to embrace the system. Most of it all the findings will provide reference document for further research. The remaining part of the paper has review of related literature in section two, methodology in section three, data presentation and analysis in section four and conclusion of the study in section five.

Review of related literature

Conceptual review

In pursuance of financial inclusion target in Nigeria, successive governments since 1970s intervened through establishment of policies. One of the major policies of the government aimed at promoting financial inclusion was the adoption of the rural banking scheme in1977 which recorded limited success. Under the scheme the commercial banks were provided with targets to establish rural branches under the scheme. Government hoped that the rural banking scheme would help achieve the transformation through provision of a platform for the mobilization of savings in the rural areas through the diffused network of branches in all part of the country; encouragement of banking habit among the large rural population; provision of credit for the growth of the small scale industries and entrepreneurs; promotion of balanced development and eventual reduction in the rural-urban migration. An observed effect of this policy on level of financial inclusion was reflected in the decline in the ratio of cash outside bank to the stock of narrow money supply in the economy from 61.1% in 1969 to 44.3% in 1979 to 40.9% in 1989 (Oluba, 2008; Kama, & Adigu, 2013).

To promote increased savings culture and grow banking habit, government founded the Peoples Bank in October 1989 to serve the poor in the society through acceptance of small deposits and provision of micro credit to the low-income members of the economy and facilitated the establishment of community banks in 1990s targeted at low income/rural dwellers. The Peoples Bank was funded from grants and loans from federal government through Central Bank of Nigeria and low interest-bearing loans from philanthropic organization. The two specialized banks were targeted to handle the provision of the credit needs of small borrowers who were unable to meet the stringent requirements normally demanded by conventional banks. The community banks were conceived as self-sustaining community owned financial institutions. All over the world, the micro finance model which involves majorly the provision of financial services to the poor and low-income earners has been identified as a potent instrument for promoting financial inclusion as well as poverty alleviation. The banks were encouraged and made to serve mostly local residents with simple and non-sophisticated services. The first set of community banks were established at the end of 1990, and by end of 1990, the total of reporting community banks stood at 550. The community banks which metamorphosed into Microfinance banks in 2005 are skewed towards the urban population leaving out large segments of the rural population. They are faced with

high refinancing cost, compounded by a low focus on deposits although driven by profitability which led to high concentration in urban areas against the populous unbanked in rural areas, high operating expenses and low staff capacity, leading to poor asset portfolios. As such the vast majority of MFBs lack the scale and operating capacity to have a strong impact on financial inclusion.

In 2010, CBN stepped-up the campaign for banks to invest heavily in other low-cost branchless channels such as ATMs, Point of Sale (POS), tele-mobile and internet banking among others to accelerate the use of modern electronic payments channels towards the implementation of cashless policy. The cashless policy was implemented in pursuit of three major objectives namely, to develop and modernize the payment system, reduce banking cost to drive financial inclusion; and improve effectiveness of monetary policy. In other words, the policy was expected to drive financial inclusion based on the implicit assumption that reduced banking cost and more efficient payment system will encourage more people and businesses to embrace the formal financial service platforms. Mehotra and Singh (2010) submitted that financial inclusion can be regarded as quasi-public good as it has features of public goods.

Financial Inclusion is a state where financial services are delivered by a range of providers, mostly the private sector; to reach everyone who could use them. Specifically, it means a financial system that serves as many people as possible in a country. Financial inclusion is an initiative that makes formal financial services available, accessible and affordable to all segments of the population. This requires particular attention to specific portions of the population that have been historically excluded from the formal financial sector either because of their income level and volatility, gender, location, type of activity, or level of financial literacy. For the purpose of the Nigerian Financial Inclusion Strategy, "financial inclusion is achieved when adult Nigerians have easy access to a broad range of formal financial services that meet their needs at an affordable cost."

In recent times, financial inclusion has assumed a critical development policy priority in many countries, particularly in developing economies. Financial inclusion implies access to a broad range of financial services such as payments, savings, credit, insurance and pension products. The products are expected to be designed according to the need of the unbanked, taking their income levels and access to distribution channels into consideration and must be provided at an affordable cost. Under the inclusion scheme, formal financial services should be affordable even for low-income groups, particularly when compared to informal services like esusu or money lenders (CBN, 2012).

Financial inclusion is defined as a process or situation which allows for ease of access to, or availability of and usage of formal financial systems by members of the economy. It describes a process where all members of the economy do not have difficulty in opening bank account; can afford to access credit; and can conveniently, easily and consistently use financial system products and facilities without difficulty. It is the process ensures that a person's in-coming money is maximised, out-going is controlled and can exercise informed choices through access to basic financial services (PCC Financial Inclusion Strategy, 2009).

The Centre for Financial Inclusion provides a somewhat all-encompassing definition. The Centre defines financial inclusion as "a state in which all who can use them have access to a full suite of quality financial services, provided at affordable prices, in a convenient manner, and with dignity for the clients. It is a state where financial services are delivered by a range of providers, most of them private sector, and reach everyone who can use them, including the poor, disabled, rural, and other excluded populations" (Centre for Financial Inclusion, 2010).

The global financial inclusion average defined as the number of adults with access to financial services is less than 50.0 per cent. The problem is more acute in the developing and African countries in particular, such that achieving a higher financial inclusion level has become a global challenge (Ardic, Heimann, & Nataliya, 2011).

