Banks Technological Advancement and Financial Inclusion in Nigeria

Fredrick Onyebuchi Asogwa Ph.D [1]; Prof. Nicholas Attamah [2], Dr. Sunday V. Agu [2],

1. Department of Economics, University of Nigeria, Nsukka, Enugu State, Nigeria
2. Department of Economics, Enugu State University of Science and Technology (ESUT) Enugu, Enugu State, Nigeria

Corresponding Email address: asogwafred@gmail.com

Abstract

This study examined the impact of deposit money banks technological advancement on financial inclusion in Nigeria covering the period 2013Q1 to 2019Q4. Data were sourced from the Central Bank of Nigeria (CBN) Statistical bulletin 2020. Data collected were interpolated and pre-estimation tests done using Augmented Dickey-Fuller(ADF) unit root and cointegration tests. The Error Correction Mechanism (ECM) was applied in estimating the structural parameters of the model. The findings showed that POS and FD had negative effect on financial inclusion in Nigeria while other variables such as ATM, WP and MOP had positive impact. The t-statistic and the probability values of the variables in the model showed that all the variables were statistically significant. The result of the Granger Causality test showed unidirectional causality flowing from financial inclusion to the use of Automated Teller Mathine (ATM). The results further showed that there was presence of causality flowing from financial inclusion to Automated Teller Machine. The paper also found that there no sign of causality between POS and FI, FI and WP, FI and MOP, and FI and FD. The researcher recommended that a sound policy that will enhance the performance of banking technological advancement should be made by the apex regulator of the Nigerian banking system.

Introduction

The nature of business transactions has reached a complex and cumbersome stage that demands business sectors to be connected to the modern means that can be convenient, faster and simpler. In this modern period, Information and Communication Technology (ICT) must be incorporated in the commercial banks' infrastructures. ICT is a designed system that embraces the electronic technologies of computers and telecommunications that comprises both electronic hardware and computer software. It has been proved that the significance of ICT cannot be underestimated as it plays a major role in the success of organizations in current business competitive world. It provides easy and fast means of collecting, storing, retrieving, processing, transmitting and distributing information. Ramesha (2014) asserts that effective payment systems boost the economy significantly. Most of the developing countries have adopted electronic banking with ease and without much additional costs to the unbanked population and with degree of success and achievement of financial inclusion to certain extent. However, the inadequate awareness, distance, poverty and financial illiteracy among the large rural population of the country seem to be the challenges confronting smooth banking in Nigeria.

Financial inclusion, the world over, has been identified as one of the drivers of inclusive economic growth (Kama &Adigu, 2013). It is a concept in banking that describes the situation where all bankable adults who wish to own a formal financial system bank account have access to one. In Nigeria, technology has the potential of opening up opportunities for financial inclusion, hence; allowing people to engage in financial activities without the restrictions of physical location or social status. Commercial banks have employed technological mechanisms to spread their banking reach, which is also an inclusive strategy. Some of these technological strategies include point of sale, automated teller machines, Unstructured Supplementary Service Data (USSD), mobile apps, etc. The evolution of e-banking in Nigeria dates back to 1986 when the banking sector in Nigeria was deregulated (David, 2016).

There is no doubt that the result of this deregulation brought far-reaching transformation through computerization and improved bank service delivery. Healthy competition with new products became intense within the system while customer sophistication posed a challenge thereby encouraging the use of automation in financial services among new generation of commercial and merchant banks. The introduction of digital

technology has greatly transformed the Nigerian financial sector but the extent to which it has increased participation and accessibility to the financial service activities remains debatable (Obakayode, 2018).

The nature of banking services in Nigeria during the conventional banking era in Nigeria were very poor because they were manually carried out owing to lack of technology innovation (Oluwatolani *et al.*, 2011; Okoye *et al.*, 2019). This kind of situation was a sure guarantee for financial exclusion and detriment to economic growth objectives of the Central Bank of Nigeria (CBN). This was why the Central Bank of Nigeria introduced the cashless policy. The policy was intended to develop and modernize the payment system in Nigeria and reduce the cost of banking services in order to drive financial inclusion. The adoption of the cash-less policy has led to a remarkable increase in the level of technology acceptance by deposit money banks in Nigeria and it is evidenced by the increase in the number of automated teller machines, point-of-sales facilities, internet banking, mobile banking, among others.