The advancement in software tools, computer hardware and telecommunications has shifted the focus of the banks towards computerization which have transformed the concept of branch banking to anytime anywhere banking (Nath, 2005). According to Simpson (2002), what actually motivate the investment in electronic banking are largely the prospects of minimizing operating cost and maximizing operating revenue. Ayo, Adewoye and Oni (2010), Safeena and Abdullahi (2010), Ovia (2009), Onay and Helvacioglu (2008), Awe (2006), Daniel (1999) agreed that with the advent of e-banking, banks are able to serve customers outside the banking hall all round the clock and time taken is minimized and that the increased adoption and penetration of internet has recently redefined the playground for retail banks. Suganthi, Blachander and Balachandran (2001) claimed that the spread of e-banking will have a significant impact on the banking space and greatly benefits the banking adults in general and corporate world in particular. The benefits of electronic banking have been documented in recent studies by Pyun, Scruggs and Nam (2002), Thornton and White (2001) as a platform that significantly reduces barriers to accelerated financial disintermediation and provides customers convenient and inexpensive access to the banking services 24 hours a day and seven days a week. There has been a mix up between electronic banking and internet banking but the fact is that internet banking is subsumed in electronic

banking. Internet is the main channel for e-banking which is accessed through electronic devices. Internet Banking is a type of e-banking service where customer's instructions are taken and attended to through the internet. Internet banking offers customers the possibility of enjoying banking services from the comfort of their homes and offices. What this means is that customers can buy goods by placing orders from the net, instruct their banks to pay the vendor the invoice amount involved, and the products are delivered to the destination where the buyer wants. Internet banking involves conducting banking transactions such as account enquiry, printing of statement of account, funds transfer, payments for goods and services, etc on the internet (World Wide Web) using electronic tools such as the computer without visiting the banking hall. E-commerce is greatly facilitated by internet banking and is mostly used to effect payment. Daniel (1999) stated that e-banking is said to have three different means of delivery, telephone, personal computer and the internet. Leow, Hock and Bec (1999) stated that the terms Personal Computer banking, online banking, internet banking, telephone banking or mobile banking refers to a number of ways in which customer can access their banks without having to be physically present at the bank branch. It is a high-order construct which consist of several distribution channels. It should be noted that e-banking is a bigger platform that does banking via the internet. Karjaluto, Mattila and Pento (2002) submit that the most general type of e-banking in our times is banking via the internet called internet banking.

Financial inclusion is today widely considered as a right of all citizens to social inclusion, better quality of life and a tool for strengthening the economic capacity and capabilities of the poor in a nation (Banco Central do Brazil, 2010).

Theoretical framework

This study was premised on the fact that e-banking platforms enhance the level of financial inclusion in a nation. In support of this theory, Humphrey (2006) claimed that if a country shifts from all paper-based to fully electronic-based transaction system and substitutes branch offices with ATMs, the annual savings can reach 1% of GDP. The Central Bank of Nigeria (CBN) in a circular released in 2013 states that only 36.3% of adult population are served by formal financial services sector. This is low compare to 68% in South Africa and 41% in Kenya. It added that twenty-one deposit money banks are serving about twenty million clients through a network of only six thousand (6000) branches and ten thousand (10000) automated teller machines, with an adult population of 84.7 million. This shows that a large part of the banking market in Nigeria is still untapped. The electronic payments sector in Nigeria is dominated by automated teller machine (ATM), which as at 2011 constitute 93% of all alternative to cash (CBN, 2011). The CBN posits that the promotion of a cashless society will modernize Nigeria financial system and will increase the level of financial inclusion, on the assumption that reduced banking costs and a more efficient payment system will encourage more people and business to embrace formal financial services. CBN financial inclusion report indicates that with this policy in place, the number of point of sale (POS) grew from 5,300 in June (2010) to 18,874 by September, 2011 and further increased to 114,423 POS, dropping to about 82,549 in Dec.2014. Currently the focus is on active point-of-sale (POS) payment system to reduce the number of failed transactions with other e-channels. There is still an aggressive push for increased deployment and activation of more POS, ATMs, mobile telephone banking and internet banking across the country which would eventually enhance financial inclusion in the country.

This is despite the fact that Okafor (2006) and Yibiu (2003) reported that the consequence of any break down even momentarily and for whatever reasons, could be devastating. Gerrard and Cunningham, 2003), Rotchanakitumnuai and Speece (2003), Black, Lockett, Winklhofer and Ennew (2001) noted some risks associated with electronic banking include confidentiality of consumer data, giving unlimited access to their personal financial information, job losses, lack of opportunities to socialize and the development of a lazy society. Jun and Cai (2001), Nancy, Lockett, Winklhofer and Christine (2001) study found that customers' complain about computer log-on times which are usually longer than making a telephone call. In addition, respondents felt that they have to check and recheck the forms filled in online, as they are worried about making mistakes. Frequent slow response time and delay of service delivery causes customers to be unsure that the transaction has been completed (Jun and Cai, 2001).

Empirical review

Thornton and White (2001) compared several electronic distribution channels available for banks in United States and concluded that customer orientations towards convenience, service, technology, change, knowledge about computing and the Internet affected the usage of different channels. Howcroft, Hamilton and Hewer (2002) found that the most important factors encouraging consumers to use online banking are lower fees followed by reducing paper work and human error which subsequently minimize disputes as observed by Kiang, Raghu and Hueu-Min Shang (2000). Byers and Lederer (2001) concluded that it was changing consumer attitudes rather than bank cost structures that determine the changes in distribution channels; they added that virtual banks can only be profitable when the segment that prefers electronic media is approximately twice the size of the segment preferring street banks. Moutinho and Phillips (2002) found that Scottish bank managers considered efficiency and enhancement of customer service to be two perceived advantages of Internet banking. Similarly, Aladwani (2001) highlighted faster, easier, and more reliable service for customers, and improvement of the bank's competitive position to be the most important drivers of online banking

among bank and IT managers in Kuwait. Moutinho, Davies, Deng,Miguel andAlcaniz (1997) pointed out that each ATM could carry out the same, essentially routine, transactions as do human tellers in branch offices, but at half the cost and with a four-to-one advantage in productivity. Agboola (2006 and 2004) Rao, Metts and Mong (2003), and Ayo (2006) observed that some payments are now being automated and absolute volume of cash transactions have declined under the impact of electronic transaction brought about by the adoption of ICT to the payment system especially in the developed countries. Emmanuel and Sife (2008) and Boyes and Stone (2003) viewed e-banking as a revolutionary progress in the banking industry and has made it possible that one can do most banking transactions from a remote location even without stepping-into a physical structure. Using firm-level survey data, Ayyagari, Demirguc-Kunt and Maksimovic (2008) find, however, that despite the financial sector weaknesses, financing from the formal financial system is associated with faster firm growth, whereas raising finance from alternative channels is not even in fast growing economies like china, where the formal financial system serves only a small part of the private sector. These findings suggest that the role of reputation and relationship based informal financing and governance mechanisms in supporting the growth of private sector firms is likely to be limited and unlikely to substitute for formal mechanisms.

Al-Smadi and Al-Wabel (2011), Adesina and Ayo (2010), Ngugi, Pelowski and Ogembo (2010), Ayo (2006) posit that the contribution of finance in alleviating poverty depends on the transmission channel. They demonstrated that technological improvements in payment systems show benefits not only in terms of banks operating cost, but also in terms of revenue as well. The migration to efficient electronic retail payment systems has a positive effect on GDP, consumption and trade, and that this relationship is strongest for card payments. The proliferation of ATMs has a positive impact on GDP and trade and integration and harmonization of retail payment markets foster trade and consumption, thus benefiting the whole economy. Greenwood and Jovanovic (1990) present a model where income inequality first rises as the financial sector develops but then declines as more people gain access to the system. Rajan and Zingales (2003) point out that the financial system may acquire greater capacity and interest to bear the high cost of small credit as it becomes stronger and more competitive. Nwude (2012), Beck et al (2007), Honohan (2004), and Jalilian and Kirkpatrick (2002) find that the degree of financial intermediation has a strong positive impact on the income of the poor through financial inclusion.

Dollar and Kraay (2002) examine the relationship between the average income of the poorest quintile in a sample of advanced and developing economies, and measure financial depth using the ratio of commercial bank assets to total assets and found that financial development does not affect the poor. Hernando and Nieto (2006) found that the impact of adopting internet on the performance of banks as a delivery channel and hold the view that the adoption of a transactional website has a positive impact on profitability which becomes significant in terms of return on Asset and Return on Equity three years after adoption. This finding actually conveys that there is a lag period for positive profitability impact to manifest on adoption of electronic banking. However, their study revealed some weaker evidence of an earlier positive impact on adoption of e-banking particularly in terms of return on assets (ROA). Adepoju and Alhassan (2010) conducted a case study on ATM usage and fraud in three selected banks in Minna, Niger State of Nigeria using a structured questionnaire and found that ATMs outside banks are more prone to fraud and customers are more conformable with e-banking of which ATM is one of the channels of usage. Andrianaivo and Kpodar (2011) found evidence that in Africa, the interaction between mobile phone penetration and financial inclusion is positive and significant in the growth region.

With an aim to expand financial inclusion through mobile banking, Siddik, Sun, Yanjuan, and Kabiraj (2014) using innovation diffusion theory and decomposed theory of planned behaviour together, this study added a variable, namely perceived financial cost to the combined model to identify and examine factors influencing behavioural intention to adopt (or continue to use) of mobile banking in Bangladesh. The results of Structural equation modelling (SEM) indicate that Perceived financial cost, Perceived risk and Subjective norm are the most influencing factors that affect people's behavioural intention to adopt (or continue to use) mobile banking.

Mohan (2006) and (Mehrotra 2009) reported that e-banking effectively creates a network of platforms across the country which extend banking platform to the greater community and that the rate of exclusion is worse in certain regions of the economy and in the rural areas when compared with the urban areas. EFInA (2010) reported that rural Nigeria is disproportionately more excluded from financial services, compared with the urban Nigeria. Similarly, while the North has the highest percentage of the unbanked population, it also has the lowest number of bank branches with as low as between 0.99 to 1 branch per 100,000 customers, compared with as high as over 5 branches per 100,000 in some parts of the south. The report also indicated a large disparity in access to finance among gender. The EFInA (2010) financial access survey report has more male Nigerian adults who are banked, while more females are financially excluded. Although women are often the main provider (especially in similar developing economies) for the family, the discrimination and cultural norms which prevents them from having access to finance causes their inability to provide for themselves and their families. In Nigeria, this phenomenon is well pronounced between the male and female population were about 52.0 percent of the female adult are financially excluded, in contrast to the 41.0 percent of the male adult

being financially excluded. CBN (2011) states that only 7% of internet users worldwide are in Africa and 167.3 million Africans have access to the internet compared with 254.4 million Latin Americans, half a billion Europeans and over 1 billion Asians. Internet penetration in Africa is 15.6% versus a world average of 34.3%. Maiyaki and Mokhtar (2010) reveals that the availability of electronic banking facilities such as automated teller machine (ATM), online banking and telephone banking do not have significant influence on customer's bank choice decision.

Atavachi (2013) studied the effect of electronic banking on financial performance of deposit taking microfinance institutions and found that all the deposit taking microfinance institutions had adopted e-banking technologies and that there exists a negative relationship between electronic banking and financial performance of deposit taking microfinance institutions in Kenya. Mago and Chitokwindo (2014) examined the impact of mobile banking on financial inclusion in Zimbabwe adopting a qualitative research methodology and a survey design. The results revealed that the low income people are willing to adopt mobile banking and the reasons are that it is easily accessible, convenient, cheaper, easy to use and secure.