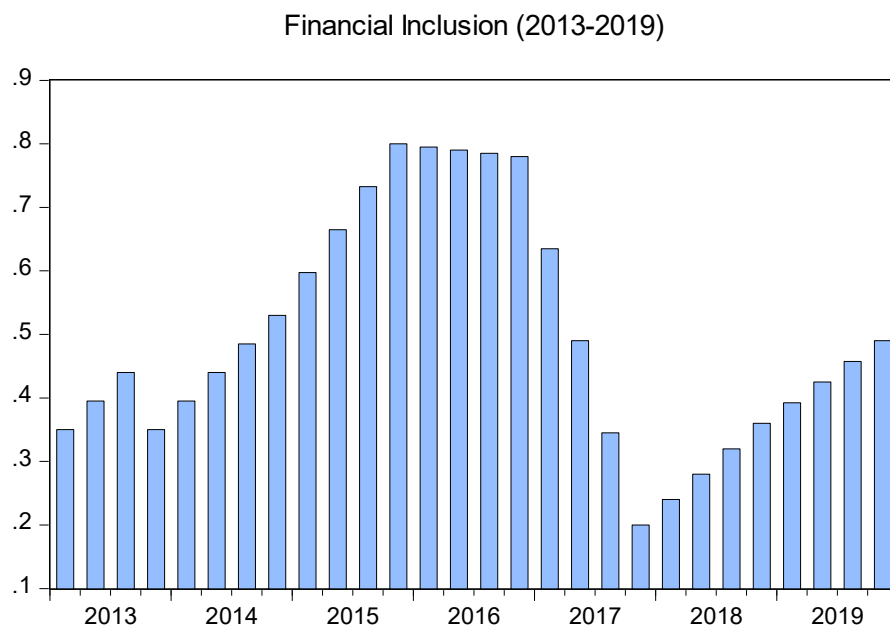Changes in financial inclusion in Nigeria between 2013 and 2019 were represented in figure 1.

Figure 1: Financial inclusion in Nigeria from 2013 to 2019
Source:*World Development Indicators (World Bank)*

Figure 1 showed that financial inclusion in Nigeria was fluctuating. It reached its apex between 2015 and 2016 and started declining in spite of financial inclusive technologies in Nigeria. A historial analysis reveals that between 2013 till date, the Central Bank of Nigeria (CBN) has introduced series of technological strategies to facilitate financial inclusion in Nigeria. The prominent technology-strategies are POS, ATM, web pay and Mobile Pay. The use of these technology strategies were shown in figure 2.
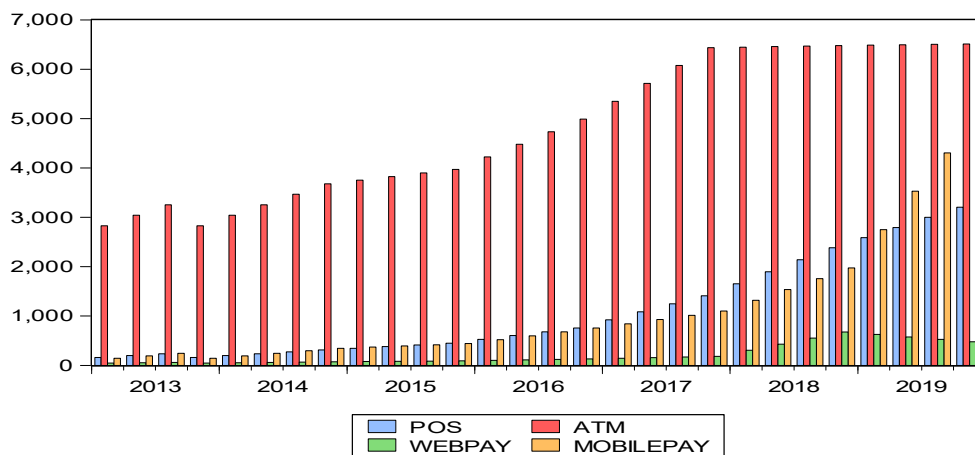
Figure 2: The use of POS, ATM, WebPay and MobilePay in Nigeria
Source:*Central bank of Nigeria (CBN) Statistical Bulletin.*

The graph showed that the four major technological channels have been in action since 2013 but with ATM more prevalent. However, studies on this have ignored mobile pay and web pay as channels of technological advancement in financial inclusion actualization.

Therefore, the aim of this paper was to trace the impact of the specified bank technological advancements on financial inclusion in Nigeria. It is based on the above discussion that this paper addressed the following questions:
1. Does financial technology contribute to financial inclusion in Nigeria?
2. What is the causality relationship between financial technology and financial inclusion in Nigeria?

Objectives of the Study
The specific objectives of the paper were:
1. To ascertain the contribution of financial technology on financial inclusion in Nigeria
2. To determine the causality relationship between financial technology and financial inclusion in Nigeria.

Hypotheses of the Study
The following hypotheses were tested in the course of the investigation:
H_{o1}: Financial technology does not significantly contribute to financial inclusion in Nigeria.
H_{o2}: There exists no causality relationship between financial technology and financial inclusion in Nigeria.

Literature Review
The Technology Acceptance Model propounded by Davis in 1989, posits that there are two factors that determine whether a computer system will be accepted by its potential users i.e. perceived usefulness, and perceived ease of use. The key feature of this model was its emphasis on the perceptions of the potential user. The theory is an adaptation of the Reasoned Action Theory specifically tailored for modeling user acceptance of information systems.