The results of the model tested by Maitlo, Kazi, Khaskheley, and Faiz (2015) show clearly that use of online banking is influenced by channel convenience, perceived risk, security perception, prior internet knowledge and information on online banking. The results also found that demographic factors also significantly affect online banking. Finally, the paper suggests that understanding the factors affecting intention to use internet banking is very important to the practitioners who plan and promote new forms of banking in the current competitive market.

While banks and other financial institutions embrace electronic payments in preference to traditional banking, stakeholders say financial inclusion policy of the Central Bank of Nigeria, CBN, may be negatively affected as many unbanked Nigerians who mostly dwell in rural areas know little or nothing about electronic and mobile banking. This runs contrary to popular belief and finding of the positive relationship existing between e-banking and financial inclusion. In Nigeria where there is huge infrastructural deficit, and low level of literacy, especially in the rural areas adoption of electronic banking would hardly promote financial inclusion at least for now (Onyeka, 2017). Fernández de Lis, Llanes, López-Moctezuma, Rojas, and Tuesta (2014) analysed recent experiences in the regulatory field with respect to mobile banking in Colombia and found that this has increased the current number of online deposits to 1.5 million, equivalent to 8% of saving accounts. These products allow banks to create electronic money so that people can use their mobile phone to buy things in retail stores that are not banking correspondents.

However, more recent study by the International Financial Corporation (IFC) 2017, imputes that e-money reduces the costs that affect both supply and demand; on the supply side, fees are affordable; shorter days and convenience to complete transaction, price transparency, fair disclosure and risk management. On the demand side, fees are affordable, constrain of time and cost to reach nearest branch is eliminated; administratively, paperwork, lack of ID, time spent on queues are reduced or eliminated. In the same vein, remittances and domestic payments have total potential reduction in costs of 75% and 90% respectively. "Technology is not the key constraint, but greater reach does require technology as an enabler." According to CBN (2015) the major barriers to financial services included irregular income or unemployment, long distance to access points and high transportation costs, low financial literacy and trust in the financial sector, high cost of financial services and cumbersome documentation requirements.

Review Summary

From the literature reviewed there has been low level of adoption and operation of e-banking in Nigeria as most transaction are cash based and few customers apply the use of credit cards especially in shopping malls and large super markets. Some empirical studies centered more on internet banking rather than e-banking while internet banking is one of the several channels of e-banking. The main benefits of e-banking to users are found to be conveniences, speed, and cheapness, enhanced social status. The benefits of e-banking notwithstanding the reviewed literature showed that, there were several challenges that border on security network, accessibility and confidentiality of transaction. However, none of the studies has addressed how Mobile/Telephone banking services, the Point of Sale machine/Automated Teller Machine; and the Internet banking services has impacted on the population of banking adult in Nigeria. According to EFInA (2010), Nigeria has a higher proportion of financially excluded adults at 46.3%, compared with South Africa 26%, Botswana 33% and Kenya 32.7%. EFInA (2010) stated that despite the potential of mobile money as a tool for financial inclusion, the statistics on mobile money in Nigeria are not encouraging. Only 12.7% of the adult population is aware of mobile money leaving a significant 87.3% of the adult population (EFInA, 2014). More than half of all Nigerians live in rural areas where financial institutions find it commercially unviable to operate; so mobile money services have immense potential in Nigeria. 90% of adults own a mobile phone (EFInA, 2014).

Methodology

The research design adopted in this study is the ex-post facto (after the event) and analytical design. The ex-post facto research design also called causal comparative research is used when the researcher intends to determine cause-effect

relationship between the independent and dependent variables with a view to establishing a causal link between them. The study covered the entire population of the twenty three (23) deposit money banks in Nigeria as at 31st December, 2016. The secondary time series data sourced from Central Bank of Nigeria Statistical bulletin and population distribution by age and sex from National Population Commission and National Bureau of Statistics are reliable and free from bias, sentiment, and verifiable.

Model specification

The study adopted the modified model of Fadare (2010), Rehman (2011) and Koutsoyiannis (2003) which statistically demonstrate that least squares estimates are the most reliable regression estimates because of their general quality of minimized bias and variance. The choice of this approach is premised on the Gauss-Markov theorem, which portends that the least squares technique is the best linear unbiased estimator, with which straight line trend equations could be estimated. The econometric equation as adopted by Fadare (2010) is specified as

$GDP = \beta_o + \beta 1IRMt + \beta 2CPSt + \beta 3SAVt + \beta 4INFt + \varepsilon t$…….(1)

Where GDP= Gross Domestic Product as measure of economic growth, IRM= Interest Rate Margin, CPS= Credit to Private Sector, SAV = Savings, INF = Inflation Rate, IRM, CPS, SAV, INF as measure of bank consolidation. β_o = Intercept/Constant, β1-β4 = Coefficient of Parameters, εt = Stochastic/Error term. The applied model rationally assisted in reducing the complex process to meaningful variables. It is a simplified view of reality designed to enable us describe the essence and inter relationships within the system or phenomenon it depicts (Yomere and Agbonifoh, 1999). The functional relationship model for the purpose of the study becomes:

BKA = f(VATMT, VPOST, VMTBT, VINTT)

The researcher used multiple regression analysis on this study to measure the effect of changes in the dependent variable (Banking Adult) as a result of changes in the independent variables (VATMT, VPOST, VMTBT, and VINTT). The econometric model is specified as:

$BKA = \beta 0 + \beta_1 MTB + \beta_2 POS + \beta_3 ATM + \beta_4 INT + \mu$

Where β_o = intercept/constant, β1-β4 = coefficient of parameters, μ = error/stochastic term. Financial inclusion (represented by Banking Adult coded BKA) as a dependent variable while MTB = Volume of Mobile/Telephone banking transactions, POS = Volume of Point of Sale transactions, ATM = Volume of Automatic Teller Machine transactions, INT = Volume of Internet banking transactions are all explanatory variables. Econometric representations of the Hypotheses in null form are

H_1: Mobile/Telephone banking services do not have a positive significant impact on the banking adult in Nigeria, $BKA = \beta_o + \beta_1 MTB + \mu$

H_2: Point of Sale machine/Automated Teller Machine do not have a positive and significant impact on the banking adult in Nigeria, $BKA = \beta_o + \beta_2 POS + \beta_3 ATM + \mu$

H_3: Internet banking services do not have a positive and significant impact on the banking adult in Nigeria, $BKA = \beta_o + \beta_4 INT + \mu$

The pair-wise granger causality test will be adopted to test the causal relationship among the variables in the already stated hypothesis.

Description of model variables

From the above econometric models therefore, Financial Inclusion(Y) proxy by Population of banking adult (BKA) is dependent on or a function of efficient electronic payment channels namely Mobile/Telephone Banking (MTB), Point of Sale machine (POS), Automated Teller Machine (ATM) and Internet Banking (INT).

Mobile banking payments are payments services operated under financial regulation and performed from or via a mobile device like phone. It has to do with payment transaction where the mobile phone plays a key role in the initiation, authorization and/or consummation of transactions. The use of mobile telephone for bank transactions is incomparable to conventional banking practice. This fact is evidenced from the reduction in the level of people queuing to be served.

ATM also known as an automated banking machine, cash machine, cash point, cash line or hole in the wall, is an electronic telecommunications device that enables the clients of a financial institution to perform financial transaction without the need of a cashier. It is a cash point that can be used to withdraw cash, do transfers with a personal identification number (PIN) has to be entered along with credit or debit card to access cash. Some ATMs will allow for cash deposits and bill payments. The development of other channels such as internet and mobile banking is currently proving complementary to ATM industry and it is far from being a threat to ATMs. Point of sale (POS) is like ATM but used where sales are made for products and services.

Internet banking (INT) involves conduct of banking transactions on the internet (www) using electronic tools such as the computer without visiting the banking hall. Internet banking, like mobile banking, uses the electronic card

infrastructure for executing payment instructions and final settlement of goods and services over the internet between the merchant and the customers.

Techniques of data analysis

In order to achieve the objective of determining the impact of electronic banking as a tool for financial inclusion in Nigeria, ordinary least squares (OLS) method of statistical analysis is considered more relevant. This is because regression method explains the variation in an outcome (dependent variable) 'Y' as it depends on a predator (independent or explanatory) variable, X. It is a correlation based test. Preliminary tests include test for stationarity, multicolinearity, normality, model fitness, Breusch-Pegan-Godfrey test for heteroskedasticity. Descriptive statistics are presented in tables.

Pair-wise Granger Casualty Test was 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. In a regression of Y on the variables(including its own past values) if we include past or lagged values of X and it significantly improves the prediction of Y, then we can say that X (Granger) causes Y and vice-visa. The direction of such influence were explored and exposed. This was done to confirm whether the causality is bi-directional or unidirectional.

Data presentation and Analysis

Table 4.1 presents the data set obtained from Central Bank of Nigeria (CBN), National Bureau of Statistics (NBS) and National Population Commission (NPC). The descriptive Statistics are shown in Table 4.2 and Table 4.3. The presentation of data for the entire period is discussed in line with the objectives of the study.

Table 4.1: Values of Dependent and Independent Variables (in Millions)

Year	BKA	MTB	POS	ATM	INT
2006	11.83	0.1	6.1	73.1	1.5
2007	17.37	4	2.3	88.5	5.1
2008	18.3	4.8	1.8	90.5	2.4
2009	24.91	1.6	0.8	85	2.3
2010	25.4	0.6	0.6	88.9	3.7
2011	27.10	0.5	0.6	93.4	1
2012	28.6	0.27	0.98	87.11	0.52
2013	33.76	6.3	4.5	88.1	1.1
2014	33.9	12.6	9	175.5	2.2
2015	34.5	44.0	33.7	433.7	8.0
2016	36.9	47.1	63.7	590.2	14.1

Source: CBN Statistical Bulletin, 2012and 2016, EFInA 2008-2016

The volume of transaction in MTB, POS, ATM, INT were 47.10, 63.70, 590.20 and 14.10 in 2016 indicate 7%, 89%, 36% and 76% increase over 2015 figures. Transactions involving the use of Point of Sale machine increased the most, followed by Internet Banking while Mobile/Telephone Banking trailed others.

Table 4.2 Descriptive Statistics of Dependent and Independent Variables

	BKA	C	MTB	POS	ATM	INT
Mean	26.59727	1.000000	11.07909	10.54364	172.1827	3.074545
Median	27.10000	1.000000	4.000000	1.800000	88.90000	2.200000
Maximum	36.90000	1.000000	47.10000	63.70000	590.2000	14.10000
Minimum	11.83000	1.000000	0.100000	0.600000	73.10000	0.100000
Std. Dev.	8.086021	0.000000	17.44977	20.09888	173.6905	3.934454
Skewness	-0.442673	NA	1.498906	2.020505	1.719059	2.205961
Kurtosis	2.063979	NA	3.468517	5.614540	4.308429	6.869193
Jarque-Bera	0.760821	NA	4.219591	10.61756	6.202462	15.78303
Probability	0.683581	NA	0.121263	0.004948	0.044994	0.000374
Sum	292.5700	11.00000	121.8700	115.9800	1894.010	33.82000
Sum Sq. Dev.	653.8374	0.000000	3044.944	4039.649	301683.8	154.7993
Observations	11	11	11	11	11	11