The Diffusion of Innovations (DOI) theory was proposed by Rogers (1995) to explain the approach through which innovation can be passed via different ways over certain period among different users (Sarker&Sahay 2004). DOI theory explores the ways in which innovative ideas are passed from one generation to the other. DOI theory shows that an innovation is conveyed through various channels continually among individuals of the same social beliefs (Echchabi&Hassanuddeen, 2013). The dispersion of Innovation hypothesis looks at the rate at which new advancement are spreading, how the new development is spreading and reasons why it is spreading with a specific end goal to research the elements influencing the selection of new data innovation advancement (Sarker&Sahay, 2004; Monyoncho, 2015).

The intellectual framework for financial reforms in developing countries in the 1980s was provided by the works of Mckinnon (1973) and Shaw (1973). The Mckinnon-Shaw (M-S) paradigm are centred on seeing the

financial sector as a pillar for economic growth and extensive government controls imposed on it prevents financial deepening and impedes its contribution.

McKinnon and Shaw presented their views by saying that the poor performance of most of the Less Developing Countries (LDC'S) is due to interest rate ceilings, high reserve requirements, and quantitative restrictions in the credit allocation mechanism caused by financial repression leading to low savings, credit rationings and low investments.

David, Tyagher, Jacob, &Tordue (2022) investigated the impact of agency banking on financial inclusion and economic activity in Benue State using First Bank Ltd's agency banking activities. The study was based on agency theory and analyzed both primary and secondary data with descriptive statistical tools and structural equation models. The finding showed that First Bank Ltd's agency banking activities have significantly increased financial inclusion and economic activity in Benue State. However, challenges such as cash shortages, security issues, network failures, and a lack of financial literacy were impeding the smooth operation of agency banking in the state.

Ehiedu (2021) examined ATM penetration and financial inclusiveness in Nigeria (1990-2019). The cardinal focus here was on a long and short-run relationship. The paper used multiple regression model and found that ATM penetration enhances the level of financial inclusiveness in Nigeria. However, in terms of individual variables, the level of ATM penetration within the economy is still weak though ATM Demographic penetration seems strong.

Udak (2020) empirically investigated the effect of digital currency development (digital finance) on financial inclusion in Nigeria. The researcher used quarterly data for the analysis from 2006:1 to 2020:4 in a weighted stepwise forward regression. The result showed that a unit rise in the usage of automated teller machines spontaneously raised financial inclusion in Nigeria by 0.012 units and were statistically significant.

Babatunde & Raymond (2019) investigated the relationship between internet usage, financial inclusion and economic growth in Nigeria for the period 1999 to 2016. The study used Engle Granger Cointegration Test and the Fully Modified Ordinary Least Squares (FMOLS) approach for analysis. The results showed that Internet usage and broad money have positive and significant effect on financial inclusion. The finding further showed that the effect of the interacted coefficient of internet usage and financial inclusion on economic growth was positive and insignificant. The study concluded that the positive effect of internet usage on economic growth in Nigeria was not transmitted through the mechanism of financial inclusion.

Michael (2018) examined the relationship between internet penetration and financial inclusion in Nigeria using frequencies, percentages and tables.The paper found that internet penetration has significant impact on financial inclusion in Nigeria.

Nwafor&Yomi (2018) studied the relationship between financial inclusion and economic growth in Nigeria and found that financial inclusion has significant impact on economic growth financial industry intermediation did not influence financial inclusion within the period under review. Other papers that found positive relationship between financial inclusion and economic growth were Harley, Adegoke and Adegbola (2017), Okoye, Adetiloye, Erin &Modebe (2017), Gretta (2017), Onalo, Lizam & Kaseri (2017), Gourene&Mendy (2017) and Oyewo&Oyewole (2014)

Oyinkola (2018) investigated the impact of Information technology on banking operations in the First bank of Nigeria PLC using primary data. The paper adopted simple frequency, percentage and Chi-square as the statistical methods. The result revealed that IT has greatly improved the growth and performance of Nigerian commercial banks and has led to increased customers satisfaction.

Lawrence (2017) studied the effect of financial inclusion on economic growth and development in Nigeria over the period 1986-2015 using the Ordinary Least Squares technique. The study showed that credit delivery to the private sector has not significantly supported economic growth in Nigeria while financial inclusion has promoted poverty alleviation in Nigeria through rural credit delivery.

Ousmane, Ismaeel, & Aliyu (2017) investigated the impact of financial inclusion on household consumption in Nigeria and its implication on poverty reduction. using a sample of 15000 individuals in about 5000 households in 2010 and 2012. The paper employed instrumental variable estimators and found a positive and significant

www.iiste.org

effect of financial inclusion on household per capita consumption and no evidence of a gender gap. They found that households headed by women are not more likely to have lower level of consumption per capita after controlling for financial inclusion, and other household characteristics.

Khalaf and Ali (2017) investigated the nexus between financial inclusion and economic development in Iraq. The researchers used two dimensions of financial inclusion i.e. the access of financial services and the usage of the financial services. By using the Autoregressive Distributed Lag Model (ARDL) for cointegration the study found no relationship between financial inclusion indicators and economic growth during the period under investigation.