Source: Researcher's EViews Result

As shown in Table 4.2, the average usage of MTB, POS, ATM, INT in terms of transaction volume in Nigeria for the period 2006 to 2016 were 11.07, 10.54, 172.18 and 3.07 million respectively as against number of banking adult of 26.59 million with maximum usage of 47.10, 63.70, 590.20 and 14.10 million respectively against the banking adult maximum of 36.90 million and minimum usage of 0.10, 0.60, 73.10, 0.10 million respectively against the banking adult minimum of 11.83 million. The level of volatility in the explanatory variables range between of 173.69million for ATM and 3.93

million for INT against the banking adult of 8.08 million divergent from the mean. This reveals that the rate of penetration of ATM as one of the electronic payment channels in Nigeria financial system contributes to 86.81% of volume of transactions outside the banking hall among all the e-banking channels under study. The MTB, POS and INT command 5.59, 5.67 and 1.92 percent of the total e-banking transactions within the study period.

Preliminary tests

Test for Normality

To confirm if the time series data set assume a pattern of standard normal distribution we utilized the Jarque-Bera (JB) statistic (Gujarati and Porter, 2009). Table 4.2 showed that only transactions using MTB is normally distributed as the p-value is 0.12 which is greater than the initial value of 0.05 and right-tailed with skewness of 1.49 and peakedness of 3.46.transaction using ATM, POS and INT are right-tailed with skewness of 1.71, 2.02 and 2.20 and p-value of 0.04, 0.004 and 0.0003 respectively are not normally distributed..

Test for Stationarity

To ensure that the parameters estimated are stationary (stable over time) we utilized the Augmented Dickey-Fuller (ADF). At lag of zero the ADF t-statistic is -4.773546 with p-value of 0.0063 while the critical values at 1, 5, 10 percent significance level are -4.420595, -3.259808 and -2.771129 respectively which shows that the banking adult has no unit root and the data is stationary.

Test for Multicolinearity

There is no evidence of multicolinearity among the variables because there is no relationship between the explanatory variables.

Table 4.3: Granger Causality Test Results

Pairwise Granger Causality Tests			
Sample: 2006 2016			
Lags: 1			
Null Hypothesis	Obs	F-Statistic	Prob.
BKA does not Granger Cause ATM	10	2.24726	0.1775
ATM does not Granger Cause BKA		0.42049	0.5374
MTB does not Granger Cause BKA	10	0.33239	0.5823
BKA does not Granger Cause MTB		1.77988	0.2239
POS does not Granger Cause BKA	10	0.47394	0.5133
BKA does not Granger Cause POS		3.07774	0.1228
INT does not Granger Cause BKA	10	3.36778	0.1091
BKA does not Granger Cause INT		0.03190	0.8633

Researcher's EViews Result

Test for Causality

Causality tests were conducted to explore the transmission mechanism between electronic banking and financial inclusion in Nigeria. Within the selected electronic channels in the financial inclusion context, the results are stated in Table 4.3. Granger Causality was established if the coefficient β is non-zero or p–values being less than 0.05 critical values. The test is carried out based on lag one of the variables and data ranges from 2006 -2016. The result of the Table 4.3 above explicitly shows that the banking adult (BKA) does not granger cause volume of transactions in MTB, POS, ATM and INT. However, volume of transactions in MTB, POS, ATM and INT do not jointly granger cause BKA. This is evidence from the probability value of F-statistic being greater than the critical value at 5%.

Table 4.4: The Regression results

Dependent Variable: BKA				
Method: Least Squares				
Sample: 2006 – 2016				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14.06568	8.227924	1.709505	0.1382
MTB	-0.394468	0.871628	-0.452565	0.6668
POS	-0.612536	0.563969	-1.086115	0.3191
ATM	0.142952	0.119496	1.196289	0.2767
INT	-0.407715	1.118993	-0.364359	0.7281
R-squared	0.543534	Mean dependent var	26.59727	
Adjusted R-squared	0.239224	S.D. dependent var	8.086021	

S.E. of regression	7.052828	Akaike info criterion	7.047689	
Sum squared resid	298.4543	Schwarz criterion	7.228551	
Log likelihood	-33.76229	Hannan-Quinn criter.	6.933682	
F-statistic	1.786119	Durbin-Watson stat	2.105075	
Prob(F-statistic)	0.250195			

Source: Researcher's EViews Results

How well the regression model actually fits the data and how well the model does which contains the explanatory variables actually explains the variation in the dependent variable, was taken care of by R^2 which is 54.35%. This means that 69.96% variation of banking adult was explainable by changes in the explanatory variables (MTB, POS, ATM, and INT). Adjusted R^2 in the result shows 23.92% as the best fit of the model for all the explanatory variables jointly tested. There was no evidence of autocorrelation since DW statistic is 2.10.

TEST OF HYPOTHESES

In this section the hypotheses are tested. The steps involved interpreting the regression results and using the decision criteria to accept or reject the null/alternate hypotheses. Our main objective is to evaluate the impact of electronic banking on financial inclusion in Nigeria.

Test of Hypothesis One

H1: Transactions using Mobile/Telephone banking services do not have a significant impact on banking adult in Nigeria. The Decision Rule is to 1. Accept this null hypothesis if coefficient estimate of computed result is not positively signed and its $p>0.05$ and 2. Accept the alternate hypothesis if coefficient estimate of computed result is positively signed and its $p<0.05$. From Table 4.4, transactions using Mobile/Telephone Banking service has a negative and non-significant impact on banking adult in Nigeria. The value of its coefficient is -0.394468 which is negative while the probability value is 0.6668.

Table 4.5: Heteroskedasticity Test: Breusch-Pagan-Godfrey (MBT)

F-statistic	2.261545	Prob. F(4,6)	0.1778	
Obs*R-squared	6.613505	Prob. Chi-Square(4)	0.1578	
Scaled explained SS	2.970026	Prob. Chi-Square(4)	0.5629	
Test Equation:				
Sample: 2006-2016				
Included observations: 11				
Variables	Coefficient	Std Error	t-Statistic	Prob.
C	162.7521	47.02362	3.461071	0.0134
MBT	9.428408	4.981464	1.892698	0.1073
R-squared		Mean dependent var	27.13221	
Adjusted R-squared		S.D. dependent var	49.44270	
S.E. of regression		Akaike info criterion	10.53392	
Sum squared resid		Schwarz criterion	10.71478	
Log likelihood		Hannan-Quinn criter.	10.41991	
F-statistic		Durbin-Watson stat	2.351413	
Prob(F-statistic)				

Source: Researchers Computation.

A test of heteroscedasticity with Breusch-Pegan-Godfrey shows there is no evidence of heteroscedasticity, since using F-statistic, Obs*R^2 and Scaled explained Sum of Squares with p-values of 0.17, 0.15, and 0.56 respectively are greater than the critical value of 0.05. The Durbin Watson statistics (DW) value of 2.35 shows that there is little evidence of negative autocorrelation. Therefore the null hypothesis is not rejected in favor of alternative hypothesis. This implies that transactions using mobile/telephone banking has negative and non-significant impact on financial inclusion in Nigeria.

Test of Hypothesis Two

H_2: Transactions using Point Of Sale machine and Automated Teller Machine do not have a significant impact on the banking adult in Nigeria.

From Table 4.4, volume of transactions using ATM has a positive and non-significant impact on the banking adult. The coefficient is 0.142952 which is positive, while the probability value is 0.2767. The p-value is greater than the critical value of 0.05. The volume of transactions using POS has a negative -0.612536 and non-significant impact 0.3191 on the banking adult.

Table 4.6: Heteroskedasticity Test: Breusch-Pagan-Godfrey (ATM and POS)

F-statistic	0.026658	Prob. F(4,6)	0.9738	
Obs*R-squared	0.072824	Prob. Chi-Square(4)	0.9642	
Scaled explained SS	0.021494	Prob. Chi-Square(4)	0.9893	
Test Equation:				
Sample: 2006-2016				
Included observation: 11				
Variables	Coefficient	Std Error	t-Statistic	Prob.
C	0.195601	0.138986	1.407346	0.1970
ATM	-0.000150	0.001456	-0.102849	0.9206
POS	0.000626	0.012582	0.049737	0.9616
R-squared		Mean dependent var	0.176416	
Adjusted R-squared		S.D. dependent var	0.173750	
S.E. of regression		Akaike info criterion	-0.218900	
Sum squared resid		Schwarz criterion	-0.110383	
Log likelihood		Hannan-Quinn criter.	-0.287305	
F-statistic		Durbin-Watson stat	2.116915	
Prob(F-statistic)				

Source: Researchers Computation.

A test of heteroscedasticity with Breusch-Pegan-Godfrey shows there is no evidence of heteroscedasticity, since using F-statistic, Obs*R^2 and Scaled explained Sum of Squares with p-values of 0.97, 0.96 and 0.98 respectively are greater than the critical value of 0.05. The Durbin Watson statistics (DW) value of 2.11 shows that there is little evidence of negative autocorrelation. Therefore the null hypothesis is rejected in favor of alternative hypothesis. This implies that transactions using mobile/telephone banking has positive and non-significant impact on financial inclusion in Nigeria. The null hypothesis is not rejected in favor of alternative hypothesis. This implies that transactions using ATM has a positive and non-significant impact on the banking adult while transactions using POS machine has a negative and non-significant impact on the banking adult in Nigeria.

Test of Hypothesis Three

H3: Transactions using Internet banking services do not have a significant impact on financial Inclusion in Nigeria

From Table 4.4 above, transactions using Internet Banking service has a negative and non-significant impact on the banking adult in Nigeria. The value of coefficient is -0.407715 which is negative while the p-value is 0.7281 which is greater than the critical value of 0.05. This shows that there is evidence of non-significant impact of application of internet banking operation on the banking public in Nigeria from 2006 to 2016.

Table 4.7: Heteroskedasticity Test: Breusch-Pagan-Godfrey (INT)

F-statistic	0.492648	Prob. F(4,6)	0.5005	
Obs*R-squared	0.570876	Prob. Chi-Square(4)	0.4499	
Scaled explained SS	0.040289	Prob. Chi-Square(4)	0.8409	
Test Equation:				
Sample: 2006-2016				
Included observation: 11				
Variables	Coefficient	Std Error	t-Statistic	Prob.
C	0.644345	0.103742	6.211007	0.0002
INT	-0.015013	0.021389	-0.701889	0.5005
R-squared		Mean dependent var	0.598188	
Adjusted R-squared		S.D. dependent var	0.259278	
S.E. of regression		Akaike info criterion	0.353198	
Sum squared resid		Schwarz criterion	0.425543	
Log likelihood		Hannan-Quinn criter.	0.307595	
F-statistic		Durbin-Watson stat	2.501385	
Prob(F-statistic)				

Source: Researchers Computation.