Musaya&Kerongo (2015) analyzed the role of agency banking in enhancing access to financial services. Utilizing a sample size of 35 agency banking outlet operators in Kilindini District, Mombasa-Kenya, the study establishes that costs associated with agency banking, bills payments via agency banking and financial services awareness among the rural population are positively correlated with access to financial services.

Sharma (2015) studied the nexus between the vast dimensions of financial inclusion and economic development of the emerging Indian economy. By applying VAR model and Granger Causality test. The paper found a positive nexus between economic growth and various dimensions of financial inclusion particularly banking penetration, availability of banking services and usage of banking services in terms of deposits. The Granger causality analysis reveals a bi-directional causality between geographic outreach and economic development and a unidirectional causality between the number of deposits/loan accounts and gross domestic product. Simply the paper concluded that the financial inclusion is a driver of economic growth.

It is obvious that the concept of financial inclusion has attracted the attention of academics. Several studies have been conducted to that respect as well. However, it was observed that from the avalanche of studies conducted on financial inclusion, there exists a lacuna on an empirical analysis of the impact of ICT on financial inclusion in Nigeria. Majority of the studies were either on the impact of financial inclusion on economic growth or impact of ICT on general bank performance: (David, Tyagher, Jacob, &Tordue, 2022,Babatunde& Raymond, 2019, Nwafor&Yomi, 2018, Oyinkola 2018,Ousmane, Ismaeel, &Aliyu, 2017, Harley, Adegoke&Adegbola, 2017, Dabwor, Nnodi&Grefory, 2017, Musaya&Kerongo, 2015).

This study therefore took a disaggregated approach in examining the impact of ICT on financial inclusion in Nigeria for the period of the study. Four dimensions of deposit money bank ICT channels namely Point of Sales (POS), Automated Teller Machines (ATM), Web Pay and Mobile Pay and their individual contributions to financial inclusion were explored.

The model

This study is anchored on the Technological Acceptance Model (TAM) of financial inclusion. The model affirms that the system's real utilization is established by each user's behavioral intention for usage and is inspired by an individual's perception to the system. The theory also explains that the perception of new technology has a direct relation to its functionality as well as the simplicity of the system (Lim &Ting, 2012).

In order to avoid spurious regression estimates, a test of stationarity was carried out in order to examine the order of integration of the variables in the model.

Time series data are accepted to be stationary if it exhibits mean reversion around a constant long-run mean and time invariant. (Asteriou, 2006). TheAugmented Dickey-Fuller and Phillips and Perron tests were used in carrying out the test. The ADF was specified as

$$\Delta \psi_t = \alpha_0 + \Omega \psi_{t-1} + \varepsilon_t$$

$$\Delta \Psi_t = \alpha_0 + \beta_2 t + \Omega \Psi_{t-1} + \varepsilon_t \dots\dots\dots\dots\dots 1$$

Where: $\Omega = (\lambda - 1)$.

Augmented Dickey-Fuller (ADF) test is used to test existence of unit root when there is autocorrelation in the series and lagged terms of the dependent variable are included in the equation. The following three models represent pure random walk, random walk with drift and random walk with drift and trend used in Augmented Dickey Fuller tests:

$$\Delta\psi_t = \Omega\psi_{t-1} + \sum_{i=1}^{p} \beta_i \Delta\psi_{t-1} + \varepsilon_t$$

$$\Delta\psi_t = \alpha_0 + \Omega\psi_{t-1} + \sum_{i=1}^{p} \beta_i \Delta\psi_{t-i} + \varepsilon_t$$

$$\Delta\psi_t = \alpha_0 + \Omega\Psi + \beta_2 t + \sum_{i=1}^{p} \beta_i \Delta\psi_{t-1} + \varepsilon_t \qquad \ldots\ldots\ldots\ldots 2$$

Various non-stationarity time series are co-integrated when their linear combinations are stationary. One of the most popular tests for cointegration has been suggested by Engel and Granger (1987). The process is demonstrated thus; given a multiple regression: $y_t = \beta' x_t + \mu_t, t = 1,...,T$, where $x_t = (x_{1t}, x_{2t},...,x_{kt})'$ is the k-dimensional I(1) regressors. For y_t and x_t to be cointegrated, μ_t must be I(0).

The Error Correction Mechanism (ECM) was used to estimate the speed of adjustment of the short-run dynamics of the variables and timing to long run convergence. The ECM is given by the equation:

$$\Delta FI_t = \beta_0 + \Delta\beta_1 POS_t + \Delta\beta_2 ATM_t + \Delta\beta_3 WP_t + \Delta\beta_4 MOP_t + \Delta\beta_5 FD_t + \Delta\beta_6 ECM_{t-1} + \mu_t \ldots 3$$

Where Δ = First Difference Operator
FI = Financial Inclusion (Proxied by Financial Inclusion Index)

POS = Point of Sales Transactions

ATM = Automated Teller Machines Transactions

WP = Web Pay

MOP = Mobile Pay

FD = Financial Deepening (measured with the ratio of broad money supply to GDP)

t = Time Period

β 's = structural Parameters to be estimated

μ = Stochastic Error Term

The a priori expectations are given as: $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 > 0$, & $\beta_5 > 0$.
Post estimation tests such as autocorrelation, Normalty test which was based on the Jaque-Berra [JB] to ascertain if the residuals of the model were normally distributed, and Heteroscedasticity test which was used to evaluate if the variance of the residuals are constant over time.
The data required for this study were quarterly time series on POS, ATM, web pay, and mobile pay transactions; and financial inclusion covering the period 2013Q1-2019Q4. The data were extracted from the Central Bank of Nigeria (CBN) statistical bulletin and global financial inclusion index. The econometric software used in this paper was the E-views Version 10 statistical software.

Results

The distributive properties of the data used in this work were explained using descriptive statistics as shown with the aid of table 2

Table 2: DESCRIPTIVE STATISTICS

	FI	POS	ATM	WP	MOP	FD
Mean	0.498750	1080.742	4810.809	218.2018	1147.444	23.23366
Median	0.448750	642.5663	4606.425	117.0675	638.9438	23.14000
Maximum	0.800000	3204.750	6512.610	675.9200	5080.960	24.90000
Minimum	0.200000	161.0200	2828.940	47.32000	142.8000	21.94000
Std. Dev.	0.183213	980.5317	1412.533	207.5850	1293.438	0.742177
Skewness	0.412550	0.899759	0.037564	1.085847	1.780797	0.459734
Kurtosis	1.990025	2.405143	1.383633	2.559784	5.290871	2.694376
Jarque-Bera	1.984313	4.190802	3.054667	5.728382	20.92188	1.095297
Probability	0.370776	0.123021	0.217114	0.057029	0.000029	0.578308
Sum	13.96500	30260.77	134702.7	6109.650	32128.43	650.5425
Sum Sq. Dev.	0.906306	25958944	53871754	1163472.	45170538	14.87233
Observations	28	28	28	28	28	28

Table 2 indicated that Automated Teller Machine (ATM) had a mean of 4810.8 as the highest mean and its media (4605.4) was also the highest in the distribution. Other variables such as Financial Inclusion(FI), Point On Sale POS), Web Pay (WP), Mobile Pay(Mop) and Financial Deepening (FD) had a mean of 0.499, 1080.7, 218.2 1147.4 and 23.23 respectively. This showed that the center of the distribution varied as we move from one variable to another. The difference among the median of FI, POS, ATM, WP, MOP and FD were also very wide thereby describing the discrepancy of the centre of information among the variables. The maximum values for POS, ATM, WP, MOP and FD were 3204.7, 6512.6, 675.9, 5080.96 and 24.9 respectively. The minimum values of these variables were very low thereby indicating high values of their ranges except FI and FD.

The ADF unit root test's decision criterion is that its statistic must be bigger than the Mackinnon Critical Value at the 5% level of significance and in absolute terms. The result of this was summarized in table 3.

Table 2: Result of Unit root test

Variables	Level form		First Diff		Second Diff		Order of integration
	ADF Stat.	ADF critical	ADF Stat.	ADF critical	ADF Stat.	ADF critical	
FI	-2.159	-2.98	-2.34	-2.98	-5.81	-2.98	I(2)
POS	1.127	-2.98	-1.053	-2,98	-6.798	-2.98	I(2)
ATM	-0.674	-2.98	-3.448	-2.98	---	---	I(1)
WP	3.958	-3.005	-0.687		-6.971	-3.004	I(2)
MOP	11.50085	-2.98	3.444	-2.998	-6.887	-3.012	I(2)
FD	-2.316		-2.254		-5.236		I(2)

Source:*Author's Computation Using E-views 10.*

Table 3 clearly showed that all the variables were stationary at oder two, I(2) except POS which was integrated of order one, I(1). The result of the Augmented Dickey-Fuller cointegration test statistic (Resid01) was -5.609416 which was absolutely greater than 5% test critical value of -2.95. This showed that the variables were cointegrated thereby having a long run relationship. The study also carried out Johasen cointegration test and the trace statistic indicated at least 5 cointegration equations at the 0.05 level of significance. These results (ADF and Johasen Cointegration tests) showed that the variables in the model have long run relationship.

The short run effects of banking technology on financial inclusion in Nigeria was estimated by applying Error Correction Model (ECM). This was also done in order to trace the speed of adjustment in the economy with respect to stochastic term. The result of the ECM was presented with the aid of table 4.