A test of heteroscedasticity with Breusch-Pegan-Godfrey shows there is no evidence of heteroscedasticity, since using F-statistic, Obs*R^2 and Scaled explained Sum of Squares with p-values of 0.50, 0.44 and 0.84 respectively are greater than the critical value of 0.05. The Durbin Watson statistics (DW) value of 2.50 shows that there is little evidence of negative autocorrelation. This implies that transactions using Internet banking has negative and non-significant impact on financial inclusion in Nigeria. Therefore the null hypothesis is not rejected. This implies that transactions using internet banking has a negative and non-significant impact on the banking adult in Nigeria.

Implications of results

The implications of these findings are discussed in line with the objectives of this study.

As revealed from the findings of this study, transactions using mobile/telephone banking had negative and non-significant impact on the banking adult. This implies that on the average, about 11.07 million of the entire population of the banking adult in rural and urban areas were encouraged, although at low rate as evidenced from the result in Nigeria from 2006-2016. Compared to other countries several reasons may have been behind the dismal inclusive growth. Top among these reasons is that people have limited knowledge about mobile money services. Existing advertising does not seem to be reaching the intended audience. The CBN needs to initiate and target advertising of mobile money services to financially excluded, especially the low income earners as part of the national financial literacy framework. Our study does not support the finding of Andrianaivo and Kpodar (2011) which evidenced that the interaction between mobile phone penetration and financial inclusion is positive and significant.

Transactions using point of sales machine (POS) had a negative and non-significant impact on the banking adult. A further look revealed that the rate of penetration of POS machine shows that on the average about 10.54 million of the banking adult population were encouraged, although at low rate as evidenced from the result. Transactions using automated teller machine (ATM) had a positive and non-significant impact on the banking adult. The result shows that the rate of penetration of ATM in terms of usage contributes 172.18 million however this high proportion implies that greater number of the banking adult embraced the innovative power of ATM technology in Nigerian financial system. The study shows that there is evidence of positive impact of ATM and POS on the banking adult in Nigeria.

The average usage of internet payment channel in terms of transaction volume in Nigeria banking system for the period 2006 to 2016 is 3.07 million.The rate of penetration is abysmally low, although the result from the hypothesis tested indicates that there is evidence of negative and non-significant impact of transactions using internet channel on the banking adult. This implies that transactions using internet banking contributes 1.92% to inclusive growth of the Nigerian bankable adults. The implication of the result is that internet services is the least used channel by the customers of deposit money banks in Nigeria, may be as a result of low level of awareness. On the other hand, the non-significant contribution of internet services may be as a result of the users' ignorance, level of literacy and banks insufficient effort in selling the product effectively to the banking public in Nigeria. Another major challenge to adoption of e-banking is the absence of statutory or regulatory provisions to protect the consumer of the products/services.

CONCLUSION

E-banking is any use of electronic means, such as ATM (debit or credit) card, mobile phone and internet service by bank customers to conduct transactions such as cash withdrawals, checking of balances, recharging of mobile phones, and payment of bills, book orders among others without time or geographical limitation. The findings from the specific objectives of this study are that transactions using ATM had positive and non-significant impact on the banking adult in Nigeria. The use of mobile/telephone, point of sales machine and internet channel had a negative and non-significant impact on the banking adult in Nigeria. In line with the findings of this study, we recommend as follows. The Central Bank of Nigeria should embark on intensive campaign for complete adoption of e-payments products especially at the grassroots in collaboration with the network providers. Banks and other financial institutions should intensify efforts in mounting e-payment channels in financially excluded areas with a view to improving financial inclusion in Nigeria. A critical constraint to achieving a high level of financial inclusion in Nigeria is infrastructure and technology. Without reliable internet and cellular network services, or even consistent access to electricity, it is difficult for digital financial services to be consistently available and reliable. While mobile network operators are investing in expanding network coverage, they point to poor infrastructure, including electricity shortages and poor roads, as well as regulatory hurdles and security constraints as challenges in expanding coverage more fully, particularly to rural areas. Government should join hand with the private sector to sort out this power issue. There is need to educate rural dwellers through public education and awareness on the importance of e-banking as it would facilitate the success of CBN financial inclusion policy.

Also, access points, such as bank branches, ATMs or agents, are essential for a functioning digital financial system, and yet the ratio of financial access points to adults in Nigeria remains low, particularly in rural areas.

Furthermore, digital financial services will not take off unless the right value proposition is in place for the customer, agent, merchant and company providing the service. For customers, this means that the new service needs to be compelling enough – and reliable enough – to justify any fees associated with it. Customers are faced with fees for online transfers, debit card issuance and account maintenance, stamp duty fees, etc.

Financial services providers are also confronted with significant costs in order to deploy new digital financial solutions: investing in enabling technology, product design, building customer awareness, etc. Even successful mobile money deployments can take a minimum of three to five years before they are profitable.

For customers to use digital financial services, they first need to be aware that they exist, and then need to understand and trust the services, particularly for services such as saving and transferring money.

Some customers are slow to trust digital financial services given general awareness about scamming, lack of familiarity with new services, and knowledge of past failures in the financial sector.

However as the number of countries and financial institutions adopting these policies to accelerate the use of electronic channels and reduce the use of cash increases, it is obvious that many who live in distant villages across the country may be excluded from this innovation.

In Nigeria with is huge infrastructural gap, and prevalence of illiteracy, particularly in the rural areas implementation of e-banking would scarcely advance financial inclusion in any case for now.

Meanwhile the introduction of cashless policy in the country has caused banks to close some of their branches while adopting online banking and Automated Teller Machines, ATM.

Studies show that some branches of some financial institutions were closed to hasten the switch of its customers to digital and also need to reduce costs in a struggling economy.

In addition to contributing to existing literature on financial inclusion our attempt in this study has provided a handy evidence for comparative studies in other countries of the world.

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