Table 4: The result of the Error Correction Model

Variables	Coefficients	Std Error	t-statistic	Prob
C	0.028696	0.008852	3.241637	0.0041
D(POS)	-0.001814	0.000224	-8.089067	0.0000
D(ATM)	0.000251	4.64E-05	5.410869	0.0000
D(WP)	0.002074	0.000384	5.406385	0.0000
D(MOP)	0.000633	7.99E-05	7.927706	0.0000
D(FD)	-0.130002	0.034857	-3.729556	0.0013
ECM	0.158950	0.119717	1.327718	0.1992

The sign of the speed of adjustment was contrary to a priori expectation. It was an indication that the speed of adjustment to shocks within a short run was not feasible. That is, the ECM parameter was 0,159 with a t-statistics of 0.1992. The result indicated that POS and FD had negative effect on financial inclusion in Nigeria with -0.001814 and -0.13 respectively. The result further indicated that ATM, WP and MOP had positive impact in financial inclusion. A unit increase in ATM usage brought about 0.000251 increases in financial inclusion. It was also indicated that an increase in WP brought about 0.002074 change in financial inclusion while an increase in MOP brought about 0.000633 change in financial inclusion, The t-statistic and the probability values of the variables in the model showed that all the variables were significant. The value of R^2 was 0.903 indicating that up to 90.3% of the variations in financial inclusion in Nigeria were explained by the exogenous variables in the model.

The F-statistic was used to measure the statistical significance of the entire regression plane. From the ECM outcome, the F-statistic yielded 31.26445. Since this value was greater than absolute value of 3, the test was statistically significant at the entire regression plane.

The result of the Pairwise Granger Causality tests showed that all the banking technological innovations did not granger cause financial inclusion in Nigeria. The result showed only unidirectional causality flowing from financial inclusion to the use of Automated Teller Machine (ATM). In this analysis we concluded that there was a unidirectional causality between Financial Inclusion and the use of ATM but no causality between POS and FI, FI and WP, FI and MOP, and FI and FD.

Normality test was also carried out and the result was presented in figure 2

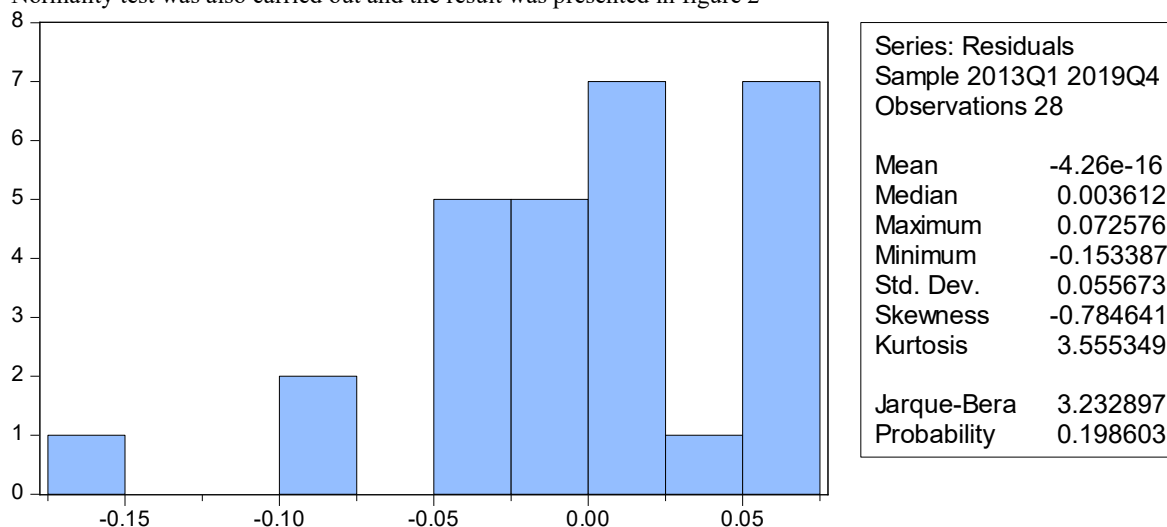| Series: Residuals	
Sample 2013Q1 2019Q4	
Observations 28	
Mean	-4.26e-16
Median	0.003612
Maximum	0.072576
Minimum	-0.153387
Std. Dev.	0.055673
Skewness	-0.784641
Kurtosis	3.555349
Jarque-Bera	3.232897
Probability	0.198603

Figure 2: Normality result

The probability value of the Jarque-Bera statistic (0.1986) exceeded 0.05 thereby indicating that the residual of the model followed normal distribution.

Conclusion

This research has been able to empirically ascertain the impact of deposit money banks technological advancement on financial inclusion in Nigeria covering the period 2013Q1 to 2019Q4. The study revealed that all the banking technological advancement used in this study had significant impact on financial inclusion in Nigeria. The study further found that financial inclusion granger caused more use of Automated Teller Machine (ATM).

The study therefore concludes that all the banking technological advancement were the critical elements in Nigeria's financial services reform that began about a decade ago. They have also proven to be key success factors in driving the National Financial Inclusion Strategy (NIFS).

Recommendations

Based on the findings of the study, the following recommendations were suggested:

1. The results showed that banking technology played key roles in driving the financial inclusion strategy in Nigeria. However, deliberate policy that will enhance the performance of banking technological advancement should be made by the apex regulator of the Nigerian banking system.

2. The result from the analysis showed a unidirectional causality running from ATM to financial inclusion. Therefore, the use of ATM should be encouraged by the apex bank to increase financial inclusion in Nigeria.

References

Abid, H,.& Noreen, D.U. (2006). Read to e-banking: An explanatory research on adoption of e-banking and e-readiness in customers among commercial banks in Pakistan. Working paper series.

Arenaza, B.U. (2019). Modeling causality between financial deepening and poverty reduction in Egypt. Social Indicators Research, 126(3), 955-969

Ayman, T.O &Poul, E.E (2007). Measuring financial inclusion and the fintech revolution. Washington: International Bank for Reconstruction and Development/The World Bank.

Binugo, H,.&Aregbeshola, N. (2017). Do efficient banking industries accelerate economic growth in transition countries" (December 19, 2017) BOFIT Discussion Paper No. 14/2002

Babatunde, D.O., & Raymond, J.O. (2019). The foundations of financial inclusion: understanding ownership and use of formal accounts. Journal of Financial Intermediation, 27(9), 1–30.

Buckley, V.I., & Malady, F.O. (2015). Financial inclusion, financial development, and economic diversification in Nigeria. The Journal of Developing Areas, 51(3), 1-15.

Chandler, O. & Smith, D. (2018). The impact of FinTech companies on financial institutions in Sweden: A qualitative study on impacts and remedies. Thesis in Business Administration of Master's Program in Finance Submitted to the Department of Business Administration, UMEA School of Business, Economics and Statistics.

Chakrabarty, J.U. (2017). Effects of cashless economy policy on financial inclusion in Nigeria: An exploratory study. Procedia-Social and Behavioral Sciences, 172, 49-56.

Chima, O. (2011). Financial inclusion and economic growth in Africa: Insight from Nigeria. European Journal of Business and Management, 7(35), 71-80.

Daniel, D.O (2005). Artificial intelligence assistants and risk: framing a connectivity risk narrative. , 1-10.. AI & SOCIETY, pp. 1-10.

David, T.A., Tyagher, M., Jacob, T.T &Tordue, E.K (2022). An empirical analysis of the impact of agency banking on financial inclusion in Benue State, Nigeria: Implications for Economic Activities.

David, E. (2016). How Blockchain can impact financial services – The overview, challenges and recommendations from expert interviewees. Technological Forecasting & Social Change 158.

Davis, F. D. (1986). User acceptance of information technology: System characteristics, user perceptions and behavioral impacts. Retrieved from
https://deepblue.lib.umich.edu/bitstream/handle/2027.42/30954/0000626. pdf?sequence=1

Dabas, O.O &Dabas, O.A (2009). An Empirical Study of Automated Teller Machines and User Satisfaction in Nigeria: A Study of United Bank for Africa in Sokoto Metropolis. International Journal of Management Technology, 2, 1-11

Egbo, A. (2019). Challenges to the efficient use of point of sale (POS) terminals in Nigeria. African Journal of Business Management, 7(28), 2801-2806.

Ehiedu, V. (2021). Automated Teller Machine (ATM) penetration and financial inclusiveness in Nigeria: A tripod banking system approach.Indian Journal of Economics and Business. 12(3), 221-223.

Ene, U. (2019). Financial inclusion and economic growth in Nigeria. International Journal of Economics and Financial Issues, 5(3), 629-637.

Echchabi, A. &Hassanuddeen, A. (2013). An empirical survey on the prospects of mobile money in Morocco. Studies in Business and Economics, 1, 46 – 54

Enhancing Financial Innovation and Access (2015). EFInA quarterly review (Oct-Dec 2015). Retrieved from https://Efina.org.ng/wp-content/uploads/2018/12EFInA-Quarterly-Review-for-Oct-Dec-2015-pdf.

Fanta, J.U., &Makina, N. (2019). Launching digital financial services in rural areas. The 2019 Brookings Blum Roundtable Policy Briefs. Mercy Corps.

Fred, O. (2018). Demand for financial services by households in Nigeria. International Journal of Social Economics, 40(5), 439-457.

Hannig, D.R., & Jansen, G.O (2019). The real impact of improved access to finance: Evidence from Mexico. Journal of Finance, 69(3), 1347–1376.

Hayton, D.I., David, O., & Bernard, U. (2017). The global findex database 2017: measuring financial inclusion around the world. World Bank Policy Research Working Paper 7255, (April), 1–88. https://doi.org/10.1596/1813-9450-7255.

International Monetary Fund, (2019). IMF annual report 2019. Retrieved from https://www.imf.org › external › pubs › 2019 › eng

Kama, A. & Adigu, E.O (2013). The foundations of financial inclusion: Understanding ownership and use of formal accounts. Journal of Financial Intermediation. 8(2), 24-29.

Lawrence, O.P. (2017). Banking services for everyone? Barriers to bank access and use around the world. World Bank Economic Review, 22(3), 397–430.

Lim, W. M., & Ting, D. H. (2012). E-shopping: An analysis of the technology acceptance model. Modern Applied Science, 6, 49-62. doi:10.5539/mas.v6n4p49.

Loto, J. (2016). The Role of agency banking in promoting financial inclusion: Descriptive analytical evidence from Tanzania. European Journal of Business and Management, 8(33), 114 – 119.

Lule, I., Omwansa, T. K., &Waema, T. M. (2012). Application of technology acceptance model (TAM) in mobile banking adoption in Kenya. International Journal of Computing and ICT Research, 6, 31-43.

Mamun, B.O (2016). The path to digital financial inclusion in Nigeria: Experiences of firstmonie. Journal of Payments Strategy & Systems, 9(4), 256-273.

McKee, K., Kaffenberger, D., & Zimmerman, C.C. (2015). Financial literacy and financial inclusion. Retrieved on 03/03/2022 from http://ssrn.com/abstract=2204173.

Mehrotra, S., Wilson, B., & Sandra, P.I. (2019). Access to and use of bank services in Nigeria: Microeconometric evidence. Review of development finance, 4(2), 104-114

Michael, V.P. (2019). Financial inclusion in Nigeria: Prospect, issues and challenges. Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020.

Moddibo, A.A (2018). Consumers' Financial Vulnerability when accessing Financial Services. Research Agenda Working Papers, 2020(3), pp. 27-39.

Moghalu, H.P. (2019). Financial inclusion research around the world: A review. Forum for Social Economics, 1-23).

Mohan, H. (2016). Financial Inclusion in Nigeria: The journey so far. Available at SSRN 2365209.

Mojtahed, R, Nunes, J.M.B &Peng, G.C. (2011). The role of the technology acceptance model in information systems research: a case study. In: Proceedings of the IADIS International Workshop on Information Systems Research Trends, Approaches and Methodologies. IADIS International Workshop on Information Systems Research Trends, Approaches and Methodologies 2011, 20 July 2011, Rome, Italy. .

Monyoncho L.N, (2015). Relationship between banking technologies and financial performance of commercial banks in Kenya. International journal of economics, commerce and management, volume III, issue 11, 784-815

Musaya, I.M &Kerongo, O. (2015). The effects of agency banking on access to financial services: a survey of commercial banks in Kilindini district. Financial inclusion in Africa: An overview. Policy research working paper. World Bank, Washington, D.C. https://doi.org/10.1596/1813-9450-6088

Nwafor, U.O., &Yomi, H.H. (2018). Financial inclusion and economic growth in Nigeria. International Journal of Economics and Financial Issues, 5(3), 1–12.

Nyamongo, B.P., &Ndirangu, O. (2013). Deepening financial inclusion beyond account opening: road ahead for banks. Business perspectives and research, 3(1), 52-65.

Obakayode, A.O (2018). The Impact of Financial Technology in the Operations (Payments/Collections) of SMEs in Nigeria. International Journal Of Innovative Research & Development, ISSN 2278 – 0211 (Online), 7(2).

Olatunji S. (2015), Supply-side: the impact of financial inclusion policies on deepening financial inclusion in Nigeria. Retrieved on 17th March 2022.

Okorie, N.N., (2017). Impact of digital finance on financial inclusion and stability. Borsa Istanbul Review, 18(4), 329-340.

Onalo, E.E., Lizam, H.O., &Kaseri, P.I. (2017). The economic impact of banking the unbanked: Evidence from Mexico: World Bank Policy Research Working Paper.

Radcliffe, S., & Voorhies, V.O. (2012). A digital pathway to financial inclusion. Bill & Melinda Gates Foundation. Electronic copy available at: http://ssrn.com/abstract=2186926

Ramesh, Naik; Santosh, Chavan and Anand, Ranagattimath (2014) Use of Electronic Resources Among The Faculty Members of Social Science Departments in Karnatak University, Dharwad, International Research Journal of Information Resources and Knowledge Management (IJIRKM) Vol 1 (2) : Pp 126 - 134

Saddam, J. (2019). Cashless banking in Nigeria: Challenges, benefits and policy implications. European Scientific Journal, 8(12).

Stephen, G.G. (2019). The impact of financial inclusion on monetary policy in Nigeria. Journal of Economics and International Finance, 5(8), 318-326.

Udak, M. (2020). Digital currency and financial inclusion in Nigeria: lessons for development. European Journal of Business and Management, 8(33), 231-240.

Villasenor, G., Darrell, M.O., & Lewis, B. (2015). Management of Nigeria's domestic debt, keynote address at the 7th monetary policy forum organized by the Central Bank of Nigeria at the CBN conference hall, Abuja.

World Bank (2020). Innovative digital payment mechanisms supporting financial inclusion: Stocktaking Report. World Bank Group

World bank, (2020). Access to Financial Services in Nigeria 2019 Survey